HE AUGURIES, SIGNS, ANL PORTENTS OF SURGERY*

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N this scientific age we must remember that the
ient is a human being and not a machine. Most
ients are anxious, and some are pent up and will
ll on every word the doctor says. The doctor there-
l should not be obscure and should not talk over the
ient's head—he should not be verbose and yet he
uld not be silent.

t is most important to secure the confidence of your
ent from the very outset; for having gained his
fidence you will be able to get a history of his com-
nt in his own words, and that history is more likely
e truthful. Confidence is important in any profession
onfidence in one's lawyer, parson, chauffeur, banker,
ilot—and trust in the doctor is a great asset to the
ent. Therefore get the confidence of your patient,
'e you are obtaining all the relevant data concerning
disease or injury, before you commence the clinical
nination. It may well be that the patient's relatives
be able to fill in some important gaps in the case-
ory. If they are available make use of their know-
e of the make-up and past history of the patient.
iable information may be forthcoming from this
ce which is nowadays so often neglected or spurned.
hen confidence has been obtained let us approach
patient determined to make our diagnosis before we
nit him or her to endless biochemical, metabolic,
ological, and instrumental investigations. Though
e investigations can certainly be helpful they are
ous and fatiguing to the patient; moreover they are
etimes misleading and may result in irreparable
age from delay. They should be used, as required,
onfirming a diagnosis, but not for making one.

some hospitals, as soon as a patient is admitted
ward, the resident medical officer, after a cursory
tion about his complaints, immediately orders
merable tests—pathological, biochemical, radio-
hical, and many others. No clinical examination is
e until the results of these tests are forthcoming,
then the clinical examination is not a thorough
because the results of the investigations have
idy biased the examiner. In some hospitals I have
ed, cases of suspected fracture are not seen by the
eon until an X-ray film has been taken; so the
nosis is made on the X-ray film and not on clinical
nination. There is a great danger of a Machine Age
iagnosis.

ow often has a surgeon removed an acute gangrenous
ndix from a patient, to be told afterwards that the
nosis could not be made because a barium meal a
th previously had revealed a normal appendix.
ice when I removed a gangrenous gall-bladder caused
orsion of its abnormal mesentery, the practitioner
harge of the case was much annoyed, because, he
the patient's cholecystogram had been normal in
y respect three weeks before the operation. But a
bladder possessing a mesentery is consistent with
rmal cholecystogram. [illegible]s has
e various manifestations of dise[illegible] distributions
eciated to the full by careful [illegible]mple the colics have
cal examinations. Do not [illegible]endicitis often starts with
[illegible]ch settles in the right iliac
[illegible] common in perforated peptic
[illegible]penis in vesical calculus.

doctors first and technicians last. Disease manifests itself in many ways. Let us train ourselves to interpret the various auguries, signs, and portents which are always to be found by the observant clinician. Let not the days of clinical acumen be numbered.

Voltaire once said: "A physician is a person who pours drugs of which he knows little into a body of which he knows less." Let us see to it that modern medicine has advanced since the time of Voltaire.

AUGURY

The art of augury or divination is no new one, and it has not always been a creditable one. Certain events were thought to indicate certain sequelæ. Certain combinations of events were thought to presage other events.

What of augury in surgery? When you begin your clinical studies you are perhaps at a loss when first you examine the patients. In the years of training you labour through the full examination of the respiratory system, cardiovascular system, locomotor system, and so on. You have taken a full history of the patient's complaints—his past illnesses, his habits in life, his age. As time passes you have laboured well, and certain combinations of history, age, and appearance have become for you auguries of disease. It is always well to consider whether or no the patient looks his age, and try to discover as much as possible about his habits before you ask direct questions. By so doing you can usually determine whether you are getting the whole truth from him. It is rarely necessary to ask a patient how many cigarettes he smokes a day; you can usually tell by noticing the colour of his fingers.

There are many examples of auguries of disease. To mention a few:

1. The fair fat fertile flatulent female of forty is indicative of gall-bladder disease.
2. The man over 50 years of age who rises from his bed at night, more and more frequently, to pass his water, suggests an enlarged prostate.
3. The patient over 40 years of age whose bowel habit changes may have a carcinoma of the colon.
4. The patient whose head is growing bigger may have Paget's disease.
5. The story of intussusception in children.
6. The change in type of the pain in chronic peptic ulcer may indicate malignant change in the ulcer.

To develop the use of auguries in surgery you must see as many cases as you can: for only by the comparison of cases, similar yet different (for all patients are different), can a combination of events become significant to you. When they have become significant you are in a strong position to pass forward to the interpretation of signs.

Some imagine that when they have seen one case of acute appendicitis all subsequent cases must or should be similar. But appendicitis is an affection which may appear in anyone at any time, though it is most common in young adults, and the male sex is more frequently attacked than the female. The disease may be of little significance, or it may occasionally run such a virulent course as to destroy life in a few hours. Its importance lies in the fact that it is an infective process, and, inasmuch as the peritoneal envelope is generally [illegible] to be said certain degree of peritonitis in almost modern times, for the young. How then [illegible] the common diseases in their early stages and not when the disease is so far advanced that the diagnosis is obvious.

The treatment of disease cannot be given until a correct diagnosis is made. Let the diagnosis be made on clinical grounds and confirmed by investigations in the laboratory or radiological departments.

Non potest medicus per epistulas eligere, vena tangenda est.

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* nual address delivered bef[illegible]
and-Northern Counties M[illegible]
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may not be evident except on rectal or vaginal examination, which should never be neglected. A definite swelling may sometimes be detected by palpation, usually above the outer half of Poupart's ligament, but varying in its position with the site of the appendix; it may be dull on percussion, but often it is tympanitic, since it consists of coils of intestine and omentum matted together around the appendix.

Cutaneous hyperæsthesia is manifest in more than half the cases of appendicitis. It is demonstrated either by stroking with a pin-point, held at right angles to the surface, or by light pinching. In the former, the two sides of the abdomen must be tested, as also the regions above and below the appendix area, which is usually contained within the triangle marked out by the middle line, Poupart's ligament, and a line drawn horizontally outwards from the umbilicus. In the pinch test corresponding portions of skin on the two sides of the abdomen are gently pinched between the thumb and finger, and the patient estimates the difference in sensation. The area of hyperæsthesia varies with different viscera, but it is uncommon to find it present in the absence of peritoneal inflammation. The appendix area corresponds in the main with the distribution of the 10th dorsal segment. Hyperæsthesia is better marked in young adolescents than in older patients, and may be exaggerated in hysterical or neurotic people. As the inflammation subsides, the area of hyperæsthesia gradually diminishes; its total disappearance without improvement of the general condition usually signifies grave mischief in the appendix, such as gangrene. I have stressed the importance of hyperæsthesia because it is often completely forgotten today.

Appendicular gastralgia is the name applied to cases in which all the signs and symptoms of the disease are referred to the epigastrium, and closely mimic those of a gastric or duodenal ulcer. The patients are usually women, and a test-meal examination reveals a hypersecretion of gastric juice, in which the hydrochloric acid is generally increased. Laparotomy shows no lesion in the stomach or duodenum, but chronic appendicitis is present. That the previous symptoms arose from the appendix is proved by the relief to the symptoms, and the changes in the gastric secretion, after appendicectomy. On the other hand, it must not be overlooked that a gastric or duodenal ulcer is often accompanied by pain referred to the right iliac fossa, and many an appendix has been removed without benefit to a patient with these conditions. The history of the case must be most thoroughly investigated. The pain of gastric or duodenal lesions is more persistent than the pain of appendicitis, and the intervals of freedom between attacks are shorter.

In appendicitis there is less vomiting, and it does not give the same relief as with duodenal lesions.

In a well-marked case the symptoms of appendicitis are so characteristic that the diagnosis is never in doubt. The pain, tenderness, fever, vomiting, constipation, abdominal rigidity, and perhaps swelling, form an almost unmistakable picture. The disease, however, often presents symptoms so varied, and manifestations so protean, that one is never surprised to meet it in all sorts of [illegible] settings. Human beings are not mass-[illegible] h one is different, and it is up to the [illegible] he differences in his several patients [illegible] t, the signs and symptoms

examiner in various final examinations up and d
land during the last thirty years I have been distressed to find that very few students and g use their powers of observation to the full; ve they miss the essential signs. There is a ten allow physical sloth to have the upper hand, a such important examinations as blood-pressure tions and the examination of the fundi are forgo

How often in a routine examination the doc to look at the finger-nails, the pupils, the neck, abdomen, or perform a rectal examination. Thi much may be found by a curious index finger, p used, in examining the rectum, the prostate, the vesicles, and the pelvis in women.

I well remember seeing a case of supposed cance rectum before the late war. The patient was a man of suffered from piles, and his doctor had ordered hi suppositories. Every night the patient had inserted pository, with its thin metal wrapping, into his rectu time came when he could not get another supposit and at this juncture he was sent to me. I removed positories, still in their tinfoil wrappings. Such remind us to be more definite and implicit in our to patients.

Piles in a middle-aged male are quite often the of a carcinoma of the rectum; and yet how o piles are treated and the cancer neglected. P the back may be caused by a secondary deposit i vertebræ from a carcinoma of the prostate; an how often the condition is missed for lack of a examination.

When eliciting signs use all your faculties:

Eyes.—Watch your patients' behaviour, gait, and hands; observe the colour of their skin, and their features for such disorders as early myxœdema.

Ears.—Listen to their speech; it may be rapid, lethargic, or aphasic, and any one of these may mean something which will help in the final di The presence of a cough may be significant, especially of the hawking variety so often heard in cases of pha pouch.

Smell may be of real use in some cases. For fœtor of the acute appendix patient, and the amm smell of the incontinent or the uræmic.

Touch.—The skin may be of the greatest help i cases. There is the moist hot hand of the thyrotoxic and the dry skin of the myxœdemic patient.

It is important that you relate your signs to pat by following your cases to the operation and by the operative findings and examining the patho specimens both macroscopically and microscop The post-mortem room may prove of real value in the value of certain signs and symptoms and in firming the diagnosis. The surgeons have a great a tage over their physician colleagues, for an ope will confirm or refute the surgeon's diagnosis, w the physician may have to wait for a post-m examination before his diagnosis can be confirmed

PORTENTS

The portents which give warning of something to happen, especially of a calamitous nature, are overlooked or forgotten.

The presence of blood in the vomit, sputum, fæc urine should always lead to further investigation.

Among portents, pain is one of the most com Bishop Westcott once wrote that pain was the ersal fact of life; and in my own experience e of the two commonest ity and its significance, we depend on our own s of sight, hearing, and touch. Therefore, in the ing of medical men and women, training in the eciation and interpretation of pain is of great rtance.

the first instance the doctor must differentiate een the pain due to stimulation of nerve-endings inflammation, infiltration by tumour, or by pressure tumour, distension, or derangements of normal tomy—and the pain which is due to unhappiness, ontent, or maladjustment to environment. This rentiation of organic from functional or psychogenic is all the more necessary because in a case of func- al or psychogenic pain prolonged investigations often ravate the condition. At the same time we must ember that psychogenic pain may well be as vivid disturbing to the patient as physical or organic n.

have already commented on the need for observation he patient while the history is being taken. The way atient tells his or her story; the account of the pain, nature, its anatomical extent, means of obtaining ef, or precipitating factors; the suggestibility of the ient—all these must be noted and appreciated.

hatever may be the doctor's reaction to the patient. to the history, let it be a guiding principle for us all elieve that a patient suffers pain if he says he does, and look therefore for symptoms and signs which are ly to confirm the story. Only by a process of exclusion we allow ourselves to arrive at the diagnosis of a ctional disorder. And even then the patient who is appy, discontented, or maladjusted, needs some p—if he will be helped.

hat are confirmatory signs of the presence and erity of pain?

1. *Nature of the Pain.*—Characteristic are the throbbing n of inflammation; the colicky pain of obstruction of ollow viscus or tube such as the cystic duct or the eter; the persistent dull ache of distension; the cinating pain due to direct involvement of a nerve- unk. And we must here determine how much the pain erferes with the patient's life—remembering at the me time how variable are the pain thresholds of different dividuals—a factor impossible of measurement and y estimable after long experience with many patients different conditions.

2. *Duration of the Pain.*—From the earliest times it s been stated that if pain is violent it is of short dura- on: and if it is long in duration it is moderate in verity. This is a truism, and merely reflects the working d resistance of the human organism. No patient puts with a severe pain for a long time. At the same time me of the most severe pains spontaneously disappear; rhaps to recur. The colics of obstruction of the biliary, imentary, and urinary tract are examples. These colics, hile they are present, are among the most severe that tients suffer. But often before the doctor arrives the tack has passed. Colic, the characteristic pain caused obstruction of the lumen of a hollow tube, is inter- ittent. But the pain due to inflammation is persistent; d the severity is often much less than that of colic. e all know the patient who has toothache, nurtures it r three days, and then calls in the doctor in the small urs of the morning.

3. *Distribution and Radiation of the Pain.*—Careful udy of patients suffering from various diseases has sulted in a knowledge of the typical pain distributions different conditions. For example the colics have haracteristic radiations: appendicitis often starts with entral abdominal pain which settles in the right iliac ssa: shoulder-tip pain is common in perforated peptic cer; and pain in the tip of penis in vesical calculus.

4. *Onset of the Pain.*—Familiar is the gradual onset of pain in cases of inflammation, in contrast with the *sudden* onset of pain in cases of perforation—so dramatic that the patient can usually state the time of onset, and say what he was doing—so dramatic that he stops in his tracks, so to speak.

We may add a word on the interpretation of pain in children. In infants more than in anyone else, the doctor must rely on the clinical picture—the findings of a complete examination and observation—in making his diagnosis. The parent's story must be well studied.

The nature of the vomiting is important: the projectile vomiting of the hypertrophic pyloric stenosis must be seen to be believed.

A simultaneous rise of pulse, respirations, and temperature some 48 hours after operation indicates collapse of the lung. The rising pulse of internal hæmorrhage following abdominal trauma, be it trivial or severe, should not be forgotten. And loss of consciousness after a latent period should be remembered as an indication of middle meningeal hæmorrhage.

It may be asked "Are there any portents of pleasant happenings?" I think not in surgery.

CONCLUSION

It is not recommended that all investigations should be dispensed with; but let it be remembered that a barium meal or a barium enema does not always show an ulcer or cancer, and a patient may be saved by exploratory laparotomy because the Auguries, Signs, and Portents have indicated it. Investigations take time, especially these days, and this time is saved if Auguries, Signs, and Portents are properly interpreted.

Equip yourselves to do so; put radiology, biochemistry, and hæmatology into their proper perspective and use them with judgment.

Are we teaching the men and women who qualify today to be good clinicians? I doubt it. They are hampered by an all too long and too complicated medical curriculum. The basic principles of medicine and surgery are not absorbed, because too little time is given to them: the various branches of general medicine and general surgery demand so much of the student's time that clinical medicine and surgery are perforce forgotten. Let us hope that when the new Medical Act is on the statute-book at Westminster, and every qualified person is required to do a year's postgraduate training before registration, clinical acumen will be considered an asset.

Let us hope that part of the year of postgraduate training will be taken in hospital or with a general practitioner, and that we shall thus revert to the former apprenticeship in medicine. It is the general practitioner who sees the early signs and symptoms; his mellowed clinical acumen stands him in good stead and he is able to act quickly. We all learn by experience, and often we are able to make a correct diagnosis in a difficult case, in which the signs and symptoms are conflicting, because we have seen identical cases before. During the early weeks of his internship the newly qualified doctor, in his keenness and inexperience, is inclined to be critical of the diagnosis of the general practitioner: but he gradually learns that the practitioner is usually right and that when an admission for an urgent case is desired it is better to admit than to refuse. There is a lot to be said for the apprentice system in these modern times, for the young doctor will see the common diseases in their early stages and not when the disease is so far advanced that the diagnosis is obvious.

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PRIMARY UMBILICAL SEPSIS IN THE ADULT

REPORT OF SEVEN CASES

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THE GENERAL INFIRMARY AT LEEDS

FOUR examples of suppuration deep to the umbilicus in men, presenting with a purulent discharge from the umbilicus after a short period of abdominal pain, are described. In these cases the inflammation had spread intraparietally, and in one case intraperitoneally also. Three further examples, in women, where the inflammation caused only a purulent discharge from the umbilicus, are also recorded.

Primary umbilical sepsis is diagnosed mainly by exclusion, and this fact emphasises the importance of recognising the condition as a reality. When investigations of a case presenting with a discharge at the umbilicus have excluded as the cause the more common developmental abnormalities, primary peritonitis, tuberculosis of the parietes with the cold abscess pointing at the umbilicus, and inflammatory or neoplastic diseases of the stomach, gall-bladder, colon, or pelvic organs, the origin of the discharge from a local lesion in the umbilicus can be predicted with confidence.

The pathology of the umbilical sepsis was not recognised in case 1, and exploration of the umbilicus showed that the inflammation had spread intraperitoneally and was involving the anterior wall of the stomach. The consistence of the stomach wall was such that it simulated malignant disease, and a partial gastrectomy was done. Rintelen[1] records a similar experience with a man, aged 28, who presented with a discharge at the umbilicus after a fortnight's colicky abdominal pain. At operation a partial colectomy was done, since it was found that the retro-umbilical inflammation involved the transverse colon.

Primary sepsis at the umbilicus associated with inflammation in the abdominal wall has been variously explained by different writers. Cullen[2] described umbilical concretions with local inflammation in the abdominal wall, and in reviewing many cases previously published as tuberculosis, infected dermoids, &c., he considered most of them to be examples of primary umbilical sepsis. Trimingham and McDonald[3] in an article on congenital anomalies in the region of the umbilicus, point out that there are no sebaceous or sweat glands in the umbilicus and emphasise the importance and frequency of retro-umbilical dermoids as the basic cause of umbilical sepsis. In none of their cases, however, do they give a histological report which substantiates the presence of a dermoid, and their statement about the absence of sweat glands is incorrect.

CASE-RECORDS

Case 1.—A man, aged 33, had felt a nagging pain in the region of the umbilicus for five days. The pain got worse each evening and was accompanied by frequency of micturition; ultimately it became so severe that he collapsed. On examination a purulent discharge from the umbilicus was seen, and there was a tender swelling deep to the umbilicus which on compression produced more pus.

Operation.—On Aug. 14, 1948, the umbilicus was excised, and an abscess cavity containing fetid pus, reminiscent of the contents of a suppurating sebaceous cyst, was drained.

Special Investigations.—On culture of the pus a growth of diphtheroids, *Staph. albus*, and a non-hæmc streptococcus was obtained. A barium meal, a enema, and radiography of the lumbar spine and chest normal. Iodised oil injected into the sinus showed an i cavity not communicating with a viscus.

Second Operation.—On Sept. 9, 1948, a transverse enclosing the area of the umbilicus was made. The a cavity was found to extend intraperitoneally as far as anterior wall of the stomach; so the original incision enlarged by a vertical limb in the linea alba. An area of anterior wall of the stomach felt thickened and hard, a partial gastrectomy by the Billroth I method was d the duodenum being joined to the greater curvature of the stomach. The abdominal wound was closed with wire su

Convalescence was uneventful, with full recovery and to work.

Pathological Report (Prof. J. M. Stewart).—"To the na eye this medium-sized partial gastrectomy specimen sh an apparently neoplastic mass in the region of the ante wall and greater curvature. The main portion of the 'tumo is rounded in outline and measures about 5 cm. in diame Externally there is an adherent mass of fibro-adipose ti incorporated with the wall of the stomach. A diam shaped portion of the anterior abdominal wall 6 × 2 is firmly adherent to the pyloric portion of the stomach w a blind-ending fistulous track or sinus running inwards fi the skin surface.

"Histology: there is no evidence of neoplasm, the thicker of the stomach wall being due to inflammatory infiltra and œdema of the submucosa. The lesion lies in immed relation to the fistulous track observed by the naked and this track is lined by granulation tissue in which infl matory cells are present in large numbers, especially lymp cytes and polymorphs, with smaller numbers of eosinop and plasma cells. There is no evidence of a communicat between the sinus and the interior of the stomach, tho the muscular wall is penetrated for some distance and m disorganised by the inflammatory changes. The fun type mucosa covering the inflammatory mass shows w marked chronic gastritic changes with large and promin lymphoid nodules and much plasma-cell infiltration.

"Comment: the relation of the inflammatory lesion i fistulous track to the anterior wall of the stomach a from the lesser curvature makes it unlikely that the origi lesion was the result of gastric ulceration. The possibility its having originated in or near the umbilicus see likely."

Case 2.—A man, aged 35, had first felt abdominal sore on Aug. 21, 1948, after particularly heavy work. During subsequent week a stitch-like pain developed on both si of the umbilicus, and pain on micturition. The umbili itched and became red and swollen, and was incised by own doctor on Sept. 3. On his admission to hospital th weeks after the onset of symptoms, there was a profuse charge from the centre of an everted umbilicus, below wh was a tender swelling. A probe passed 5 cm. backwards downwards through the discharging sinus.

Operation.—The pouting everted lips of the umbilicus w excised, and the incision extended downwards through linea alba for 4 cm. The abscess cavity thus laid open situated between the peritoneum and transversalis fas It was about 3 cm. in diameter and contained a mass sebaceous-like material. The cavity healed in sixteen days.

Case 3.—A man, aged 53, had had a month's history stabbing pain in the right iliac fossa and a fortnight's hist of a purulent discharge from the umbilicus. Examinat revealed a discharging umbilicus and a swelling about 7 in diameter, below and partly to the right of the umbilic The mass was tender, and pressure caused increased fl of pus.

Operation.—Under general anæsthesia a radial incis from the umbilicus into the cavity was made, liberati stinking sebum-like material. The cavity was extraperiton but behind the abdominal muscles.

Convalescence was uneventful, the area healed in a mon and the patient returned to work.

Case 4.—A girl, aged 20, had noted at intervals o the preceding eighteen months a yellowish or bloodstain discharge from the umbilicus, particularly after exerti amination, before excision of the umbilicus, showed only ttle thin yellow discharge. Convalescence was uneventful.

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[1] Rintelen, G. *Zbl. Chir.* 1937, 64, 615.

[2] Cullen, T. S. Embryology, Anatomy, and Diseases of the Umbilicus, together with Diseases of the Urachus. Philadelphia and London, 1916.

[3] Trimingham, H. L., McDonald, J. R. *Surg. Gynec. Obstet.* 1945, 80, 152.

athology.—Dr. T. Adler found, on histological examination, dence of low-grade inflammation of the skin of the bilical pit.

ase 5.—A woman, aged 22, had noted soreness and tation of the umbilicus a year ago, and since then an ermittent yellow purulent discharge from it. Examination wed that the umbilicus had a deep funnel-shaped depres- n, and there was tenderness in the right iliac fossa.

peration.—The umbilicus was excised, and convalescence s uneventful.

Pathological Report (Dr. T. Adler).—"To the naked eye e specimen of skin measures 7 × 4 cm. and is 5 cm. deep, th a navel in its centre. Section shows a rather elongated bilical depression with a small amount of reddish tissue neath the tip of the pit. Histological examination shows in from the umbilicus with slight cornification. Sweat nds are scanty, but their glandular portions are very large, d they can be found throughout the entire extent of the in of the pit, from which hair follicles and sebaceous glands e missing. The corium is infiltrated by round cells and some ollen histiocytes, more heavily towards and below the tip the umbilical depression. In this last site a small abscess d formed, surrounded by regional purulent lymphangitis. o obvious cause for this inflammation can be seen other than e accumulation of debris and the low-grade dermatitis within e navel itself."

Case 6.—A woman, aged 34, had had an intermittent ul-smelling purulent discharge from the umbilicus for four onths. Examination revealed no abnormality of the nbilicus or of the surrounding skin.

Operation.—The umbilicus was excised on June 2, 1949, d the wound had healed by June 10.

Pathological Report (Dr. T. Adler).—"Skin and sub- taneous tissue 12 × 5 × 3 cm. with central umbilicus. hough naked-eye examination shows no obvious abnormality, icroscopically there is an area of dense round-cell infiltration the cutis near the bottom of the navel pit. This infiltration most marked in the papillæ and forms dense sheaths round e spiral superficial portions of the sweat-gland ducts. The rresponding deeper duct segments and glands are normal, hich fact suggests that the inflammation has been caused by perficial maceration of the duct and epidermis epithelium ther than by retention of secretion and back pressure in the landular portions."

Case 7.—A man, aged 38, had noticed pain and tenderness und the umbilicus a fortnight before admission; this as followed a few days later by a thin yellow discharge. he pain and swelling increased and on admission he had an durated discoloured swelling extending about 6 cm. below nd laterally from the everted œdematous umbilicus g. 1). Pressure on the swelling produced a flow of pus rom the apex of the umbilicus. The inguinal glands were nlarged and tender. Dilatation of the orifice permitted the nsertion of iodised oil, and on screening there was seen to be large abscess cavity lying behind the abdominal wall but ot communicating with any intra-abdominal viscus. Only small sinus ran to the surface. Penicillin was given for three lays and many of the acute signs subsided though the ndurated mass remained.

Operation.—On Sept. 15, 1949, the umbilicus was excised and ound to contain a large plug of thick cheesy material. The abscess cavity was further opened by a vertical incision in the linea alba below the umbilical orifice. The deep wall of the abscess was then seen to be composed of greater omentum. The wound was partially closed with 'Nylon' sutures round a rubber drain to the cavity.

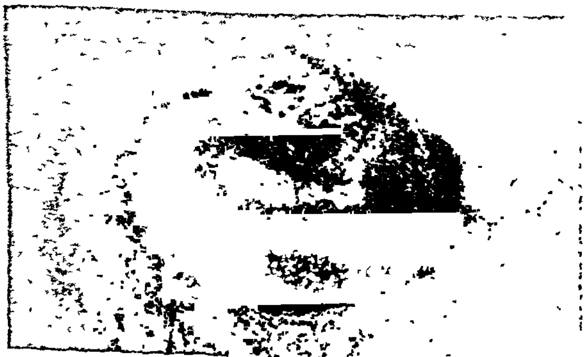

Fig. 1—Everted umbilicus (case 7)

The postoperative course was satisfactory and the man was discharged on Sept. 30, the wound then being healed.

DISCUSSION

Concretions and eczematous processes at the umbilicus are frequent in the aged, but the average age of our patients was 30. Cullen[2] states that primary umbilical sepsis is more common in men than in women, and that it occurs in the age-group 20–60 years. The illness begins with vague abdominal pain, localising later at the umbilicus, where a swelling appears. The umbilical opening becomes narrower, and the skin reddens: severe pain precedes the escape of pus. The margins of the umbilicus may be flat, or their place may be taken by granulation tissue, and the cavity deep to the umbilicus is filled with pus and stinking cheesy material which may contain felted hair or a concretion. Cullen considers that lack of cleanliness in a deep umbilicus leads to the accumulation of wool or hair from the clothes, and that this starts the inflammation, which narrows the external opening, the stenosis leading to the formation of an abscess; a concretion results when the pus becomes inspissated. Cullen reports 23 cases: 12 originally described as umbilical concretions, 5 as dermoid cysts, 2 as non-spreading tuberculosis, 3 as fistulæ, and 1 as a carcinoma. He believes that all are cases of primary umbilical sepsis.

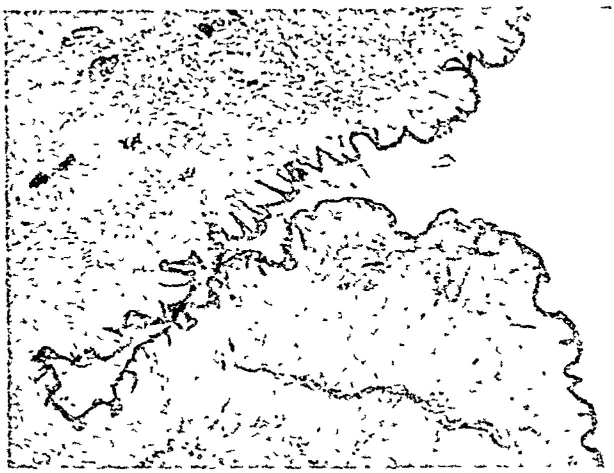

Fig. 2—Section of wall of umbilical pit, showing recess and sweat glands. (Hæmatoxylin and eosin, × 7.)

Hicken and Best[4] report 4 cases; in one the concretion ruptured intraperitoneally, and in another the history extended over six months, there being five attacks before the condition was recognised. These writers, unlike Cullen who advises simple drainage, consider that the condition will recur unless the umbilicus is excised, and they do not agree that lack of personal cleanliness is an ætiological factor. Enlarging on Cullen's suggestion that there is a narrowing of the opening, they postulate an accumulation of sebaceous material behind the stenosis, and that this sebaceous material forms a nidus for infection. The substance found in these abscesses is best compared with the contents of a suppurating sebaceous cyst, and an inspissated portion may or may not be present as a concretion.

As has been mentioned, Trimingham and McDonald[3] state that no sebaceous or sweat glands are found in the umbilicus. If this is so, doubt must be cast on the

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suggestion that the abscesses result from stenosis of the umbilical orifice, necessitating serious consideration of a complication occurring in a developmental abnormality as the ætiological factor. Hicken and Best list the congenital anomalies which may be found at the umbilicus, of which the following conditions are pertinent to this discussion: alimentary-tract anomalies, such as a partially patent intermediate portion of omphalomesenteric duct (vitelline cyst); and urachal anomalies, such as a partially patent intermediate portion of the urachus (urachal cyst). They state that a vitelline cyst is lined with an intestinal type of mucosa, but that, as the cyst gets bigger, tension flattens the epithelium, and the original type of cell cannot be identified. Similarly, a urachal cyst may not show its original transitional epithelium. The fluid in these cysts they describe as like ascitic fluid or as containing ropy material or chocolate-coloured fluid resulting from previous slight hæmorrhages. If these cysts burst they do so at the umbilicus. The fact that epithelial characters may be lost as tension develops makes it difficult, on histological grounds, to be certain of the origin of some of these conditions, and much reliance may have to be placed on the presence of fascicles of smooth-muscle bundles.

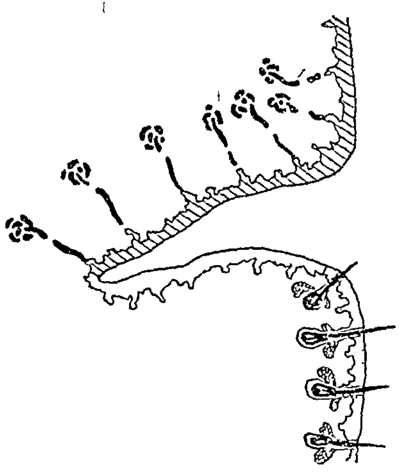

Fig. 3—Diagram to show distribution of sebaceous and sweat glands in umbilical pit: hatched, epidermis with sweat glands; stippled, epidermis with hair follicles and sebaceous glands.

Histological examination of the normal umbilical area by us refutes Trimingham and McDonald's assertion that neither sweat nor sebaceous glands are present in the umbilical skin. Dr. Adler gives similar findings in his pathological reports on cases 4, 5, and 6. All the sections show the presence of sweat glands throughout the umbilicus, but sebaceous glands present in the outermost part only of the umbilical pit (fig. 3). The sections also show many small recesses in the umbilical pit (fig. 2). Accumulation of keratinous debris in these recesses is an important mechanical factor leading to bacterial invasion, stenosis, and abscess formation in these cases, but the sweat glands may have considerable importance in determining the onset of sepsis and explain the development of the condition in spite of reasonable personal hygiene. Detailed histological examination shows lanugo hair follicles and sebaceous glands extending from the circum-umbilical, and particularly from the subumbilical, skin on to the inverted marginal rim of the umbilical pit. The walls of the pit have, as appendages, sweat glands of eccrine type which extend throughout the entire pit. The size of the secreting duct of the sweat gland varies considerably from person to person, and it seems, from evidence of round-cell infiltration round the duct but not round the deepest part of the gland, as in case 6, that the secretion of the sweat gland macerates the epithelial lining of the duct wall, and of the surface skin on to which it opens, with subsequent infection, stenosis, and abscess formation. No evidence has been found in this series that retention of secretion and retrograde infection of the glands play any part.

Case 1, in which the specimen obtained at operation was fully investigated by Prof. Stewart, showed no evidence of intestinal epithelium, and the progres the other cases after a simple operation inclines us to view that an accumulation of squames in the [illegible] recesses, depending in part on a dermatitis caused by sweat glands, is the basic ætiological factor.

We believe that the treatment, when an absces present, is simple drainage with wide efficient opening the cavity and removal of the contents, and [illegible] the umbilicus if no abscess is evident.

SUMMARY

Seven cases of primary umbilical sepsis in adults reported.

In one case, owing to lack of recognition of condition, the patient was subjected to pa gastrectomy.

The ætiological factors are discussed, and a mechani origin associated with the sweat glands in the umbilic is put forward as the likely cause.

Treatment in the first place should be by simple adequate drainage, or excision of the umbilicus if th is no abscess.

DIPHTHERIA IMMUNISATION IN YOUN BABIES

A STUDY OF SOME FACTORS INVOLVED

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DURING the past three years we have been inves gating the quantity and rate of loss of maternally tra mitted diphtheria antitoxin in the newborn, how the passive antitoxin interferes with active response an injection of prophylactic, and the age at wh babies can respond efficiently to active immunisation.

The active immunisation of very young babies h also been investigated in Sweden by Vahlquist,[1] w showed that infants born without any passive antitox could be satisfactorily immunised with 1 ml. (45 of alum-precipitated toxoid at birth, though the antito response might be somewhat retarded. He also obtain evidence that a passive antitoxic concentration exceedi 0·1 unit per ml. interfered with active immunisation babies, whereas a concentration below 0·02 unit per did not.

Bousfield,[2] working with babies 3–5 months o found that of 43 children injected with one dose P.T.A.P. (25 Lf) 40 were Schick-negative at the age a year; with two doses of 12·5 Lf, given at an interv of a month, all of 51 babies were Schick-negative. each case the prophylactic was combined with pertuss vaccine. The tables in Bousfield's paper show, howeve that the three failures in the first group were all in babie under the age of 5 months; hence the Schick-negativ rate was actually 28 out of 31 (90·9%) in babies aged or 4 months, and 12 out of 12 (100%) in those age 5 months. The titres of passive antitoxin in these childre were not measured, and so the reason for the 3 failur is unknown; they may have been due to swamping-o of the antigen by circulating passively acquire antitoxin, or to the inadequacy of the single-injectio method.

We have previously given[3] figures showing that i two socially similar districts of South-East Londo 21 and 29 babies, from random samples of 100, wer with no detectable passively conferred antitoxin. the other hand, 6% from one of these districts and % from the other had 1 unit or more of antitoxin per ml. in their cord blood.

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[1] Vahlquist, B. *Lancet*, 1949, i, 16.
[2] Bousfield, G. *Ibid*, p. 1100.
[3] Barr, M., Glenny, A. T., Randall, K. J. *Ibid*, 1949, ii, 324.

Any scheme laid down for the immunisation of young babies must take into account the immunity state and distribution of antitoxic values in the newborn. These may vary in different districts, and with the present widespread immunisation campaign the immunity state of the young adult population, including expectant mothers, may change.

Theoretical considerations suggest that much attention should be directed to the maintenance of antitoxin produced as a result of immunising injections, owing to the lack of subsequent stimulation from epidemics. If immunisation were general but slightly inadequate because of too small a dose, a state of affairs might arise in which the good responders reached and maintained relatively high levels of antitoxin, while the poor responders only reached low levels which were not maintained into adult life.

Whatever may be the effect of general immunisation, little is known about the amount of antitoxin present apart from the qualitative information obtained by Schick testing. This test, however, gives no indication of the levels of antitoxin in Schick-negative people, nor does the Schick-positive rate of a population give any indication of the range of antitoxic levels in the Schick-negative members of that population, there being no correlation between these two factors. Further, the Schick test may give a misleading impression of the general antitoxic levels if applied to babies at some definite chosen age—e.g., 3 months.

In a study of antitoxic levels in different districts, now being carried out by two of us with Dr. H. J. Parish and the help of a number of collaborators, we have found that, whereas in district A 42% of babies were born with antitoxic levels below the Schick level, the figure for district B was only 23%. The figures for the same babies at the age of 13 weeks would be A 61·8% and B 38·4%; and at 30 weeks 84·4% of babies in district A and 85·3% in district B would have fallen below the Schick level (we are taking the Schick level as being 0·002–0·004 unit per ml.). The figures given for 13 and 30 weeks were calculated from the formula derived from our earlier work, in which it was shown that the average rate of loss of maternally acquired antitoxin was represented by the equation $\log A_w = \log A_c - 0{\cdot}2 - 0{\cdot}065W$, where A_w is the antitoxic level of a baby w weeks old and A_c is the antitoxic level of the cord blood. Thus a Schick test done in the first few weeks of life, if this were practicable and reliable, would show great differences between these two populations, whereas a test dose at the age of just over 6 months would make them appear identical. We suggest that the distribution of antitoxic levels among infants should be followed by means of antitoxin titrations on a limited number of cord-blood samples, so as to determine the range of levels existing at birth and, by calculation, at any later age.

The ideal method for determining the best age at which to start immunisation would be to test the antitoxic level in the cord blood of every baby born, and to determine by the formula given above the approximate age at which the level would fall low enough not to interfere with active immunisation. Since this would prove too vast an undertaking, tests on a limited number of samples from different districts would give a good general picture of the immunity of the newborn, and methods of immunisation could be devised which would be most satisfactory for most of the babies.

EXPERIMENTAL

In the work here described we have tested the antitoxic level in the cord blood of each baby, and investigated the level of antitoxin which will interfere with active immunisation by two doses, each of 0·5 ml. of A.P.T. (50 Lf per ml.). The influence of age on response has also been considered. In some cases the amount of antitoxin remaining in the baby's blood at the time of the first injection was obtained by calculation from the antitoxic level in the cord blood, and in others it was obtained by titrations of a blood sample. The techniques adopted for taking blood samples and estimating antitoxic levels were those already described by us.[3]

EFFECT OF AMOUNT OF PASSIVELY ACQUIRED ANTITOXIN ON RESPONSE TO IMMUNISATION

Table I shows the antitoxic levels of babies about two months after the second injection of 0·5 ml. of A.P.T. The results have been grouped according to the amount of passive antitoxin present at the time of the first injection, and one group has been further subdivided according to age. An amount of passive antitoxin less than 0·02 unit per ml. does not interfere with active immunisation under the conditions here present. The 10 babies with titres of 0·01–0·02 unit per ml. responded as well to immunisation as did 31 babies of similar ages but with less passive antitoxin; the geometric means of the titres reached were 0·272 and 0·250 respectively. The logs of the levels attained by all the babies with less than 0·02 unit of passive antitoxin per ml. at the time of the first injection showed a good approximation to a normal distribution ($\chi^2 = 3{\cdot}019$ — $P = 0{\cdot}397$); and the mean value of 0·265 unit per ml. for the group, about two months after the second injection, is satisfactory. The values recorded in the tables include values up to the next figure given—e.g., 0·2 unit includes values between 0·2 and 0·5 unit. Hence in calculating the geometric means of groups each value has been taken as the geometric means of the limits within which it lay, tests having been made at about 100% differences. Group D, composed of babies with 0·02–0·04 unit of passive antitoxin per ml., is small, but the geometric mean of the values is definitely lower than those of groups A, B, and C, and this is also the case with group E,

TABLE I—ANTITOXIC RESPONSE OF BABIES TO TWO INJECTIONS, EACH OF 0·5 ML. OF A.P.T.: BABIES GROUPED ACCORDING TO THE TITRE OF PASSIVE ANTITOXIN PRESENT AT THE TIME OF THE FIRST INJECTION

Group	Passive antitoxin at time of 1st injection (unit/ml.)	Age (weeks)	No. of babies producing titres (unit/ml.)								Total no.	Geometric mean (unit/ml.)	Av. interval (weeks) between	
			<0·01	0·01	0·02	0·04	0·1	0·2	0·5	1·0			1st and 2nd injections	2nd injection and blood sample
A	Under 0·02	6–13	..	..	..	1	3	11	4	1	20	0·329	8·1	8·9
B		14–26	..	..	..	3	6	9	3	2	23	0·267	8·7	8·5
C		Over 26	..	..	2	3	1	10	1	1	18	0·207	9·6	8·9
A + B + C	Total under 0·02	6 upwards	..	..	2	7	10	30	8	4	61	0·265	..	..
D	0·02–0·04	Av. 18·4	..	..	1	2	1	1	2	0	7	0·166	9·9	9·1
E	0·04–0·10	Av. 12·9	..	1	1	1	2	0	0	1	6	0·098	7·8	7·7
F	0·10–0·20	Av. 18·2	3	1	..	1	..	..	..	..	5	<0·020	8·2	8·2

which had 0·04–0·1 unit per ml. at the time of injection. One baby produced 1 unit per ml., but the values, taken as a whole, were lower, and it seems that in group E the passive antitoxin interfered with the first dose of prophylactic in about half the babies. It is possible that the response in these groups was delayed and a slow rise may still have been in progress when the samples of blood were taken. The responses of babies in group F show that the large amount of passive antitoxin present interfered considerably with the start of immunisation.

EFFECT OF AGE

Consideration of groups A, B, and C suggests that a better response is obtained with babies in the younger age-groups. Though the numbers are small, this suggestion is supported by the progressive slight decrease in the mean antitoxic values from A to C and by the greater number of low values (0·02 and 0·05 unit per ml.) in group C. The differences might be accounted for by differences in weight, because the same doses were injected into all the babies and the average weights of group C would be nearly double those of group A. This would lower the effective size of the primary stimulus in two ways: (1) the dose/weight ratio would be lower in the heavier babies; and (2) though the titre of passively conferred antitoxin in units per ml. was the same for all groups, the total amount of this passive antitoxin present in the circulation would be greater in the older and bigger babies. It is thus very probable that the passive antitoxin would interfere with immunisation more in the heavier children. If this is so, the question of large initial doses is of very great importance if immunisation is not done in the first few months of life. There is a further possibility that some degree of poor immunisability might be acquired after the first few months of life.

In group A 5 babies received their first injection at the age of 6–8 weeks, and the geometric mean of their antitoxic values after immunisation was 0·314 unit per ml., compared with 0·329 unit per ml. for the whole group. These results show that successful immunisation is possible at a very early age.

EFFECT OF INTERVAL BETWEEN INJECTIONS

Table II shows the antitoxic values of babies injected with two doses of A.P.T., each of 0·5 ml., given at different intervals. The numbers in each group are small, but in babies immunised before the age of 6 months (groups A and B) there is strong evidence that better responses were obtained as the interval between injections was increased. In group C, composed of babies over the age of 6 months, this improvement did not occur. The difference between the age-groups, if significant, may again be due to the reduced effect of the primary stimulus, owing to the greater weight and greater total amount of circulating antitoxin in group C. Though, in general, higher values are obtained by increasing the interval between primary and secondary stimulus, this is not the case if the primary stimulus is small.[4]

TABLE II—INFLUENCE ON RESPONSE OF INTERVAL INJECTIONS OF A.P.T. IN BABIES WHOSE PASSIVE A LEVELS WERE BELOW 0·02 UNIT PER ML.

Group (see table I)	Weeks between injections	No. of babies producing titres (unit/ml.)						Total no.
		0·02	0·05	0·1	0·2	0·5	1·0	
A	6, 7	..	1	2	3	..	..	6
	8	..	..	1	6	3	..	10
	10–12	..	..	..	2	1	1	4
B	6, 7	..	2	2	5	..	..	9
	8, 9	..	1	4	1	2	..	8
	10–18	..	..	..	3	1	2	6
C	8, 9	1	1	..	7	1	..	10
	10–12	1	2	1	3	1	..	8
Total A, B, and C	6, 7	..	3	4	8	..	..	15
	8, 9	1	2	5	11	6	..	28
	10–18	1	2	1	8	3	3	18

COMPARISON OF RESPONSES OF EXPECTANT MOTHERS BABIES TO IMMUNISATION

Some expectant mothers at Guy's Hospital Schick tested in the fourth month of pregnancy, an positive reactors were immunised with two doses and 0·5 ml., of A.P.T. By this means we ensured some babies would be born with large amounts of maternally transmitted antitoxin, the rate of which could be followed for a considerable time part of the experiment has been described previous

The scatter of antitoxic values after immunis babies in groups A, B, and C in table I is relatively 59 out of 61 titres were over 0·04 unit and unde units per ml. The remaining two levels were bet *0·02 and 0·04 unit and* were produced by babies the oldest age-group. Table III shows how immunised expectant mothers produced titres above, between, or below these limits (over 0·04 and under 2·0 units per ml.). The women were d into those who had been Schick tested and found (group L), those not so tested but found to have less *0·001 unit of antitoxin per ml.* in their serum immunisation (group N), and those with antitoxic levels which ranged from 0·01 to 2·0 per ml. (group P). In addition to these women were two with high antitoxin levels at the time of first injection of A.P.T.; one had 2–5 units and the 10–25 units per ml.; neither showed any ap rise after immunisation, the recorded values being units in the first woman and 12–15 units per ml. in second. Since all the other expectant mothers in produced 6 or more units per ml., it seems that a of 2 or more units per ml. may interfere with respon actively immune persons to the injection of 0·2 ml A.P.T., compared with interferences by 0·1 or more per ml. in passively immunised babies injected 0·5 ml. of A.P.T.

Women with little or no circulating antitoxin, Schick-positive (L) or with titres below 0·001 unit ml. (N), appear to fall into three groups: (1)

TABLE III—ANTITOXIC VALUES REACHED BY EXPECTANT MOTHERS AND BY BABIES AFTER IMMUNISATION WITH A. THE MOTHERS HAVING RECEIVED TWO DOSES OF 0·2 AND 0·5 ML. AND THE BABIES TWO DOSES EACH OF 0·5

Groups	No. of persons reaching (after immunisation) antitoxic titres (units/ml.)						
	Under 0·001	0·001–0·01	0·01–0·04	0·04–2·0	2–10	10–100	100 and over
Babies from table II							
H, under 6 months old	0	0	0	43	0	0	0
K, over 6 " "	0	0	2	16	0	0	0
Expectant mothers							
L, Schick tested, positive	3	2	0	6	1	3	1
N, Not Schick tested; antitoxic titre under 0·001	3	0	0	3	3	1	0
P, " " " " " 0·01–2·0	0	0	0	0	3	6	0

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4. Barr, M., Glenny, A. T. *J. Hyg., Camb.* 1945, 44, 135.

give similar results to babies who almost certainly not actively immune before injection; (2) those do not respond; and (3) those whose production of oxin is considerable and who can be accepted as g into the category of "potentially immune without lating antitoxin." The antitoxic values reached by potentially immune women in groups L and N est that preliminary Schick testing may have some ence on immunisation, though the numbers involved very small; 3 out of 4 not Schick tested gave lower ues (2, 3, and 5 units per ml.) than those tested, only out of 6 of whom gave titres below 10 (6 and 8) units ml. Of the others, the remaining untested mother roduced 13·5 units per ml., and the 4 other tested others produced 15, 30, 30, and 100 units per ml.

Thus, of 26 adults below the Schick level of immunity, were very poor responders to immunisation, about 9 ave normal responses, and about 9 were potentially mune. It is impossible to decide definitely whether ose women producing 2–5 units per ml. were potentially nmune or not, though no baby we have yet tested has roduced 2 units or more per ml.

It appears probable that all in group P and those in L and N who were potentially immune would have sponded strongly to a single injection of prophylactic; f 23 Schick-positive women whose immunisation was iscontinued after the first injection of 0·2 ml., one was bviously potentially immune and produced 15 units er ml.

ABLE IV—RESPONSES OF EXPECTANT MOTHERS AND THEIR BABIES TO IMMUNISATION WITH A.P.T.

ase no.	Response of mother (cord-blood value) (units/ml.)	Antitoxin value of baby when injected (unit/ml.)	Age (weeks)	Interval between		Response of baby (unit/ml.)
				1st and 2nd injections	2nd injection and blood sample	
1	0·002	< 0·001*	19	16	9	1·0
2	0·002	< 0·001*	10	12	20	0·2
3	0·004	< 0·001	31	9	7	0·2
4	0·01	< 0·001*	10	11	9	0·1
5	0·2	< 0·001	36	12	8	0·04
6	0·5	0·004	27	10	10	0·1
7	1·0	0·002	32	9	7	0·2
8	1·0	0·01*	22	11	9	0·2
9	25	0·01*	37	8	8	0·02
10	25	0·02*	37	11	13	0·04
11	120	0·01	61	8	8	0·2

Values obtained by titration of blood sample; the remainder were calculated from the cord-blood value.

Table IV compares the antitoxic responses of 12 mothers and their babies; there seems to be no correlation between the response of the mother and that of her baby.

DISCUSSION

Only one factor has been kept constant in all these experiments on immunisation of babies—i.e., all received two doses of A.P.T., each of 0·5 ml. Any conclusions drawn from the results, regarding optimum interval between injections, or the level of maternally conferred passive antitoxin causing interference with active immunisation, can only be applied to the active immunisation of babies with two doses of 0·5 ml. of A.P.T. This must always be borne in mind because, if the first dose of A.P.T. were 0·3 ml., a lower level of passive antitoxin would bring about interference so that immunisation would have to be delayed for a slightly longer time after birth, and the optimum interval between injections would be shorter.[4] The effect of giving this lower dose is entirely disadvantageous from the immunological standpoint, because the larger the initial dose the longer is the interval which can with advantage be allowed before the second dose, and both these factors bring about the establishment of sound basal immunity. Nor does there seem to be any good reason for injecting young babies with small doses, since reactions are not encountered among them and they do not show any adverse emotional disturbances.

TABLE V—PERCENTAGE OF BABIES WHOSE PASSIVE MATERNALLY ACQUIRED ANTITOXIN WOULD BE BELOW 0·04 UNIT PER ML. AND BELOW 0·004 UNIT PER ML. AT VARIOUS AGES. BOTH SETS OF FIGURES WERE CALCULATED FROM ANTITOXIC VALUES OF 200 RANDOM CORD-BLOOD SAMPLES FROM SOUTH-EAST LONDON

Age (weeks)	Percentage of babies with passive antitoxin	
	Under 0·04 unit/ml.	Under 0·004 unit/ml.
0	36·5	26·0
4	56·4	31·8
13 (3 months)	83·7	38·3
17	91·0	50·0
21	95·2	60·6
26 (6 months)	98·7	76·4
28	100·0	83·1
39 (9 months)	. .	96·9
43	. .	100·0

Our results (table I) show that 61 babies whose level of passive antitoxin had fallen below 0·02 unit per ml. were all satisfactorily immunised, the chief variables being age (from 6 weeks to over 6 months) and interval between injections (6–18 weeks). The facts that there were no failures in this group, and that the antitoxic values after immunisation were normally distributed and showed small scatter, provide strong evidence that these babies were adequately immunised, so long as their antitoxin and their basal immunity are retained until they receive a boosting dose. This conclusion may also apply to the small group D (table I) in which the level of passive maternal antitoxin had fallen to 0·02–0·04 unit per ml. at the time of the first injection of A.P.T., but in group E, with 0·04–0·1 unit per ml. when injected, there were indications of unsatisfactory responses, though 1 baby out of 6 produced 1 unit per ml. It should be noted here that all in this small group, and at least 2 out of 5 in group F, would presumably have been Schick-negative at the time of the test on the blood samples, and it therefore appears to us that in all fundamental work designed to throw light on methods of immunisation the Schick test should be avoided, except to detect on a much larger scale the numbers of very bad responders to any particular treatment, and to confirm the need or otherwise of boosting doses at a later age. Schick testing does not reveal the scatter of antitoxic values, which, after satisfactory immunisation and in the absence of previous *natural or artificial stimulation, should be small.* Very little attention has been paid in the past to the scatter of antitoxic values, or to the type of their distribution. We are convinced that a small scatter of values normally distributed is a sure proof that the course of immunisation has been satisfactory, and it appears that the Schick test is insufficiently stringent to apply to recently immunised populations, because many people who have produced only traces of antitoxin (over 0·002 unit per ml.) are Schick-negative and on the results of the test would therefore seem to be satisfactorily immunised.

The questions of size of first dose, interval between injections, and duration of resulting antitoxin are all linked together. We have evidence from animal experiments that actively produced antitoxin is retained for a longer time when the interval between two injections of prophylactics can be extended beyond four weeks; the optimal interval to ensure a good antitoxic response depends in turn on the size of the first dose. Thus the duration of antitoxic immunity, in the form of circulating antitoxin, depends on the size of the first dose, which, if large, also establishes good basal immunity or power to respond to further stimulation in the form of further injections of prophylactic or chance infection. As immunisation of the population becomes more general, encounters with chance infections would be expected to become less numerous; therefore a sound course of artificial immunisation should be aimed at, if antitoxic values are to be maintained.

Our results suggest that an initial dose of 0·5 ml. of A.P.T. is sufficient in babies whose levels of maternally acquired passive antitoxin are below 0·02 unit per ml., but there is a suggestion that this might not be so in older infants and adults, because in babies over 6 months old the response to immunisation was not improved by increasing the interval between injections beyond nine weeks, as in the younger babies. This, as mentioned earlier, might be explained by the fact that the total amount of passive antitoxin would be greater in the older and heavier babies, but the possibility of inadequate dose in relation to weight cannot be excluded. The levels reached by expectant mothers with little or no antitoxin (table III) strongly suggest that two doses, 0·2 and 0·5 ml., of A.P.T. were inadequate. Assuming that 9 mothers out of 26 in table III were already potentially immune and 17 non-immune at the time of the first injection, 8 of the 17 did not respond adequately to immunisation. There is a need for further work on the immunisation of adults. It is possible that a much larger dosage is needed and that this can only be achieved by giving purified toxoid or some derivative therefrom after testing for sensitivity, or by giving a longer course of immunisation with a mild prophylactic. The average weight of the expectant mothers can be taken as at least eight times that which their babies will attain at the age of 3 months and at least six times that of their babies at 6 months.

The high proportion of potentially immune women with little or no antitoxin at the time of the first injection of prophylactic may account for the occasional occurrence of clinical diphtheria in the presence of a considerable amount of antitoxin. The time interval between the production of small amounts of toxin by the invading organism and the first indications of illness may be less than the latent period before the production of antitoxin. If to this interval be added the time elapsing between the onset of illness and admission to hospital, sufficient time may have elapsed for antitoxin to be produced.

In our previous paper[3] we gave figures for the antitoxic values of 100 random samples of cord blood from each of two South-East London districts and showed that the difference in distribution of the values for the two sets was not significant ($\chi^2 = 5{\cdot}719 - n = 6$; $P = 0{\cdot}46$). By the formula for rate of loss of maternally transmitted antitoxin, to which we have already referred, it is possible to calculate the average number of babies from these areas whose passive antitoxin has decreased at any given time to some chosen level. In table V we record the percentage of babies whose passive antitoxic level would have fallen below 0·04 unit per ml., and in whom active immunisation could be started, and the percentage whose levels would be below 0 004 unit per ml. and would thus be expected to be Schick-positive. Work now in progress suggests that these figures for South-East London are not of general application elsewhere. The figures show that over 80% of the babies in this population could benefit by a first dose of 0·5 ml. of prophylactic at the age of 3 months, though only 38% would be expected to be Schick-positive. At 4 months immunisation of 91% could be started (50% Schick-positive), but just over 6 months would have to elapse before the levels of passive antitoxin of all babies fell below 0·04 unit per ml. At this age, however, 83·1% would be below the Schick level, and many would have been totally unprotected for several weeks.

It seems probable that all babies, except th of potentially immune mothers who received immunisation during pregnancy, could be su immunised by three injections of prophylactic the ages of 3, 6, and 18 months. Those in the mentioned population whose passive antitoxin with the first dose of prophylactic would respond second injection, in some cases by giving an response and in the remainder by the est basal immunity. All the babies should then give antitoxic response to a third injection given at of 18 months. Better results could be expected wit dose of 1 ml. of prophylactic or with 0·5 ml. of a s prophylactic.

SUMMARY

Babies were actively immunised with two inj of A.P.T., each of 0·5 ml., given at an interval weeks or more. Conclusions reached as a result work can therefore be applied only to schemes in this particular dosage is given, and not to th which the first dose is 0·2 or 0·3 ml. The adva of giving as large a first dose as possible are dis since there seems to be no sound reason for using doses in young babies.

When the level of maternally conferred an in the baby had fallen below 0·04 unit per ml. time of the first injection, there was no interferenc active immunisation; but when this level was 0·1 unit per ml. immunisation was unsatisfactory.

A group of 61 babies with levels below 0·02 unit when injected produced normally distributed lo toxin levels with a small scatter; this is taken as ev of satisfactory immunisation.

Twenty babies were successfully immunised wh first injection was given between the ages of 6 weeks; 5 of the babies were under 2 months old. was a slight suggestion of poorer response in babies immunisation was started after the age of 6 mon

Higher antitoxic values were obtained in immunised before the age of 6 months when the injection of A.P.T. was given 10–18 weeks rathe 6–9 weeks after the first. This was not so in over 6 months old. Reasons for this are suggested

By calculation from antitoxic values of cord it is estimated that over 80% of a population babies born in South-East London could be succes immunised, starting at the age of 3 months. It i gested that all babies, except those born of poten immune mothers further immunised during pregn could be successfully immunised with three [illegible] of prophylactic given at the ages of 3, 6, and [illegible] Figures are also given of the estimated Schick-p rate of babies from this area at different ages.

Active immunisation of expectant mothers sh that of those with little or no antitoxin at the time first injection about a third responded badly, a were potentially immune and produced high titr antitoxin, and a third responded in a similar mann the babies.

There was no correlation between the respon immunisation of expectant mothers and of their ba

The Schick test should not be used in fundam work designed to throw light on methods of immu tion. It is insufficiently stringent and does not r the scatter of values, which should be small. Its of usefulness is essentially confined to routine wor

We wish to thank the staffs of the obstetric departme Guy's Hospital and St. Alfege's Hospital for their [illegible] particularly Miss L. Coombe, superintendent [illegible] at Salomon's Welfare Centre; and Miss F. Anderson, B. Cripps, Miss D. Delahoy, and Mr. A. Service for tech assistance in the antitoxin estimations.

ITUITARY ADRENOCORTICOTROPIC IORMONE (A.C.T.H.) AS A TOOL OF INICAL AND LABORATORY RESEARCH

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.C.T.H. seems to be the most promising tool medical stigators have today. It is our working hypothesis it acts through a fundamental biochemical system he body, with the result that the metabolism of all cells is affected. The fact that patients with such erent syndromes as are reported here and elsewhere ond to A.C.T.H. supports the concept of its wide ge as a tool of research. That at present it must be sidered only for use in research is obvious because its great scarcity and the side-effects which may, often do, develop.

hen A.C.T.H. is injected into a person with normally ctioning suprarenals, the sterol 17-hydroxy-11-ydrocorticosterone and other substances are promptly med. These materials have a profound effect in man, before discussing our experiences with them perhaps s best to say a few words about sterols in general. g ago chemists found in certain animal and vegetable fats an unsaponifiable material. This material was insoluble in water and could not be made into a soap by boiling with an alkali. Eventually these compounds were called steroids, and it was learnt that they are far more complex in structure than the fats. They contain rbon, oxygen, and hydrogen and are soluble in most the organic solvents. The sterols contain what is rmed the cyclo-penteno-phenanthrene ring, which can regarded as a condensed carbon-ring structure (fig. 1). fig. 2 shows, 17-hydroxy-11-dehydrocorticosterone Cortisone') contains this grouping.

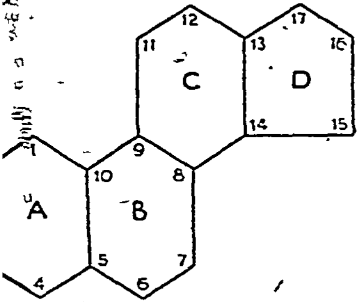

Fig. 1—Cyclo-penteno-phenanthrene.

The prompt amelioration of the symptoms of rheumaid arthritis after the injection of synthetic cortisone A.C.T.H. was first reported by Hench et al. (1949). heir findings with cortisone have been confirmed by oland and Headley (1949); and Spies and Stone 949a), Spies et al. (1949), and Markson (1949) have ported the relief of gouty arthritis after the administration of A.C.T.H. Hench et al. have also noted that soriasis associated with arthritis is relieved. Thorn t al. (1948) have shown that the number of circulating sinophils in persons with intact suprarenals decreased apidly after the injection of A.C.T.H., and we have used his as a screening method to study A.C.T.H. (Spies and Stone 1949b). So far as we know, no-one has reported he amelioration of symptoms of allergic states with this material.

The present report describes the response of a patient with acute rheumatoid arthritis to A.C.T.H. and his failure to respond so well, if at all, to some chemical compounds (sterols) closely related to cortisone. It also describes the response to A.C.T.H. of a patient with rheumatoid arthritis, chronic eosinophilia, and asthma: of a patient with gout; and of a patient with psoriasis and rheumatoid arthritis. Some of the side-effects are discussed.

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CASE 1

A white married man, aged 64, had worked actively as a bridge-construction carpenter until forced to retire because of his present illness. In April, 1947, he first had pain and stiffness, chiefly in the right hand, knee, and shoulder. The symptoms were mild and of very short duration. Since then he has had frequently recurring pain and severe stiffness and tenderness which gradually involved more and more joints, particularly the hands, wrists, elbows, shoulders, feet, and knees. The symptoms tended to persist longer with each attack, and, though the severity subsided somewhat, some stiffness and disability remained. Eventually the patient was forced to discontinue working, because of intense pain. He noticed that the symptoms were worse during cool damp weather and more pronounced early in the morning than in the afternoon. During the past year he has had recurrent soreness and burning of the mouth and tongue, associated with gastro-intestinal distress and mild diarrhœa. He consulted several physicians, who prescribed various remedies with little or no relief.

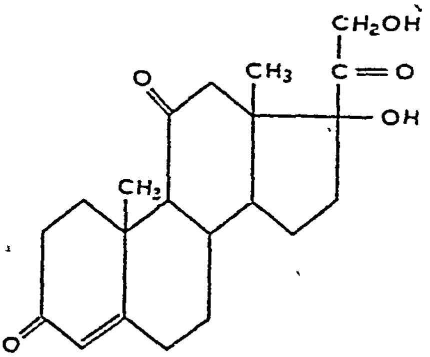

Fig. 2 — 17-Hydroxy-11-dehydrocorticosterone ('Compound E' of Kendall, 'Compound F' of Wintersteiner and Pfiffner, and 'Substance Fa' of Reichstein).

Physical examination showed a large heavily built man who appeared to be in moderate distress. Walking was difficult and laboured; his gait was slow, deliberate, and stiff. He had considerable difficulty in rising from a sitting position, in removing his coat, and in elevating his arms. Every time he moved he had great pain. The conjunctivæ and finger-tips were slightly pale. The tongue was large and moderately red. He was edentulous. The gums were essentially normal. There was moderate swelling, with tenderness and limitation of motion in all the joints of the hands, wrists, feet, and ankles, and some limitation of the shoulders and knees. The joints were tender to touch but not red. The patient was comfortable at rest but in distress in motion, particularly in walking.

Laboratory Findings.—Analysis of the urine was negative. Gastric analysis showed no free hydrochloric acid in the gastric juice after histamine stimulation. Blood: seven uric-acid determinations ranged from 4·35 to 4·80 mg. per 100 ml.; non-protein nitrogen (N.P.N.) 31·5 mg. per 100 ml.; sugar 122 mg. per 100 ml. fasting; total cholesterol 179 mg., esters 110 mg., and free cholesterol 59 mg. per 100 ml. Red blood-cells 2,200,000 per c.mm.; Hb 7·1 g. per 100 ml. (46%): reticulocytes 1·6%. Packed cell volume (P.C.V.) 24 ml. per 100 ml.; mean corpuscular volume (M.C.V.) 109 c.μ; mean corpuscular Hb (M.C.H.) 32 $\mu\mu$g.; mean corpuscular Hb concentration (M.C.H.C.) 29·5%. Differential leucocyte-count: polymorphs 52%, eosinophils 3%, basophils 2%, lymphocytes 36%, monocytes 7%. The erythrocyte-sedimentation rate (E.S.R.) varied from 60 to 69 mm. in 1 hr. (corrected 16–22 mm./hr.).

Treatment and Progress.—The patient was given 15 mg. of A.C.T.H. (Armour Standard) every four hours until sixteen intramuscular doses had been given. Within twenty-four hours after the initial injection of A.C.T.H. there were considerable relief of pain, decreased swelling of the joints, less limitation of movement, and less difficulty in rising from a sitting position and in walking. The patient could close his hands with ease and walk up and down stairs without difficulty—a thing he had been unable to do for many months. There was progressive lessening of pain with improvement in joint function until he had no symptoms in motion. Soon after the beginning of treatment he had a remarkable boost in sense of well-being, increasing to the point of elation.

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* Clayton Foundation Fellow.

During several weeks of observation before the injection of A.C.T.H. the blood-pressure had ranged from 98/48 to 104/58 mm. Hg. During the four days of treatment it ranged from 108/52 to 130/66. Before the injections were started, the patient's greatest weight was 186 lb. After the fourth injection of A.C.T.H. he developed slight œdema of the ankles and feet. Three days later his body-weight was $197^{1}/_{2}$ lb. and he had bilateral pitting œdema of the ankles. By the second day after the injections were discontinued his body-weight had decreased 2 lb., and a week later it was 184 lb. There was considerable diuresis associated with the loss of weight, and the pitting œdema disappeared. There was little change in the red-cell count or in the Hb content; the E.S.R. decreased slightly; and the blood-pressure returned to its initial level.

About twelve days after the last injection the symptoms began to return. Within eight weeks the patient had disability of all the joints of the hands and wrists and limitation of movement, pain, swelling, and tenderness of the feet, ankles, and knees, which was more severe in the early morning. These symptoms were almost as severe as they had been before A.C.T.H. therapy; the patient again could not dress himself or get up or down without assistance, and he could walk only with extreme difficulty.

Effect of Other Sterols.—Eight weeks after A.C.T.H. therapy was discontinued, the patient had definitely relapsed. Since our supply of A.C.T.H. was exhausted and the patient wished to be treated, we decided to administer the following compounds in the order in which they are listed:

Pregnene-(4)-triol-(17α, 20β, 21)-one-(3)-diacetate
Pregnane-3, 12, 20-trione
17-MethylΔ5-androstendiol-3 (β), 17 (α)
17-α-Hydroxyprogesterone
17-α-Hydroxy-11-desoxycorticosterone-21-acetate
Deoxycortone (desoxycorticosterone) acetate
Ergostanyl acetate

These compounds were administered over four days. In each twenty-four hours a total of 200 or 300 mg. was given in divided doses, except for deoxycortone acetate, of which a total of 20 mg. was given. Many of these sterols were difficult to get in suspension. Some of them were suspended in saline and injected intramuscularly. Others were suspended in a mixture of benzyl alcohol and various oily solvents. In no instance was there any improvement comparable to the effect of A.C.T.H. There was slight amelioration in some of the symptoms after the administration of ergostanyl acetate, but this could well have been a slight spontaneous remission. No objective changes were apparent.

Second Course of A.C.T.H.—During the six weeks that these compounds were under test the symptoms progressed until the patient could not turn over in bed or walk without assistance; so we decided to administer A.C.T.H. again. It was given in five injections, six hours apart, 10 mg. in each injection. Again there was prompt improvement. Within twelve hours from the time of the first injection there was beginning relief of the soreness and stiffness of the joints. Within twenty hours the patient could get out of a chair without assistance, walk with ease, go up and down stairs without difficulty, and shave; he again became interested in eating; and he felt better in general. Since no more A.C.T.H. was available, it was discontinued; and within a week the symptoms were almost as severe as before treatment.

Case 1 is representative of 5 cases of rheumatoid arthritis which had been under observation for a year or more. The duration of the disease varied from one to four and a half years. Each of the other 4 patients had moderately severe articular swellings and pain on motion, some elevation of E.S.R., and the constitutional symptoms of pronounced loss of appetite, weakness, and general lassitude. The symptoms in each case were relieved by A.C.T.H., but they were not relieved by any of the other seven sterols except ergostanyl acetate, which produced slight amelioration of symptoms in case 1. This study demonstrates the great specificity of A.C.T.H.

CASE 2

A white man, aged 61, came to the Nutrition Clini
plaining of pain in the right shoulder, elbow, hand, an
and in both knees. Twelve months previously he
having pain in his right shoulder. Within two mon
was unable to raise his right arm above shoulder
Gradually the pain involved the right elbow, hand, an
and both knees. The pain increased in cold, damp w
and was worse at night than in the morning.

Physical examination showed a well-developed and
what overweight man who appeared to be in pain wh
moved. The joints of both knees and of the right
elbow, and shoulder were tender. The right hand w
swollen that the patient could not close it. He had diff
in rising from a sitting position and could not raise his
arm above shoulder level.

Laboratory Findings.—Blood-uric acid was 6·7 mg
100 ml. or more on repeated determinations. N.P.N. 38
per 100 ml. Fasting blood-sugar 122 mg. per 100 ml.
cholesterol 125 mg., esters 86 mg., and free cholesterol 3
per 100 ml. Total serum-proteins 7·15 mg., serum-alb
4·46 mg., and serum-globulin 2·69 mg. per 100 ml.
cells 5,310,000 per c.mm.; white cells 6000 per c.
Hb 13·6 g. per 100 ml. (88%); reticulocytes 0·5%;
44 ml. per 100 ml.; M.C.V. 83 c.μ; M.C.H. 25·5 μμg.; M.
31%. Differential leucocyte-count: polymorphs
eosinophils 1%, lymphocytes 23%, monocytes 8%.
E.S.R. varied between 16 and 20 mm. in 1 hr.

Treatment and Progress.—Mild atypical gout was diag
and the patient was given a single 30 mg. dose of A.
intramuscularly. About 30 min. after the injection
was less pain in the right shoulder, elbow, hand,
and in both knees, and less swelling of the right hand.
patient could raise his right hand above his head fo
first time in three months. Twelve hours after the inj
the swelling of the right hand and all the soreness i
joints had disappeared. At the present time, four m
after A.C.T.H. therapy, there has been no recurrence of
in any of the joints. The patient is working steadily.

There was essentially no change in the laboratory fin
except as regards uric acid. Two days after therapy
uric acid was 4·20 mg. per 100 ml.; four days later it
1·7 mg. per 100 ml.; and two months later it was 3·
per 100 ml.

Three other patients, all with severe gout,
received relief from symptoms of acute attack whe
A.C.T.H. injections were started early enough.

CASE 3

A white married woman, aged 31, came to the Nutr
Clinic complaining of "psoriasis" and "rheumatism."
psoriatic lesions first appeared on the scalp when she
9 years old. Seven years later they appeared on her c
and abdomen. They varied in severity according to
time of year, being worse in the winter than in the sum
Some proprietary remedies applied locally occasion
relieved the itching and appeared to reduce the scal
On several occasions the symptoms almost disappeared
various lengths of time, the longest being during her
pregnancy, when she was aged 21. During her se
pregnancy, a year later, they did not subside. Through
years she noticed that with each exacerbation they
worse. The swelling of the thumb of the left hand b
during her first pregnancy. Gradually the joints of
hands and feet became involved. Though there had
periods of partial remission, the symptoms never subs
entirely. The progression had been slow to the poin
moderate disability in the use of the hands and feet.
patient tried numerous "home remedies," as well as d
prescribed by physicians, without any definite beneficial e
on the joint pain, swelling, and stiffness.

Physical Examination.—There were several large circ
lesions on the abdomen, measuring up to 3–6 in. in diam
with typical psoriatic elevation, redness, and scaling. A s
lar lesion was present over the sacrum, smaller lesions v
scattered over the lower back, upper cervical area, and sc
[illegible] joints of the hands were seve
[illegible] largement and limitation of mot
Several joints were slightly discoloured and modera
tender. The fingers of the left hand were fixed in a parti
flexed position. There was moderate limitation of mo
of the wrists. The feet were similarly, but considerably

olved. Disability of the hands was apparent. Disability the feet was noted only in walking; they appeared stiff en the patient started to move. The finger and toe nails re definitely ridged and rough and in areas appeared be partially separated from the nail beds.

Laboratory Findings.—Blood-uric acid was 3·8 mg. per 100 . N.P.N. 32·5 mg. per 100 ml. Fasting blood-sugar 85·1 mg. 100 ml. Total serum-proteins 6·64 mg., serum-albumin 4 mg., and serum-globulin 2 mg. per 100 ml. Red cells 40,000 per c.mm.; white cells 7700 per c.mm.; Hb 13·4 g. r 100 ml. (86%); reticulocytes 1%. Differential leucocyte-unt: polymorphs 63%, eosinophils 2%, basophils 2%, nphocytes 27%, monocytes 6%. E.S.R. 21 mm. in 40 min.

Treatment and Progress.—The patient was given 15 mg. A.C.T.H. six-hourly until eighteen doses had been given. ithin seventy hours after the beginning of treatment me amelioration in the skin lesions was noted; the intensity the colour had faded somewhat, the lesions seemed to subsiding centrally, and itching, fever, and scale formation ere somewhat less. Within the next twenty-four hours ere was slight improvement in the joint signs and symptoms arthritis, particularly in the swelling and tenderness of e finger joints, and there was less discoloration of these ints. During the next few days the patient could use her nds better than she had been able to for years and she had ss discomfort of the feet. Throughout the treatment the in lesions continued to subside but not to the point of mplete clearing. The patient experienced a remarkable ychological elation or stimulation from treatment; she id over and over again that A.C.T.H. was the only therapy hich had ever relieved both the psoriasis and arthritis. er body-weight on admission had been 123 lb. Six days ter it was 130 lb. During the first four days after the .C.T.H. injections had been discontinued the body-weight ecreased from 130 to 122 lb. This was associated with iuresis. The blood-pressure during the period of injections A.C.T.H. varied from 108/70 to 122/76 mm. Hg. The ulse-rate varied from 84 to 124 per min. There was no ange in the E.S.R.

A week after therapy was discontinued there was evidence at the skin lesions were becoming worse. They became deeper violaceous hue and thicker. At this time the atient experienced a moderate emotional upset as regards he skin lesions which had flared up. Until this time there as no evidence that the joint lesions had resumed activity, ut within about two weeks after treatment the signs and ymptoms of arthritis began to recur.

CASE 4

A white housewife, aged 59, came to the Nutrition Clinic omplaining of periodic attacks of asthma, hay-fever, urticaria, and pain and aching in the wrists, hands, knees, and ankles. Her father and her son have asthma and "hives." For at least twenty-five years the patient has been having mild periodic attacks of asthma characterised by difficulty in breathing, associated with a "breaking out" on the arms, hands, and face. She had observed that these attacks were also associated with an "upset stomach" and headache. Nine years previously she begun having pain and aching of the joints, especially the wrists and knees.

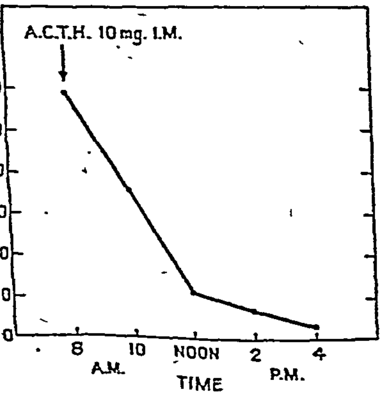

Fig. 3—Eosinophil-count in case 4 under treatment with A.C.T.H.

Physical examination showed a well-developed woman. On the arms, hands, neck, and face there was evidence of residual eczematous dermatitis. There was no difficulty in breathing at the time of examination. The patient sneezed often and had almost constant "watering" of the nose and eyes. The right wrist and the index finger of the right hand were swollen, and she could not close this hand. The knees were swollen and felt hot to touch. The ankles were tender and swollen.

Laboratory studies repeatedly showed an absolute eosinophil-count ranging between 1000 and 3000 per c. mm. The patient had thick tenacious sputum containing many eosinophils.

Treatment and Progress.—The patient was given 10 mg. of A.C.T.H. intramuscularly twice daily for four days. On the day following the initial dose the soreness of the right hand and wrist and of the knees and ankles disappeared, and the swelling of the wrist, knees, and ankles began to subside. The sneezing and the "watering" of the nose and eyes ceased at this time. By the following day the patient was free from pain, and the swelling of the right wrist, knees, and ankles disappeared. Her appetite, which was poor before therapy, became excessive. She volunteered that she "felt cheerful" and better than she had for many years. There was no return of symptoms for ten days after therapy had been discontinued, but at the end of this time she began to have slight soreness of the right wrist. Occasional pain in the knees and ankles and slight swelling of the wrist began a week later. These symptoms have persisted but they have not increased in severity during the three months that have elapsed since A.C.T.H. therapy was discontinued, and there has been no recurrence of asthma or urticaria.

The eosinophil-count decreased toward normal (fig. 3) and remained low until A.C.T.H. therapy was discontinued. Within three days after the A.C.T.H. injections had been discontinued the eosinophils returned to their previous high level. The number of eosinophils in the sputum greatly decreased within a few hours after the first injection.

SUMMARY AND CONCLUSIONS

Repeated intramuscular injections of 25 mg. of pituitary A.C.T.H. were well tolerated during a short period of administration. There was prompt relief of symptoms in 5 patients with rheumatoid arthritis, 3 with gout, 1 with rheumatoid arthritis and psoriasis, and 1 with rheumatoid arthritis, asthma, hay-fever, urticaria, and chronic eosinophilia of unknown origin.

Amelioration of the symptoms and disappearance of swelling and tenderness of the joints in the patients with rheumatoid arthritis and those with gout began on the first or second day of therapy. There was a sharp decrease in the circulating eosinophils within four hours. The patients with rheumatoid arthritis relapsed within 3–14 days of the end of treatment. Within 96 hours after the last injection the patients had a diuresis with a loss of body-weight and a decrease of blood-pressure to the initial levels. Seven sterols resembling cortisone in structure were administered one at a time, but with little or no decrease in symptoms. Each patient was then given injections of A.C.T.H. again, and prompt and dramatic improvement followed. The side-effects are of considerable interest; we observed water retention with an associated gain in body-weight, some increase in blood-pressure, and pronounced "elation" in some patients.

These studies throw no light on the mechanism by which A.C.T.H. relieves the symptoms arising from rheumatoid arthritis, gout, asthma, hay-fever, urticaria, and psoriasis, or why the circulating eosinophils decrease in number after its administration. They are clinical leads for vigorous experimental studies. One needs to know the effect on the pituitary and the suprarenal glands. Perhaps if this were known we would know how to maintain normal function of these glands. If the protective substances made by these glands could be augmented by giving proper nutrients it might prove desirable. It is significant that persons with Addison's disease or Simmonds's disease do not have rheumatoid arthritis, gout, or psoriasis as an integral part of their syndromes. Do such persons have some way of utilising the proper raw materials to prevent the development of these diseases?

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COMPARATIVE SERUM TESTING WITH CARDIOLIPIN AND STANDARD WASSERMANN ANTIGENS

REVIEW OF 5124 TESTS

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The Wassermann reaction (W.R.) has long occupied a unique place among serological diagnostic tests because of the highly specific results obtained with an apparently non-specific antigen. Much work has been done since the inception of the test to determine the nature of the antigenic material in alcoholic extracts of beef heart, and Pangborn [1] has isolated a phospholipide called cardiolipin, which is an unstable acid and is therefore used in the form of its stable sodium salt. In crude tissue extracts it is probably present as either the potassium or sodium salt. Neither pure cardiolipin nor pure lecithin alone is active serologically, but in combination the mixture shows activity, and the addition of cholesterol enhances its sensitivity. The mixture of these three substances in well-defined proportions forms an antigen which has been widely used for the serodiagnosis of syphilis. By varying the proportions of the components, antigens suitable for both complement-fixation and flocculation techniques can be produced. Recent work on the properties and potentialities of cardiolipin has been summarised by Pangborn.[2]

The examination of large numbers of sera from widely differing types of patients, mainly in the United States, has produced favourable reports of the value of the cardiolipin antigens in the serodiagnosis of syphilis. They have been claimed to be both more sensitive, and at the same time more specific, than the relatively crude tissue-extract antigens now in common use, though cardiolipin antigens still produce some false positive reactions. Since the components of the antigens can be prepared in a high state of purity and their chemical constitution is fairly well known, the preparation of the antigen on a gravimetric basis may be attempted, but serological standardisation of each batch of antigen is essential, since batches of lecithin, and to a lesser extent cardiolipin, may vary in their antigenic activity. At present cardiolipin antigen has been adapted to many of the existing serological techniques, and there is no uniformity of opinion about which of these is the most satisfactory. The next serological conference to be held under the auspices of the World Health Organisation should give an opportunity for the controlled comparison of standard techniques by their originators, and should establish the place of cardiolipin in the serology of syphilis.

PRESENT INVESTIGATION

The present investigation was undertaken to compare the performance of cardiolipin antigen with the standard
Wassermann antigen prepared at the V.D. Refc
Laboratory, by the following method.

The muscle from the left ventricles of freshly killed o
freed from fat, epicardium, and endocardium. The n
is divided as finely as possible and then ground in a n
with a little powdered glass and successive portions of ab
alcohol to a total of 9 ml. of alcohol for each gramme of
muscle. The triturated muscle and alcohol are trans
to a flask closed with a tinfoil-covered cork and allow
stand in the dark at room temperature for five days
flask being shaken gently two or three times a day.
contents are then filtered through a no. 1 Whatman p
and the filtrate is placed in a refrigerator for twenty
hours and again filtered through a no. 1 Whatman p
The final product is stored in the dark at room tempera

The Wassermann technique used was a two-tube modi
tion of the Harrison-Wyler method developed by Pr

The cardiolipin antigen was made available thro
the courtesy of the New York State Departmen
Health, Division of Laboratories and Research. It
composed of cardiolipin 0·0175%, lecithin 0·0875%
cholesterol 0·3%, and was used at a dilution of 1 in
of saline.

Sera were tested in parallel on the same day; th
giving anomalous results were retested, usually a
an interval of three days. Before the second examina
a fresh specimen of serum was removed from the orig
blood-clot to reduce the possibility of technical er
to a minimum. The sera examined were drawn f
three sources:

Group I: routine sera from the Whitechapel Cli
A small series of sera from male cases of primary syphil
which the *Treponema pallidum* had been demonstrated
included in this group.

Group II: sera from a teaching hospital (The Lon
Hospital), of which about a third came from antenatal ca

Group III: sera sent to the V.D. Reference Laboratory
opinion. These included straightforward sera sent for c
firmatory testing as well as many "problem sera" which
given anomalous results in other laboratories.

In groups II and III we have had to depend on the b
clinical details supplied with the sera sent for testing;
that cases had to be assessed on these limited grounds.

In all, 5124 sera were examined in parallel with
two antigens. Those from the V.D. clinic and the teachi
hospital form a representative sample of sera likely to
encountered by any laboratory undertaking large nu
bers of Wassermann tests. It was found necessary
restrict the numbers of sera from the V.D. clinic whi
were tested in parallel with cardiolipin antigen to t
first 96 of each batch because of shortage of water-bat

Sera sent to the V.D. Reference Laboratory form
special group, since a proportion had previously giv
anomalous results in other laboratories. They we
included in the investigation because it was felt that th
would give a useful indication of the specificity
cardiolipin antigen.

DISCUSSION OF RESULTS

Cardiolipin antigen possesses several technical adva
tages by virtue of the high dilution at which it can
used. In this investigation it was used at the titre
1 : 150, the figure advised by the American worker
Titration of this batch (no. 72) by the optimal-proportio
method has since shown that the best results with th
Wassermann technique used are given at an even greate
dilution—1 : 400. However, at a dilution of 1 : 150
gives a very faintly opalescent solution which has n
more destructive action on complement than has salin
alone. The clarity of the antigen suspension as compare
with the well-marked opalescence of the cholesterolise
standard Wassermann antigen as issued from thi
laboratory when used at a dilution of 1 : 15 enhance
the clarity of negative tests in which the hæmolysis

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[1] Pangborn, M. C. *Proc. Soc. exp. Biol., N.Y.* 1941, **48**, 484.

[2] Pangborn, M. C., in Recent Advances in the Study of the Venereal Diseases. U.S. Public Health Service, Washington, 1948; p. 57.

[3] *Price, I. N. O.* (in the press).

truly "sparkling," and makes it easier to determine minor degrees of inhibition of lysis.

It can be said, however, that work by Price has shown that the standard cholesterinised Wassermann antigen gives its best performance at considerably higher suspensions than the 1 : 15 generally adopted, and a comparative series of tests between cardiolipin antigen and the standard antigen at its optimal titre are now being done.

RESULTS

Group I

The results obtained with routine sera from a V.D. clinic were as follows. Of 1982 sera tested, the tests agreed in 1898 (95%) and disagreed in 84 (5%). The tests were cardiolipin positive and routine W.R. negative in 80 sera as follows: untreated primary syphilis 4, treated syphilis 65, and non-syphilitic 11 (eight patients); and 4 sera from one patient (case 2) were cardiolipin negative and routine W.R. positive.

Clinical details were available regarding these V.D. clinic sera. Of the 80 sera where the cardiolipin antigen gave a positive result and the standard antigen a negative one 69 came from cases of syphilis. The remaining 11 sera were from eight patients, of whom one was a newborn child of a syphilitic mother, and passive transfer of reagin from the maternal circulation is a possible explanation. This case would therefore be included in the syphilitic group. There were five coloured patients from the West Indies or from West Africa; four of these had gonorrhœa and one non-specific urethritis. All of them omitted to attend for surveillance after treatment; so it is impossible to form any opinion about their syphilitic status. Moreover the possibility of positive serum tests as a result of childhood infection with yaws cannot be excluded. Since patients from West Africa and the British West Indies form only a minority of the patients in the clinic (1·9% of male admissions in 1948), their high proportion among this group of discrepancies may be significant. The remaining two patients (cases 1 and 2) are considered to have given biological false positive reactions with both antigens and are recorded in some detail.

Case 1.—A white man, aged 36, attended on Aug. 26, 1948, with gonorrhœa and was treated with penicillin 150,000 units. Tests of cure for gonorrhœa were satisfactory. Serological examinations gave the following results:

Date	*Routine W.R.*	*Cardiolipin W.R.*	*Price's precipitation reaction*
Aug. 26, 1948	Pos.	..	Neg.
Sept. 10, "	Pos. 1/10*	..	Neg.
" 20, "	Pos. 1/10	Pos.	Neg.
" 27, "	Pos. 1/10	Pos.	Neg.
Oct. 4, "	Pos. 1/10	Pos.	Neg.
" 11, "	Neg.	Pos.	Neg.
" 25, "	Neg.	Pos.	Neg.
Jan. 31, 1949	Neg.	..	Neg.
June 13, "	Neg.	..	Neg.

* Quantitative titre.

The possibility of an early syphilitic infection being aborted by the penicillin treatment for gonorrhœa cannot be excluded but is thought to be remote. The patient's wife was examined and no evidence of syphilis was found.

Case 2.—A white man, aged 44, had had syphilis in 1927, which had been treated with two courses of injections. There had been no further surveillance. On Nov. 1, 1948, he attended with a penile sore of two days' duration. Dark-ground examination for *T. pallidum* was negative on five occasions, and a Dmelcos skin test was negative. The patient was treated with sulphonamides. Serological examinations gave the following results:

Date	*Routine W.R.*	*Cardiolipin W.R.*	*Kahn*	*Price's precipitation reaction*
Nov. 1, 1948	Neg.	Neg.	..	Neg.
" 9, "	Pos. 1/80	Neg.	Pos.	Neg.
" 15, "	Anticomp.	Neg.	..	Neg.
" 18, "	Pos. 1/160	Neg.	Pos.	Neg.
" 23, "	Pos. 1/40	Pos.	Pos.	Neg.
Dec. 28, "	Pos. 1/10	Neg.	Pos.	Neg.

This patient did not attend further, so no definite conclusion is possible. The rapid rise of the W.R. with standard antigen to a high titre and the subsequent fall towards negativity are noteworthy, as also is the fact that cardiolipin antigen gave a positive result with only one sample of serum from this patient.

Because six patients in this group of discrepancies are defaulting, it is impossible to assess their syphilitic status. Weighting the balance against cardiolipin, and assuming that all these patients were non-syphilitic, cardiolipin gave false positive reactions with 11 sera out of 1982 (0·5%); the true figure may well be below this.

The performance of the standard Wassermann antigen in this group was very good; the only times it gave positive results when the cardiolipin antigen gave negative ones were with 4 samples of serum from case 2.

In 59 cases of primary syphilis, proved by dark-ground microscopy, some of which are included in group I, the following results were obtained on testing the sera:

	Cases
Cardiolipin positive, routine W.R. positive	27
Cardiolipin negative, routine W.R. negative	25
Cardiolipin positive, routine W.R. negative	7
Cardiolipin negative, routine W.R. positive	0
Total ..	59

The foregoing figures for group I and the dark-ground positive group afford a basis for assessing the sensitivity of cardiolipin antigen. In the 59 dark-ground positive primary cases cardiolipin antigen gave 7 positive results when tests with the standard antigen were negative. In no case did the standard antigen give a positive result before cardiolipin. Though the number of patients is small, cardiolipin antigen does appear to detect primary syphilis earlier than does the standard antigen.

Though the dark-ground figures show that cardiolipin antigen is more sensitive than the standard antigen with sera of untreated primary syphilis, the other side of the picture is given by the 65 cases of treated syphilis in group I. Here the cardiolipin test was still positive, whereas the standard Wassermann had reversed to negative. It has been noted during the course of this work that this is the expected pattern of results in these cases, and cases of treated late syphilis have been observed where the cardiolipin test has remained positive for as long as eighteen months after the standard test and precipitation tests have reversed to negative. Subsequent follow-up of these patients for nine months after these positive cardiolipin results were obtained has not yet shown any other evidence of active syphilis.

It seems that the protracted seropositivity of treated cases is the price that must be paid for the high sensitivity required for the earlier detection of reagin in primary syphilis than is possible with standard antigen. The tendency of recent years has been to raise the sensitivity of serological tests for syphilis to the highest possible level compatible with the maintenance of specificity, and even deliberately beyond this level in the so-called presumptive or exclusion tests used for screening sera. In tests designed for the initial diagnosis of syphilis a very high level of sensitivity is eminently desirable, provided that it is not achieved at the expense of specificity. In the follow-up of treated cases of syphilis the high sensitivity of cardiolipin may prove an embarrassment to the clinician called on to interpret the results of tests in which it is used. For this type of work a simple standardised quantitative technique employing cardiolipin seems very necessary.

Group II

The results obtained with 2202 routine sera from a teaching hospital, consisting of 1417 from general medical and surgical cases and 785 from antenatal cases, were as follows. The tests agreed in 2184 (99%) and disagreed in 18 (1%). The tests were cardiolipin positive and routine W.R. negative in 8 sera from cases in which syphilis had been diagnosed, 8 sera (five patients) where the diagnosis had been other than syphilis, and 2 sera where the diagnosis was unknown. Of the 8 sera from cases diagnosed as syphilis, 7 were from cases of neurosyphilis and 1 from a woman with salpingitis who later became frankly seropositive. The 8 sera (five patients) from cases other than syphilis included 2 sera from a man with ophthalmoplegia and 1 from a case of intracerebral thrombosis, where syphilis might be expected to enter into the differential diagnosis; the remaining 5 sera came from patients with diagnoses of tuberculous bronchopneumonia, pneumonia (unspecified), and thyroid adenoma. Thus, where the diagnosis was known, the cardiolipin antigen gave 8 positive reactions in possibly non-syphilitic patients, or 0·36% of the total number tested. This figure is exaggerated by the fact that in two cases the serum was examined twice. In no case did the standard antigen give a positive result and the cardiolipin a negative one; this may be because the number of sera examined was relatively small. Of the sera examined in this group, 785 (35%) came from antenatal cases, and in these the results were identical whichever antigen was used: 6 sera (0·75%) were positive and the rest negative.

Group III

The results obtained with 940 sera sent to the V.D. Reference Laboratory for examination were as follows. The tests agreed in 853 (91%) and disagreed in 87 (9%). The tests were cardiolipin positive and routine W.R. negative in 36 sera from cases in which syphilis had been diagnosed, 4 sera from cases in which the diagnosis had been other than syphilis, and 4 sera from cases in which the diagnosis was unknown, making a total of 44. The tests were cardiolipin negative and routine W.R. positive in 7 sera from cases in which syphilis had been diagnosed, 33 sera from cases in which the diagnosis had been other than syphilis, and 3 sera from cases in which the diagnosis was unknown, making a total of 43.

Of the 44 sera in which the standard W.R. was negative while the cardiolipin W.R. was positive, 36 had come from cases diagnosed as syphilitic, the majority being old treated cases. Of the 4 sera from cases diagnosed as other than syphilis 2 were from newborn children of syphilitic mothers in whom reagin may have been transferred from the maternal blood-stream; these 2 sera might be included in the syphilitic group. The other 2 sera came from a case of keratitis and choroiditis and a case of gonorrhœa. Thus, where a diagnosis had been made, only 2 of 40 sera were from possibly non-syphilitic patients—i.e., 0·2% of the total sera.

Of the 33 sera where the standard W.R. was positive and the cardiolipin W.R. negative in cases diagnosed as other than syphilis, 5 came from cases of gonorrhœa, 1 from a case of keratitis, and 2 from a man with a chronic penile sore. Where a diagnosis had been made, the standard antigen gave positive reactions with 33 possibly non-syphilitic sera—i.e., 3·5% of the total sera.

These sera cannot be considered as routine specimens, for many of them had given anomalous results in other laboratories and they included many "problem sera." Nevertheless, the superior performance of cardiolipin antigen over the routine antigen is conspicuous, and the cardiolipin W.R. might prove a useful additional means of investigating possible false positive sera.

SUMMARY

Cardiolipin antigen has been compared with standard Wassermann antigen by the parallel testing of 5124 sera, using a modified Harrison-Wyler technique. The sera included routine specimens from a venereal diseases clinic, a general hospital, antenatal clinics, and sera sent for opinion to the V.D. Reference Laboratory.

Cardiolipin antigen was appreciably more se than the standard antigen, detecting a higher prop of cases of early primary syphilis, and remaining p in treated cases of syphilis after other tests had reversed to negative.

In testing the special sera sent to the V.D. Ref Laboratory cardiolipin was more specific than standard antigen. In the other two groups (V.D. and general hospital) this advantage was not appa

CHLOROMYCETIN IN SCRUB-TYPHU

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THE first clinical trial of natural 'Chloromyc (chloramphenicol) in scrub-typhus was made b American research unit working from the Institut Medical Research in Kuala Lumpur in 1948. The val chloromycetin was unequivocally established (Sma al. 1948), and a few months later similar results obtained with synthetic chloromycetin (Smadel 1949).

Attention has since been directed towards redu of dosage, owing to the cost and scarcity of chloromy In their earlier cases Smadel et al. (1948) gave an i dose of about 50 mg. per kg. of body-weight, follow 0·2–0·3 g. every 2–4 hours for a variable period. Inc ing experience enabled them to shorten the course, their last seven patients received about 6 g. in 24 h with equally satisfactory results. Smadel et al. (used a still smaller dosage of synthetic chloromyc two cases responded to 4 g. and 5 g. given in onl hours.

In March, 1949, therefore, at the suggestion of Charles Bailey, who was then leading the scrub-ty research unit, we undertook to reduce our stan course to a single dose of 3 g. This dose has now used in sixteen consecutive unselected cases of s typhus (table I) in Service personnel between M and July. All the patients were men of military age youngest being 17 and the eldest 31; British, Gurk and one Chinese are included. The infections acquired in various localities throughout North Central Malaya; hence, if different strains of *Ricke tsutsugamushi* exist in the Malay peninsula, our ex ence is not likely to be restricted to one variety on

TABLE I—SUMMARY OF RESULTS IN 16 CONSECUTIVE C OF SCRUB-TYPHUS TREATED WITH CHLOROMYCETIN

Case no.	Nationality	Age (yr.)	Severity	Eschar	Mouse inoculation	Weil-Felix (*OXK* agglutination titre)	Dose (g.)	Day of disease when started
1	B	31	+ +	0	Not attempted	1:1000 → 1:1600 → 1:200	3	16th
2	G	19	+ + +	+	Positive	1:200 → 1:6100	3	10th
3	B	24	+	+	Negative	1:400 → 1:3200	3	12th
4	B	25	+ +	+	Not attempted	1:400 → 1:3200	3	9th
5	G	19	+ +	0	Not attempted	1:400 → 1:1600	3	8th
6	G	28	+ +	+	Negative	1:400 → 1:3200	3	11th
7	G	27	+ +	0	Negative	1:100 → 1:1600	3	11th
8	G	19	+ +	0	Not attempted	1:400 → 1:1600	3	8th
9	G	24	+ +	+	Not attempted	1:400 → 1:1600 → 1:80	3	13th
10	B	19	+ +	0	Positive	1:400 → 1:800	3	8th
11	G	17	+ +	0	Not attempted	1:400 → 1:1600	3	21st
12	B	19	+ + +	+	Negative	1:100 → 1:800	5·25	7th
13	G	20	+ +	0	Not attempted	1:800 → 1:1600	3	20th
14	B	20	+ + +	0	Not attempted	1:400 → 1:1600	3	11th
15	B	20	+ + +	0	Not attempted	1:100 → 1:800	3	12th
16	C	29	+ + +	+	Negative	1:200 → 1:100	3	4th

B = British. G = Gurkha. C = Chinese.
+ = mild case. + + = average case. + + + = severe ca

important point in planning a dosage schedule of eral application. Chloromycetin was given at various ges of the disease, once as early as the 4th day, and ce as late as the 21st.

CLINICAL FEATURES AND DIAGNOSIS

Scrub-typhus has a case-mortality which has varied om 0·6 to 35·3% in different epidemics (Philip 1948) d in Malaya in 1940 was about 15% (Lewthwaite and voor 1940). Its natural course in non-fatal cases is wards resolution by rapid lysis after a febrile period nging from 12 days in mild cases to 25 or more in those mplicated by bronchitis or bronchopneumonia. The inical syndrome is marked by some or all of the following atures: eschar, maculopapular erythematous rash, cal and generalised enlargement of lymph-glands, njunctival suffusion and injection, a characteristic bloated" facial appearance, and, almost invariably, vere headache and intense general malaise. Complica- ons may be pulmonary, cardiac, or neurological.

In only two of the present cases was it possible to stablish the diagnosis beyond dispute by recovery and emonstration of the causal rickettsia after inoculation f a saline suspension of the patient's defibrinated red lls into mice. Nevertheless, seven patients had an mistakable eschar with well-marked regional lymph- enopathy, and in all the cases fever, rash, generalised mphadenopathy, facial appearance, and subjective nptoms in various combinations were enough to point cisively to the diagnosis. Confirmation was provided the Weil-Felix reaction. Lewthwaite gives as his inion that agglutination of *Proteus OXK* to a titre in 125 may be regarded as evidence of tsutsugamushi ection, but points out that titres as high as 1 in 480 ve been recorded in leptospirosis (Lewthwaite and voor 1940). Personal experience leaves us in no doubt at non-specific titres as high as 1 in 400 are regularly ncountered. It will be seen, however, that in twelve of he present cases the titre rose to 1 in 1600 or more, and his level was maintained until well into convalescence; e consider that these figures can be accepted as diag- nostic. In three other cases, where the highest titre was in 800, we regard them as strongly suggestive. The tre of 1 in 400, which was the maximum recorded in remaining case, is not inconsistent with the diagnosis, d the clinical picture here was typical in every way.

TREATMENT

All the patients, irrespective of age, race, weight, or he severity or duration of the disease, received a standard ose of 3 g. of synthetic chloromycetin, given as twelve ·25 g. tablets, not crushed or modified in any way. ost of the patients experienced nausea immediately fter receiving the tablets, but all retained them without due difficulty. Case 12 received a further 2·25 g. spread er 30 hours, and is reviewed in greater detail below. his patient and two others also received a course of enicillin, in view of the intensity of their pulmonary ymptoms. All the British patients, and some Asians, ho were taking suppressive antimalarial drugs before dmission, received 0·1 g. of mepacrine daily as a routine hroughout their stay in hospital. Any other treatment iven was purely symptomatic—e.g., analgesics for eadache and muscular pain.

ILLUSTRATIVE CASE-RECORDS

Case 9.—A Gurkha soldier, aged 24, who had been on jungle operations for the previous fortnight, was admitted on May 13, 1949, with headache, cough, and fever. These symptoms had first been noted 10 days before and had become progressively more severe; he had also developed a septic spot under the right armpit, with swollen and tender glands above it.

On examination, the patient was moderately ill; temperature 101°F, pulse-rate 90 per min. There was no conjunctival suffusion or injection, and no rash. In the right axilla there was a small black scab about 7 mm. by 2 mm. overlying an ulcer of similar size, with the typical appearance of a primary eschar. The regional lymph-nodes were much enlarged and tender, and there was a lesser degree of generalised lymphadenitis. No evidence of cardiovascular, respiratory, or nervous involvement was found.

Investigations.—Blood slides showed no malarial parasites, the Widal reaction was negative, and agglutination tests for brucellosis were also negative; the white-cell count was 5000 per c.mm., with a normal differential count. The Weil-Felix reaction (May 14) was negative with *Proteus OX19* and positive to a titre of 1 in 400 with *OXK*. Mouse inoculation was not attempted.

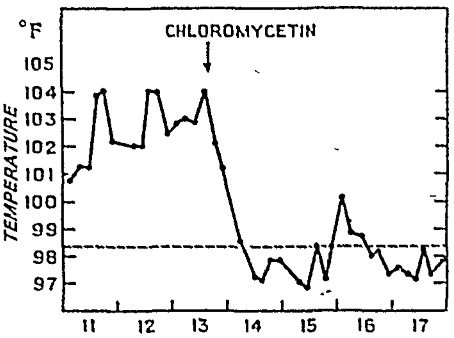

Fig. 1.—Chart of case 9.

Progress and Treatment.—During the next 2 days the patient's temperature ranged between 102° and 104°F; there was no essential change in his general condition. On May 16 at 2.30 P.M. he was given 3 g. of chloromycetin. At 6 A.M. on the 17th—i.e., $15^{1}/_{2}$ hours later—his temperature was normal, and he had lost all his symptoms and felt perfectly well. The lymph-glands were still enlarged but were no longer tender, and during the subsequent week they returned to normal size and the eschar healed. On May 20 the patient's serum agglutinated *OXK* in a dilution of 1 in 1600. He was transferred to convalescence on June 7.

Case 14.—A British soldier, aged 20, who had been on operational duties in the jungle, was admitted on June 20, 1949, with frontal headache, sore eyes, diarrhœa, and cough. The symptoms had started 9 days previously and were associated with nausea, vomiting, and insomnia. A full mepacrine course was instituted 4 days before admission, but there had been no change in symptoms or reduction in temperature.

On examination the patient looked toxic and ill; his temperature was 104·6°F and his pulse-rate 110 per min. His skin was hot and dry, and the conjunctivæ were injected. There was some faucial and pharyngeal inflammation. No rash or eschar was observed; the axillary and inguinal lymph-glands were slightly enlarged and tender. Generalised rhonchi were audible throughout the lungs, and there were a few basal râles, but no other abnormality was found in lungs, heart, abdomen, or central nervous system.

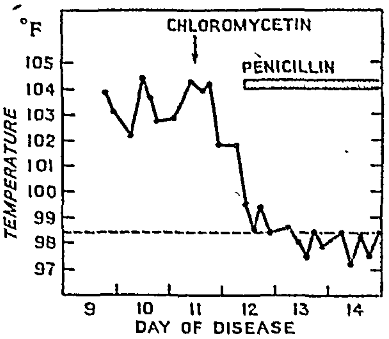

Fig. 2.—Chart of case 14.

Investigations.—Blood slides were negative for malarial parasites; the white-cell count was 7800 per c.mm., with a normal differential count; the Widal reaction was negative. The Weil-Felix reaction (June 21) was positive with *OX19* to a dilution of 1 in 50 and with *OXK* to a dilution of 1 in 400.

Progress and Treatment.—There was no essential change in the patient's condition on June 22, and he was given 3 g. of chloromycetin at 12.30 P.M. His temperature fell rapidly and by 2 P.M. on the 23rd—i.e., $25^{1}/_{2}$ hours later—it had become normal and he felt very much better. The lymph-glands, though still enlarged, were no longer tender. In view of the persistent signs of pulmonary involvement, the patient was given 50,000 units of penicillin 4-hourly for 5 days. On June 25 the Weil-Felix was positive with *OX19* to a titre of 1 in 200 and with *OXK* to 1 in 1600; the patient was afebrile and felt well, though there was still some residual bronchitis. On July 5 the lungs were clear on auscultation and the lymphadenitis had completely resolved. A coarse grating friction sound developed in the region of the right nipple, but the patient remained afebrile and symptom-free and was ultimately transferred to convalescence on July 26.

RESULTS

Mortality.—There were no deaths.

Effect on Temperature and Pulse.—In eleven cases the pulse-rate and temperature fell to normal within 18 hours and the temperature did not subsequently exceed 100°F at any two consecutive readings (temperatures were recorded 4-hourly). Figs. 1 and 2 show charts of typical cases from this group. In three cases a further 24 hours elapsed before the temperature settled completely, whereas two others required 54 and 72 hours.

Effect on Physical Signs.—The rash disappeared with the fall in temperature, except where there was petechial staining of the skin; this faint brownish discoloration persisted until well into convalescence. The primary ulcer lost its inflamed appearance the day after chloromycetin had been begun and healed as rapidly as any simple aseptic abrasion. Adenitis became painless within 24 hours or so, but enlargement of the glands subsided very gradually and was often still detectable at the time of discharge from hospital. Conjunctival injection and suffusion cleared in 24 hours.

Effect on Symptoms.—This was perhaps most striking of all. Headache and malaise were relieved even before the temperature returned to normal, and the change in the patient's appearance and demeanour was remarkable; men who one day were thoroughly miserable and apathetic by next morning looked bright and well and asked to be allowed up. Nevertheless, weakness, lassitude, giddiness, and other manifestations of postfebrile debility often appeared if convalescence was unduly hurried.

Effect on Complications.—Two patients with severe bronchitis and one with clinical bronchopneumonia were treated with penicillin, making it difficult to assess the part played by chloromycetin. In all three the pulmonary condition began to improve soon after the administration of chloromycetin—i.e., within 2 or 3 days. One patient developed a symptomless pleural rub during convalescence; radiography of the chest did not reveal any parenchymatous lesion, and the pleurisy resolved uneventfully. Only one patient showed significant evidence of cardiac involvement, in multiple extrasystoles, but the irregularity had largely disappeared before chloromycetin was given, and after treatment no clinical evidence of myocarditis was found. In many patients, especially those treated late in the disease, even gentle exercise caused disproportionate tachycardia until well on in convalescence. This is no doubt a manifestation of functional rather than structural disorder; it is none the less well established that fatal cases of scrub-typhus may show histological evidence of an intense myocarditis. One would not expect chloromycetin to influence pre-existing myocardial damage, and we have therefore continued to enforce a protracted convalescence on the assumption that time must be allowed for the repair of a structural cardiac lesion. On all other counts most of the patients could have been discharged within a few days of treatment.

Relapses.—Every patient has been under our own observation for at least 19 days after treatment, and at a convalescent depot for at least another fortnight. Only in case 11 was anything suggesting a relapse observed; this patient had an irregular fever rising to 101–102°F associated with headache, which lasted 10–16 days after treatment. It is noteworthy that he was not treated until the 21st day of his illness. One patient had a low-grade fever accompanied by gastro-enteritis, which started on the 3rd day after treatment and responded to sulphaguanidine.

Ultimate Disposal of Patients.—All patients who have completed their convalescence have returned to full military duty. In pre-chloromycetin days 25% of those who recovered from scrub-typhus had eventually to be invalided (*Lancet* 1949), and this result is therefore regarded as of real significance.

Failures.—As mentioned above, in case 12 the response to a single dose of 3 g. of chloromycetin could be regarded as suboptimal; this man's temperature chart is shown in fig. 3, and his case-record was as follows:

Case 12.—A British soldier, aged 19, who had been on jungle operations up to the onset of his illness, was admitted on June 7, 1949, with headache, fever, and general malaise, which had first been noticed 5 days before; 2 days before admission he had developed an unproductive cough.

On examination he was flushed and looked ill; his temperature was 104°F, and his pulse-rate 108 per min. There was slight cervical and axillary lymphadenopathy. No rash was observed, but behind the left knee, lying in the line of the skin folds, was a punched-out ulcer about 6 mm. by 4 mm. covered with a black scab, surrounded by a pink areola, and having the *typical appearance of a primary eschar.* Auscultation of the lungs revealed numerous adventitious sounds, including crepitations, at the left base. No abnormality was found in heart, abdomen, or central nervous system.

Investigations.—Blood slides were negative for malaria parasites; the white-cell count was 5400 per c.mm., with a normal differential count. The Weil-Felix reaction (June 8) was positive to 1 in 25 with *OX19* and to 1 in 400 with *OXK*.

Treatment and Progress.—In view of the pulmonary condition 40,000 units of penicillin 4-hourly was started at 6 P.M. on June 8. On June 9 the patient was more prostrated and lay inertly in bed with eyes half-closed; his facial appearance exhibited the blend of "bleariness" and apathy characteristic of the severe case of scrub-typhus. His lungs were clearer on auscultation, but his respiration-rate had risen to 38 per min. Blood taken at this time for mouse inoculation gave negative results. The patient was given 3 g. of chloromycetin at noon, but at 6 P.M. his temperature was 104°F and pulse-rate 112 per min.; his general condition showed no improvement, and his respiration was almost entirely abdominal. At 10 P.M. his condition was worse, and his respiration-rate had risen to 56 per min. He was given 1 g. of chloromycetin at 10.30 P.M. followed by 0·25 g. at 3 A.M. and 7 A.M., and 0·5 g. at 11 A.M. on June 10. By this time his condition was very much better, his temperature being down to 99·2°F and respirations to 28 per min. His liver and spleen were palpable 1 finger-breadth below the costal margin on inspiration. He was given a final dose of 0·25 g. of chloromycetin at 3.30 P.M. Thenceforward his convalescence was uneventful. The Weil-Felix reaction on June 11 was negative with *OX19* and positive to 1 in 800 with *OXK*. By June 17 the lungs were clear on auscultation, the liver and spleen were impalpable, and the patient was finally discharged on July 10.

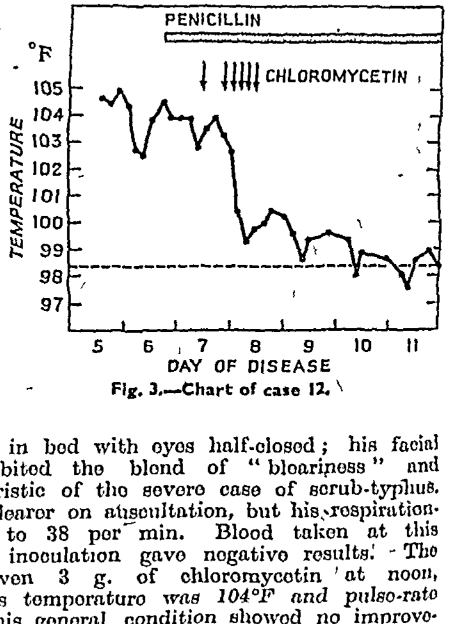

Fig. 3.—Chart of case 12.

Toxicity of Chloromycetin.—Other than slight and transient nausea, no toxic effects have been observed which could be attributed to chloromycetin.

Comment.—Smadel et al. (1948), whose series is the only one so far available for comparison, have tabulated

TABLE II—COMPARISON OF RESULTS WITH THOSE OF SMADEL ET AL. (1948)

—	Smadel et al.	Present series
No. of patients	25 (18 male, 7 fem.)	16 males
Day after onset when treatment was begun	3–11 (av. 6·2)	4–21 (av. 11·3)
Last febrile day of illness	4–12 (av. 7·5)	5–22 (av. 13·0)
Duration of fever (hr.) after treatment begun	10–96 (av. 31)	12–72 (av. 26·0)
Day after onset when discharged from hospital	9–28 (av. 19·2)	26–53 (av. 37·0)
Complications	0	1 (dry pleurisy)
Deaths	0	0

their results as in table II. where those of the present investigation are also recorded. The longer period, in our series, from the onset of the disease to discharge from hospital is, as explained above, due to the policy of retarding convalescence to allow for the repair of any possible cardiac damage. The greater delay in starting treatment is related to the difference in composition between the two groups, and, since there is no significant discrepancy between the results obtained, is of no further relevance.

DISCUSSION

Chloromycetin is now in daily use for the treatment of scrub-typhus in Malaya, and the brilliant promise of the original report of Smadel et al. (1948) has been amply fulfilled. The remarkable therapeutic response which we describe here is coming to be accepted as a commonplace, and we show that this response can be as rapidly and fully evoked with a single dose of 3 g. of chloromycetin as with the heavier and more protracted dosage hitherto used. This contention is based on a consideration of the mortality-rate, subjective and objective response, relapse-rate, incidence of complications, and ultimate disposal. In the single case where this dose seemed inadequate the patient was very severely ill and had developed a complicating bronchopneumonia before chloromycetin could be given. He would probably have recovered without additional chloromycetin, but it would clearly have been unjustifiable not to give it. Nevertheless even in this type of case treatment can be started with a single dose of 3 g., for the response is normally so rapid that the necessity, if any, for more chloromycetin will be apparent within 10–12 hours—i.e., before any significant time has been lost. Clearly, further reduction in dosage may be found possible, but here already is a treatment of exceptional simplicity, efficacy, and general applicability for a crippling and lethal disease. The most severe attack of scrub-typhus can be dramatically and consistently terminated within a few hours, and the dangerously ill patient rapidly made afebrile and symptom-free with one dose of a drug which is devoid of toxic effects and can be administered by the most unskilled. This is surely one of the most remarkable achievements in the whole field of chemotherapy.

The advent of chloromycetin makes early diagnosis more important than ever. Other fevers encountered in scrub-typhus areas may have a similar onset, and the distinction from them is sometimes difficult to make on clinical grounds alone. The Weil-Felix reaction may not give a conclusive answer until the middle of the 2nd week, and the results of mouse inoculation are not available for a fortnight; hence these tests are of value only in retrospect. When chloromycetin is more plentiful diagnostic uncertainty will no doubt seem less important: in existing circumstances we have been acutely aware of the lack of a reliable means of establishing the diagnosis in the first few days of illness.

SUMMARY AND CONCLUSIONS

Sixteen cases of scrub-typhus in British, Gurkha, and Chinese soldiers in Malaya are reported.

Each patient was given one dose of 3 g. of synthetic chloromycetin: fifteen responded fully and required no further treatment.

One patient did not improve within 10 hours, and was given an additional 2·25 g. of chloromycetin, after which he made a rapid recovery.

In the light of these results it is suggested that the routine treatment of scrub-typhus need consist of no more than a single dose of 3 g. of chloromycetin. If, however, obvious improvement is not apparent within 10–12 hours an additional dose of 1 g. should be given, followed by 0·25 g. 3-hourly to a total of about 6 g.

We wish to acknowledge with gratitude the unstinted advice and assistance we have received from the staff of the Institute for Medical Research, Kuala Lumpur, and in particular from Dr. J. W. Field, the director, and Dr. R. Green, the senior bacteriologist; we are also indebted to them for our chloromycetin. Our thanks are due to the Director of Medical Services, FARELF, for permission to publish this article.

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HIRSCHSPRUNG'S DISEASE

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IN August, 1948, Swenson and Bill reported a clinical and radiographic study of Hirschsprung's disease, and in their paper of October, 1949, they give credit to Neuhauser for the radiological findings (Swenson, Rheinlander, and Diamond 1949). They demonstrated a "spastic" segment of colon distal to the dilated part and concluded that this obstructive narrowing is responsible for the megacolon. They introduced resection of the abnormal segment—rectosigmoidectomy—as a new rational treatment.

Our first communication on this subject was published in THE LANCET of Jan. 1, 1949, just a year ago. The purpose of the present paper is to record the results of a clinical and radiological follow-up for over a year of the previously published 12 cases treated by rectosigmoidectomy; to report a further 14 cases; and to discuss the pathological findings in a total of 28 specimens.

It may perhaps be useful to summarise our previously published findings. Clinical, radiological, and pathological evidence was produced for a new conception of the organic ætiology of Hirschsprung's disease, thus separating it from idiopathic megacolon. Hirschsprung's disease, a congenital condition, may present as acute intestinal obstruction in the newborn, and, if not fatal, it runs a chronic course with superadded acute attacks. Medical and surgical procedures, other than colostomy, failed to produce more than transient relief, since they were aimed at treating the hypertrophied dilated "megacolon." Distal to this, however, a narrow segment was invariably demonstrable by careful radiological technique. Clinical evidence was produced which placed the site of obstruction in this relatively unimpressive

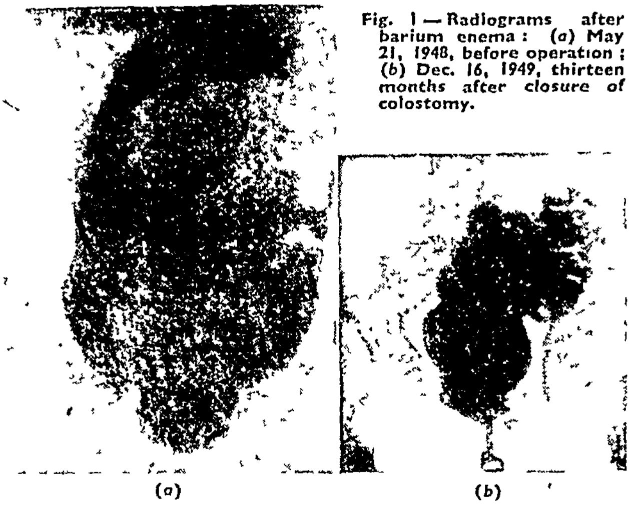

Fig. 1—Radiograms after barium enema: (a) May 21, 1948, before operation; (b) Dec. 16, 1949, thirteen months after closure of colostomy.

distal segment. Histological examination of the entire intestinal tract in 2 fatal cases revealed complete absence of ganglion cells from the intramural plexuses of this narrow distal segment. It was postulated that this would impair coordinated propulsive movement and lead to secondary hypertrophy and dilatation of the bowel proximal to the site of the lesion. A new surgical technique for removal of the abnormal distal segment—rectosigmoidectomy—was used in 12 children, and the pathology was uniformly confirmed. A preliminary follow-up of 11 cases for periods of one week to three months showed encouraging results.

FOLLOW-UP OF FIRST 12 CASES

Clinical Findings

The follow-up period was calculated from the date of final closure of the colostomy after rectosigmoidectomy. In the 12 cases originally described, the clinical course has been satisfactory during the last twelve to fifteen months. All the children are in excellent general health. They have regular spontaneous bowel actions, 8 without medicines and 4 with mild aperients. One child had his bowels open only every fourth day, but he is in good health and there is no evidence of any residual organic obstruction (fig. 1). Seven children are completely free from abdominal distension, and 5 have occasional distension which is relieved by spontaneous passage of flatus. The motions are still somewhat narrowed in 2 cases, unformed in 2, and normally shaped and formed in the remainder. Six older children appear to have normal rectal sensation, and respond at will to an apparently normal urge to defæcate. One child, who had severe bladder palsy for five months requiring cystostomy, is now cured. Two children had transient postoperative urinary retention, one minor fæcal incontinence, and one a mild form of narrowing at the site of intestinal anastomosis. All the patients are now continent of urine and fæces, and there are now no complications in this series.

It is appreciated that the final judgment of a new form of treatment in a chronic disease will require many years' follow-up.

Radiological Findings

All the 12 original cases show radiological improvement. Generally, they were examined postoperatively at five to nine months, and again at twelve to fifteen months after closure of the colostomy.

Straight films of the abdomen show a little more than average amount of gas in the colon and no excess of fæces. Barium enemata were performed by the technique previously reported. Only the segment of colon adjacent to the anus was filled, this being the part which before operation was adjacent to the aganglionic segment.

In 3 cases this part of the colon was almost within normal limits. In 7 cases the colon, while much reduced in size, was still above normal diameter (fig. 2). Haustrations had not reappeared, and where the gut was not distended by gas or emulsion it had a wrinkled and folded appearance. It follows that owing to the prolonged distension and hypertrophy, the volume of the full colon and the surface area of the collapsed colon are both greater than normal. In 2 cases, where the preoperative examination was made in infancy and only moderate distension demonstrated, the absolute size of the bowel shows little change postoperatively, but relative to the size of the child it approximates more nearly to normal.

Immediate postevacuation films, taken before and after operation, were thought to reveal no significant physiological information.

Further observation will be necessary to determine the end point of the regressive changes which are apparent on comparison of preoperative with first and second postoperative examinations.

THE NEXT 14 CASES

During the past twelve months a further 14 rectosigmoidectomy operations have been performed for Hirschsprung's disease. The last stage of the procedure —closure of the colostomy—has not been reached in one case and was so recent in 2 cases that they have been excluded from the follow-up analysis. Nine children were followed up for periods ranging from three to eleven and a half months. Six of these appear to be making satisfactory progress similar to that of the earlier group. Two have developed anastomotic strictures which require regular dilatations, but in spite of this they have regular spontaneous bowel actions and progress as well as the 6 mentioned above. One patient is much improved, and has daily spontaneous evacuations, but abdominal distension develops in the evenings and subsides spontaneoulsy after passage of flatus during the night; this is possibly due to the failure at operation to remove enough of the pathological segment at the lower end of the rectum.

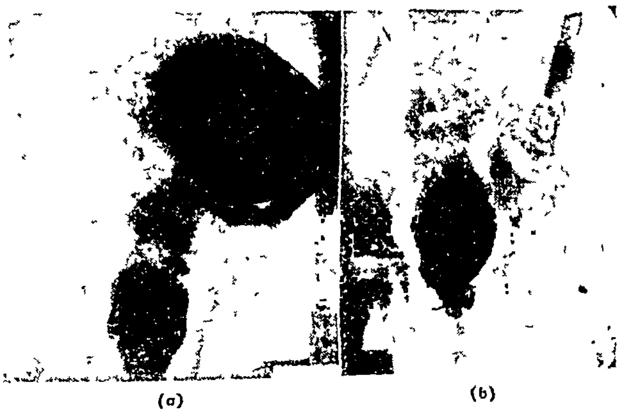

Fig. 2—Radiograms after barium enema in the case with long narrow segment illustrated by Bodian et al. (1949): (a) March 9, 1948, before operation; (b) Dec. 16, 1949, fifteen months after closure of colostomy. Rectosigmoidectomy was performed on July 29, 1948, and the colostomy was closed on Sept. 6, 1948.

There were 2 deaths. An infant, aged 1 year, died at the end of the rectosigmoidectomy operation which was complicated by severe and protracted anæsthetic convulsions. The other fatality was in a boy aged 7½ years who had previously had nine operations, including sigmoid colectomy, for relief of obstruction and closure of fistulæ. He died on the third postoperative day from peritonitis and ischæmic necrosis at the suture line.

In this last group of 14 rectosigmoidectomy operations, 2 children have previously had sigmoid colectomies performed. One was the fatal case just described, and in the other the descending colon was successfully mobilised and anastomosed to the lower end of the rectum after excision of the aganglionic segment.

One child had had a left hemicolectomy. Rectosigmoidectomy and anastomosis of the transverse colon to the lower end of the rectum were successful. He now has regular unformed spontaneous motions, with only occasional transient abdominal distension, and is in good health eleven and a half months after the closure of his colostomy.

Postoperative follow-up reveals a most encouraging improvement in the general condition of the children and the appearance of normal bowel habits. The complications are due to technical errors which, we hope, have been overcome by slight alterations in procedure.

PATHOLOGY

Our material to date consists of 28 consecutive cases. The first 2 were necropsies in 1947, previously reported, and 26 specimens were received after rectosigmoidectomy operations. In addition, necropsies were performed on the 2 fatal surgical cases. Histological examination was carried out by the technique previously described, and in all fatal cases consecutive blocks were taken from œsophagus to anus.

The histological findings which were reported a year ago have been amplified and uniformly confirmed. Complete absence of ganglion cells from the intramural plexuses was noted in the most distal segment of large intestine, which varied from 4 to 26 cm. in length and comprised the distal "narrow segment" frequently extending for 1–5 cm. into the transitional dilated zone (fig. 3). The distal extremity of the aganglionic gut was the line of excision in the rectum or anal canal in all surgical specimens, and the anocutaneous margin in all autopsies. The proximal extremity varied and lay either at the rectosigmoid junction or anywhere in the sigmoid or descending colon, the splenic flexure being the highest level in our series. Extensions of the aganglionic segment to the hepatic flexure and even to the terminal ileum have been reported elsewhere. Except for a short transitional zone with scanty and small ganglion cells, normal ganglia were found in all blocks proximal to it. Complete section of the intestinal tract in our 4 necropsy cases gave the same result.

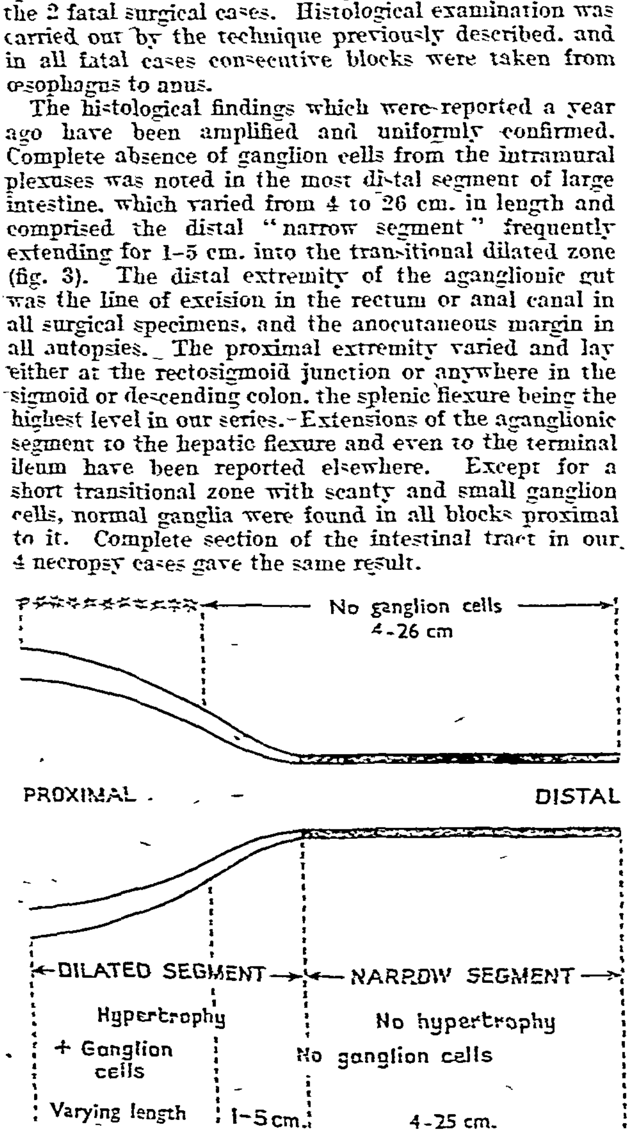

Fig. 3—Pathology of 28 cases of Hirschsprung's disease with narrow segment.

A striking feature in the aganglionic segments was the finding of numerous nonmedullated nerve bundles with supporting cells in the customary sites of the intramural autonomic plexuses. These bundles were densely woven and surrounded by a definite connective-tissue sheath. They varied considerably in size and were sometimes very conspicuous. They constituted as characteristic a feature of the abnormal segments as the absence of ganglion cells, and could not be found in any of our previously reported 11 control cases. The origin of these nerve-fibres is not known.

DISCUSSION

The absence of intramural ganglion cells is interpreted as the principal lesion in Hirschsprung's disease, and absence of peristaltic movement is its functional manifestation.

Some important new physiological observations have been made by Swenson, Rheinlander, and Diamond (1949), who have studied colonic motility by means of a multiple balloon technique. In 8 patients with Hirschsprung's disease they have recorded strong peristaltic waves in the dilated and hypertrophied colon, but the peristalsis did not enter the narrow distal segment, which exhibited increased tonus.

We find it difficult to explain in terms of current physiological teachings the three observed facts of absent intramural ganglion cells, absent peristalsis, and increased tone in the affected segment. In our previous paper we tried to correlate the pathological and clinical findings with the autonomic innervation of the bowel, but we now prefer not to offer any such interpretations.

Removal of the pathological segment by rectosigmoidectomy appears to be a rational treatment of Hirschsprung's disease, and this contention is supported by our own follow-up and by the excellent therapeutic results of Swenson, Rheinlander, and Diamond (1949). Operations in their 34 patients have resulted in one postoperative death and in apparently complete cure in the remaining 33 cases, who have been followed for periods up to two years. Re-examination by barium enema has demonstrated return of the colon to approximately normal size and contour by the third postoperative month. In 3 patients normal colonic peristalsis was demonstrated postoperatively by balloon studies.

We conclude from the histological findings in our 28 consecutive cases that these structural changes are characteristic of Hirschsprung's disease and constitute its uniform pathology. In this respect we go further than Swenson, Rheinlander, and Diamond, who in their paper of October, 1949, describe similar changes in 7 out of their total of 34 cases but do not suggest "that this occurs in all cases of congenital megacolon." Unfortunately they do not describe the histological findings in their first 26 cases, which were reported in August, 1949 (Swenson, Neuhauser, and Pickett, 1949). One of their specimens displayed a pathological variant which has been reported once before (Tiffin *et al.* 1940)—namely, segmental absence of ganglion cells in part of the sigmoid colon with normal ganglia above and below. We have not yet encountered this interesting but probably rare pathological variant of Hirschsprung's disease.

Another valuable pathological study of 11 cases of Hirschsprung's disease was published by Whitehouse and Kernohan early in 1949. Their findings are essentially the same as ours, and their results and our own may be taken as mutually confirmatory.

SUMMARY

A new ætiological conception of Hirschsprung's disease has been developed over the last two years, and a rational treatment devised. The observed facts are absence of intramural ganglion cells, absence of peristaltic movement, and increased tone in an apparently grossly normal segment distal to the dilated and hypertrophied colon.

This distal "narrow" segment has been removed by rectosigmoidectomy in 26 children.

Postoperative follow-up for twelve to fifteen months of the first 12 previously reported cases shows a most encouraging improvement in the children's general condition and a return to normal bowel habits. Radiological examinations also indicate considerable regressive changes in the volume of the full colon and the surface area of the collapsed colon.

Rectosigmoidectomy has been done in a further 14 patients during 1949, with 2 deaths. Nine children are making satisfactory progress comparable with the former group, notwithstanding some technical errors resulting in complications in 3 cases. The last 3 operations were too recent to be evaluated.

Histological examinations in 28 consecutive cases of Hirschsprung's disease have revealed two striking structural changes in the distal "narrow" segment of bowel—absence of intramural ganglion cells, and the presence of abnormal nerve bundles in the customary sites of the intramural plexuses.

These changes are thought to be characteristic of the condition.

We are glad to acknowledge our indebtedness to the consultant staff of the Hospital for Sick Children for their cooperation and permission to include their cases in this report.

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PASSAGE OF AN INTESTINAL TUBE PER ANUM

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The following experience with intestinal intubation, though not unique, seems unusual enough to be recorded.

A woman, aged 28, was admitted to hospital on Dec. 11, 1948, with colicky abdominal pain which had continued for three days, during which she had passed neither stool nor flatus and had vomited several times. In the previous year she had twice undergone right posterior pyelotomy for removal of calculi; and at the second operation, three weeks previously, right-sided nephropexy had been performed. *Urological examination at that time had revealed on the opposite (left) side the presence of two ureters which led by a common ureter into the bladder.*

On admission, the patient's general condition was good; she was afebrile. The tongue was somewhat dry. In the abdomen there was meteorism, but no muscle-guarding; occasionally, especially on the left side, the bowel was palpable in spasm; on auscultation numerous borborygmi were heard. The urine was normal; non-protein nitrogen 40 mg. per 100 ml. blood.

It was decided not to operate. A Cantor intestinal tube was introduced nasally; and eight hours later X-ray examination showed that the tip of the tube had passed far into the jejunum. During the first twenty-four hours no more than 500 ml. of intestinal contents was withdrawn by permanent suction through the tube. *The cramp-like pain and vomiting continued*; and saline and glucose were infused intravenously.

On Dec. 12, twenty-four hours after the tube was introduced, the abdominal pain became still more severe, notably on the *left side in the region of the descending colon.* The sigmoid colon was palpable in severe spasm, during which intestinal fluid gushed from the end of the Cantor tube. Soon afterwards, to our astonishment, the balloon end of the tube appeared at the anus. *The whole tube was then drawn without difficulty through the anus.* Thereafter the ileus ceased, *and the patient passed stool and flatus. For a day or two she continued to vomit and to have abdominal pain*, but this grew milder and soon ceased. Further investigation of the alimentary tract and gall-bladder brought to light no further clue to the cause of the ileus. Three months later the patient was symptom-free.

The Cantor tube was 10 ft. long, and when the balloon-end passed the anal ring there was still 3 ft. 3 in. protruding from the nose; thus the length in the nasal and alimentary tract was 6 ft. 9 in.

After death, the bowel appears longer than it actually is in life; and evidently in this case the normal in-vivo length of the small intestine was much reduced by *concertina-like spasm, which may have been aggravated by* the mechanical irritation of the tube itself. Thus, it is perhaps unwise to insert through the nose or mouth more than 5–6 ft. of an intestinal tube.

A SWALLOWED BOUGIE

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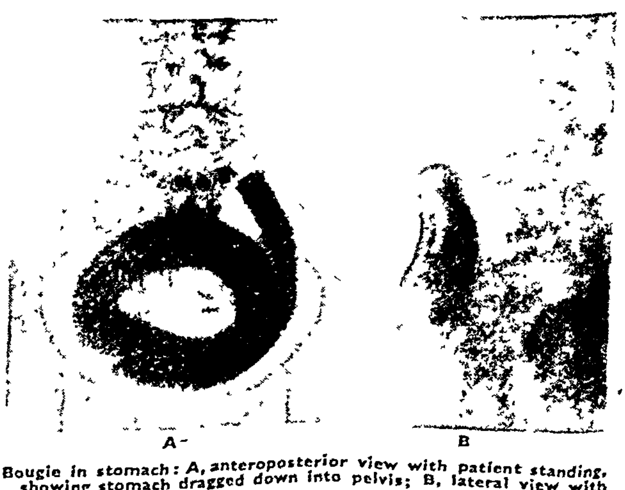
In the treatment of achalasia of the cardia the habitual passage of a Hurst's mercurial bougie is "both simple and effective."[1] After the unpleasantness of the preliminary trials, the patient becomes accustomed to swallowing the heavy tube. In this, however, as in other things, familiarity may breed contempt, with unpleasant consequences, as the following case-history shows.

On June 15, 1949, a married woman, aged 59, was admitted to the Royal Infirmary, Edinburgh, under the charge of Mr. R. Leslie Stewart, with a history of having swallowed her mercury bougie about three hours before.

She had been in the *Chalmers Hospital, Edinburgh,* in 1934 with a complaint of difficulty in swallowing, which was found to be due to achalasia of the cardia. She was treated *by the passage of a mercury bougie, and after leaving the* hospital she continued to pass the bougie herself at about once a fortnight for the next fifteen years, always lubricating the tube well with glycerin. In time the tape attached to the bougie wore off but she did not bother to replace it, always relying on holding the end firmly between her fingers.

At 9 A.M. on the morning of admission, she passed the tube, carefully lubricated, as usual. This time however it slipped, and, having no tape attached to check its passage, down it went. The patient tried to make herself vomit by tickling the back of her throat, but when this proved unsuccessful her doctor (Dr. A. D. F. Corrigall) was called in, and she was sent to the Royal Infirmary.

On admission she was a thin little woman, not unduly alarmed by her experience and not in any particular discomfort.



Bougie in stomach: A, anteroposterior view with patient standing, showing stomach dragged down into pelvis; B, lateral view with patient lying down.

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[1] Dunlop, D. M., Davidson, L. S. P., McNee, J. W. Textbook of Medical Treatment. Edinburgh, 1939.

X-ray examination (see figure) confirmed her story. Mr. Stewart and I both concluded that the tube was in the stomach, which had been dragged down into the pelvis by the weight of the mercury. The patient began to have abdominal pain and vomited several times in the early afternoon, so it was decided to operate forthwith.

Under general anæsthesia—thiopentone, cyclopropane, and *d*-tubocurarine chloride—a left upper paramedian incision was made. The stomach was found distorted into a J shape, passing down into the pelvis, and the mercury bougie was easily palpable through its wall. A small incision was made in the anterior wall of the stomach at right-angles to the long axis, and the tube was grasped with ring forceps and easily withdrawn. It was 33 in. long and weighed 19 oz. The incision in the stomach was closed in three layers and the abdomen closed without drainage.

The patient made an uninterrupted recovery. She was transferred to a convalescent home on June 27, and when seen on Aug. 23 after five weeks at home was in excellent health. Her chief concern had been that the mercury tube, having been successfully retrieved, might get lost in hospital. She intended to start passing the bougie as soon as she felt the need, but in future she would see that a piece of tape was firmly tied to its end.

I am grateful to Mr. R. Leslie Stewart for permission to record this case.

Preliminary Communication

DIRECT MEDULLARY ARTERIOLES AND ARTERIOVENOUS ANASTOMOSES IN THE ARCUATE SPONGES OF THE KIDNEY

During a hundred years of controversy over the exact anatomy of the renal blood-vessels, attention has been fixed on the results of injections. Few people seem to have looked closely at ordinary microscopical sections of the main site of dispute—the corticomedullary boundary. Examination of serial sections of many human kidneys has convinced us that arteriovenous anastomoses do exist, and that the medulla has an arterial blood-supply *independent of the glomerular circulation*. These anatomical facts have implications in every phase of renal function and pathology.

ANATOMY OF JUXTAMEDULLARY BLOOD-VESSELS

Almost immediately after their entry into the kidney the branches of the renal artery take up a position between the medulla and cortex, and there is no anatomical reason for separating them into interlobar and arcuate arteries. They may conveniently all be called arcuate arteries. Von Möllendorff[1] discusses their course fully. While in this site they branch frequently, so that one sees arcuate arteries of widely varying sizes. Their special feature, and one that has been almost completely neglected, is that they are accompanied by bundles of smooth muscle. These bundles are situated only on one side of the artery and consist of alternate bands of smooth muscle and collagen with varying amounts of elastic fibres. The muscle-fibres all run longitudinally and parallel to the artery, except for a peripheral thin circumferential muscular capsule which encloses the bundle and attaches it to the adventitia of the artery. The muscle bundles run the full length of the arcuate arteries and branch when the arteries branch, but are not usually continued on to the cortical (so-called interlobular) arteries. The peripheral capsule makes the muscle bundles impenetrable by any blood-vessels except at the line of junction between artery and muscle bundle.

When cut in cross-section, most of these bundles are seen to contain one or two arterioles also cut in cross-section and about the calibre of an afferent glomerular artery. These arterioles come directly from the arcuate arteries into the muscle bundle, and their subsequent course is of great interest. They run quite straight for a short distance and then show a remarkable change in the character of their cell structure. The layers become lost, and the wall is composed of loosely attached abundant concentric hyperchromatic plump cells. The arteriole is often tightly coiled at this point, and is always closely invested by a mesh of sinusoids lined by a single layer of cells. These sinusoids form coils and networks inside the muscle bundle and eventually drain into an arm of one of the big veins. Open communications between the sinusoids and the arteriolar coil are extremely difficult to demonstrate, but we have seen a few, and from collateral evidence we believe that the main function of these structures is that of an arteriovenous shunt.

After leaving the coil the arteriole regains its normal structure, runs straight again, and then undergoes the same changes one or more times. It then leaves the muscle bundle at right angles to the muscle-fibres and breaks up into a leash of vessels which supply the peripheral part of the medulla. The whole system of thin-walled sinusoids inside the muscle bundle forms a remarkable sponge-work, the spaces of which are commonly mistaken for lymphatics. We consider that the most suitable name for this system is "the arcuate sponge."

APPEARANCES OF THE ARCUATE SPONGE

The muscle bundles may be seen in all routine sections of the corticomedullary zone. The sponge is commonly empty: and, because its sinusoids have no wall other than endothelium, the only evidence of their existence is the presence of a few elongated small darkly-staining cells which seem out of place in their setting of muscle and collagen fibres.

Another common appearance of the arcuate sponge depends on the frequent presence in its centre of a branch of the renal vein. Like most of the intrarenal veins this tributary achieves increase in volume by a change in its shape. When nearly empty it is a fissure; when full it is circular in cross-section, and then the main body of the muscle bundle caps it on the side opposite to the artery. This appearance led von Möllendorff to describe the muscle bundles as eccentric thickenings of the walls of veins. The sinusoids of the sponge often open into this central vein by a series of tight coils which seem to have a valvular action. There may be a clue here to why the system has not been noticed in most injected specimens.

A rarer appearance of the arcuate sponge, and the only one which allows its nature to be studied, is seen when the sponge spaces are distended with blood. The sinusoids can then be seen to be in free communication with the veins, and sometimes a communication with the arteriole also can be made out. The blood-vessels we have described have been seen and illustrated by Golubew,[2] who discovered them by means of silver-nitrate injections and emphasised the difficulty of demonstrating them by any other methods. We feel that the reason why his work has not been accepted is that he omitted to define the site of these vessels so that they could be recognised in ordinary histological preparations. Their presence inside the muscle bundles of the arcuate arteries makes their identification a matter of no great difficulty.

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[1] von Möllendorff, W. Handbuch der mikroskopischen Anatomie des Menschen. Berlin, 1930; vol. VII, pt. 1.

[2] Golubew, W. Z. *Int. Mschr. Anat. Physiol.* 1893, **10**, 541.

Medical Societies

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Cerebral hæmorrhage and thrombosis	48	44	92	5·0
Chronic bronchitis and bronchiectasis	76	28	104	5·8
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Acute infections	90	54	144	8·0
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Gastric and duodenal ulcer	66	27	93	5·2
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Totals	1082	595	1677	93·5

The first three categories comprised the degenerative cardiovascular lesions and accounted for one-fifth of all the deaths in this series, compared with two-fifths in the Registrar-General's figures. Dr. Smith held that coronary disease in those over 65 differed in some unexplained way from that in younger subjects. Cerebral hæmorrhage accounted for only 5% of deaths in this series—a figure lower than might have been expected. Chronic bronchitis and bronchiectasis, though present in many cases, could be regarded as the real cause of death in only 6%. Simple prostatic enlargement accounted for 8%, and some of these patients might have survived had they submitted to surgical treatment some years earlier. Among the acute infections (8%), lobar pneumonia and bronchopneumonia and acute septic conditions were the most numerous, but many of these occurred in pre-antibiotic days.

Acute abdominal conditions (excluding those arising from carcinoma or peptic ulcer) accounted for nearly one-tenth of the total deaths—a relatively high proportion, as might have been expected in a purely hospital series. The important causes of the 159 deaths in this group were as follows:

Cause of death	*No. of cases*
Strangulation or volvulus	73
Acute appendicitis	17
.. ..	36
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Total	152

Strangulated hernia and volvulus, which in many cases might have been treated surgically with success if diagnosed earlier, caused 73 deaths. The complications and sequelæ of peptic ulcer—perforation and peritonitis, and, to a lesser extent, hæmorrhage—caused one-twentieth of the deaths. Here again many of these cases arrived at hospital too late for successful surgical intervention. Chronic nephritis, blood diseases, and trauma were insignificant groups, and tuberculosis (generally of an extensive fibrocaseous type) was responsible, as might be expected in this age-group, for no more than 3% of deaths.

There remained the last and most important single cause of death—malignant neoplasm, which deserved detailed consideration. The Registrar-General's report for the whole country in the decade 1936–1945 gave cancer as the cause of death in one-fifth of all cases in the age-group under consideration. In this autopsy series the figure was higher—one-third of all causes of death. The total was made up as follows:

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Dr. Smith had been impressed by the relatively large number of deaths due to diseases which, if properly and promptly treated, were often curable, and by the relatively small number of deaths due to purely degenerative, "senile" conditions.

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AT a meeting on Dec. 15, with Prof. CHARLES WELLS, the president, in the chair, Mr. RONALD EDWARDS read a paper on Cardio-œsophageal Obstruction.

Mr. Edwards described the more common causes of obstruction at the cardio-œsophageal junction—cardiospasm, peptic ulceration and stricture, and malignant disease. The salient feature was dysphagia. This started as a definite pain due to excessive peristalsis, but as soon as the circular-muscle fibres weakened dilatation took place, and pain was replaced by a sensation of distension. With long-standing obstruction the œsophagus might become a functionless sac. Hypersalivation and regurgitation were common, but vomiting of gastric contents was usually impossible. The caloric value of the diet progressively diminished as it became more fluid, and hypoproteinæmia supervened; this might be very difficult to correct and increased the surgical hazard. In cardiospasm, the œsophagus acted as a "drip-feed" and loss of weight might be long delayed; through spending a large part of his life in eating, the unfortunate patient was liable to get into economic and social difficulties.

Peptic ulceration of the œsophagus was due to functional incompetence of the cardiac sphincter associated with widening of the œsophagogastric angle, secondary to hiatus herniation. In a few people there was a wide hiatus, due to late descent of the stomach in embryological life. True congenital short œsophagus was present in only about 5% of cases. Paraœsophageal hernia without shortening of the œsophagus did not produce peptic ulceration. Secondary strictures formed if hyperchlorhydria was present, and associated juxtapyloric ulcers were common.

Carcinoma involving the sphincter was more commonly adenocarcinoma than squamous-cell, and the area 5 mm. each side of the œsophagogastric mucosal junction was very prone to malignant disease. Mr. Edwards described three cases of adenocarcinoma arising in intraœsophageal gastric mucous membrane. In every case the lymph-glands around the cœliac axis were involved early. It was necessary to remove the lesser omentum, greater omentum, cœliac nodes, mediastinal nodes, and suprapancreatic nodes. Adenocarcinoma called for removal of the lower end of the œsophagus, two-thirds of the pancreas, spleen, and related nodes in continuity, and for an œsophagojejunal anastomosis. For a squamous-cell carcinoma a subtotal gastrectomy might be performed, and œsophagogastric anastomosis completed the operation; but it was necessary to perform extensive nodal resection similar to that in the previous operation.

The treatment of cardiospasm, if simple measures failed, was by Heller's operation of œsophagocardiomyotomy, which should be done early, preferably through the abdomen; the incision down to the mucosa must be at least 2 in. long. In 15 cases this procedure had been uniformly successful. Other operations were not recommended.

The treatment of well-established peptic ulceration was difficult; repeated dilatations, alkalis, and sleeping in the erect position would help. If the condition was found early, cure might result from restoring the normal anatomy. Excision of stricture with œsophagogastric anastomosis after two-thirds resection of stomach had been recommended, but the experience was not great enough to evaluate this procedure.

With regard to carcinoma of the stomach, Mr. Edwards made a plea for more radical treatment, in view of the poor long-term results. The postoperative course might be difficult owing to hypoproteinæmia and vitamin deficiency, and before operation care must be taken to make good these deficiencies. Of 21 cases in which œsophagogastric resection had been performed, 2 had died after operation—one from bronchopneumonia three days afterwards, and one from hypoproteinæmia nine weeks afterwards. The patients, 4 of whom were over seventy years of age, tolerated these operations very well. Follow-up showed that of 5 patients operated on at least two years ago, 4 survived. The main mortality was from metastases in the 40–50 age-group; the older age-groups did well.

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Mr. Prince's book, apart from discursive accounts of the anatomy and physiology of the visual apparatus properly speaking, is packed with items of curious information about many matters indirectly related to vision; and its entertainment value is enhanced by an abundance of photographic and coloured illustrations. As Prof. Hamilton Hartridge points out in an introduction, it is full of information and raises many problems of the greatest interest which call for solution. But it is uneven in its treatment of the many subjects with which it deals, and here and there occur rather startling statements which arrest the reader's attention somewhat abruptly (as, for instance, the remark that "primitive man's remains have been found in conditions which suggest that he may have been well advanced as much as eighteen million years ago"). The lack of adequate references makes it difficult to distinguish the author's own observations from those he quotes from the work of others. He says in the preface that volume II (in preparation) will be concerned with "attempts at proving points and presenting new theories."

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Editor: Dr. MARIA PFISTER-AMMENDE, Zürich. Berne: Huber. 1949. Pp. 423. Sw. fr. 28.

MENTAL hygiene on a world-wide scale has lately been propagated as a panacea against many troubles of our times. Its theoretical aims are rather vague, but practical mental welfare work can claim results in many fields. This is the impression one gains from this Swiss publication in which over 40 writers do homage to Dr. H. Meng, of Basle, holder of the only professorial chair of mental hygiene in Europe, on the occasion of his 60th birthday. Contributions from Switzerland reflect the high standard of mental health services and of psychiatric personalities outside and inside hospitals. By far the most interesting articles deal with welfare work among the 300,000 refugees from all parts of Europe, prisoners-of-war, displaced persons, and deprived children received by the Swiss authorities since April, 1940. Organisation, selection and training of welfare workers, and special difficulties with certain national groups and their psychological problems are described in some detail; but this must be only a fraction of the large and unique Swiss experience in practical mental hygiene, from which other peoples could greatly profit.

That mental hygiene as a movement and practice has not made the same progress in many countries is obvious enough from the reports in this book from Britain, the United States, France, Hungary, Denmark, and Berlin—in spite of some rosy articles suited to the festive occasion for which it was compiled. It is not a comprehensive picture, for some of the best-known work in the field of social and preventive psychiatry—that of the Children's Police in Holland, and the mental-aftercare organisations in Amsterdam and New York State, and preventive work directed against crime and other forms of asocial behaviour in the Scandinavian countries—has not been included. It is difficult to gather from the book a clear idea of Dr. Meng's own teaching on the

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Streptomycin and Dihydrostreptomycin in Tuberculosis

Reports of research including studies sponsored by the American Trudeau Society (Medical Section, National Tuberculosis Association). Editors: H. McLeod Riggins, M.D.; H. Corwin Hinshaw, M.D. New York: National Tuberculosis Association. 1949. Pp. 554. $7.50.

This volume is of historic interest, for it gathers together the most important papers on streptomycin published in the United States since the first account of its discovery by Schatz and Waksman in 1944. The early experimental and clinical studies by Feldman and Hinshaw, the clinical reports by McDermott and his co-workers, the 1948 report of the Veterans Administration Streptomycin Committee, and the first reports on dihydrostreptomycin, are all reprinted here. Special articles on the bacteriological problems have been written for this volume by Steenken and Youmans, on the pathology by Baggenstoss and Medlar, and on toxicity by Fowler and others.

In the Trudeau Society investigations, which form the nucleus of the book, a main finding was that large daily doses (1·5–3·0 g.) gave better therapeutic results than smaller doses; but the treatment groups differed so much from one another at the outset, and so many results appear as "not stated," that the findings must be hedged with reservations, and cannot be held to invalidate the opposite findings by the Veterans Administration. At the same time, clinical reports by the individual investigators offer much enlightened comment on the problems of streptomycin therapy.

The book is handsomely produced, and is a valuable addition to the literature on the chemotherapy of tuberculosis.

The Infancy of Speech and the Speech of Infancy

Leopold Stein, M.D., F.R.A.I., physician in charge of speech therapy, Tavistock Clinic. London: Methuen. 1949. Pp. 209. 21*s*.

Study of the origin and early evolution of language is fundamental for the study of the evolutionary development of the human family; but it is difficult of approach. Dr. Stein's book on the evolution of speech is best regarded as a speculative essay, for (as the prospective reader is informed on the cover) "where direct evidence is lacking he has resorted boldly to analogy and fantasy." The fact is that we have no direct evidence of the linguistic capacity of palæolithic man, and the question naturally arises how far the author is justified in the use which he makes of analogies and fantasies. This is a matter, perhaps, for the individual reader to decide for himself, and in any case Dr. Stein may be commended for his strenuous effort to align all the indirect evidence —provided by comparative philology, by the study of the development of speech in the modern human infant, and by broad psychological principles—with what is known of the evolution of man and of human culture. To those unfamiliar with the notations used for expressing elementary voice sounds, the book is by no means easy to read. At the first mention of lists of phonetic symbols the reader is referred to the index, but unfortunately finds nothing there to help him. Much of the book is a popular account of the development of man and his culture in palæolithic times, and this draws largely on previous popular accounts (rather than specialist studies) for its factual data. Opinions are thus attributed to certain authors which they have really quoted from others. There are not a few inaccuracies of prehistory which are bound to affect the value of the book as a whole. Nevertheless, Dr. Stein's essay has been well worth while, for he demonstrates quite candidly the limitations of the sort of evidence on which he is bound to rely, and at the same time indicates the utmost limit to which it is possible to go, on the evidence at present available, in any attempt to elucidate the origin of language.

A Textbook of Bacteriology (6th ed. London: Heinemann. 1949. Pp. 484. 20*s*.).—In this edition of Dr. R. W. Fairbrother's book the sections on milk, the viruses, and the Rh factor have been revised, but otherwise there is little change. Subjects which have only technical interest are wisely omitted, but space is given to the relation of bacteriology to clinical medicine. The book covers the course in reasonable space, but it could be made shorter and better, though medical students, for whom it was written, seem to like it. It has a few useful illustrations but no references.

Proceedings of the Ninth International Congress on Industrial Medicine, London, 1948 (Bristol: John Wright & Sons. 1949. Pp. 1090. 60*s*.).—Those who attended the industrial medicine congress last year will be glad to have this stout memento of an interesting occasion. The book, however, is more than this, for many of the papers reproduced here will be valuable references for many years to come. Photographs, drawings, and diagrams shown at the sessions are well reproduced, and English synopses of foreign papers are provided.

The Filterable Viruses (Supplement no. 2, Bergey's Manual of Determinative Bacteriology. 6th ed. London: Baillière, Tindall, and Cox. 1948. Pp. 172. 20*s*.).—This supplement, by Francis O. Holmes, which was included in the last edition of "Bergey," classifies and names the viruses which cause disease in man, animals, plants, and bacteria, and gives valuable references and information about most of them. We shall miss the pleasant descriptive names of some of the plant viruses—those causing wilts, crinkles, and curls—and it is small consolation to know that mumps and herpes simplex viruses take the latinised names of a pettifogger and a rascal. Children with measles and chickenpox may share the taxonomist's fun when they learn that the generic name of both viruses is Briareus, the hundred-armed giant.

Law Relating to Hospitals (2nd ed. London: H. K. Lewis. 1949. Pp. 587. £2 2*s*.).—The start of the National Health Service has obliged Mr. S. R. Speller, LL.B., to rewrite much of his useful book and to put in a good deal of new matter, not only about the National Health Service Act itself but about the Penicillin Act, 1947, and the Radioactive Substances Act, 1948. Moreover he has taken the bold and helpful course of putting in a chapter on the mental hospitals. Doctors will again find that part II and part III contain much to interest them, and nurses will find their position and obligations defined in part IV. Part V deals entirely with the operation of the Act. As a barrister, as former editor of *The Hospital*, and as secretary of the Institute of Hospital Administrators, Mr. Speller is in a good position to know his subject both in theory and practice, and his survey should be of great use to our profession.

What is Man? (London: C. A. Watt. 1949. Pp. 204. 10*s*. 6*d*.).—The concept of man as a being who carries his evolutionary past as a fixed if inconvenient corollary of his present belongs more to the last than to the present century. It is this approach which may limit the value of Mr. Alfred Machin's essays—or rather aphorisms—for modern biological or sociological readers. He traces the very broad outlines of the conflicts between evolutionary survivals, in the form of instinct and conduct-pattern, and human aspirations; but he adds very little to the pattern of evolutionary rationalism which was far more comprehensively and accurately stated by T. H. Huxley nearly a century ago. It is hard, for example, for a 20th-century reader to come to terms with an author for whom "men hate work . . . (and) have no social instinct," or for whom "sex is one of the aberrant instincts of mankind" because it fails to coincide with civilised institutions. It is difficult to imagine that such a sequence of dogmatic inaccuracies could have been written by anyone familiar with the work of Mead or Unwin on sexual and social patterns, or of any of the more recent workers on the social behaviour of animals. The book is an interesting statement of an obsolete position—more cannot be claimed for it.

THE LANCET

LONDON: SATURDAY, JAN. 7, 1950

Mechanism and Purpose

THE other day an experienced physician was asked what criteria he would apply in judging the efficiency of a hospital: what relative importance would he attach to the qualifications of the staff, the ratio of beds to nurses, the adequacy of special departments, the catering, the facilities for reablement, and the various other items on which inspecting authorities commonly make notes? He replied: "I should not inquire into any of these things. I should simply go into the wards, select six patients, and find out precisely what had been done for them, and the care they had received, since the day of their admission." This wise answer has implications beyond even the hospital services, for it embodies the truth that any kind of machinery, however ingenious, is but a means to an end. In constructing a new mechanical system such as the National Health Service it is probably inevitable that we should at first be preoccupied with its design and control and with the affairs of those who have to work it. But there is a real danger of our eyes becoming fixed on the mechanism rather than on its purpose—which is to benefit all the people of this country, in the home, at work, and in the ward.

There is a particular risk that in focusing closely on the more elaborate parts of the machinery, which certainly need constant attention, some other parts will be neglected. Of course the basic principle of the National Health Service, on which the rest is founded, is that the patient is entitled to *any* kind of medical care he needs at any time. But in fact, as we all know too well, the resources of the service —in money, skill, and labour—are strictly limited; and it is at present quite impossible to provide everybody with comprehensive medical care of the best sort. This means that the way in which the resources are apportioned may make a great difference to the benefit the public actually obtains. The main value of the National Health Service Act is that it permits us, for the first time, to plan medical services as a whole; and this value will be lost if we go on putting all our efforts into making the old wheels turn more smoothly. The time has come to consider how far the system is economical: how far does it give the nation the best possible return for its money?

In terms of expenditure, the cheapest form of medicine is preventive medicine; the next cheapest is efficient care of patients in their homes; and the most expensive is hospital treatment. Anyone concerned with economy must therefore be disturbed by the bias of the National Health Service, in its initial phase, towards the development and improvement of hospital care, at the expense, to some extent, of the communal services and of general practice. The most powerful and best-endowed administrative bodies in the service are the regional hospital boards and the boards of governors, which control almost all the specialist talent. Properly intent on their own enormous tasks, these boards can hardly be expected to give much thought to the needs of other branches of the service; which makes it regrettable, as Dr. FRASER BROCKINGTON[1] has pointed out, that no authority in the regions is in a position to survey the situation objectively and decide whether some of the specialists would be not more usefully employed on preventive or domiciliary work. The decline of the so-called priority dental service for children and expectant and nursing mothers is, we fear, symptomatic of a general, if unintentional, shift of emphasis from preventive to curative work. As Dr. J. L. BURN[2] says, "it is deplorable that the dental resources, so limited in man-power, should be diverted from the needs of the future"; and he may well be right in going on to claim that a tenth of the increase in money for hospital services would, if diverted to public-health services, secure a vast improvement in public health within a generation. While approving the change that has relieved medical officers of health of their responsibility for hospitals, we view with disquiet the signs of a relative decline in their status. Similarly the lack of any sufficient endeavour to restore and rehabilitate general practice gives cause for anxiety even greater than we expressed last New Year. Admittedly general practice in this country was deteriorating long before the National Health Service was introduced, and its further deterioration is due rather to a heavier load than to any legislative alterations made by the Act. But on balance the effects of the Act on such practice have so far been for the worse, and there is little evidence that its problems are being squarely faced. Of the two possible policies, the first is to say that general practice is so often unsatisfactory that the correct course is to compensate for its defects—to develop hospital and specialist services in such a way that the shortcomings of general practitioners become relatively unimportant. This, we cannot help thinking, is the policy that is, consciously or unconsciously, being pursued. Yet if we are right in believing that, at any rate nowadays, patients should never unnecessarily occupy expensive hospital beds, it is definitely the wrong policy. The alternative—the only alternative— is to make a big positive effort to raise the level and prestige of general practice. This can still be done; and we hopefully welcome last week's news that Scotland, again taking a lead, is to make an initial inquiry into the relations between the general practitioner and the hospital and specialist services.

Depressing features in the medical scene as this year opens should not obscure the fact that policies can be changed and mistakes corrected. There is no reason, apart from human fallibility, why the new service, so brilliantly conceived in outline, should not be steadily improved, so that it brings more real benefit to the people—in the home, at work, and in the ward. But this improvement will not come automatically; and, now that the machinery is working, it is becoming urgently necessary to consider whether, or how far, the purpose of the system is being fulfilled to the best of our ability. The review that is needed might well be undertaken by the

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1. *Lancet*, 1949, ii, 759.
2. Annual Report for 1948 by the Medical Officer of Health for the City of Salford.

Central Health Services Council, which was intended to play a really important part as the accessory brain and the voice of the service. Somehow or by someone, the large view must be taken, and we must all be made to feel (as we should) that, amid unavoidable confusion and disappointment and hardship, we are progressing towards a service of high quality, soundly balanced. In the words of Prof. I. G. DAVIES[3]:

> "Looking back on 1948 and the year subsequent, there is discernible a vast national system of medico-social services administered by a number of different types of authority and run by different kinds of administrative machinery. Not even the kindliest critic of this machine could say that it worked smoothly or that its components were properly synchronised with each other. . . . Is it too much to hope that some method will be devised of integrating these different parts into one of the finest national medico-social services yet seen? The parts are all there—it would be a pity to leave them as they are."

Risks of Anti-histamine Medication

THE introduction and development of anti-histamine drugs in the last dozen years has been a notable advance in therapeutics, and their success in allergic diseases has naturally led to their trial in ailments on or beyond the borders of the allergic group. Since they have been particularly valuable in paroxysmal rhinorrhœa, it was inevitable that they should be tried in the common cold. In medicine, we are told, sensible experimentation is preferable to speculation, so such trials were obviously desirable. The ætiologies of the two conditions are generally agreed to be quite different—the one allergic and the other a virus infection—but it was argued that the symptoms of the early coryzal and congestive phases of a cold might be allergic in origin and that at this stage an anti-histamine drug might abort the cold before secondary infection had occurred.[4] Individual practitioners who have experimented on themselves seem to agree that the anti-histamines afford some symptomatic relief, and BREWSTER's[5] trial in the U.S. Navy was encouraging so far as it went, though the plan was subject to serious criticism.[6] On the other hand, PATON, FULTON, and ANDREWES,[7] who emphasised the difficulty of assessing "cold cures," reported a small but carefully controlled experiment to test the value of 'Anthisan' and concluded that the results did not show any dramatic effect of this drug on the common cold. They added this rider concerning their findings:

> "We do not bring them forward as evidence that there is no beneficial action, but only to draw attention to the necessity for rigorous control of any test of a remedy for colds; the need to depend on subjective judgments by patient and clinician alike make such tests particularly difficult."

A cautious attitude on the part of doctors is highly desirable, if only because the Poisons Board has not, so far, taken steps to prevent the public from buying these toxic drugs over the counter. It is said that by the Monday evening after an article had appeared in a Sunday newspaper on the virtues of anti-histamines as a cold cure, stocks of them in the chemists' shops were almost exhausted. It seems likely that of the thousands of people who bought these drugs at least a third would experience some toxic effect, such as drowsiness, giddiness, or the peculiar psychological states of unreality and disorientation. Trivial as this may appear, there will certainly be tragic consequences if drivers of cars and public transport dose themselves indiscriminately with anti-histamines. The decision not to include these drugs in the Poisons Schedules was doubtless made at a time when it could reasonably be assumed that the people taking them would normally be under immediate medical supervision. Today this applies only to a minority, and the change of circumstances has created a potential danger which merits immediate intervention by the Ministry of Health. The possibility that a labyrinthitis may develop on withdrawal of anti-histamine therapy, of which three examples are reported by CHERRY[8] for South Australia, also deserves consideration.

According to reports reaching this office several children have died from eating sugar-coated anti-histamine tablets as sweets. In cases of acute poisoning by anti-histamines the obvious antidote is histamine acid phosphate, injected subcutaneously in doses of 0·1 mg. per kg. of body-weight. Tablets which are vividly coloured and sweet to taste can scarcely be resisted by a normal child, and we have the unfortunate experience with ferrous sulphate tablets as evidence of this fact. Responsibility for safe disposal of poisons in the household rests with its adult members; but manufacturers might consider whether the time has not come to incorporate into the coating of these tablets a trace of some bitter substance which would discourage a child without causing undue hardship to adults.

Prognosis in Myocardial Infarction

THE mortality from coronary disease appears to be increasing. In his Harveian oration of 1946, CASSIDY[9] voiced his conviction that the increase could not be explained by more accurate certification; and he pointed out that relatively few cases were seen by the great physicians of the past, such as MACKENZIE and OSLER, or by the astute morbid anatomists of those days, though they were fully alive to the existence of the condition. According to the Registrar-General's returns, deaths in England and Wales from coronary disease numbered 1880 in 1926, 25,012 in 1945, and 33,168 in 1947. This is a startling increase; and RYLE and RUSSELL,[10] after allowing for changing fashions in diagnosis, amendments to the international classification of causes of death, and the lengthening span of life, conclude that the increase is real. Similar figures have in fact been published in the U.S.A., where 28,286 fatal cases were recorded in 1930, 101,467 in 1940, and 113,636 in 1942.[11] And at the Royal Adelaide Hospital,[12] in Australia, the proportion of necropsies showing cardiac infarction rose from 1·1% in 1935 to 4·5% in 1946

In myocardial infarction death often follows immediately on the onset of symptoms, or it may come without any warning at all; probably some 30% of all natural sudden deaths are due to coronary-

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3. *Medical Press*, Dec. 14, 1949, p. 555.
4. Cort, F. *Brit. med. J.* 1948, i, 758.
5. Brewster, J. M. *Nav. med. Bull., Wash.* 1949, 49, 1.
6. Annotation, *Lancet*, 1949, i, 480.
7. Paton, W. D. M., Fulton, F., Andrewes, C. H. *Ibid*, p. 935.
8. Cherry, A. *Med. J. Aust.* 1949, ii, 510.
9. Cassidy, M. *Lancet*, 1946, ii, 587.
10. Ryle, J. A., Russell, W. T. *Brit. Heart J.* 1949, 11, 370.
11. U.S. Bureau of the Census: Vital Statistics 1942, Part I. Washington, 1944.
12. Cleland, J. B. *Med. J. Aust.* 1949, ii, 733.

artery disease.[13] Statistics on prognosis are unsatisfactory for several reasons. There are inevitable variations between cases admitted to hospital and those treated at home. Some patients will be regarded as too ill to be moved to hospital, or will refuse to go: others will be regarded as too ill to be nursed at home, or circumstances may make home nursing impossible. On the whole, however, the more serious cases will be treated in hospital, and it is on hospital groups that most reports are made. On the other hand, hospital treatment may well be more effective, especially in these days of anticoagulants. Some years ago PARKINSON and BEDFORD[14] reported that of 100 patients who did not die immediately, 23 died within six months and a further 7 within two years. CONNER and HOLT[15] found shortly afterwards that of 209 cases about 16% died in the first attack; of those who survived this, 75% were alive at the end of a year, 56% at the end of two years, 21% at the end of five years, and 3·5% at the end of ten years. In 1931 WHITE and BLAND[16] recorded that 10% died within a month and a further 17% within a year. In 1935 BEDFORD[17] remarked that the outlook is always uncertain until the danger period of the first three weeks is past, though the chances are definitely in favour of recovery; that 25% of cases died within 6–8 weeks: and that thereafter there was a good chance of fair health and activity for some years, and a possibility of surviving more than five years. PALMER[18] found that of those who survived the first three months 75% were alive after five years and almost 40% after ten years. LEVINE and ROSENBAUM,[19] however, observed that the average expectation of life was only 3½ years. In a recent investigation of 866 cases in Servicemen under 40 years of age, YATER and his colleagues[20] found that of 450 who died no less than 83% did so within twenty-four hours of the onset of symptoms. How grave myocardial infarction can be in a hospital series has lately been illustrated by KATZ and his colleagues[21] of the Michael Reese Hospital, Chicago, who analysed 488 cases admitted to a general hospital. About a quarter of these patients died in the first two months, about half had died by the end of a year, about two-thirds by the end of the third year, and about four-fifths by the end of five years. Thus the survival-rate fell from 72% at two months to 55% at a year and to 16% at five years.

It is now realised not only that infarction may be painless but that coronary occlusion often takes place without infarction and infarction without occlusion.[22,23] It is generally conceded, too, that the prognosis for patients with angina pectoris is better than for those with clinically manifest infarction. Among 3000 cases of angina which were followed up by PARKER and others,[24] the average five-year survival-rate was 71% for women and 58% for men, and the average ten-year survival-rate was 40% for women and 33% for men. Questioning of patients with angina often elicits the history of an episode suggesting myocardial infarction some time—perhaps years—previously: and electrocardiography commonly brings to light unequivocal evidence of previous infarction. Some of these patients have kept on with their work, or gone back to it in a few days, after what in retrospect was clearly an infarction: but others seek advice for even minor pain and have thus been put to bed at home or admitted to hospital. There can be all grades of infarction, from the death of a small area of myocardium, or even of a few fibres, to extensive necrosis of large areas of ventricular wall. Suitable treatment may make all the difference to the outcome. Rest and relaxation are of paramount importance. Some patients will need oxygen and others treatment for shock. Continued pain demands relief, and though morphine is the usual standby GIBSON[25] emphasises the value of aspirin. If a serious arrhythmia develops, quinidine may be life-saving, or it may be useful prophylactically. Digitalis will be needed for congestive failure. Above all, perhaps, there are the possibilities of anticoagulant therapy.

The causes of death in the first two months are worth considering in detail. In KATZ's[21] series, further myocardial infarction was responsible for 65% of the deaths and in that of LEVINE and ROSENBAUM[19] for 40%. Next in importance is pulmonary infarction, and then peripheral arterial embolism, which may involve vital areas such as the brain or mesentery. In an analysis of 1605 clinical cases of myocardial infarction collected from eleven reports, HELLERSTEIN and MARTIN[26] found that 11·5% had clinically detectable lesions due to thrombosis or embolism. In their own series of 160 necropsies, infarction was found in 45%: in 12% of these cases this was held to be the main cause of death and in a further 15% a contributory cause. Here then is a promising field for anticoagulant therapy. Heparin and dicoumarol might well be expected to lower the incidence of mural thrombosis over the site of infarction in the ventricles and hence of arterial embolism. They help to prevent peripheral venous thrombosis, with its risk of subsequent pulmonary infarction: they probably limit the "build-up" of further thrombus behind the obstructed coronary artery: and they may also reduce the likelihood of further coronary thrombosis in other vessels during the period of hospital treatment. The American Heart Association set up a committee in 1946 to collect data on this subject from teaching centres, and the resulting series of 800 cases was divided into two groups. One group was treated in a standard way with dicoumarol, sometimes plus heparin, and the other served as controls. A preliminary report[27] showed encouraging results, which have been confirmed by other workers. Over the six weeks' period of observation, the death-rate in the treated group was 14·9%, compared with 24% in the untreated group. The incidence of thrombo-embolic complications was 11% compared with 25%. Moreover, about half the treated series experienced complications before the anticoagulant drugs had had

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13. Rabson, S. M., Helpern, M. *Amer. Heart J.* 1947, 35, 635.
14. Parkinson, J., Bedford, D. E. *Lancet*, 1928, i, 4.
15. Conner, L. A., Holt, E. *Amer. Heart J.* 1930, 5, 705.
16. White, P. D., Bland, E. F. *Ibid.* 1931, 7, 1.
17. Bedford, D. E. *Lancet*, 1935, i, 223.
18. Palmer, J. H. *Quart. J. Med.* 1937, 6, 49.
19. Levine, S. A., Rosenbaum, F. F. *Arch. intern. Med.* 1941, 68, 1215.
20. Yater, W. M., Traum, A. H., Brown, W. G., Fitzgerald, R. P., Geisler, M. A., Wilcox, B. B. *Amer. Heart J.* 1948, 36, 334.
21. Katz, L. N., Mills, G. Y., Cisneros, F. *Arch. intern. Med.* 1949, 84, 305.
22. Blumgart, H. L., Schlesinger, M. J., Zoll, P. M. *J. Amer. med. Ass.* 1941, 116, 91.
23. Ravin, A., Geever, E. F. *Arch. intern. Med.* 1946, 78, 125.
24. Parker, R. L., Dry, T. J., Willius, F. A., Gage, R. P. *J. Amer.*
25. Gibson, P. C. *Lancet*, 1949, ii, 1172.
26. Hellerstein, H. K., Martin, J. W. *Amer. Heart J.* 1947, 33, 443.
27. Wright, I. S., Marple, C. D., Beck, D. F.

time to become fully effective. Since the risk of these complications is greatest in the first four weeks and thereafter decreases rapidly, the prospects for such treatment influencing prognosis are bright. This form of treatment cannot be undertaken in the patient's home and is possible only in a hospital with sufficient laboratory resources. The necessary estimations of prothrombin-time with a daily control require particular care and involve dangers for the unwary. This raises the question whether myocardial infarction should not be regarded as an indication for urgent admission to hospital. With prompt hospital treatment (not to mention inclusion of the many more minor cases which can now be diagnosed) the results of the future may be a good deal less gloomy.

Intestinal Intubation

DECOMPRESSION of the obstructed small intestine by aspiration through swallowed tubes is a valuable and widely used measure. Like all potent remedies in medicine it has its snags and dangers. The intestine is intubated with more difficulty than the stomach because the pylorus often refuses to pass the bulky tip of a Miller-Abbott or similar tube. The substitution of a bag containing mercury for the more usual air balloon on the end of these long tubes is one of the devices used to facilitate their transmission through the pylorus, and HARRIS and GORDON[1] have lately recorded their experiences with such a tube. Its advantages are that, as it requires only one lumen, the whole diameter of the tube can be used for its primary purpose of aspiration, and that it passes the pylorus more easily than its double-lumen predecessors, especially if, once its tip is in the stomach, it is left to descend spontaneously and unaided by well-intentioned hands. Rupture of the bag containing the mercury in 4 cases caused HARRIS and GORDON some alarm, but those familiar with the writings of the late Dr. THOMAS DOVER[2] will recall his habit of prescribing metallic mercury in daily doses of an ounce for a variety of disorders, and will know that mercury in the intestine seemed to do his patients no harm. One of them, Captain COLT, writing about the year 1740, estimated that he had swallowed 120 lb. of quicksilver over a period of nine years, with complete relief of his gout!

The usual trouble with an intestinal tube is that it will not go far enough; but on occasion it may go too far. Not only is a tube whose tip lies in the colon useless for decompressing the small intestine, but apparently it may irritate the small intestine to the point of aggravating the ileus it is supposed to relieve. In our present issue Dr. FRANK reports an extraordinary case in which the balloon of a 10 ft. tube was seen at the anus when over 3 ft. of the suction end still protruded from the nose; the patient's ileus passed off spontaneously when the tube was removed per rectum. HARRIS and GORDON advise that if a long tube passes through the ileocæcal valve it should be cut off at the nose and left to be evacuated per rectum, since attempts to pull it back may damage the bowel. They think that the position of the tip of a tube should be checked by X-ray examination when the 3 ft. mark has reached the nose, and that only 2–3 ft. of tube in the sma
intestine is needed for satisfactory decompressio
They believe that 6 ft. is the proper length for
intestinal tube. A curious difficulty they encountere
was swelling of the mercury-filled bag in tubes whi
remained in situ a long time—a swelling due to t
permeability of rubber to carbon dioxide. In a singl
lumen tube the added carbon dioxide cannot
evacuated and may make it impossible to wit
draw the tube. On three such occasions the tu
passed per rectum, but in a fourth case operatio
was required. POOL[3] has recorded another curio
occurrence, in a patient with a gastro-enterostom
A long tube was passed into the jejunum via th
duodenum, re-entered the stomach through th
artificial stoma, and continued on this merry-go-roun
for three revolutions, knotting itself in the process
It had to be removed by operation. (The case of th
disappearing mercury bougie, recorded on anothe
page, is simple compared with these others, bu
none the less instructive to those who use such things.

None of the papers mentioned deal with the ra
pressure necrosis which long residence of a tube ma
cause in the nose, behind the larynx, or above th
cardia; nor do they refer to the slight but definit
interference with post-anæsthetic coughing. Th
biochemical difficulties which the body encounter
through continuous removal of gastro-intestinal juice
must also be reckoned on the debit side. Thoug
undoubtedly a great blessing, intestinal aspiratio
is by no means foolproof.

Annotations

HOW TO TEACH HEALTH PRINCIPLES

CONVINCING arguments are wasted on those who choose not to hear them. Dr. Iago Galdston,[4] reviewing the history of health education, recalls the early antituberculosis campaigns, in which plain facts given as starkly as possible were expected to raise standards of sanitation and cleanliness. But people were not really interested—partly, as he points out, because this was disease education rather than health education. An era of jolly little health rhymes and animated cartoons has followed, and is doing rather better: but these too fail with most people because they are minatory and instructive. They try to condition the reader to better habits; but it is impossible to condition anyone whose interests are not in some way engaged. Pavlov's dog, when his mouth watered in obedience to the bell, was interested in his dinner; but health education has no immediate appeal to any of the body's instincts. Dr. Galdston thinks that nobody except a hypochondriac "wants" health in a positive way; the ordinary person wants not to be bothered by bad health and wants to take his good health for granted without having to think about it. He also wants many things for which good health is essential—to eat, move, rest, and serve his body's needs—but he puts them first and health nowhere, for he will often pursue them at the expense of health. Though the growing boy will govern and direct his appetite when he is in training, he does it not on account of any abstract ideal of health but because he wants his side to win.

Well then, Dr. Galdston suggests, we must approach people through their living interests if we want to improve their health. Unfortunately he does not give

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1. Harris, F. I., Gordon, M. *Surg. Gynec. Obstet.* 1918, 86, 617.
2. Dover, T. The Ancient Physician's Legacy to his Country. 7th ed., London, 1762; p. 37 et seq.
3. Pool, R. M. *Ann. Surg.* 1949, 130, 267.
4. *Amer. J. publ. Hlth*, 1949, 39, 1276.

many examples of what he thinks might be done, though he quotes an example of what should not. An American social-hygiene booklet addressed to high-school students gives a good deal about syphilis and gonorrhœa, remarks that syphilis may be transmitted by kissing, and says that "heavy necking" may lead to venereal infection. Grim and forceful pictures illustrate the text. But the inmates of high schools are not really interested in venereal disease: and they know that kissing does not lead to venereal disease—anyhow in their experience—and that necking leads to marriage more often than to infection. The effect of propaganda of this kind on most Americans, he says, is to provoke the vulgar, but sound, expression "I say it's spinach and to hell with it." A social-hygiene pamphlet for the high-school population should, in Dr. Galdston's opinion, be reassuring and constructive. It should tell them that the stirrings of youth, with their associated confusion and embarrassment, are the precursors of adult opportunities, achievement, and satisfactions. It should explain that many of the fears of the young are based on superstition and misconception, naming them only to discredit them. It should give sound advice on the way youngsters might deal with their behaviour problems, and prepare themselves for the adventure of adult life. Venereal diseases would be mentioned somewhere, but as conditions which hinder and interrupt progress towards youth's goals. "Youth," he says, "is interested in the adventure of living, in love and in achievement."

That it is normal to fall harmlessly in and out of love in the 'teens has never been generally admitted in Great Britain. We continue to segregate our adolescents into rigidly homosexual communities, and to tell them they are interested in games and Girl Guiding when in fact they are not. Some of them, thanks to our insistence, get permanently bent out of the true. The frank American approach has much to recommend it.

FATHER'S BLOOD IS BAD FOR MOTHER

WHEN a mother needs a blood-transfusion after labour it is quite a common practice to take her husband's blood if he happens to be in the same ABO and Rh groups as his wife. According to Chown,[1] this may lead to trouble later, and he gives details of the following example, under the striking heading "Never Transfuse a Woman with her Husband's Blood."

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thus be possible to ascertain which categories of patient most need convalescence and to what extent their needs are met. Other agencies sending patients for convalescence or recuperative holidays include county health authorities, friendly societies, and large business firms; and a selection of these, too, are being asked to state their needs and to say how far they are satisfied. At the same time a study is to be made of those actually reaching convalescent homes. A large number of homes will be asked how many patients they receive over a given period, and into what categories they fall. The answers should show how many patients get into convalescent homes, where they come from, and what is their state of health on admission.

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It should be possible to complete a reasonably accurate survey within a year, and the Fund will then be able to issue a report for the guidance of those whose duty it is to maintain homes. It will also go on helping to establish new homes by making grants of money. Thanks largely to its financial help, several homes have been set up already to take the types of case for which accommodation is scarce. The most notable of these are perhaps Capesthorne, at Mudeford, which is run by the Red Cross for babies under the age of 2, and a small home for epileptics at Fairwarp in Sussex, run by the National Association for Mental Health. The Fund is also giving support to a new home for epileptics, shortly to be opened by the N.A.M.H. at Saxmundham, and to a new wing of the Dedisham Convalescent Nursery School for children under 5. These are a beginning, but before any large programme can be planned it is essential to know accurately what types of home are most needed. This the survey should reveal.

CARCINOMA AS A SEQUEL TO ULCERATIVE COLITIS

ONE of the most serious complications of ulcerative colitis is carcinoma of the colon or rectum. This is certainly rare, though the incidence varies widely in different series. Johnson and Orr[1] put the figure at about 2·5%. The highest incidence is recorded by Jackman and colleagues[2] in 95 patients who developed ulcerative colitis before the age of 16 years; 6·5% of these children developed carcinomas of the large bowel in later life. The duration of symptoms of ulcerative colitis before the carcinoma is diagnosed varies in the reported cases from 3 months to 36 years; the average duration has been given by Cattell and Sachs[3] as 9 years. In patients with ulcerative colitis, carcinomas of the colon and rectum seem to arise, on average, at an earlier age than in the general run of patients. Thus Johnson and Orr found that in 40 recorded cases of carcinoma complicating ulcerative colitis the average age at onset was 40·2 years, compared with 53 years in other cases of carcinoma coli.

A much more common complication of ulcerative colitis is the formation of polypi, which are seen in 10–16% of most series. They arise in severe cases during the healing phases and are most numerous in the rectum, getting less frequent higher up. They have sometimes been observed in the lower part of the ileum. In view of the known tendency of intestinal polypi to become malignant, it is sometimes suggested that they are the precursors of carcinoma in patients with ulcerative colitis. In considering this question the pathology of the polypi must be clearly understood. Most of them are inflammatory in origin and consist of œdematous hypertrophic areas of mucosa which have escaped the destruction suffered by the surrounding areas. Microscopically, beneath a generally intact layer of lining epithelial cells the tissues are infiltrated with inflammatory cells with an increase of fibrous tissue. Some of the glands may become blocked, leading to retention of mucus and the formation of cysts. These so-called pseudoadenomatous polypi must be distinguished from true adenomatous polypi. The adenomatous type is occasionally found in patients with ulcerative colitis and may become malignant. But Felson and Wolarsky[4] have found that out of 955 patients of varying ages who came to necropsy, excluding cases of ulcerative colitis, 6·4% had two or more adenomatous polypi in the colon. (This does not include the rarer hereditary adenomatosis coli, in which the whole colon is studded with multiple adenomas.) The incidence of adenoma in their patients with ulcerative colitis was well below this figure. Polypi of the pseudoadenomatous type were seen in 134 (15·7%) of their 855 patients with ulcerative colitis. In no case did they note any tendency for the polypi to become malignant. These findings must be taken as evidence against the polyposis of ulcerative colitis being a pre-malignant condition; and it must be concluded that the presence of such polypi is not an indication for colectomy.

THE LIVER LOBULE IN PERSPECTIVE

FOR a century misconception of the histological structure of the liver has been copied from textbook to textbook (with a few exceptions); and this despite the embryological studies of the latter half of the century and the more recent large volume of experimental work on the ætiology of hepatic cirrhosis. The picture familiar to all—the liver lobule composed of anastomosing cords or columns of cells radially arranged around the central vein—was conceived by Gerlach in 1849, developed chiefly by Beale (1856, 1889), and supported by Pflüger (1869); the description, analysis, and reassertions of Hering (1866, 1872) on the geometric three-dimensional aspect were almost completely ignored. So a good many modern textbooks still give only the one-dimensional account.

It was the preparation of a stereoscopic filmstrip on the histology of the liver for anatomy students that stimulated Elias[5] to re-examine the structure of the liver lobule. Having completed stereograms of liver lobules he wanted to add photographs of wax-plate reconstruction models and also some photomicrographs. When he came to examine sections of the human liver made perpendicularly to the central lobular vein he noted that long rows of cells were invariably seen and were unaccountably numerous. For he reasoned that if there were tortuous but linear columns arranged *radially* about the central vein, the chances of the microtome cutting them lengthwise for any considerable distance would be very slight; most of them would be cut obliquely and would be about three to four cells long. Further, it was almost impossible to find cross-sections of cords, which should be very numerous in tangential sections of the lobule. In man and the cat, sections parallel to the central vein showed long rows of cells simulating cords, and, no matter how the human or cat liver was cut, long linear rows of cells were always seen, with, at wide intervals, small isolated groups of cells in an epithelial arrangement. Elias concluded that this appearance in sections could only be produced by curved plates, sheets, or laminæ, *one cell thick*. This was verified by making wax-plate reconstruction models and by examining thick unstained sections mounted in glycerin.

Thus the new concept is that the hepatic cell-plates are curved and perforated at short intervals to permit the passage of the sinusoids which run towards the central vein: the cell-plates have unicellular and sometimes bicellular bridges, and it is these which account for the appearance of cords on cross-section. The human hepatic lobule therefore consists of a continuous tissue of connected walls, which enclose the spaces for the sinusoids to run through. The polygonal meshwork of bile-capillaries runs between the cells in the plates and bridges, and it forms hexagonal intercellular and pericellular networks within the liver plates. This is in close accord with the easily demonstrable network commonly seen in sections, which fits poorly into the hitherto conventional picture. Since in man and the cat the spaces formed for the sinusoids between the plates are like long sacks, their type of liver may be regarded as "saccular," in contrast to the "tubular" type of liver of the horse and rabbit, in which the spaces between the hepatic laminæ are narrow and cylindrical.

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[2] Jackman, R. J., Bargen, J., Helmholtz, H. F. *Amer. J. Dis. Child.* 1940, **59**, 459.

[3] Cattell, R. B., Sachs, E. *J. Amer. med. Ass.* 1948, **137**, 929.

[4] Felson, J., Wolarsky, W. *Arch. intern. Med.* 1949, **84**, 293.

[5] Elias, H. *Science*, 1949, **110**, 470.

NEW CONCEPTIONS IN HIRSCHSPRUNG'S DISEASE

ANOTHER year's work on Hirschsprung's disease here and in the U.S.A. has confirmed the views on its pathology and treatment which Dr. Bodian and his colleagues[1] at the Hospital for Sick Children, Great Ormond Street, set out in their paper of January, 1949. At that time clinical evidence had placed the site of intestinal obstruction in a narrow "spastic" segment distal to the dilated hypertrophied colon. A careful radiological technique had been developed to display the terminal narrow segment and to obviate the flooding of the lower colon with barium which produces a fallacious appearance of dilatation to the anus. Resection of this abnormal distal segment by rectosigmoidectomy had been reported, first by Swenson,[2] of Boston, to the Society of University Surgeons at New Orleans, and then by Stephens,[3] one of the Great Ormond Street team, to the surgical section of the Royal Society of Medicine. Histological examination of the distal segment by Bodian in 15 cases had revealed an absence of intramural ganglion cells and the presence of abnormal nerve-trunks at the sites of Auerbach's and Meissner's plexuses.

Early in 1949, Whitehouse and Kernohan[4] published a pathological report on 11 cases of Hirschsprung's disease from the Mayo Clinic; 10 of the specimens were obtained at necropsy and 1 after subtotal colectomy; 8 of the patients were children aged 8 months to 15 years, and 3 were adults. The histological findings were essentially the same as those reported by Bodian et al. During 1949 Swenson and his collaborators[5] amplified their former clinical and radiological reports by a study of colonic peristalsis in 8 cases of Hirschsprung's disease, using a multiple balloon technique, and by a histological study of 7 specimens. They also reported on a total of 34 rectosigmoidectomy operations. Their physiological experiments proved that peristalsis is absent and tonus increased in the distal colonic segment, and they confirmed that there are no sympathetic ganglion cells in this part of the gut. Their follow-up results for periods up to two years were apparent cures in 33 cases and 1 postoperative death. Radiologically they demonstrated return of the colon to approximately normal after operation.

In this issue (p. 19) Dr. Bodian, Mr. Stephens, and Dr. Ward bring their findings and results up to date. The number of children with Hirschsprung's disease treated by rectosigmoidectomy at the Hospital for Sick Children is now 26, and the 12 cases which were formerly reported have now been observed for twelve to fifteen months. This is still too short a time to reveal the final effects of the treatment, but the clinical improvement in the children, the establishment of regular spontaneous bowel actions, and the striking regression of radiological appearances after operation are impressive. The histological findings previously described have now been established in 28 consecutive cases; there can be no reasonable doubt that they are characteristic of Hirschsprung's disease and that absent peristaltic movement and increased tone in the distal colonic segment are functional manifestations of these structural changes. On the basis of the new ætiological concept rectosigmoidectomy is a rational treatment, and its value is certainly supported by the results so far obtained.

NOTIFICATION OF INFECTIOUS DISEASES

THE classification of notifiable diseases of the central nervous system has now been placed on a more realistic basis. By new regulations, which we outlined last week, the distinction of polioencephalitis from poliomyelitis has been brought to an end; and poliomyelitis is now notifiable as "paralytic" or "non-paralytic." "Acute encephalitis" ("infective" or "post-infectious") replaces the former heading of "encephalitis lethargica"; and the more generic "meningococcal infection" supersedes "cerebrospinal fever." The regulations are discussed in our public-health columns this week.

NEW YEAR HONOURS

Dr. Haden Guest, who receives a peerage, entered Parliament first in 1923 and is chairman both of the House of Commons Medical Parliamentary Group and of the Medical Personnel (Priority) Committee. He founded the Labour Party's Commonwealth Group, and the breadth and vitality of his interests have likewise been shown by contributions to our columns as a special correspondent abroad in war and peace, as well as by regular parliamentary notes from "Medicus, M.P." over many years. We thus have special reason to be glad at this recognition of his public services and personal merits. The knighthood in the Royal Victorian Order bestowed on Dr. H. K. Graham-Hodgson, of the Middlesex Hospital, is a suitable promotion from the C.V.O. he received as the radiological member of the team who attended King George V in his illness of 1928. Mr. T. E. V. Hurley, who becomes K.B.E., is consulting surgeon to the Royal Melbourne Hospital, and of the new knights bachelor two (Dr. F. A. Gunasekera, of Ceylon, and Mr. T. G. Wilson, of Adelaide) are distinguished members of our profession overseas. At home it is a pleasure to see the name of Dr. H. E. A. Boldero, dean of the Middlesex Hospital medical school and registrar of the Royal College of Physicians, whose wisdom in counsel has been decisive so much more often than his modest demeanour would suggest. Dr. J. A. Charles, who will next May succeed Sir Wilson Jameson as chief medical officer of the Ministry of Health, is another quietly effective man, whose ability was evident when he was medical officer of health for Newcastle upon Tyne, and who, as a deputy C.M.O. at the Ministry, has won confidence by his readiness to listen and his power to understand. Our colleagues in Northern Ireland will especially welcome the honour paid to Dr. W. W. D. Thomson, professor of medicine at Queen's University since 1923, and one of those who have helped to make Belfast the outstanding school it is today.

These and the other names on a good list appear in full on another page. Outside the Medical Register, one of the highest honours, the G.C.B., goes to Sir William Douglas, secretary to the Ministry of Health during its difficult labours of the past few years, and a knighthood to Mr. Arthur Sims, benefactor of medicine and surgery through his Commonwealth travelling professorships.

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[2] Swenson, O., Bill, A. H. *Surgery*, 1948, 24, 212.

[3] Stephens, F. D. *Proc. R. Soc. Med.* 1948, 41, 831.

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Special Articles

CONTROL OF INFECTION WITH THE BOVINE TUBERCLE BACILLUS*

JOHN FRANCIS
B.Sc., M.R.C.V.S.

In the control of human or bovine tuberculosis the ultimate object is to prevent tubercle bacilli entering the lung. The measures which have to be taken to achieve this are far from simple, and because of differences in the pathogenesis of human and bovine tuberculosis, and differences in the value placed on human and animal life, very different methods are used in man and cattle.

PATHOGENESIS AND NATURAL HISTORY

The striking fact about primary tuberculous infection in man is that as a rule the lesions heal, giving rise to "the familiar non-progressive globular little lesions of the primary complex." Hence a large proportion of the population reacts to the tuberculin test but does not spread infection. It is the person with bronchogenic phthisis of the "reinfection type" who chiefly spreads the disease.

In cattle the position is quite different. Only about 20% of British cattle react to the tuberculin test, but almost all of these have "open," though not acute, pulmonary tuberculosis of the bronchogenic type.

This difference between man and cattle has long been obvious, but our knowledge of bovine pulmonary tuberculosis has been put on a much firmer basis by Stamp (1948). It appears that when either calves or adult cattle become infected for the first time, by the aerogenous route, the result is usually a slowly progressive bronchopneumonia; and reinfection, either endogenous or exogenous, also gives rise to a bronchopneumonia. Calves which are housed with cows are exposed to a constant risk of infection by the aerogenous route, but when calves are not housed with cows about 90% of them reach maturity (two years) without being infected. (This is usually true even if they are pastured with cows, for the danger of infection at pasture is far less than in the cowshed.) Beef cattle are killed at two or three years, and figures obtained at meat-inspection show that the incidence in these animals is only 5–15%. After parturition a heifer enters the cowshed and in many dairy-herds she is exposed to heavy aerogenous infection during the rest of her life.

Fig. 1 shows the average incidence of tuberculosis at various ages. The evidence indicates that the high incidence of tuberculosis in dairy-cows is caused by this exposure to aerogenous infection and their longer average life; there is no real evidence that the "strain of milk production and calf-bearing" lowers resistance to tuberculosis. In support of this view it may be mentioned that Wade (1942) and Burke (1940) have been unable to demonstrate that pregnancy and suckling influences the mortality of tuberculous rabbits.

The risk of calves being infected by milk is not great, for only about 1% of tuberculous cows have tuberculosis of the udder. On the other hand, where it does exist, udder tuberculosis is a grave danger because if one cow has the disease it may infect all the calves fed on the mixed milk of the herd.

INCIDENCE AND EPIDEMIOLOGY

In Great Britain there has been much confusion about the incidence of bovine tuberculosis, the figure of 40% being applied indiscriminately to "cows" and "cattle." It will be seen from fig. 1 that if the incidence in dairy-cows is 40% the incidence in all cattle is much lower. The most reliable estimate is that of Ritchie (1946):

	Cattle of all ages (%)	Cows (%)
England	20	—
Wales	7·5	—
Scotland	15	—
Great Britain	17–18	30–35

Assuming that "cattle" have an average age of 2·5 years and cows of 5 years it will be seen that the figures for Great Britain fit reasonably well on to the curve of age-incidence.

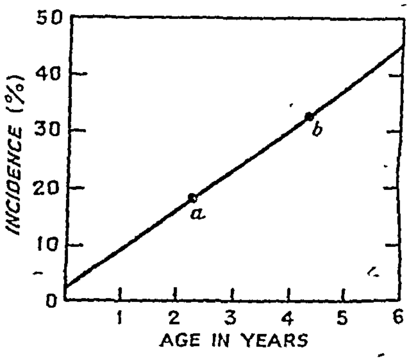

Fig. 1—Incidence of tuberculosis in cattle at various ages. The curve is based on information relating to Great Britain (Francis 1947). Point *a* shows the incidence of tuberculosis in all cattle, and point *b* the incidence in cows, as estimated by Ritchie (1946), and it will be seen that, presuming the average age of all cattle is $2^1/_4$ years and of all cows $4^1/_4$ years, these estimates fit on to the curve.

In his estimate Ritchie took account of the fact that there were then nearly a million cattle in officially tubercle-free herds. There are now $1^1/_2$ million cattle in attested herds and a considerable number in tuberculin-tested (T.T.)

Estimates of the economic loss from tuberculosis vary from £1 million to £3 million, but these only include the more obvious losses, and a better idea of the effect of tuberculosis can be obtained from the statement of Arthur (1948):

> "It is only when one has worked on a farm with an originally high reactor rate and then later on the same farm under identical conditions and with the same breed and type of animal—but free from tuberculosis—that one is fully conscious of the tremendous toll that this disease is exacting from the national economy in such a diversity of insidious and spectacular ways."

The course of the tuberculous epidemic clearly depends on two factors—the degree of exposure to infection and the resistance of those exposed. Krause (1928) has shown how tuberculosis must have increased with the early civilisations, where large numbers of people were crowded together in cities, decreased during the Middle Ages, and then reached a peak during the 17th century in London, followed by a steady decline beginning at the turn of the 18th century. Much the same may be true of bovine tuberculosis. It may have been introduced to Great Britain by Roman cattle, but under the conditions then prevailing it would have spread very little. It was probably introduced again during the 17th century with the Dutch cattle which helped to found our Shorthorn breed. The great success of the Shorthorns caused them to be crossed with most other local breeds, and British stock became fairly heavily tubercularised, so that when the famous beef and dairy herds were exported to the New World they, like the human beings, took tuberculosis with them. However, tuberculosis seldom reaches a high incidence in cattle kept in the open: it is only when they are housed, for intensive milk-production, that the incidence rises. Fig. 2A shows that in Great Britain, the incidence is highest in the areas supplying milk to the large cities, where farmers buy in cows to maintain their "flying" herds and thus provide every opportunity for the spread of infection.

There is no reason to think that the various European breeds of cattle differ in their susceptibility to tuberculosis; but the Zebu cattle of Africa and India have a considerably higher resistance, although, in Africa at least, they have not been exposed to tuberculosis for many hundreds of years.

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* Based on a paper given to the Tuberculosis Association's annual conference on April 8, 1949.

RELATIONSHIP OF BOVINE AND HUMAN TYPES OF TUBERCLE BACILLUS

The bovine tubercle bacillus can produce disease in a very wide range of species: it is less specialised in its pathogenic properties, and therefore perhaps developmentally more primitive, than the human type.

In 1901 Koch expressed the opinion that it was not pathogenic to man; but the workers of the Royal Commission on Tuberculosis (Cobbett 1917), from epidemiological and pathological evidence, with experiments on monkeys, concluded that it was just as virulent for man as the human type. There must, however, be some reason for the existence of the human type of tubercle bacillus and some explanation of the fact that it is much commoner than the bovine type in the human lung. Griffith (1937) said that the rarity of bovine-type infection could not be due to a lesser invasive power. He pointed out that the bono and joint forms of tuberculosis are often produced by the bovine type which has gained entry by the difficult intestinal route. It may be, however, that the bovine tubercle bacillus has less power to establish itself in the human lung than has the human tubercle bacillus. It is well known that some pathogens have great powers of spread but produce a mild disease, whereas others have low infectivity but when once established are very lethal; and Lurie (1947) has shown that strains of rabbits can be produced which are resistant to infection but succumb rapidly when once infection is established, whereas others are easily infected but are resistant to the established disease. Pinner (1940) has described a similar phenomenon in man: the chances of a negro becoming tuberculous in a given environment are no greater than those of a white man, but the chances that the negro will die of his tuberculosis are three times greater. If these differences can exist in the host it does not seem unreasonable to assume that the bovine tubercle bacillus has less power of establishing itself in the lung than the human, but when once established is equally virulent.[1]

INFECTION OF MAN WITH THE BOVINE TUBERCLE BACILLUS

A small proportion of persons who ingest bovine tubercle bacilli in milk become ill with tuberculosis. This is the one form of human tuberculosis that can be easily prevented; so it is natural that there should be a great effort to obtain milk free from tubercle bacilli. But the quantitative aspect of the subject is usually neglected. Samples are described as infected or uninfected on the basis of a guineapig test, but the 1–5 bacilli which will infect a guineapig when given subcutaneously will usually fail to infect a child when given orally; Webber (1910) found that quite heavy infection often failed to produce disease in man. Ostermann (1908) thought that for milk to be safe for man, it must not contain more than 1000 tubercle bacilli per ml. This is hardly an acceptable "standard," but the intensity of infection is clearly very important. Even though the number of positive milk samples remains high in this country, the decrease in non-pulmonary tuberculosis in children (Lethem 1946) may indicate that veterinary inspection of herds has reduced the weight of infection.

Though Theobald Smith in 1898 drew attention to the risk of respiratory infection from cattle, this has had comparatively little attention in Great Britain, perhaps because most studies of human tuberculosis have dealt with town-dwellers (e.g., Blacklock 1932). In 1909 Griffith observed pulmonary tuberculosis in man due to the bovine type, but Griffith and Munro (1943) concluded that bovine-type infection was rarely acquired by contact with human cases or tuberculous cattle. Cutbill and Lynn (1944), who found 1·6% of bovine-type infection in 2004 cases of phthisis which had not been in contact with cattle, compared with 16·4% in 97 cases of phthisis which had been in contact with cattle, emphasised the possibility of respiratory transfer of the bovine bacillus from cattle to man, man to man, and man to cattle; but in general, British investigators seem to have been loth to accept the importance of direct inhalation infection with the bovine type. It has remained for the Scandinavians to make it abundantly clear that people who work with tuberculous cattle are exposed to a very real danger of direct aerogenous infection chiefly from the dust of the cowsheds.

Earlier work on this subject has been reviewed by Hedvall (1942) and Sigurdsson (1945).

Hedvall, in Sweden, described 67 cases of bovine pulmonary tuberculosis in man. Only 14 of the 67 cases were in persons living in towns, and of these several had acquired their infection during an earlier stay in the country. As there were rather more people in the urban than in the rural districts of the area studied, the rural population obviously ran a much

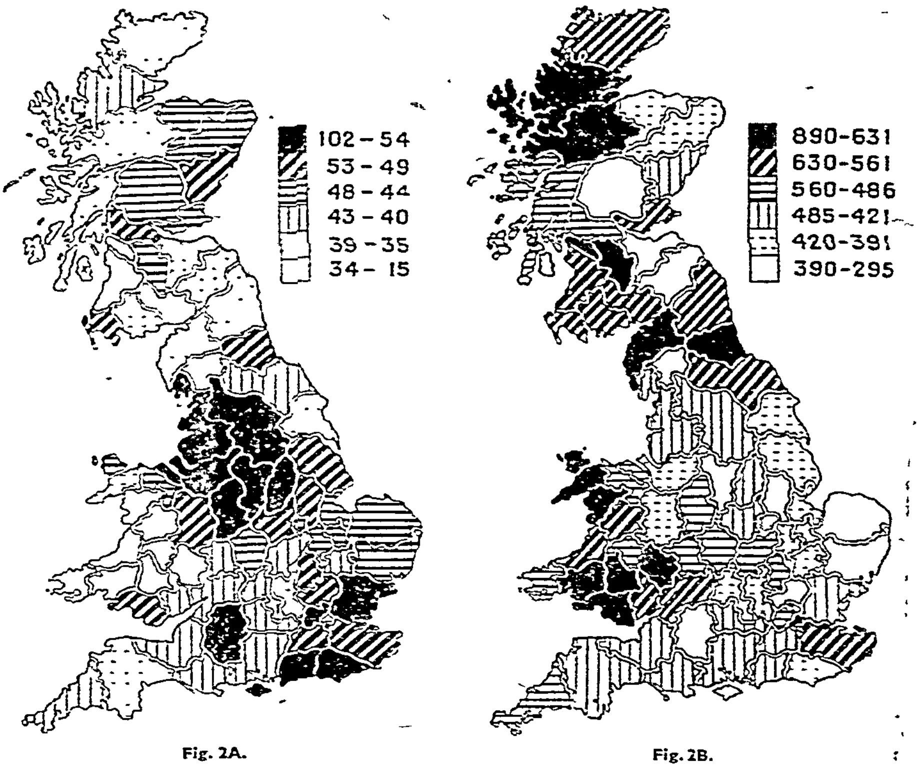

Fig. 2A. Fig. 2B.

Fig. 2—(A) Incidence of tuberculosis in cattle (combined bovine tuberculosis index Francis 1948a). (B) Tot mortality from tuberculosis in administrative counties (country districts) per million of population.

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[1] There is some evidence that change of type from bovine to human may occur in the human lung (Francis 1950).

greater risk of bovine infection than the urban, the risk being much greater in veterinary surgeons, butchers, and farmers than in those country-dwellers not handling cattle. In 35 cases the route of infection was uncertain; in 12 the primary lesions appeared to be in the abdomen, and in 20 in the lung.

Sigurdsson (1945) made a detailed epidemiological study in Ribe county, Denmark. From 1932 to 1936 the average proportion of tubercle-free herds was 7·9%, and of 37 rural patients developing phthisis 57% were infected with the bovine type of tubercle bacillus. From 1937 to 1940 the average proportion of tubercle-free herds was 31·2% and of 64 cases of phthisis in rural patients 31% were of the bovine type. These figures are, of course, no more than suggestive.

After consultation with local veterinary surgeons a special investigation was carried out on 100 families who lived on farms with tuberculin-negative cattle, and 100 who lived on farms with strongly tuberculous herds. In the latter the proportion of tuberculin-positive persons increased steadily during childhood, reaching 75% at fifteen years, whereas in children on clean farms the proportion of reactors was only 15% at this age.

Sigurdsson concludes that the amount of bovine tuberculosis in human beings is directly related to the degree of tuberculosis in the herds with which they have been in contact. Mild disease associated with bovine-type infection appeared to originate by either the alimentary or aerogenous routes. All the severe cases of bovine phthisis seem to have developed by inhalation infection in the cowshed, and their condition was indistinguishable from those produced by the human type of tubercle bacillus. Sigurdsson found little evidence of bovine-type infection passing from man to man, but he did observe 6 cases in which infection was apparently transmitted from man to cattle: in 3 the type was human and in 3 bovine.

Griffith and Munro (1943) have shown that bovine-type pulmonary tuberculosis is commoner in Great Britain than was formerly believed, but no inquiry on the Scandinavian lines has been undertaken here. As Sigurdsson (1945) says, "extensive systematic investigations covering all forms of tuberculosis, urban patients as well as rural patients in all age classes, all social classes, all parts of the various countries, and performed in the proper proportion to the morbidity within these groups" must be made before a reliable picture can be obtained.

EFFECT OF TUBERCULOUS MILK ON THE EPIDEMIOLOGY OF HUMAN TUBERCULOSIS

I thought it might be of interest to see whether there is any obvious relation between the regional incidence of bovine tuberculosis in cattle and the regional death-rates from tuberculosis in man. Fig. 2A shows the combined bovine tuberculosis index (Francis 1948a), and fig. 2B the average tuberculosis death-rates for 1945 and 1946, in the "administrative counties"—i.e., in the whole of Great Britain except the large towns and urban areas.[2] The two maps reveal a remarkable inverse relation between the incidence of bovine tuberculosis and the death-rate from human tuberculosis, and one cannot help wondering whether exposure to tubercle bacilli in milk does not after all provide a protection against the more dangerous respiratory infection in later life. There is, indeed, other evidence that it does.

Bovine tuberculosis was common in South Jutland when Holm and Holm (1945) examined 9000 children of three to fourteen years and found that about one-third were tuberculin-positive. In Zeeland, which was free from bovine tuberculosis only about one-ninth of 4500 children were tuberculin-positive. But, although the proportion of tuberculin-positive children was three times higher in Jutland than in Zeeland, the proportion of children with X-ray lesions in their lungs was two and a half times higher in Zeeland than in Jutland, and in the tuberculin-positive eight times higher. Holm and Holm write: "It is safe to say that tuberculous milk infection protects the children against tuberculous infection of the lungs." In South Jutland 86% of the adults were tuberculin-positive and 1·16% radiographically positive; in Zeeland 78% of the adults were tuberculin-positive and 1·73% radiographically positive. In towns with tuberculous milk 75% of children were tuberculin-positive at fourteen years of age, whereas in towns with tubercle-free milk only 20% were tuberculin-positive; but there was no more clinical tuberculosis among children drinking the tuberculous milk than among those drinking the tubercle-free milk. From all this Holm and Holm conclude that bovine milk infection is fairly harmless except in small children, whereas inhalation infection, whether human or bovine, is much more dangerous. They draw attention to the grave danger to which adolescents from tubercle-free areas are exposed when they meet respiratory infection in the towns, and they advocate wide use of B.C.G., particularly in adolescents.

Madsen et al. (1942) examined nearly 3000 children in areas where tuberculosis occurred in cattle and 9000 in areas where it did not. The proportion who were tuberculin-positive was four times greater where there was bovine tuberculosis, but examination of hospital records showed that the proportion requiring treatment was twice as large in the regions where there was no bovine tuberculosis; and so was the proportion with X-ray changes in the lungs.

Since the maps for Great Britain were prepared, I have seen the report by Lichtenstein (1924) on his careful inquiry relating the tuberculosis death-rate in various age-groups in Sweden to the incidence of tuberculosis in cattle. He concluded that "thus far, Swedish statistics afford no proof whatsoever for the assumption that there is any noteworthy connexion between infantile tuberculosis and tuberculosis in cattle, but, on the contrary point in the direction that there is a similar connexion between infantile tuberculosis and tuberculosis among the population as a whole." The inverse relation between the incidence of human and bovine tuberculosis was, however, rather less striking than in Great Britain.

Various people have, of course, always believed that milk infection via the resistant alimentary route confers immunity against the more serious respiratory infection, and there is little doubt that they are right. On the other hand, those who advocate pasteurisation have pointed out that tubercle bacilli cannot be tolerated in milk as a means of immunisation, because they kill something like 1000 people a year. This likewise is true; but the Registrar-General's report shows that during 1945 2208 persons under fifteen years of age died of tuberculosis, and 4331 persons between fifteen and thirty. If removal of tubercle bacilli from milk is going to increase susceptibility and mortality in adolescents one is entitled to ask whether on balance it will benefit public health—unless more is done to protect this important age-group.

Having said this, I must make it perfectly clear that I am not opposed to pasteurisation of milk and believe that every effort should be made to eradicate tuberculosis from cattle. From the standpoint of public health the increase in milk-supplies which will follow eradication may well be more important than the removal of tubercle bacilli from milk. This removal will, however, prevent the deaths from bovine-type infection in children and I believe that the loss of the specific immunity formerly produced in most children by ingesting tuberculous milk can be offset by vaccination with B.C.G., which seems to be capable of reducing tuberculosis morbidity and mortality by 60–80% (Francis 1949).

CONTROL

Great Britain led the world in the control of the major epizoötics during [illegible]948b), and was in the forefront o[illegible]" (Newsholme 1927, Wilson 1948). But by the time the acute epidemics had been brought under reasonable control, much of our energy, both in the human and animal field, seems to have been dissipated, and we have allowed other countries to take the lead in work on tuberculosis. However, there now seems to be a new interest in the subject and a tribute is due to Dalling and his colleagues, at the Veterinary Research Laboratory, for their work on tuberculin-testing, which forms the basis of all schemes to eradicate bovine tuberculosis. To overcome the difficulties of "non-specific" sensitisation caused by avian tubercle bacilli and other organisms, they have devised the comparative intradermal test, in which avian and mammalian tuberculin are injected simultaneously in different sites in the neck. The interpretation of the test, which is carefully defined, depends on comparison of the measurements of the two swellings. For the purpose of these tests large quantities of mammalian and avian P.P.D. (purified protein derivative) tuberculins are produced at Weybridge using the methods described by Green (1946). The great advantage of these tuberculins is that their potency can be readily standardised by chemical methods to ± 0·5%, whereas Old Tuberculin can only be standardised to ± 40% using eight guineapigs per group (Green 1946). There can be little doubt that the tuberculin-testing carried out on cattle with P.P.D. tuberculins in Great Britain is more efficient than that done in any other country. Old Tuberculin is still widely used in man, but for any extensive programme of tuberculin-testing the pure standardised product appears preferable.

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[2] Figures for England and Wales as published by the Registrar-General. Figures for Scotland kindly supplied by Dr. P. L. McKinlay.

In 1917, when the over-all incidence of tuberculosis in the U.S.A. was probably 6–8%, eradication under the accredited herd and area plan was begun. Under this plan cattle in an area were tuberculin-tested and the reactors slaughtered. An area was claimed as "accredited" when less than 0·5% of the cattle reacted to tuberculin. The progress of the scheme is shown in figs. 3 and 4. Between 1917 and 1940, when the last county reached this status, over 200 million cattle had been tuberculin-tested. Yet this campaign in the U.S.A. often had surprisingly little support. Even such a far-sighted and penetrating observer as Krause (1919) wrote: "Nothing can be more wasteful, extravagant and unproductive of real results than the slaughter of infected cattle" and he condemned the early efforts at eradication. Drolet (1946) speaks of the value of pasteurising milk in the U.S.A. to prevent infants being infected with tubercle bacilli; he does not mention that bovine tuberculosis has been eradicated!

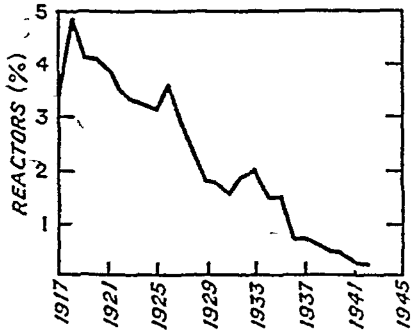

Fig. 3—Control of bovine tuberculosis in the United States of America. (The number of cattle tested between 1917 and 1942 was about 253 million. There were nearly 4 million reactors.)

In Scandinavia the position seems to have been quite different. There physicians and veterinarians have collaborated closely, and, to paraphrase Krause (1919), they have not gone to the people as scientists, physicians, experts, or officials, but as *men*. Awakening the interest of the community, they have achieved remarkable results. In Denmark in the early 1930s the incidence of tuberculosis was very similar to that in Britain. In 1932 a voluntary area eradication scheme was introduced, based on the coöperative dairies, and its progress from 1937 onwards is shown in fig. 5. Results in the Danish Islands were very good; but it became obvious that the law needed strengthening to finish the work on the mainland, and this was done in 1942 (Nielsen 1947). Under the new law the owner of a tuberculosis-free herd may insist on any farm hand being examined for tuberculosis: if the man refuses he may be discharged forthwith. The owner, for his part, must inform his cowmen if any of the cattle are found to have tuberculosis.

Denmark became virtually free from bovine tuberculosis in 1948; so it will be seen that the veterinary authorities and farming community eradicated the disease in 16 years, starting from conditions much the same as those in Great Britain in 1935. In the U.S.A., starting with a much lower percentage of reactors, it took 23 years to achieve the same result.

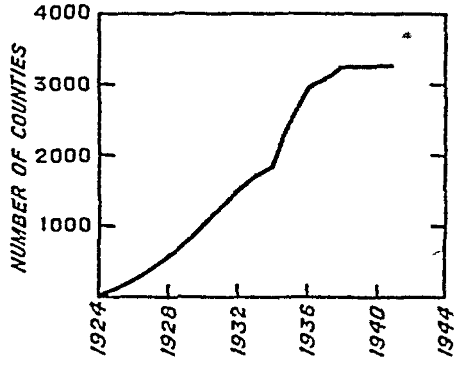

Fig. 4—Modified tuberculosis-free counties in the United States.

Magnusson (1942) describing the incidence and control of bovine tuberculosis in Sweden, mentions that partial pasteurisation was introduced in 1939 and complete pasteurisation (except for milk from tuberculin-tested herds) in 1940. When human-type infection is encountered in a herd the veterinary surgeons inform the medical board, who order an examination of the attendants, and many cases of human tuberculosis have been detected in this way. Magnusson emphasises the danger children run when they play in infected cowsheds and points out that it is not enough to exclude tuberculous animals from eradication areas, because persons with bovine phthisis can easily infect a herd.

In Great Britain the first legislative attempt to control bovine tuberculosis was the Tuberculosis Order of 1915, which was not put into force until 1925. It is largely a public-health measure, which aims at removing severely diseased animals. Grade A tuberculin-tested milk was recognised under the Milk (Special Designations) Orders, 1923, but this did little to promote a progressive increase in the number of tubercle-free herds. Accordingly the attested herds scheme was introduced in 1935, and powers to carry out area eradication were granted in the Agriculture Act of 1937. Fig. 6 shows that the rapid increase in the number of attested herds, arrested during the war, has now been resumed. There are now 1½ million cattle in attested herds, out of a population of 8–9 million, and Shetland has the distinction of being the first attested area in Great Britain. Only parts of Wales and south-west Scotland, however, contain areas on the mainland with a substantial proportion of attested herds,

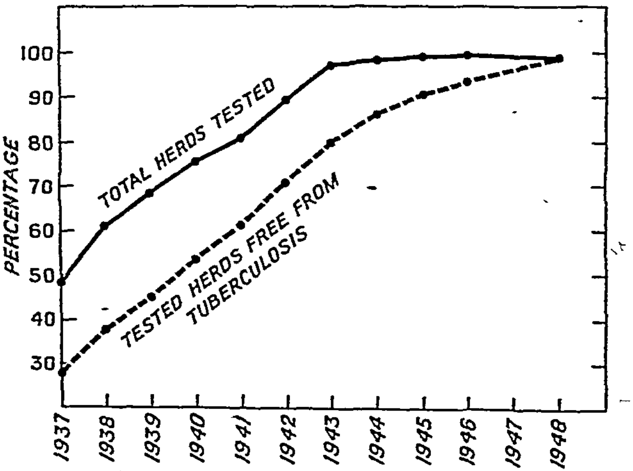

Fig. 5—Control of bovine tuberculosis in Denmark.

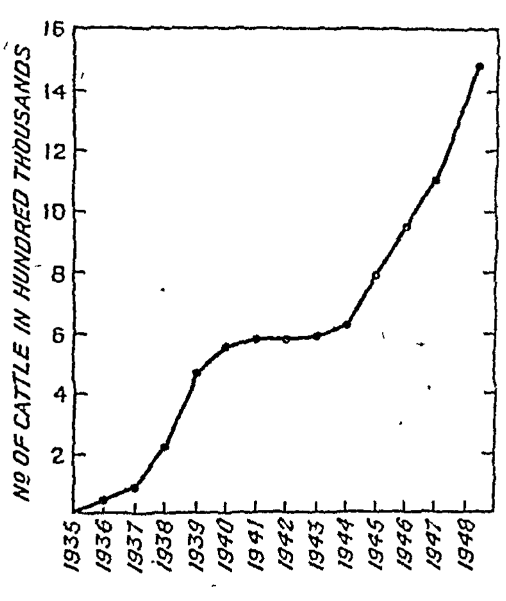

Fig. 6—Progress of the attested herds scheme in Great Britain.

and it is surprising that no steps have been taken to produce a really good area in Cornwall, Devon, Somerset, and Dorset.

Opinion differs on what is the best way of rapidly increasing the number of tubercle-free herds.[3] Ritchie and Stamp (1948) state that if 40% or more of the adult stock react they should all be sold and replaced by young stock. On the other hand, Bruford (1948) has had excellent results by using more gradual methods, and Anderson (1948) has stated that most herds became free from tuberculosis by steady replacement from their own young stock. Clearly much depends on the degree of isolation which can be provided on the farm; but in many parts of the country the need is to break the chain of infection from old to young stock on each individual farm. Success depends on the farmer and his men thoroughly understanding a few elementary principles. Once their interest is aroused this usually causes little difficulty. Arthur (1948) described how tuberculosis was eradicated by this method, within four years, from a herd in which over 80% of the adult stock were reactors.

The wider problem of how tuberculosis should be eradicated from the country as a whole was discussed at the National Veterinary Medical Association congress following a paper on the tuberculin test by Dalling (1948). Arthur (1948), outlining the complexity of the allergic state, emphasised that it was impossible to have a perfect tuberculin test. He believes that if the present test were used as the basis of a slaughter policy too many non-tuberculous animals would be slaughtered; and in any event, he said, any sudden adoption of a slaughter policy would disrupt the dairy industry and therefore the milk-supply. Many cows which react to the tuberculin test have only minimal lesions, and Arthur suggested that Government farms should be established for reactors from eradication areas. These farms would be kept under strict veterinary supervision and all the milk coming from them would be pasteurised. In Switzerland there is already an official scheme for removing infected stock from herds where eradication is taking place to other commercial herds (Balmer 1947). In Great Britain the process goes on through the markets without any supervision; yet it is probably more economical and less unsatisfactory at the present stage of progress than might be imagined.[1]

Clearly, the attested herds scheme must continue largely in its present form, though every effort must be made to simplify the tuberculin test and the administration of the scheme. In addition, the financial inducement to the farmer to eradicate tuberculosis should be reconsidered. The eradication of tuberculosis has now been taken over by the Animal Health Division of the Ministry of Agriculture as an agricultural problem, but the financial inducements still reflect the old "public health" outlook. The following bonuses are paid, per gallon, on milk from various types of herds:

Accredited	1¼d.
Accredited and attested	2¼d.
Tuberculin-tested (T.T.)	4d.
T.T. and attested	4d.
Attested but not T.T.	1d.

An attested herd is one that is taking adequate measures to protect itself from tuberculosis, whereas a T.T. herd is one that has passed a tuberculin test and reaches the accredited standard of cleanliness. It will be seen that a farmer receives a substantial bonus (4d. per gallon) for selling milk from a T.T. herd. If, however, his buildings do not reach a certain standard he gets only 1d. per gallon for carrying out the important and sometimes difficult task of eradicating tuberculosis from his herd, which is less than the 1¼d. received by another farmer who manages to obtain an ordinary accredited licence, which is sometimes notoriously easy. Sometimes, too, it is notoriously difficult to meet the sanitary requirements of the T.T. licence (Anon. 1949). These should be just the same as for an accredited licence, but some local authorities seem to impose special standards of their own. Much more consistent rulings, with much less irritation to the farmer, would be obtained if the Animal Health Division took over both the work of attestation and the issue of T.T. licences.[5]

Many farmers would eradicate tuberculosis from their herds if they could obtain the "T.T. bonus"; but they cannot obtain this because neither they nor their landlords can afford to reconstruct the cowsheds. We thus have the untenable position in which the farmers having the most unhygienic cowsheds, in which the spread of tuberculosis is most rapid, are given the least encouragement to eradicate disease. It may seem retrograde to do away with any architectural standard for cowsheds; but surely the farmer with poor buildings, who is willing to eradicate tuberculosis from his herd and constantly produces milk of good quality, is entitled to at least as much reward as his neighbour who is fortunate enough to have better buildings? In the Danish scheme of tuberculosis eradication the rewards and penalties were not linked in any way with the standard of buildings.

Eradication areas are now to be gradually established, and as this happens, and the attested herd scheme progresses, new methods of dealing with reacting animals will have to be devised. Under present economic conditions they cannot reasonably be slaughtered and some means of supervising them, perhaps on special farms, must be found. In the final stages of eradication, however, reactors will have to be slaughtered.

In the past, people interested in agriculture have felt that if pasteurisation of milk became general there would be much less support from the medical profession for the eradication of bovine tuberculosis; but it is now obvious that so long as bovine tuberculosis exists there will always be a serious risk of its communication to man by direct inhalation. Quite apart from considerations of "public health," the eradication of bovine tuberculosis will increase the efficiency of milk-production and thus improve human nutrition. There is, therefore, every reason for the medical and veterinary professions to collaborate in aiding the farming community and public to eliminate tubercle bacilli from the environment of animals and man in Great Britain.

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[3] I have elsewhere reviewed the evidence on the value of B.C.G. in cattle (Francis 1947). It is now generally concluded that, although it produces a considerable immunity in cattle, its use is contra-indicated because the allergy produced would interfere with the tuberculin test which is the basis of the eradication policy.

[1] A proper system uld provide invaluable information on tuberculosis, as on all other diseases o precise information is so badly needed assist the campaign to eradicate bovine [illegible] (as it has in the U.S.A.) and, as pointed out recently (British Medical Journal 1949), it is the natural function of the Animal Health Division.

[5] Under the new milk regulations the Ministry of Agriculture is the body that issues licences, and the various grades of milk will be simplified.

SUMMARY

Only 18-20% of all cattle in Great Britain react to tuberculin, but all these have to be regarded as infectious. The figure of "40%," which is so widely quoted, applies only to old cows.

Once established in the human lung, the bovine tubercle bacillus is just as virulent as the human, though there is reason to think that it has greater difficulty in establishing itself in the lung, and therefore less power of spread from man to man. Scandinavian work has shown that the most serious form of bovine-type pulmonary tuberculosis in man is caused by inhaling infection from cattle, and in country districts about half of all cases of human phthisis may be caused by bovine-type infection.

The maps in fig. 2 show that in country districts in Great Britain there is an inverse relation between the incidence of bovine tuberculosis and the total mortality from human tuberculosis. Data from Denmark show that, though the proportion of tuberculin-positive persons is greater in areas where there are tubercle bacilli in the milk, tuberculous disease is not so common in such areas as it is in areas where the milk is free from bacilli.

As milk is freed from tubercle bacilli by the eradication of tuberculosis from cattle and by pasteurisation, more will have to be done to protect adolescents from infection, and increase their resistance by immunisation with B.C.G.

Of about 9 million cattle in Great Britain, some 1½ million are now in attested herds which are maintained free from tuberculosis. Area eradication of the disease is to begin next autumn.

A system of meat inspection organised by the Animal Health Division could materially assist the scheme by producing data on the incidence of tuberculosis.

The attested herds scheme is now based on the "comparative" tuberculin test in which carefully standardised mammalian and avian P.P.D. tuberculins are used. In testing human beings, however, wide use is still made of Koch's Old Tuberculin. As this cannot be accurately standardised, its replacement by purified protein derivative might be considered.

As bovine tuberculosis is eradicated the risk of cattle being infected from man will increase. People who look after cattle may need to be examined in order to prevent infection of the animals—as well as for other reasons.

Eradication of bovine tuberculosis will increase the efficiency of meat and milk production. Indeed, this may prove to be its most valuable contribution to public health and well-being.

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GENERAL MEDICAL AND PHARMACEUTICAL SERVICES

AMENDING REGULATIONS

AMENDING regulations[1] have been issued by the Minister of Health under the terms of the National Health Service Act and of the amending Act, which received the Royal Assent on Dec. 16. These regulations deal with the method of filling practice vacancies, the employment of assistants, certificates to be provided without charge by practitioners, bulk prescribing for residents of schools and institutions, and restriction of advertising by contractors included in the pharmaceutical lists of executive councils. The effect of the new regulations has been set out in a circular to executive councils.

Practice vacancies.—The new regulations provide for a modified procedure, from Feb. 1, for filling "declared vacancies" (normally following the death or retirement of a doctor). It will be for the Medical Practices Committee (or the Minister on appeal) to select the doctor to fill such a vacancy, even if the doctor is already on the executive council's medical list: and all doctors whose applications are refused, including those already on the medical list, will be entitled to appeal.

The regulations also embody the understanding that where a selection has been made by the Medical Practices Committee (or on appeal the Minister) from a number of applicants to fill a vacancy created by the death or retirement of a doctor, the patients of the retiring or deceased doctor shall be transferred to the doctor selected by the Medical Practices Committee (or on appeal the Minister) unless the committee (or Minister) otherwise provide.

Employment of assistants.—At present a doctor who is refused consent by the executive council to the employment of an assistant has no right of appeal: but under the new regulations an appeal will lie to the Medical Practices Committee.

The regulations also provide for the allocation scheme to be amended so as to give a doctor who employs an assistant the right to have his list increased by a maximum of another 2100 patients if the Minister so decides. (In one case the executive council has declined to allow a doctor employing an assistant to increase his list by this maximum, even though the Medical Practices Committee had decided that there was room for that assistant in the area and had granted his application for inclusion in the medical list.) Assistants are no longer to have their names included in the medical list, or (in consequence) to have lists of patients of their own. This will be achieved by prohibiting doctors under the terms of service from employing assistants whose names are included in the medical list. The only exceptions are: (*a*) part-time assistants who are also practising separately on their own account, and who

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[1] The National Health Service (General Medical and Pharmaceutical Services) Amendment (no. 2) Regulations, 1949. Statutory Instruments, 1949, no. 2341.

MR. FRANCIS: *references—continued*

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in the latter capacity can build up lists of their own; and (*b*) assistants whose names are included in the medical list of an area on Feb. 1, when this part of the regulations takes effect.

Prescribed certificates to be issued without charge.—By the Amendment Act, a doctor may be required to issue free of charge to his National Health Service patients or their personal representatives only those certificates—being certificates reasonably required by the patients under, or for the purposes of, any enactment—which are prescribed by regulations. A schedule to the regulations gives a provisional list of such certificates, to which the General Medical Services Committee has agreed, and to which a few additions may be made. The regulations also make it clear that a practitioner is not required to issue certificates to his patients if they are receiving treatment from unqualified persons.

The provisional list comprises the following certificates:

1. To support a claim or obtain a payment either personally or by proxy, under the Family Allowances Act, 1945, the National Insurance (Industrial Injuries) Act, 1946, and the National Insurance Act, 1946.
2. To prove inability to work or incapacity for self-support for the purposes of an award by the Minister of Pensions, or to enable proxy to draw pensions, &c., under the Pensions (Navy, Army, Air Force, and Mercantile Marine) Act, 1939, the Pensions (Mercantile Marine) Act, 1942, the Naval and Marine Pay and Pensions Act, 1865, the Air Force (Constitution) Act, 1917, the Personal Injuries (Emergency Provisions) Act, 1939, and the Polish Resettlement Act, 1947.
3. To procure extra coal in cases of illness, extra milk, extra petrol, or extra rations, under the Emergency Powers (Defence) Acts, 1939–45 and other statutes.
4. To obtain permission to import foreign drugs and appliances, or to export special foods with a sick traveller or with infants, aged 2 years or less, under the Import, Export, and Customs Powers (Defence) Act, 1939.
5. To enable a patient to have his sight tested under the supplementary ophthalmic services, in accordance with the National Health Service Act, 1946.
6. To establish fitness to receive nitrous-oxide and air analgesia in childbirth (Midwives Act, 1902).
7. To secure registration of stillbirth (Births and Deaths Registration Act, 1926).
8. To enable payment to be made to another person in case of mental disability of a person entitled to payment from public funds, or to justify release of a patient from detention after absence on trial (Lunacy Act, 1890).
9. To establish unfitness for jury service (Juries Act, 1922).
10. To establish unfitness to attend for medical examination (National Service Act, 1948).
11. To support late application for reinstatement in civil employment where application has been delayed by sickness (Reinstatement in Civil Employment Act, 1944).
12. To enable a disabled person to be registered as an absent voter (Representation of the People Act, 1949).

Bulk prescribing.—Under the new regulations the requirement that a prescription on form E.C.10 may be issued only for an individual patient is relaxed in respect of a practitioner who is responsible for the treatment of not less than ten persons in a school or institution where at least twenty persons are normally resident. Under these circumstances he may now issue a bulk prescription for two or more of these residents for whom he is not receiving a dispensing capitation-fee, provided that (*a*) the prescription is limited to drugs (other than drugs to which the Dangerous Drugs Acts apply and drugs which are, or contain, fourth-schedule poisons) included in the *National Formulary* or an official supplement; and (*b*) it is endorsed by the doctor with the name and address of the school or institution and the number of residents for whose treatment the doctor is responsible.

NEW YEAR HONOURS

THE list of honours published this week contains the *names of the following members of the medical profession:*

Baron

LESLIE HADEN GUEST, M.C., M.R.C.S.
M.P. for Southwark North 1923 and 1924, and for Islington North since 1927. For political and public services.

K.C.V.O.

HAROLD KINGSTON GRAHAM-HODGSON, C.V.O., M.B. Durh., F.R.C.P.
Director, X-ray department, Middlesex Hospital, London.

K.B.E. (Civil)

THOMAS ERNEST VICTOR HURLEY, C.B., C.M.G., M.D., M.S. Melb., F.R.C.S., F.R.A.C.S.
Consulting surgeon, Royal Melbourne Hospital. For public services.

Knights Bachelor

HAROLD ESMOND ARNISON BOLDERO, D.M. Oxfd, F.R.C.P.
Dean, Middlesex Hospital medical school: registrar, Royal College of Physicians of London.

JOHN ALEXANDER CHARLES, M.D. Durh., F.R.C.P.
A deputy chief medical officer, Ministry of Health.

FRANK ARNOLD GUNASEKERA, C.B.E., M.R.C.S.
Senator, Ceylon.

WILLIAM WILLIS DALZIEL THOMSON, M.D. Belf., F.R.C.P., D.L.
Professor of medicine, Queen's University, Belfast.

THOMAS GEORGE WILSON, C.M.G., M.D. Sydney, F.R.C.O.G.
Director of obstetrics and gynæcology, University of Adelaide. For public and philanthropic services.

C.B. (Military)

Surgeon Rear-Admiral JOSEPH ARCHIBALD MAXWELL, C.V.O., O.B.E., M.B. Dubl., F.R.C.S.E., K.H.S., retd.

Major-General FRANCIS ROBERT HENRY MOLLAN, O.B.E., M.C., L.R.C.P.I., late R.A.M.C.

Air Vice-Marshal TERENCE CHARLES ST. CLESSIE MORTON, O.B.E., M.D. Edin., F.R.C.P., K.H.P.

C.M.G.

ERIC HOWARD MANLEY LUKE, M.B.
Surgeon, Wellington public hospital for over 25 years; chairman of the council, British Medical Association (New Zealand branch).

C.B.E. (Military)

Surgeon Captain THOMAS NORMAN D'ARCY, L.R.C.P.I., R.N.

Group-Captain ANDREW HARVEY, M.B. Belf., R.A.F.

C.B.E. (Civil)

Miss JANET KERR AITKEN, M.D. Lond., F.R.C.P.
Consulting physician, Elizabeth Garrett Anderson Hospital, London; member of the council, Royal College of Physicians of London.

ROBERT VIVIAN BRADLAW, M.D.S. Durh., F.R.C.S., F.D.S. R.C.S.,
Dean, faculty of dental surgery, Royal College of Surgeons of England; professor of oral pathology, University of Durham.

CLIFFORD VINEY BRAIMBRIDGE, M.V.O., M.A., M.B. Camb., F.R.C.S.E.
Senior surgical specialist, Kenya.

Miss IDA CAROLINE MANN, M.A. Oxfd, M.B., D.SC. Lond., F.R.C.S. (Mrs. Gye).
Senior surgeon, Royal London Ophthalmic (Moorfields) Hospital.

ERNEST ALEXANDER NICOLL, M.A., M.D. Camb., F.R.C.S.E.
Surgeon-in-charge, Berry Hill Hall Miners' rehabilitation centre and consulting surgeon to the Miners' Welfare Commission.

FREDERICK TAVINOR REES, M.C., B.SC. Wales, M.R.C.S.
Director-general of medical services Ministry of Pensions.

O.B.E. (Military)

Surgeon Captain ALFRED EDWARD FLANNERY, L.R.C.P.I., R.N.

O.B.E. (Civil)

OKINADE AJIBADE, L.R.C.P.E.
For public services in Nigeria.

Edgar Scott Bowes, m.r.c.s.
Chairman, Poole centre, St. John Ambulance Association.
Thomas Gregory Burnett, m.b. Manc.
Chairman, Bulawayo Hospital advisory committee, Southern Rhodesia.
Ernest Thomas Conybeare, m.d., b.sc. Lond., f.r.c.p.
Medical officer, Ministry of Health.
Panagodage Bertram Fernando, m.b. Lond., m.r.c.p.
Professor of medicine, University of Ceylon.
Robert Searson Rodney Francis, m.b.
Of Hastings, New Zealand; for services to the community in connexion with the treatment of tuberculosis.
Miss Minnie Gosden, m.b. Lond.,
Senior pathologist, Sierra Leone.
George Vert Thomson McMichael, m.b. Edin.
Medical officer of health, Paisley.
David Gwilym Morgan, b.a. Oxfd, m.r.c.s.
Administrative medical officer, United Cardiff (Teaching) Hospitals.
Arthur Harold Morley, m.b. Leeds, f.r.c.s.e.
Surgical specialist, Tanganyika.
Charles Elias Reindorf, m.d. Durh.
For public services in the Gold Coast.
Alfred Eaton Spaar, f.r.c.s.e.
Medical practitioner, Kandy.
John Hargreaves Harley Williams, m.d. Edin.
Secretary-general, National Association for the Prevention of Tuberculosis.

M.B.E. (Military)

Major Mohandirange Don Simon Jayawardena, l.r.c.p.e.
Ceylon Medical Corps (Reserve).

Public Health

Notification of Diseases of the Central Nervous System

New regulations[1] which came into operation on Jan. 1 introduce nomenclature consistent with the international standard classification of diseases, which was brought into use on the same date. They also slightly extend the scope of clinical conditions notifiable under the heads of acute encephalitis and meningococcal infection.

Acute Poliomyelitis.—The distinction formerly made between acute poliomyelitis and acute polioencephalitis was always a difficult one, and has never been adopted in other countries. On the other hand, in Sweden and some parts of the U.S.A. it has long been the practice to report cases of acute poliomyelitis (including polioencephalitis) under the sub-headings (*a*) "paralytic," which includes cases with either transient or permanent paralysis, and (*b*) "non-paralytic," which includes cases where there is no paralysis but where the diagnosis was made on clinical signs with or without examination of the cerebrospinal fluid—it is recognised that in such cases the diagnosis is often uncertain. If cases which are non-paralytic when first notified and admitted to hospital become paralysed in hospital, the ordinary procedure for correction of diagnosis by the hospital should be applied.

Acute Encephalitis.—This heading replaces the former heading "encephalitis lethargica." It is very doubtful whether true encephalitis lethargica now occurs in this country, and under the new sub-heading "infective encephalitis" can be included cases of all forms of encephalitis, some of obscure ætiology, which are presumed to be of microbic or viral origin. The sub-heading "post-infectious" covers the forms of encephalitis occasionally following, or associated with, certain well-defined infections—e.g., chickenpox, measles, mumps, and vaccinia.

Meningococcal Infection.—This heading includes, as well as meningococcal meningitis (formerly notified as cerebrospinal fever), illness due to fulminant and other forms of meningococcal infection[2] without an initial meningitis.

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[1] The Public Health (Acute Poliomyelitis, Acute Encephalitis, and Meningococcal Infection) Regulations, 1949. See *Lancet*, 1949, ii, 1238.

[2] Banks, H. S. *Lancet*, 1948, ii, 635, 677.

Typhoid in a Liner

From the liner s.s. *Moollan* some 45 members of the crew are now in hospital; and in 30 of these the diagnosis of typhoid fever has been confirmed. Stool specimens have demonstrated 5 ambulant excretors. Among the passengers there have been 8 cases—1 each from Northern Ireland, Scotland, Lowestoft, Oldham, Shrewsbury, Sunderland, Twickenham, and Wandsworth. The dates of onset, where known, suggest that the source of infection arose during the last three weeks of the voyage and persisted until the vessel docked in the Port of London on Dec. 15. Chloramphenicol is proving of great value in treatment.

Poliomyelitis

In the week ended Dec. 24, notifications in England and Wales were: poliomyelitis 71 (87), polioencephalitis 10 (6). Notifications in the previous week are shown in parentheses.

The Third Quarter

ENGLAND AND WALES

Provisional figures published in the Registrar-General's quarterly return[1] show that the stillbirth and the infant-mortality rates for the September quarter, 1949, were the lowest ever recorded for any quarter.

Births.—The number of live births registered was 183,278, giving a rate of 16·6 per 1000 total population, which may be compared with 17·5, 20·0, and 19·8 in the third quarters of 1948, 1947, and 1946 respectively. The number of illegitimate births, included in the total, was 9248, or 5·0% of the total births registered, compared with 10,186 or 5·3%, in the corresponding quarter of 1948. There were 4104 stillbirths registered during the quarter, giving a rate of 21·9 per 1000 live and still births, compared with 4447 and the previous lowest rate of 22·7 in the same period a year ago.

Deaths.—101,207 deaths were registered during the quarter, giving a rate of 9·2 per 1000 total population. This compares with 101,545 deaths and a rate of 9·3 for the corresponding quarter of 1948, and an average death-rate of 9·3 for the third quarters of the five years 1943–47. Deaths from acute poliomyelitis and polioencephalitis (provisional total, excluding non-civilians) numbered 250, compared with 60, 83, 27, and 28 in the four preceding quarters.

Deaths of children under one year of age numbered 4883, representing an infant-mortality rate of 26 per 1000 related live births, compared with 5514 deaths and a rate of 28 per 1000 in the same period last year, which was the previous lowest rate recorded for any quarter. The diarrhœa death-rate for children under two years was 2·6 per 1000 births.

Natural Increase.—The births registered exceeded the deaths by 82,071, the corresponding increases for the third quarters of 1946, 1947, and 1948 being 112,642, 119,409, and 90,313.

Survey of Sickness.—Out of 3509 men interviewed, 2186 reported having had some illness or injury in May and there were 1478 consultations with doctors; out of 4323 women interviewed, 3167 reported having had some illness or injury in the same month and there were 1856 consultations with doctors. Illness or injury of some kind during a month in the period April, May, June was reported by 68·1% of all persons interviewed; the average incapacity was 0·90 of a day per month. Among housewives, 76·5% reported having had some illness or injury during a month.

SCOTLAND

In Scotland[2] the death-rate was the lowest ever recorded; the death-rate from tuberculosis was lower, and for both respiratory and non-respiratory forms the rates were better than the average. The maternal-mortality and the infant-mortality rates were the lowest ever recorded in Scotland.

Births.—Live births numbered 23,322, giving a rate of 17·9 per 1000 population, compared with 24,389 and a rate of 18·7 in the corresponding quarter of 1948. The proportion of illegitimate births—5·5%—was 0·2 below that for the third quarter of 1948, and 1·4 below the average. The number of stillbirths registered during the quarter was 641—equivalent to a rate of 27 per 1000 total births.

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[1] The Registrar-General's Quarterly Return of Births, Deaths, and Marriages: Quarter ended Sept. 30, 1949. H.M. Stationery Office. Pp. 29. 1s.

[2] Quarterly Return of the Registrar-General, Scotland: Births, Deaths, and Marriages registered in the Quarter ended Sept. 30, 1949. H.M. Stationery Office. Pp. 28. 1s.

Deaths.—These numbered 13,118, equalling a rate of 10·1 per 1000 population, which is 0·4 lower than in the third quarter of 1948 and 0·4 below the five-year average. The death-rate from all forms of tuberculosis was 59 per 100,000, that from respiratory tuberculosis being 51 and that from other forms 8 per 100,000. The rate for all forms was 7 below that in the corresponding quarter of 1948 and 9 below the average. The respiratory-tuberculosis death-rate was 8 below that for the third quarter of 1948 and 4 below the average. The maternal-mortality rate was 0·9 per 1000 live births—1·2 below the five-year average. The infant-mortality rate was 35 per 1000 related live births, which was 5 lower than that for the corresponding quarter of 1948 and 14 lower than the five-year average.

Towards Cleaner Food

An illustrated booklet[1] of 49 quarto pages, prepared for internal use in their canteens by Messrs. Marks and Spencer, includes a historical sketch, the legislation relating to hygienic food-handling, a simple statement of the significance of germs, and precise rules for the practice of hygiene as it affects persons, foodstuffs, service, equipment, premises, vermin control, and storage. Apart from the excellence of its production and the sound complete advice upon all the important aspects of food-handling in catering establishments, this little work is an encouraging sign of the increasing realisation of the importance of clean food to public health.

London's Health Service

With the start of the National Health Service on July 5, 1948, the London County Council lost charge of the municipal hospital service which it had diligently built up since 1930. In his report for 1948,[2] Sir Allen Daley, the county medical officer of health, recalls that the service comprised 98 hospitals with a pre-war bed complement of 70,120 and a staff of about 32,000. The council's hospitals were transferred to one or other of the four Metropolitan regional hospital boards, except that the Hammersmith Hospital (to which is attached the Postgraduate Medical School of London) was transferred to the board of governors of the Hammersmith, West London, and St. Mark's group of hospitals; the Maudsley Hospital (to which is attached the Institute of Psychiatry) to the Bethlem Royal and Maudsley Hospitals board of governors; the St. Pancras Hospital to the University College Hospital board; and the North Western Hospital to the Royal Free Hospital board.

If in some respects the load of the council's responsibility has been eased, in others it has been increased. For example, on the appointed day the control of maternity and child-welfare centres was transferred to the L.C.C. from the various borough councils. Few of the transferred buildings were freehold or were even held on long leases, and the premises were mainly improvised. Of the specially designed centres, many fulfilled functions that became the responsibility of the council on the one hand and of one of the regional boards on the other, while in a few instances the borough council still retained a residual interest in the building. "These buildings became subject to 'apportionment' between the various claimants, and negotiations to solve the complex questions involved in their future ownership and administration were still proceeding at the end of the year." As a long-term policy there are to be comprehensive health centres in each of the 162 "health service" areas of the county (and compared with other authorities, the L.C.C. can count itself lucky to have one of them actually under construction).

In the latter half of 1948 the equivalent of twenty full-time dentists resigned from the school dental service, and 27 out of 73 surgeries had to be closed or partly closed.

Each year the report is to include a detailed survey of one section of the council's work; and the present report reviews the origin and operation of the domiciliary midwifery service.

In England Now

A Running Commentary by Peripatetic Correspondents

ALL these articles on the adrenal cortical hormones, and the less recent ones on the Rh factor, have convinced me that the average man cannot expect to understand such things without either (*a*) taking a month's holiday and doing a few hours' rhesus research and cortical questing between long country walks, or (*b*) turning into a gibbering lunatic bereft of the power of normal speech and restful sleep. The authors of the articles aforesaid could help by dressing their ideas and facts in some of those funny little coloured symbols, showing $3^1/_2$ labouring men or $4^3/_4$ bales of cotton, which grace the modern geographical primers. When considering A.C.T.H., L.A.P., O.A., R.H.D., O.H.M.S., D.O.C.A., N.A.D., S.M.R., and O.G.P.U., it would be nice for the reader to know just who was on whose side. For instance, all those *for* rheumatoid arthritis (or hæmolytic anæmia, or what you will) could be printed in pink, and all those agin it in bold green, Doubtful Depressors (the villains) in a pale yellow, and Probable Stimulators in bright jazz patterns. All references to members of a control series could be printed in Gothic type, and significant results be stamped in gold with the values for t and χ^2 etched beneath in vermilion filigree. The article should end with a jolly little verse embodying all the main points in the argument; music to which the said verse can be sung in the bath or used as a college war-cry; a summary of the verse; and a frank confession of all the author's little peccadilloes, bees in bonnet, and lost causes, and any illuminating intimate peculiarities, such as whether he wears long or short pants.

* * *

Doctors, I know, must not be witch doctors; but as a patient I feel they might do more to preserve us from things that go bump in the night. I write as a man in the early forties with an artificial pneumothorax now almost in its dotage—it is more than 11 years old.

My A.P. went through the normal progression of refills, division of adhesions, more refills, occasional fluid, more refills—about 200 refills, I estimate, before the fluid finally fibrosed and the lung (who shall blame it?) decided that was that and sat down. All the time I have been happy, healthy, and hard-working, and I still am. I have no complaints, only gratitude to a grand profession.

But—about those things that go bump in the night. If all T.B. specialists had experienced an A.P., which heaven forfend, they would think more of warning the patient of what to expect. An artificial pneumothorax is followed by the most alarming explosions, crashes, heavings, lurches, twangings, bumps, and flutterings; and most of them happen in the night. Medically they do not mean a thing. To the patient they can cause panic and a sense of impending doom.

Some three months after my A.P. induction, adhesions were divided. Next morning a gobbet of sputum bubbled up most satisfactorily and I have never been troubled in that way since. Medically speaking, the surgeon had done a perfect job. But two nights later, as I was toppling over the edge of sleep, an atom bomb exploded in my chest. There was no pain—just sensation. But what a sensation! My little world had blown up, and I, of course, was about to die. In seconds my mind raced through all the possibilities and all the impossibilities as well. Panic seized me. My breathing jangled, my palms sweated, my limbs went limp, and I only just managed to ring for the night nurse. She scurried along the corridor, the doctor panted up the stairs. And of course there was nothing wrong with me at all. An adhesion had slipped. Immediately the doctor told me what had happened I stopped dying. Instead, I felt rather a fool. Two nights later another bomb exploded and I laughed at it.

Why on earth did not the doctor warn me? If he had told me that such a thing might happen, and that if it happened it didn't matter a hoot, I would have been saved a temporary but embarrassing demise.

Six months later, when I left the sanatorium to have a few weeks at the seaside before returning to work, I had another gefuffle. (I have always called these terrifying but harmless sensations gefuffles, and I am

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1. Hygienic Food Handling. 1949. Copyright by Marks and Spencer Limited.
2. London County Council: Report of the County Medical Officer of Health and School Medical Officer for the Year 1948. Obtainable from Staples Press Ltd., 14, Great Smith Street, London, S.W.1. Pp. 139. *2s. 6d.*

beginning to think that the word is needed in the medical lexicon.) This gefuffle took the form of a sudden tightening of the breathing, followed by an unnatural freedom and loss of the respiratory rhythm. As I was no longer surrounded by the comfort of a sanatorium I worked that one out for myself. I guessed it was plain wind, first pressing on the diaphragm and then going away, but creating a sensation which would induce panic in the uninitiated. Doctors may find it difficult to believe that even intelligent patients think that their lungs are as deep in the front as they are at the back. Any sensation above the navel is at once related to the lungs. That does not matter to a man in health. He passes it off with a shrug or a drink. But one who has had an A.P. thinks straight away: "It's me chest!"

What a deal of apprehension the patient could be saved if doctors would come clean and tell him what is liable to happen. This is particularly important in a sanatorium. There, surrounded by medical aid and ability, the patient feels secure. He is in the womb of science. Then, after a few months, he is delivered into a harsh world he has almost forgotten. He may be medically fit, but his mind has undergone a subtle change. He no longer takes his body for granted. He has lost trust in the ability of his involuntary functions to work smoothly and efficiently. He regards every deviation from the normal with grave suspicion. True, there are aftercare lectures. Don't we remember them! "Never stand when you can sit. Never sit when you can lie down. Don't get tired. Don't lie in the sun. Rest . . . rest . . . rest." But we are never told what to do when something shifts and feels like the clutch of doom. We find out; but would it not be better to tell us? A funny feeling within the aseptic walls of a sanatorium is one thing; a funny feeling in the middle of Piccadilly is quite another. All this, and claustrophobia too, is the burden of the rehabilitated tuberculous patient.

Doctor, there is an ordinary bloke with ordinary fears behind that orderly collapse. Tell him everything is all right. But at the same time warn him about the gefuffles that will seem so much but mean so little.

* * *

Christmas Eve on the marshes was mild, misty, and windless. The open sheets of water were covered with hundreds of teal and wigeon, a few mallard, coots, black-tailed godwits, and redshanks, and a solitary dabchick. I was standing half-hidden by a tall clump of reeds, when a sudden startling "whee-ee-ee-eesh," like a shell splitting the air, made me look up. A compact bunch of sixteen ducks whizzed over me and settled on the water behind the reeds without having seen me; so I made a long and difficult detour through reed-beds and flooded ditches to get a view of them from behind some dead willows. Alas, they were too wild. After my hard work they saw me and took off in alarm and sped swiftly out to sea, whereas teal, wigeon, et al. continued their peaceful occupation of the water unaffrighted. But I had just time to note that there were five drakes, each with a dark head carried high on a long white neck, and eleven ducks somewhat resembling female mallard. Before I came away, however, another drake arrived with two ducks, again whooshing overhead like a shell from a gun. That's pintail, that was.

* * *

PERDITA

How came a golden retriever bitch
To be all by herself on a bus?
Since nobody owned her,
We quietly boned her.
That's how she came to us.
The County Police took down the facts
At enormous and tedious length.
Since no-one has claimed her,
We've formally named her
And taken her on the strength.
But why such a comely and shy young bitch
Should be travelling solo thus,
Is, it must be admitted, a question which
Is one too many for us.

Letters to the Editor

THE FIRST MEDICAL EXAMINATION

SIR,—The letter from C. C. Hentschel in your issue of Dec. 17 calls for some reply from the schools and indeed from the general public.

As possible patients we are deeply concerned that the doctors who attend on us shall not be mere mechanics or technicians, but shall be possessors of a broad and humane outlook. We believe this outlook is an essential constituent of the healer's art, and we know that it is in the best traditions of the medical profession, where the doctor has occupied the rôle of wise counsellor and friend, not simply that of pill-prescriber or sawbones. As educationists we play our part in seeing that future doctors shall possess these qualities. We should like to stress the unique opportunity enjoyed by the boy who remains at school up to the age of 18 to take his first medical examination. Once he has left school for a medical school he will be a specialist surrounded by specialists, and will in any case not be afforded time for any education in the humanities. But at school he has direct contact with men and boys devoted to a wide range of humane studies. He lives with them, plays games with them, and does some of his serious study with them. If we "allowed him to concentrate" on physics, chemistry, and biology from the age of 16, we should not be serving the interests either of the medical profession or of the community at large.

The thing which accounts for the high proportion of failures in the London 1st M.B., and which does urgently need altering for the better, and which can, with the assistance of C. C. Hentschel, easily *be* altered, is the syllabus and exemption rules for the examination itself, particularly in biology.

We have an average of about 8 boys annually in our Upper Sixth biology class. Some will be intending to go to Oxford or Cambridge, some to other universities, some to London. Most other universities will grant exemption from 1st M.B. on a General Certificate of Education at "A" level in physics, chemistry, and biology (the old H.S.C.), given by any examination syndicate. London will not accept other syndicates' biology. For London the candidate must either offer both zoology and botany (which obliges him to go much further in botany than is valuable to him, and is a frequent source of frustration and discouragement, if not failure); or he must abandon the Certificate (and with it the possibility of being awarded a State scholarship) and take London 1st M.B. externally.

The biology syllabus for this last examination is quite out of sympathy with modern ideas and is so designed that it does not coincide with that for any other biological or 1st M.B. examination. It is this, rather than lack of experienced teachers, that handicaps schools in preparing external candidates by enforcing an unnecessary variety of teaching in the biology sixth. Among other things we would particularise as follows:

1. A mass of detailed embryology is included, involving about 3 or 4 weeks' work and additional to that shared with other syllabuses.
2. There is an emphasis on the more formal comparative anatomy and physiology and a complete absence of ecology and natural history. (Contrast these with the syllabus of the Oxford and Cambridge Joint Committee, 1944, which (pp. 3–4) "has reached the conclusion that the biological sections of the preliminary Medical Examinations should be confined to testing such biological work as is properly included in a general scientific education at school" and (p. 5) believes "that individual study of natural history provides the finest training of this kind" (i.e., scientific judgment).)
3. No human and economic biology is specified.
4. The published syllabus is vague on many points, which makes it difficult for the school teacher to give a boy reasonable help and guidance, and may give the internal student

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Six months later, when I left the sanatorium to have a few weeks at the seaside before returning to work, I had another gefuffle. (I have always called these terrifying but harmless sensations gefuffles, and I am in this matter, and it therefore seems possible that the official estimate of our needs is still 1 or 1·2 beds per annual death, and that the North West Metropolitan region has 0·05 beds more than it has any right to expect!

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[1] Hygienic Food Handling. 1949. Copyright by Marks and

: Report of the County Medical Officer
Medical Officer for the Year 1948. Obtain-
s Ltd., 11, Great Smith Street, London,
6d.

It would be unrealistic to assume, while the economic "crisis" and the shortage of nursing staff persist, that any large increase in the total number of beds available for the treatment of tuberculosis is possible, except through the diversion of general-hospital beds to this purpose. There would seem therefore to be a strong case for the closest possible collaboration between the sanatorium and the clinic physician, possibly on the lines indicated by Dr. Climie and Dr. Roe (Dec. 24), though I see no absolute need for the sanatorium physician to surrender the control of beds used in this way if collaboration is effective. Certainly there is a good case against such action.

The quotation given in this letter seems to suggest that any future decline in the death-rate might be accompanied by the closure, or diversion to other purposes, of a comparable number of beds. I think we shall be well advised to see that this does not happen before the desired ratio of $2^{1}/_{2}$–3 beds per death is achieved.

The National Sanatorium,
Benenden, Kent.

T. W. Lloyd
Chief Medical Officer.

ACADEMIC SALARIES

Sir,—The progress of medical research during the present century has provided ever-increasing evidence of the contribution which can be made by the non-medically qualified scientist. Today, not only biochemists but also pathologists, bacteriologists, pharmacologists, physiologists, and even anatomists not infrequently enter their chosen subject by way of an honours degree in one of the physical or biological sciences rather than by way of a medical qualification. An adequate appreciation of much modern clinical practice demands a "scientific" outlook on the part of the clinician, and it is therefore not surprising that the most progressive medical schools contain a considerable proportion of non-medically qualified preclinical teachers.

The development of the medical sciences is therefore in grave danger of being checked by the recent tendency of hospitals, universities, and research institutions to offer research and preclinical teaching appointments at two salary scales often differing by as much as 30% according to whether the successful applicant has a medical qualification or not. In these appointments there is no suggestion that a suitably qualified applicant who does not possess a medical degree is not fully competent to occupy the post. The inevitable consequence of this policy, if it becomes general, must be to deter young men from entering the medical sciences by any route other than that provided by a medical course and to encourage older men to sacrifice potentially productive years in acquiring a medical qualification.

The protest of Dr. Harris and Dr. Bull (Dec. 17, p. 1150) should be seen in relation to this wider problem. One cannot but admire the firm refusal of Cambridge University to surrender an important academic principle to expediency, and its insistence that in the absence of any possibility of a general increase of university salaries to the proposed medical level, the medical scales should be applied only to those with definite clinical responsibility. A valid grievance does, however, remain; it is most unfortunate that wide discrepancies have appeared in the policies of different universities in this matter of medical-school salaries. It is to be hoped that these important issues, vital for the future of medical research and teaching in this country, will be considered without delay at the highest levels.

Oxford.

V. P. Whittaker.

INTRAVENOUS CANNULA

Sir,—Mr. Hughes's clear instructions (Dec. 17, p. 1156) on the elementary principles involved in intravenous therapy should prove of value to the student dresser or to the inexperienced houseman. His diagram of the no. 20 s.w.g. needle should give a clear picture of it to those not acquainted with this standard type of needle.

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London, W.1.

J. Douglas Robertson.

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3. If the cannula becomes blocked, another can be inserted through the external needle remaining in the vein. This saves the patient the unpleasantness of another vein puncture.

Lastly I would mention that an intermittent intravenous drip is not always due to faulty technique, an advantage over the external. For example, there is no indication of the scope of the work required in animal histology, or in animal physiology, or in plant anatomy. (Contrast this with the Cambridge Joint Syllabus.)

The 1st M.B. syllabus should everywhere be determined by the course that is most desirable on general educational grounds. It is to be hoped that London, usually in the forefront, will not on this occasion lag behind the other universities.

JOHN OUNSTED
Headmaster.
RICHARD G. SCHARDT
Senior Biology Master.

Leighton Park School,
Reading.

PEPTIC ULCER

SIR,—A ten-year follow-up of patients with peptic ulcer is of great interest to physicians, and important conclusions are reached by Dr. Martin and Dr. Lewis in their paper of Dec. 17. Hence it is particularly necessary to examine their material to see that it is capable of sustaining the conclusions.

According to Martin and Lewis, "medical treatment did not appear to have influenced the natural course of the disease." It would be supposed, therefore, that they had observed groups of patients comparable in all respects other than that of treatment. But this is not so. On the contrary, "apart from essential surgery dictated by perforation, the majority of patients were treated medically." Medical treatment is not defined and we are not told what proportion did not have a course of medical treatment. It appears later (in their table v) that all the patients used for the assessment of medical treatment had medical treatment with or without the additional suture of a perforation. Thus it is at least arguable that the initial medical treatment in hospital was partly responsible for the recovery of the 44% of patients with gastric ulcer and of the 32·5% of patients with duodenal ulcer who, surviving to follow-up, ceased to have symptoms.

Alternatively, Martin and Lewis may mean that *continued medical treatment at home* did not influence the natural course of the disease. The evidence they cite is that while 94% of the gastric and duodenal ulcers which were active at follow-up were in patients who had taken a regular or an occasional gastric regimen, 55% of the ulcers which were inactive were in patients who had abandoned treatment. If by the "abandonment of treatment" we are to understand that they did not treat themselves at all after leaving hospital, it would appear that medical treatment might even be harmful—though before reaching a conclusion one would need to know something about the comparability of the ulcers in the two groups on discharge from hospital. But if treatment was abandoned later, it is essential to know the time relations of the cessation of treatment and of activity. Martin and Lewis recognise that it is possible "that the continued activity of both gastric and duodenal ulcers favoured perseverance with the ulcer regimen and that inactivity encouraged abandonment of treatment." Indeed, as they comment, "this is only human nature." How then can it be concluded that "medical treatment did not appear to have influenced the natural course of the disease" when it can as reasonably be deduced that the natural course of the disease influenced the treatment?

Passing on to consider the "criteria of chronicity," Martin and Lewis note that "no active gastric or duodenal cases had, at follow-up, a duration of activity of less than five or ten years"—an observation which is not surprising when it is remembered that, by definition, "active ulcers" were active at the beginning and end of a ten-year period of follow-up. It is, therefore, hardly relevant to the question of when a gastrectomy ought to be performed. In the same context, the assertion that "if activity is prolonged to . . . beyond fifteen years an ulcer almost certainly will not heal" is contradicted by their own figures. According to table IX there must have been some 18 to 23 surviving patients with a history of more than fifteen years' symptoms on admission to hospital, yet of these 6 to 11 became inactive. In fact, however, the prognosis cannot be as good as this, since the large number of deaths from peptic ulcer (75 out of 356) should also be taken into consideration.

Finally, to what extent were the patients admitted to hospital with gastric and duodenal ulcers representative of all the patients with ulcer in the district? This must be known before a comparison can be made between the chances of bleeding, &c., in gastric and in duodenal ulcers. The fact that the gastric-duodenal ratio in the series was 2·3 : 1, against the more usual figure for the South of England of 1 : 3 (or at the most 1 : 1), suggests that the common practice of admitting uncomplicated gastric ulcers more readily than uncomplicated duodenal ulcers may have been in operation. If this were so, it must have biased the results.

Gastroenterological Department,
Central Middlesex Hospital.
RICHARD DOLL.

CONTROL OF TUBERCULOSIS

SIR,—I find myself in full agreement with those chest physicians who hold that they should have some control in the treatment of their patients while in sanatoria. The period spent in the sanatorium is only a small portion of the time required to arrest a case of pulmonary tuberculosis; but it is in the sanatorium that the decision is made as to how the patient should be treated —e.g., by artificial pneumothorax or other form of collapse therapy. It appears reasonable that the chest physician in charge of the case both before and after sanatorium should be consulted before this decision is made, and this is best done by enabling him to attend the sanatorium regularly.

A scheme somewhat similar to that suggested by Dr. Climie and Dr. Roe (Dec. 24) was in operation at Ware Park Sanatorium under the Hertfordshire tuberculosis scheme before July, 1948, and was found to work satisfactorily. A "round" of the bed-patients was made each week by the medical superintendent (who was also the chief tuberculosis officer), accompanied by the chest physicians and the resident staff. The decision about treatment was reached before or during these rounds; and when opinions differed, the last word was with the chest physician under whose care the patient was admitted.

Ware Park Sanatorium, Ware, Herts.
A. P. FORD.

SIR,—Dr. Trenchard[1] has suggested that common agreement has been reached on the need for $2^{1}/_{2}$–3 beds per annual death from tuberculosis. The development of this estimate in the U.S.A., first put forward only seven years ago, was sketched in a recent editorial[2] the theme of which was that, with the object of eradicating tuberculosis, the figure should be raised to 10 beds per annual death. The following extract from a report by the chief medical officer of the Ministry of Health[3] is therefore of interest:

> "Before the war there was approximately one bed for every death from all forms of tuberculosis and it was estimated that 4 beds for every 5 deaths should meet the needs of the country. . . . If . . . tuberculosis mortality continues its downward trend, it is reasonable to expect that the existing total of some 30,000 beds, if fully staffed, should suffice for the next few years and that thereafter the requirement will diminish."

I have not been able to find any more recent statement by the chief medical officer suggesting a change of opinion

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1. Trenchard, H. J. *Lancet*, 1949, ii, 956.
2. Bogen, E. *Amer. Rev. Tuberc.* 1949, 59, 707.
3. Ministry of Health: On the State of the Public Health during Six Years of War. H.M. Stationery Office, 1946; p. 62.

this matter, and it therefore seems possible that the ficial estimate of our needs is still 1 or 1·2 beds per nnual death, and that the North West Metropolitan egion has 0·05 beds more than it has any right to xpect!

It would be unrealistic to assume, while the economic crisis" and the shortage of nursing staff persist, that ny large increase in the total number of beds available or the treatment of tuberculosis is possible, except hrough the diversion of general-hospital beds to this urpose. There would seem therefore to be a strong ase for the closest possible collaboration between the anatorium and the clinic physician, possibly on the ines indicated by Dr. Climie and Dr. Roe (Dec. 24), hough I see no absolute need for the sanatorium hysician to surrender the control of beds used in this vay if collaboration is effective. Certainly there is a good ase against such action.

The quotation given in this letter seems to suggest hat any future decline in the death-rate might be ccompanied by the closure, or diversion to other purposes, of a comparable number of beds. I think we hall be well advised to see that this does not happen before the desired ratio of 2½–3 beds per death is chieved.

The National Sanatorium,
Benenden, Kent.

T. W. LLOYD
Chief Medical Officer.

ACADEMIC SALARIES

SIR,—The progress of medical research during the present century has provided ever-increasing evidence of the contribution which can be made by the non-medically qualified scientist. Today, not only biochemists but also pathologists, bacteriologists, pharmacologists, physiologists, and even anatomists not infrequently enter their chosen subject by way of an honours degree in one of the physical or biological sciences rather than by way of a medical qualification. An adequate appreciation of much modern clinical practice demands a "scientific" outlook on the part of the clinician, and it is therefore not surprising that the most progressive medical schools contain a considerable proportion of non-medically qualified preclinical teachers.

The development of the medical sciences is therefore in grave danger of being checked by the recent tendency of hospitals, universities, and research institutions to offer research and preclinical teaching appointments at two salary scales often differing by as much as 30% according to whether the successful applicant has a medical qualification or not. In these appointments there is no suggestion that a suitably qualified applicant who does not possess a medical degree is not fully competent to occupy the post. The inevitable consequence of this policy, if it becomes general, must be to deter young men from entering the medical sciences by any route other than that provided by a medical course and to encourage older men to sacrifice potentially productive years in acquiring a medical qualification.

The protest of Dr. Harris and Dr. Bull (Dec. 17, p. 1150) should be seen in relation to this wider problem. One cannot but admire the firm refusal of Cambridge University to surrender an important academic principle to expediency, and its insistence that in the absence of any possibility of a general increase of university salaries to the proposed medical level, the medical scales should be applied only to those with definite clinical responsibility. A valid grievance does, however, remain: it is most unfortunate that wide discrepancies have appeared in the policies of different universities in this matter of medical-school salaries. It is to be hoped that these important issues, vital for the future of medical research and teaching in this country, will be considered without delay at the highest levels.

Oxford.

V. P. WHITTAKER.

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SIR,—Mr. Hughes's clear instructions (Dec. 17, p. 1156) on the elementary principles involved in intravenous therapy should prove of value to the student dresser or to the inexperienced houseman. His diagram of the no. 20 S.W.G. needle should give a clear picture of it to those not acquainted with this standard type of needle.

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London, W.1.

J. DOUGLAS ROBERTSON.

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Many operators find that as much dexterity can be acquired without the use of a syringe attached to the needle. This is my experience.

It is not always possible to "feel" the needle point through the vein wall. Many vein walls are extremely thin and offer less resistance to the needle than the surrounding fascia.

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The advantages of the cannula-needle, as described, are as follows:

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3. If the cannula becomes blocked, another can be inserted through the external needle remaining in the vein. This saves the patient the unpleasantness of another vein puncture.

Lastly I would mention that an intermittent intravenous drip is not always due to faulty technique, but may be caused by venous spasm. A few drops of nikethamide injected into the tube will overcome this spasm almost immediately but not necessarily permanently.

London, W.1. F. R. ELLIS.

SIR,—It was very refreshing to read Mr. Hughes's letter of Dec. 17 about the much-debated intravenous cannula and its method of insertion. Perhaps I may point out a few additional requirements for successful operation:

1. The needle must be really sharp. Blunt needles automatically cause more damage to the vein, increasing the chance of a hæmatoma, venous spasm, and subsequent thrombosis.

2. Mr. Hughes's illustration shows a 45° bevel, but he does not point out the importance of this. Many transfusion needles are machined with a concave end, which often terminates in a useless spike. It is extremely easy to transfix a vein, however well distended, with such a weapon. Further, the intima is readily lacerated when the needle is advanced up the vein.

3. A fine, slow, lateral tremor transmitted from the operator's hand to the needle-tip helps to prevent accidental laceration of the intima during final advancement of the needle.

Having got a "drip" successfully erected, it is timely to remember the possible causes of venous spasm; this is the nocturnal epitaph of too many well-deserving transfusions. For trouble-free and protracted transfusion the 'Polythene' catheter appears to have no peer. Perhaps the simple and effective needle cannula will eventually be used for inserting this excellent innovation.

R.A.F. Hospital,
Ely, Cambs. R. N. G. ATHERSTONE.

PENICILLIN-RESISTANT STAPHYLOCOCCAL INFECTION IN A MATERNITY HOSPITAL

SIR,—The careful and comprehensive investigation by Dr. Mary Barber and her colleagues, reported on Dec. 17, brings out again the potential dangers, and the high incidence, of carriers of virulent strains of *Staphylococcus aureus* in some maternity hospitals, and the particular circumstances in which the carrier-rates may remain high despite the application of any direct method of clearance.

The intrinsic difficulties in many maternity hospitals are such that overcrowding, overwork, and improvised arrangements are likely to continue for a time; but fresh air and outdoor exercise may be of considerable value in keeping down the incidence, and severity of infection, of carriers. Whenever possible, therefore, nursing personnel should be encouraged to get out into the fresh air during their leisure-time and to make good use of the natural sunshine. The significant decrease in the number of carriers during August, 1949, in comparison with February, 1949, might have been due to improved general health and other factors arising from the seasonal advantages of summer. However, the whole story plainly indicates that any new maternity hospitals should be constructed upon a plan of reasonable dispersal and at the same time be well surrounded with a green belt so that everyone working in them shall have at least a short walk in the fresh air several times a day and every encouragement to slip out into the sunshine for a few minutes in the less busy periods of the day's routine.

To those who have responsibilities in maternity departments, Dr. Barber's findings may come as a shock, especially because of the high percentage of penicillin-resistant strains in the carriers. The report reminds us that in an overcrowded, ill-ventilated, and overworked maternity department, the newborn baby is often at the mercy of an intensely infective environment.

Department of Child Health,
University of Bristol. A. V. NEALE.

FOREIGN BODIES IN THE ABDOMEN

SIR,—Two days before Christmas I did a necropsy for the coroner on a woman of 88. In the duodenum was a diverticulum, and in this was a round black object, resembling a small button. On cleaning it we found it to be a threepenny piece, old style, minted in 1940. Obviously a relic from a previous Christmas. There was no inflammatory reaction, and it is unlikely that there had been symptoms, although the coin had probably been there for several years. The cause of death in this case was acute heart-failure, hypertension, and chronic nephritis.

Kent and Canterbury Hospital,
Canterbury. I. B. MORRIS.

VITAMIN E

SIR,—The important article by Dr. Ratcliffe in your issue of Dec. 17 mentions the wholesale condemnation of the use of vitamin E in cardiovascular disease which was released to the press, the radio, and *Modern Medicine in Canada* in November, 1946, by Dr. R. L. Noble, secretary of the Ontario College of Physicians and Surgeons. That statement has been widely quoted, of course.

It should be known that the college is purely a legal body, concerned with regulating the details of medical practice in the Province of Ontario. It has neither the power nor the facilities to decide on the merits of any medical discovery, or to pass judgment upon one. How inaccurate and misleading the statement was is now rapidly becoming apparent. Castagna and Impallomeni[1] have shown the value of α-tocopherol therapy in phlebitis. Stritzler[2] and Burgess and Pritchard[3] have corroborated its value in indolent ulcers. Its powers as a physiological and safe anticoagulant have been emphasised independently by Zierler's[4] group at Johns Hopkins and the group at Tulane,[5] the latter having already used it in the prophylaxis of thrombosis. The value of this agent in vasospasm has been made clear by Tusini,[6] and in muscle ischemia by the Manchester group.[7]

We notice that one who teaches "experimental methods" at Manchester already is convinced that what benefits were achieved "in certain cases" (citing our heart papers) we have reported could scarcely be "due to causes other than vitamin-E therapy." May we indicate that our conclusions of 1945–46 on both cardiac and vascular disease were reached by identical methods, are obviously all of a piece, and we are no more or less accurate with respect to one than the other? We patiently await the news that cardiologists, at least in the country of Lord Burleigh, have picked up the data the students of vascular disease have brought forward and have hurdled the diaphragm.

W. E. SHUTE
E. V. SHUTE.

The Shute Institute, London, Ontario.

SIR,—In their letter last August, Shute and Shute[8] assert that I found that vitamin E gives encouraging results in Buerger's disease. In my report on this subject I said[9]:

> "In the six cases of thromboangiitis obliterans, none can be considered to have shown improvement while on vitamin E. . . . vitamin E has contributed nothing

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1. Castagna, R., Impallomeni, G. *Boll. Soc. piemont. Chir.* 1948, 18, 155.
2. Stritzler, E. Proceedings of the Second International Conference on Vitamin E. New York, 1949; p. 368.
3. Burgess, J. F., Pritchard, J. E. *Canad. med. Ass. J.* 1948, 59, 212.
4. Zierler, K. L., Grob, D., Lilienthal, J. L. *Amer. J. Physiol* 1948, 153, 127.
5. Kay, J. H., Hutton, S. B. Unpublished data. Kay, J. H., Hutton, S. B., Weiss, G. N., Ochsner, G. Unpublished data.
6. Quoted by Ferrero, V. *Lancet*, 1949, ii, 579.
7. Boyd, A. M., Ratcliffe, A. H., Jepson, R. P., James, G. W. H. *J. Bone Jt. Surg.* 1949, 31B, 325.
8. Shute, W. E., Shute, E. V. *Lancet*, 1949, ii, 346.
9. *Ann. N.Y. Acad. Sci.* 1949, 53, 113.

to our cases which have stopped smoking and just as ineffective in those who continued to smoke.

My experience in other cases with leg ulcers, as outlined in the paper quoted, has been that vitamin E failed to hasten the healing-time, and its use has been discontinued. There is no ambiguity regarding my stand on this controversial subject, and I resent being placed on the opposite side. Such tactics can only bring disrepute on the proponents of vitamin-E therapy.

Pittsburgh, Pennsylvania. L. LEWIS PENNOCK.

CURARE AND PRECIPITATE LABOUR

SIR,—In his letter of Dec. 10, Dr. Mills gives a fair and reasonable analysis of the conclusions reached by Dr. Rollason (Nov. 19). Most of us who have observed the uterus under local anæsthesia alone will appreciate that, as Marshall[1] has lately pointed out, the effect of curare on uterine contraction and retraction is, in comparison, probably minimal; though Malpas[2] has cited one purely mechanical contra-indication to its use which may on occasion be significant.

I therefore hope too that any further cases in which fœtal distress might be attributed to curare will be published, since my own experience leads me to the firm belief that in good hands the use of the curare-'Kemithal'-cyclopropane sequence is a valuable contribution to "cæsarean" anæsthesia. I find it, however, difficult to agree with Dr. Mills that "hæmorrhage experienced during cæsarean section under curare is considerably more than when either a local or a spinal anæsthetic is employed." On the contrary, I have observed the final stages of the operation to proceed smoothly and with a minimum of blood-loss, though I always have my anæsthetist give an ampoule of ergometrine intravenously as the head is being extracted, believing that I am not justified in withholding it.

Liverpool. H. VINCENT CORBETT.

CHANGING YOUR DOCTOR

SIR,—May I bring to notice how gravely the administration of the National Health Service is breaking down through the continuation of the present preposterous regulation by means of which everyone is free to change from one general practitioner to another whenever he wishes? It is in fact theoretically possible to have six different doctors in one week. Recently, we have seen resolutions put forward by the Ayr and Norwich executive councils recommending a return to the old system of National Health Insurance days. No doubt the new scheme had, at its inception, much in its favour, but its possible abuses were not appreciated. Now the mounting cost of the service is causing such alarm to our administrators that it might be worth reviewing the present system in comparison with the past.

In order to prevent unnecessary expenditure, a doctor's position in relation to his patients should be as independent as possible. Since his remuneration is based on the number of patients on his list, the tendency must be for him to give no incentive for patients to transfer to other doctors. Such an incentive would certainly present itself if he failed to comply with a request for: (*a*) medical certificate for incapacity for work, (*b*) authority for car and ambulance service, (*c*) recommendation for ophthalmic services, (*d*) recommendation for specialist or consultant services, or (*e*) the ordering of a particular drug or appliance; or if the doctor would not guarantee admission to a particular hospital in case of illness. There are many other incentives of a most trivial kind.

…resent arrangements the doctor is placed in a false position—who can blame him if he leaves the straight and narrow path with the possibility of his own, not the State's, insolvency at the end of it?

In case the position may seem overdrawn, let me give a few examples:

The Ambulance Service.—The mileage for one county council alone is:

1948		*1949*	
January	14,800	February	53,000
July	24,800	July	48,700
August	37,700	August	53,000
November	43,400		

The Home-help Service.—The estimate has been doubled. A special appeal has been issued to doctors to have regard to the cost and to make requests only where there is real need and where the assistance required cannot be given by relatives. This is very easy to do if the doctor himself is secure.

Executive-council Administration.—Since the new regulations started, the clerical work involved through patients changing their doctor has increased to such an extent that extra clerks have sometimes been required.

It would appear to be obvious that immediate steps must be taken to improve the situation. The simplest and easiest is undoubtedly to return to the old National Health Insurance system of permitting change only once every three months, except by mutual consent of old and new doctor.

Worthing, Sussex. HAROLD LEESON.

OPERATIONS FOR MITRAL STENOSIS

SIR,—The leading article on this subject in your issue of Oct. 29 gives the impression that the development of the surgical treatment of this condition springs entirely from American sources. The auricular approach to the stenosed valve, which is now being used with considerable success and is undoubtedly the route of choice, was used successfully by Sir Henry Souttar in this country in 1925.

A recent paper[1] mentioned that a successful direct operation for mitral stenosis had been performed at Guy's Hospital. For some three to four years our efforts have been directed towards valvulotomy for mitral stenosis and several cases have now been operated on successfully at Guy's Hospital, the first over eighteen months ago. A full report of this work is now being prepared for publication. This letter is to draw attention to the fact that this country is not behindhand in the development of surgery for the relief of mitral stenosis.

CHARLES BAKER
R. C. BROCK
Guy's Hospital, London, S.E.1. MAURICE CAMPBELL.

STERILISATION OF POLYTHENE TUBING

SIR,—Dr. Bryce-Smith's ingenious apparatus, described in your issue of Dec. 24, is of great interest to all interested in continuous spinal, spinal-extradural, or caudal-extradural methods of analgesia.

Recently, however, I received a report from another anæsthetic centre in Great Britain that a fine 'Polythene' catheter (sterilised by boiling) had broken after several hour's use during a continuous caudal analgesia for childbirth. It seems that the mobility of the skin in the sacrococcygeal region had strained the catheter at its point of entry into the sacral hiatus (where it was kept still) and it had finally fractured—leaving 2–3 in. within the sacral canal. It would appear, therefore, to be inadvisable to use fine plastic catheters for continuous caudal analgesia until they can be made in this country from materials as tough as those employed by anæsthetists in the U.S.A.

King's College Hospital, London, S.E.5. A. H. GALLEY.

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1. Marshall, C. M. 12th British Congress of Obstetrics and Gynæcology, 1949.
2. Malpas, P. *Brit. med. J.* 1949, i, 156.

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1. Brock, R. C. *Brit. med. J.* 1949, i, 399.

Obituary

WILLIAM HENRY NEWTON

M.D., M.SC. MANC., D.SC. LOND.

Professor Newton died on Dec. 21 in Edinburgh, where he had held the chair of physiology for only a year. His early death will be widely and deeply regretted both for his personal qualities and for his value as investigator, administrator, writer, and teacher.

Born in 1904, he was the son of the Rev. J. T. Newton. From Ashville College, Harrogate, he went to Manchester University, where he took first-class honours in physiology at the B.SC. examinations in 1925 and graduated as M.SC. a year later after a period of study on smooth muscle with the late] B. A. McSwiney. This work he continued during the clinical years before he qualified in medicine in 1929. The longest spell of his academic life was some 14 years spent at University College, London, where, with an interval in 1937–38 as Rockefeller travelling fellow at Yale University, he was in succession Sharpey scholar, lecturer, senior lecturer, reader in physiology, and sub-dean of the faculty of medical sciences. In 1934 he took his M.D. Manc. and in 1940 his D.SC. Lond. From 1939 to 1944, as acting head of the department of physiology during the absence of Professor Lovatt Evans, he clearly showed his worth: despite rather unstable health, he conducted the department with tact and wisdom under the trying conditions of evacuation, first at Cardiff and later at Leatherhead. Of Newton as chief a colleague writes: "He was a man who was loved as well as respected. His manner was unassuming, and his kindness and human understanding were obvious at first sight. He considered others and consulted their wishes, though this did not mean that he was incapable of coming to decisions or of making up his own mind. A department run by Newton was a happy department, because his own character was both strong and charitable."

In 1944 he was appointed to the Holt chair of physiology in the University of Liverpool, where he was responsible for great changes in the physiological work. In 1948 he was invited to the chair at Edinburgh, which he accepted, though not without some heart-searching, perhaps because of the opportunity which this change offered him of rejoining his former colleague, Professor G. F. Marrian. He first fell ill last May; so his new university had not long to learn to know him; but he had already won affection and respect. L. M. P. writes: "He came at a time when the preclinical syllabus was being replanned. It was quickly apparent that he knew what needed to be done, and that he was willing and anxious to coöperate with other departments so that the syllabus might be a well-knit whole. Though his time with us was short his power to teach lucidly and hold interest made an impression. It was at once evident that he was a good and considerate head of department. He kept his courage and sense of humour even when he knew the meaning of his illness."

In his research Newton was conspicuously patient and self-critical, and his results could always be accepted with the fullest confidence. His interest in reproductive endocrinology was first roused by some observations made with Professor Marrian on weight changes in mice during pregnancy, which showed that mice may be physiologically pregnant in the absence of fœtuses provided that the placentæ are retained. Later observations by Newton and other workers showed that pregnancy could persist in the absence of the ovaries in certain species which include the guineapig, horse, monkey, and man, and suggested that in these species the œstrogen and progesterone necessary for the maintenance of pregnancy is supplied from an extra-ovarian source—probably the placenta. His work with Beck and Richardson made it clear that the placenta plays a part in mammary development, which is largely independent of both ovaries and pituitary. With his associates he was also interested in the activity of relaxin and œstrogen in the separation of the pubic bones.

But Newton's abilities went far beyond the ploughing of a single furrow, and there were few fields of physiology with which he did not have a sound and broad acquaintance, as the contents of his new edition of *Recent Advances in Physiology* showed last year. In writing a book of this kind there is a temptation to take shelter behind one's own specialist knowledge and to produce yet another specialist monograph. But, except for the chapter on the physiology of pregnancy, the book deals with a wide [illegible] from temperature regulation to colour-vision, which lay well away from his own interests. Later he published his own *Introduction to Physiology*.

In 1931 Newton was elected a member of the Physiological Society, and he served it with characteristic zeal and loyalty as secretary (1943–47) and later as chairman of the committee, when his good judgment showed to advantage and his pleasant sense of humour often lightened the proceedings. He often spoke at meetings, and his last communication, jointly with A. D. Dewar, was on the programme for Dec. 17. As a member of the editorial board of the *Journal of Physiology* (1948–49), his ability to give the essence of a subject briefly and clearly was of great value. As head of a department he had learnt to pull together loosely written papers, and to the inexperienced writer he used to say "When you are sure of your facts express yourself definitely, not hesitantly." Many of his friends recognised his contribution in 1939, from A Physiologist in America, to THE LANCET series, "Grains and Scruples"; for, as C. L. E. points out, "Bill Newton wrote well and gracefully, and with a characteristic charm of style. His letters, until the last, had flashes of shrewd wit and neatly turned phrases. He had fine discrimination in art and a talent in making water-colour drawings which were vigorous and effective. . . . He belonged to a generation of physiologists which, for one reason or another was already too small in number, and among them he was outstanding."

A. S. P. writes: "Newton was known to many of his students as 'friend Newton,' and in such matters students are discerning people. He was essentially a friendly person, restful, unassuming, and helpful on every occasion, with the same quiet easy manner for the newest laboratory assistant as for the most distinguished figure of the academic world. With all this he had great qualities of mind and personality—determination, originality, and scientific curiosity which showed in years of fruitful research along several different lines, and moral and physical courage which was tried to the uttermost before his death.

"Newton excelled as a teacher, especially in the practical laboratory in which he had the gift of making the routine experiments seem of vital interest and importance. The less intelligent students could always be sure of help and encouragement from him, and the more intelligent and original were stimulated to their best. With his students Newton had the greatest satisfaction that can come to a teacher, that his old students constantly returned for help and advice."

Dr. Newton married, in 1931, Stella, daughter of Mr. Roger Reynolds. His family consists of two daughters.

LANCELOT BROMLEY

M.A., M.CHIR. CAMB., F.R.C.S.

Mr. Lancelot Bromley, who died at Seaford, Sussex, on Dec. 17, at the age of 64, was the son of Sir John Bromley. He was educated at St. Paul's School and Cambridge University. He qualified from Guy's Hospital in 1909, and took the Cambridge M.B. the following year. In 1912 he obtained the F.R.C.S. and the next year the M.CHIR. In 1916 he was appointed assistant surgeon to Guy's. He took on the additional appointment of surgeon to the neurological department in 1920, which he held for a number of years, and he became full surgeon in 1933. Early in his career he was for a time warden of the residential college at Guy's, and he was dean of the medical school from 1915 to 1920. He was also on the staff of Putney Hospital and Surbiton Hospital.

The complete upheaval that the war imposed on Guy's was distasteful to his orderly mind, and he felt he could not do his best work in a makeshift communal underground theatre. While retaining most of his London appointments, in 1942 he retired from Guy's to become surgeon to the new Ministry of Pensions Hospital at Stoke Mandeville. A few years ago he gave up all his

London work, except for a regular visit to the Medical Sickness Society, of which he was the vice-president, and retired to Seaford.

"Those who had the pleasure of knowing and working with Lancelot Bromley," writes N. L. E., "could not fail to be struck, from the first meeting, by his charm of manner. Always friendly, courteous, and modest, he spoke quietly and softly, and was seldom, if ever, known to raise his voice. Even in the middle of what might be considered a very difficult and tedious operation he would never lose his composure. Few surgeons have his quality. In debate he had the facility of getting at the pith of the matter better than most men and of expressing his views quietly in clear and convincing language. These same qualities of gentleness and control pervaded all his work. At a time when many surgeons worshipped speed, Bromley was one of the first to practise a quiet unhurried technique, and taught this to his registrars and house-surgeons. He would advise his first assistant in a whisper, which the students around would be unable to hear. But he knew well that at that stage they were unable to appreciate the niceties of technique. At his outpatients he took great trouble to select the best cases for demonstration at length to his students. His ward teaching was also much appreciated. He was not often to be seen at medical meetings or committees, but when he did attend he could be relied upon to contribute to the discussion his well-reasoned arguments.

"He had always devoted his spare time enthusiastically to his family, and after he retired his life at Seaford was gladdened by the visits of his children and grandchildren, and by an occasional game of golf. A keen yachtsman, he had a boat built to his own design, and he was also a good cricketer and hockey player, and a first-class golfer, playing many times in the Amateur Championship."

Mr. Bromley is survived by his widow, formerly Miss Dora Ridgway Lee, of Dewsbury, a married daughter, and a son who has inherited much of his surgical skill and athletic prowess.

JOHN PHILIP BUCKLEY

M.C., M.D., M.S. LOND., F.R.C.S.

SOME eighty years of surgery and good fellowship has been broken in Manchester by the death of Philip Buckley on Dec. 20. His father, Sam Buckley, who qualified in 1868 and was surgeon at the Clinical (now the Northern) Hospital, could tell many a story of the doings of residents at the Manchester Royal Infirmary which brought to mind hospital tales of early Victorian times.

Philip was educated at Rugby School and Trinity College, Cambridge, where he took a first class in the natural sciences tripos in 1904. Four years later he qualified from the London Hospital, and, after holding surgical posts, took the F.R.C.S. in 1911. In 1914 he was appointed assistant surgeon to the Manchester Royal Infirmary. His work there was almost immediately interrupted by the outbreak of war, during which he served in France and the East.

As a surgeon his chief interest was in rectal work and in the treatment of hernia, in which he developed a special technique.

Buckley was popular with his students for he always had some experience to fix his teaching in their minds, and his own generation will also remember him with affection as a good teller of tales. E. B. L. recalls two of his favourite stories:

"When Buckley was stationed near Mount Sinai in the first war a report came in that some of the men on outpost duty had been poisoned by eating berries. His commanding officer suggested he should go up and investigate. Buckley thought that the commanding officer, who was a general practitioner and therefore had a wider experience, was more suitable for the task, but, after an argument, was ordered by his senior to go and report and treat. On arrival he found the plant and rather helplessly examined the berries. Then his mind wandered to far-off days when he was learning the nature of specimens kept in drawers for materia medica diagnosis at the Manchester University. 'Why, they are castor-oil beans,' he thought. He wrote a learned report, the gist of which was that if the men stopped eating the beans they would recover. For this, according to his own account, though his friends did not altogether believe him, he was awarded the Military Cross. Again, his adventure with the hippopotamus at the Zoo which he was trying to photograph and which, resenting the process, made him run the gauntlet for his life, or at any rate to avoid a full-dress ducking, along the slippery edge of her pool, was a story worth hearing. He had a good knowledge of the comparative anatomy of mammals."

JOHN EDWARD LOVELOCK

B.M. OXFD, M.R.C.P.

THE medical profession has contributed liberally to athletic history: there is not one branch of sport in which outstanding exponents cannot be identified. So far as the running-track is concerned, the name of Jack Lovelock may well be supreme for all time.

Physical prowess always incites hero-worship but alone does not always confer world-wide celebrity: there must be other special contributions to a personality. Lovelock had everything—charm, character, and intellect, as well as remarkable physical endowments, and the world has been robbed of a spectacular figure. His tragic accidental death on Dec. 28, at the age of 39, is early enough for his exploits to be within recent memory. He came from Otago University, New Zealand, to Exeter College, Oxford, as a Rhodes scholar in 1931, and gained his athletic blue as a freshman. During his first year at Oxford he established new British records for the mile and the three-quarter mile and displayed his versatility by winning the cross-country race against Cambridge in record time and in boxing for the university as a feather-weight.

In 1933, when running in America for Oxford and Cambridge against Princeton and Cornell, he won the mile in 4 minutes 7·6 seconds, a world record. Further triumphs included presidency of the Oxford University Athletic Club, an Amateur Athletic Association championship, a British Empire championship, British records at 2 and 3 miles, and, as the culmination of his career, victory in the 1500 metres race at the Olympic Games in Berlin in 1936, in world record time.

Because he was on occasion beaten in comparatively mediocre time, Lovelock was criticised as a temperamental runner—an absurd designation if intended in a disparaging sense, for great athletes like great artists are inevitably temperamental, partly as an exponent of their nature, partly from the circumstances of intense competition. Lovelock's career coincided with a plethora of mighty middle-distance runners, and good judges consider him to have been the greatest of them all. He had the anatomical proportions which produced a beautiful body balance, a perfect style, and an optimum stride with maximum rhythmic coördination and muscular economy. Moreover, a philosophic approach to the principles of training and of competition were based on a scientific foundation. When I examined him in the summer of 1935 on the eve of his departure to Princeton to run against the leading Americans in "the mile of the century" his cardiac rate was only 39 to the minute—the most infrequent I have ever encountered. His supreme fitness was accompanied by a tranquillity, a confidence, an inability to contemplate defeat. "Temperamental"—perhaps; but for the great occasions he had the capacity to mobilise all his resources. In the final of the Olympic 1500 metres in Berlin he displayed superb generalship. Early in the race he placed himself exactly as he wished, in a position from which he could dominate. Indeed, one had the impression that he was manipulating the field of champions according to his set plan.

Thenceforth he abandoned athletics to apply himself with equal resolution to the practice of his profession. He qualified B.M. in 1937 and took the M.R.C.P. in 1940. He showed himself to be, as would have been expected, a thoroughly capable physician, shrewd rather than brilliant, knowledgeable but with common sense. In the war his special knowledge and interests were eagerly utilised by the R.A.M.C., in which he worked as a specialist in physical medicine. His article in the Corps *Journal* on the problems of assessing physical fitness for hard work showed a masterly grasp of the subject expressed with a highly desirable dogmatism.

On demobilisation he was appointed director of the newly established rehabilitation department at St.

Bartholomew's Hospital. A highly successful career in a specialty for which he was so eminently fitted appeared certain; but unhappily, after a short period of enthusiastic application, he became restless, and he resigned to take an appointment in New York as assistant director of physical medicine and director of rehabilitation at the Hospital for Special Surgery. In this he appeared contented and energetic, though he suffered from persistent diplopia and frequent headaches. Early in the war he had sustained a severe hunting accident with concussion and a far more serious cerebral injury than he was willing to admit.

ADOLPHE ABRAHAMS.

Dr. Lovelock married, in 1945, Miss Cynthia Wells James, of Brooklyn, who survives him with two daughters.

CLIFFORD DOBELL

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Dr. Dobell, who died in London on Dec. 23 at the age of 63, was protistologist to the Medical Research Council. Earlier he had held a lectureship and assistant professorship in protistology and cytology at the Imperial College of Science. His work on amoebic dysentery during the 1914–18 war was summarised in his Medical Research Council reports on the protozoological investigation of cases and carriers in 1917, and his study of 1300 convalescent cases in 1918. During the late war he continued his researches on the intestinal amœbæ of man: he completed his study of the life-history of *Endolimax nana*, and he was able to cultivate iodamœba in vitro for the first time. His early studies of coprozoic flagellates are also well known and of acknowledged value. One of his outstanding contributions was his study of the life-cycle and of the nuclear changes in the parasitic sprozoon *Aggregata eberthi*. While other workers did not entirely agree with his interpretation, it remains a classic of this kind of investigation.

Though Dobell was a protozoologist he also did important work in bacteriology, and did much to lay the foundation of a more academic and cytological approach to the study of bacteria in general. For many years the science of bacteriology suffered from the study of the pathogenic forms by medical men with, naturally enough, little interest in the finer structure of the organisms. Dobell's mastery of technique and his able use of the microscope, as well as his choice of some of the larger free-living forms as objects of study, opened up an approach to bacteriology which has now been followed in many directions.

Dobell was devoted to science, but he belonged to an earlier tradition and he accepted the modern experimental and biochemical approach with considerable reluctance.

Sir CHARLES GORDON-WATSON

D. R. C. writes: "Sir Charles Gordon-Watson came to York early in the war as surgical consultant to Northern Command. He was one of the first of a galaxy of talent which descended on York Military Hospital, and which transformed it into one of the most efficient units in the country. From then until his retirement he ranged over nearly half of Eastern England, visiting hospitals and dealing with major surgical problems and policy. He stayed on in York when he retired, liking the old city and its racecourse. His tall figure and his imperious but kindly features were well known in the town and on the golf course.

"Two years ago he had a major abdominal operation, done by one of his old Bart's juniors. This was very successful, and it was hoped he would have many years of active life, but despite a new eupepsia other signs of the wear and tear of a busy surgical life showed themselves. He fought his disabilities with great courage; only a few months ago he started having a new course of golf lessons. Later, when his limbs wouldn't quite obey his commands, he would practise movements for hours, and by his strong will force his legs to carry him in some sort of fashion. Even to those who knew him only in his later years it was plain that here was a commanding personality and a good and skilful surgeon."

A requiem mass for Sir Charles Gordon-Watson will be held at St. James's, Spanish Place, London, W.1, on Wednesday, Jan. 11, at 11.45 A.M.

Appointments

Adeney, N. F., M.B. Camb., F.R.C.S.: director of thoracic Southampton.

* Alergant, C. D., M.D. Lpool, M.R.C.P.: consultant venereol Liverpool region.

Crawshaw, D. G., M.B. Manc., D.C.H., D.P.H.: M.O.H., Peterbor

Curtis, Gladys, M.R.C.S.: asst. school M.O., Sheffield.

Darke, C. S., M.D. Lond., M.R.C.P.: consultant physician, General Hospital, and physician, thoracic surgical Sheffield.

Friel, W. R. N., M.B. Edin., M.R.C.P.E., D.P.H.: medical sup tendent, All Saints' Hospital and Hill Top Hospital, Br grove, Worcestershire.

Glanville, H. J., M.R.C.S., D.PHYS.MED.: consultant physicia physical medicine, Salisbury Hospital Management Comm area.

Hutton, T. B., M.A., M.B. Camb., F.R.C.S.E., D.L.O.: ear, nose, throat surgeon (consultant), Castleford and in Wakefield A group.

Lloyd, T. W., D.M. Oxfd, M.R.C.P.: medical superintendent consultant chest physician, South Worcestershire grou hospitals and St. Wulstan's Hospital, Malvern.

McLeod, W. J., M.D. Belf., D.P.H.: senior M.O., Belfast co borough health committee's establishment.

Mulvein, Margaret, M.B. Glasg.: asst. M.O. for the staff o County Council of Yorkshire.

Middlesex Hospital, London:

Boyle, A. C., M.B. Lond., D.PHYS.MED.: asst. physician, de physical medicine.

Lloyd-Davies, O. V., M.S. Lond., F.R.C.S.: asst. surgeon.

Snelling, Margaret, M.D. Lond., M.R.C.P., F.R.C.S.: radiotherapist.

* Amended notice.

Births, Marriages, and Deaths

BIRTHS

Atkinson.—On Dec. 18, at Beckenham, Kent, the wife of Dr. W. J. Atkinson—a daughter.

Boreham.—On Dec. 30, in London, the wife of Mr. Peter Boreham, F.R.C.S.—a daughter.

Bradmore.—On Dec. 22, to Dr. Rosemary Bradmore, wife of Mr. H. M. Bradmore, F.R.C.S.—a son.

Devas.—On Dec. 21, in London, the wife of Dr. M. B. Devas—a son.

Elsom.—On Jan. 1, at Lichfield, the wife of Dr. A. R. Elsom—a son.

Gladstone.—On Dec. 26, in London, the wife of Dr. G. S. Gladstone—a son.

Hayden.—On Dec. 26, the wife of Dr. R. K. Hayden—a daughter.

Headley.—On Dec. 22, in London, the wife of Dr. S. R. T. Headley—a son.

Lennox.—On Dec. 19, in London, the wife of Dr. Bernard Lennox—a son.

MacKeith.—On Dec. 20, in London, the wife of Dr. R. C. MacKeith—a son.

Morgan.—On Dec. 20, in London, the wife of Dr. G. O. Morgan—a daughter.

Pennington.—On Dec. 24, the wife of Dr. M. C. Pennington—a daughter.

Pringle.—On Dec. 14, the wife of Dr. Edward Pringle—a daughter.

Vowles.—On Dec. 25, at Barnstaple, to Dr. Mary Vowles, wife of Dr. Keith Vowles—a son.

Walker.—On Dec. 22, the wife of Dr. M. F. C. Walker—a daughter.

MARRIAGE

Chivers—Corbishley.—On Dec. 30, at High Lane, Cheshire, Charles Peter Chivers, M.B., to Jean Corbishley.

DEATHS

Chaplin.—On Dec. 25, Clement Woodthorpe Chaplin, M.D. Lond., aged 74.

Clarkson.—On Dec. 16, at Watford, Colin Campbell Clarkson M.B. Lond.

Cruden.—On Dec. 24, in London, Robert Cruden, M.A., M.B. Aberd.

Lovelock.—On Dec. 28, in New York, John Edward Lovelock, M.A., B.M. Oxfd, M.R.C.P.

McRobert.—On Dec. 28, at Rangoon, Burma, Ronald McRobert, M.B. Aberd., F.R.C.O.G., lieut.-colonel, I.M.S. retd, aged 53.

May.—On Dec. 22, at Westerham, P. M. May, M.R.C.S., surgeon captain, R.N. retd.

Mulvany.—On Dec. 23, in London, Thomas Edward Mulvany, M.R.C.S., aged 81.

Murray.—On Dec. 31, at Hythe, Kent, John George Patrick Murray, M.D. Edin., F.R.C.S.E.

Newton.—On Dec. 26, in Edinburgh, William Henry Newton, M.D. Manc., D.SC. Lond.

Pare.—On Dec. 25, at Harrogate, Henry Burton Pare, M.B. Manc.

Pead.—On De John Hunter Pead, B.A., M.B. Camb d, aged 81.

Pesel.—On De M.C., M.D. Edin., aged 72.

Platt.—On D Noble Platt, M.R.C.S., aged 78.

Scales.—On Dec. 21, in London, Cuthbert Scales, M.C., M.B. Edin., colonel, R.A.M.C. retd.

Unitt.—On Dec. 22, at Leicester, James Arthur Unitt, L.R.C.P.E., aged 89.

Upcott-Gill.—On Dec. 31, at Ryde, I.O.W., Geoffrey Allen Upcott-Gill, F.R.C.S.E., aged 71.

Wolverson.—In December, at Folkestone, Frederick Wolverson, M.D. Glasg., aged 75.

THE EARLY YIELD OF HUMAN MILK, AND ITS RELATION TO THE SECURITY OF LACTATION

HAROLD WALLER
M.B. Camb.
PÆDIATRICIAN, BRITISH HOSPITAL FOR MOTHERS AND BABIES, WOOLWICH

STATISTICAL reviews of methods of infant feeding have shown conclusively that nearly half the babies born in this country are bottle-fed by the time they are three months old. There is no certain knowledge why this is so, and it seems to be accepted by many as a social phenomenon related in some way to the habits of women and their conditions of life. Opinions on the causes differ, and differ chiefly on whether women are truly incapable of yielding enough milk to meet the requirements of breast-feeding or are merely unwilling to undertake the task. The necessity for wage-earning soon after childbirth is admittedly far less than in the past, though it still applies with special force to the unmarried mother. If we exclude the category due to separation of mother and child, we are still left with many thousands of whom we need to know how many are truly incapable of breast-feeding and how many needlessly give it up.

From time to time something fresh emerges from the surveys, such as that the failure to breast-feed is not related to differences in social status [1]; that the time at which the change is made to artificial feeding varies in different localities [2]; and that women delivered in hospitals are slightly more successful than those delivered in their own homes.[1] The chief value of findings such as these is in checking opinions which easily gain currency, but I think it unlikely they will do more. For it is in the nature of things that from almost whatever motive a woman resorts to artificial feeding she will say she lost her milk. It also happens that, if she ceases to breast-feed either wholly or in part, it is not long before this statement will be true. Should the change precede the inquiry, it must often be pure conjecture whether it was made of necessity or for some other reason.

Those who contend that many women are physically incapable of producing enough milk for their babies do not often define just what they imply by this incapacity. It could, for example, refer to a lack of enough secretory tissue in the breasts. This is very difficult to assess by physical signs, but some evidence should be afforded by measurement of the yield at the start of lactation. An attempt to do this is described here. On the other hand, despite a sufficient yield at the beginning, failure could arise from an inability to maintain it. There are many difficulties in prolonging regular measurements of yield beyond the lying-in period, and I have not been able to include any here. There are, however, certain features of lactation in the early phase which appear to have an influence on its subsequent security. One of these has been chosen for discussion.

PREPARATION FOR BREAST-FEEDING

Before giving details of the measured yield of a series of women delivered in this hospital, two ways must be mentioned in which their supervision probably differs from what is usual elsewhere. Both concern preparation for breast-feeding.

All are examined early in pregnancy for a defect of the nipples which, even in slight degree, is a hindrance to getting the newborn to take the breast and if at all pronounced may wholly frustrate its attempts to feed. The defect is developmental: the nipple, instead of being loosely attached to the breast and forming, as it were, merely a thickened prolongation of the areola, is more or less anchored to the underlying structures. It then reacts to pressure between the child's jaws by retracting towards the breast instead of projecting into its mouth. The defect is not revealed by mere inspection but is easily detected by compressing the areola between finger and thumb just behind the nipple's base, a test which forms a fair imitation of the baby's grasp. Applied as a routine, this test reveals in rather more than a third of our patients in their first pregnancy enough defect in one or both nipples to threaten difficulty. In all but a few correction, or at any rate much improvement, can be got by the use of a hemispherical glass or plastic shield with a circular opening in its base. The shields are worn under a well-fitting brassière which presses the nipples through the opening and gradually stretches and loosens their attachment. Some may have to wear the shields throughout pregnancy to obtain the necessary change. As a result of their use the handicap of the inverted or retracting nipple scarcely applies to the women whose lactation is considered here.

Further, all in their first pregnancy and any who have already met with feeding difficulties are taught how to use their hands so that they will be skilled in expressing milk and should need little help from the nurses in the lying-in wards. Starting not later than the 32nd week of pregnancy they are instructed to practise the expression of colostrum for ten minutes daily.

ESTIMATION OF YIELD OF MILK

For several years it has been a routine practice in our wards to control breast tension by the manual removal of milk, using it as a means to make sure that the breasts are emptied. If by test weighing we ascertain what the baby obtains through the twenty-four hours and add to this what can be expressed from the breasts, we get an approximate value for the total yield. We find also the proportion of the yield which the baby is using. The figures given here were collected from 200 primiparæ and 200 multiparæ as they passed through the hospital, and refer to the fifth and tenth days after delivery. These days were chosen because on the fifth day fullness of the breasts is usually at its height, whereas by the tenth day feeding should as a rule be smoothly under way as a result of the milk's outflow having become free: by then also the baby's appetite may be expected to have increased, and it will have acquired skill in feeding. Between the fifth and tenth days the ratio of the baby's intake to the mother's yield should reflect these changes. It was thought best to exclude women whose babies weighed less than 6 lb. at birth, since several had to be fed by special methods because of prematurity and other causes of frailty.

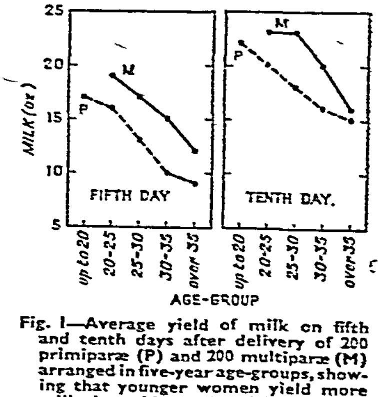

Fig. 1—Average yield of milk on fifth and tenth days after delivery of 200 primiparæ (P) and 200 multiparæ (M) arranged in five-year age-groups, showing that younger women yield more milk than older and multiparæ more than primiparæ.

Obstetrically I believe the series can be taken as representative of women who register for admission to the hospital: 2 required cæsarian section; 18 instrumental delivery; 17 had pre-eclamptic toxæmia, in 10 of whom it was classified as moderately severe; 2 had

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1. Dykes, R. M. *Publ. Hlth*, 1949, 62, 118.
2. Maternity in Great Britain: Survey by a Joint Committee of the R.C.O.G. and the Population Investigation Committee. London, 1948.

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M.A., SC.D. CAMB., F.R.S.

Dr. Dobell, who died in London on Dec. 23 at the age of 63, was protistologist to the Medical Research Council. Earlier he had held a lectureship and assistant professorship in protistology and cytology at the Imperial College of Science. His work on amœbic dysentery during the 1914–18 war was summarised in his Medical Research Council reports on the protozoological investigation of cases and carriers in 1917, and his study of 1300 convalescent cases in 1918. During the late war he continued his researches on the intestinal amœbæ of man: he completed his study of the life-history of *Endolimax nana*, and he was able to cultivate iodamœba in vitro for the first time. His early studies of coprozoic flagellates are also well known and of acknowledged value. One of his outstanding contributions was his study of the life-cycle and of the nuclear changes in the parasitic sprozoon *Aggregata eberthi*. While other workers did not entirely agree with his interpretation, it remains a classic of this kind of investigation.

Though Dobell was a protozoologist he also did important work in bacteriology, and did much to lay the foundation of a more academic and cytological approach to the study of bacteria in general. For many years the science of bacteriology suffered from the study of the pathogenic forms by medical men with, naturally enough, little interest in the finer structure of the organisms. Dobell's mastery of technique and his able use of the microscope, as well as his choice of some of the larger free-living forms as objects of study, opened up an approach to bacteriology which has now been followed in many directions.

Dobell was devoted to science, but he belonged to an earlier tradition and he accepted the modern experimental and biochemical approach with considerable reluctance.

Sir CHARLES GORDON-WATSON

D. R. C. writes: "Sir Charles Gordon-Watson came to York early in the war as surgical consultant to Northern Command. He was one of the first of a galaxy of talent which descended on York Military Hospital, and which transformed it into one of the most efficient units in the country. From then until his retirement he ranged over nearly half of Eastern England, visiting hospitals and dealing with major surgical problems and policy. He stayed on in York when he retired, liking the old city and its racecourse. His tall figure and his imperious but kindly features were well known in the town and on the golf course.

"Two years ago he had a major abdominal operation, done by one of his old Bart's juniors. This was very successful, and it was hoped he would have many years of active life, but despite a new eupepsia other signs of the wear and tear of a busy surgical life showed themselves. He fought his disabilities with great courage; only a few months ago he started having a new course of golf lessons. Later, when his limbs wouldn't quite obey his commands, he would practise movements for hours, and by his strong will force his legs to carry him in some sort of fashion. Even to those who knew him only in his later years it was plain that here was a commanding personality and a good and skilful surgeon."

A requiem mass for Sir Charles Gordon-Watson will be held at St. James's, Spanish Place, London, W.1, on Wednesday, Jan. 11, at 11.45 A.M.

Appointments

ADENEY, N. F., M.B. Camb., F.R.C.S.: director of thoracic unit, Southampton.

* ALERGANT, C. D., M.D. Lpool, M.R.C.P.: consultant venereologist, Liverpool region.

CRAWSHAW, D. G., M.B. Manc., D.C.H., D.P.H.: M.O.H., Peterborough.

CURTIS, GLADYS, M.R.C.S.: asst. school M.O., Sheffield.

DARKE, C. S., M.D. Lond., M.R.C.P.: consultant physician, City General Hospital, and physician, thoracic surgical unit, Sheffield.

FRIEL, W. R. N., M.B. Edin., M.R.C.P.E., D.P.H.: medical superintendent, All Saints' Hospital and Hill Top Hospital, Bromsgrove, Worcestershire.

GLANVILLE, H. J., M.R.C.S., D.PHYS.MED.: consultant physician in physical medicine, Salisbury Hospital Management Committee area.

HUTTON, T. B., M.A., M.B. Camb., F.R.C.S.E., D.L.O.: ear, nose, and throat surgeon (consultant), hospitals in Pontefract and Castleford and in Wakefield A Hospital Management Committee group.

LLOYD, T. W., D.M. Oxfd, M.R.C.P.: medical superintendent and consultant chest physician, South Worcestershire group of hospitals and St. Wulstan's Hospital, Malvern.

MCLEOD, W. J., M.D. Belf., D.P.H.: senior M.O., Belfast county borough health committee's establishment.

MULVEIN, MARGARET, M.B. Glasg.: asst. M.O. for the staff of the County Council of Yorkshire.

Middlesex Hospital, London:

BOYLE, A. C., M.B. Lond., D.PHYS.MED.: asst. physician, dept. of *physical medicine*.

LLOYD-DAVIES, O. V., M.S. Lond., F.R.C.S.: asst. surgeon.

SNELLING, MARGARET, M.B. Lond., M.R.C.P., F.R.C.S.: asst. radiotherapist.

* Amended notice.

Births, Marriages, and Deaths

BIRTHS

ATKINSON.—On Dec. 18, at Beckenham, Kent, the wife of Dr. W. J. Atkinson—a daughter.

BOREHAM.—On Dec. 30, in London, the wife of Mr. Peter Boreham, F.R.C.S.—a daughter.

BRADMORE.—On Dec. 22, to Dr. Rosemary Bradmore, wife of Mr. H. M. Bradmore, F.R.C.S.—a son.

DEVAS.—On Dec. 21, in London, the wife of Dr. M. B. Devas—a son.

ELSOM.—On Jan. 1, at Lichfield, the wife of Dr. A. R. Elsom—a son.

GLADSTONE.—On Dec. 26, in London, the wife of Dr. G. S. Gladstone—a son.

HAYDEN.—On Dec. 26, the wife of Dr. R. K. Hayden—a daughter.

HEADLEY.—On Dec. 22, in London, the wife of Dr. S. R. T. Headley—a son.

LENNOX.—On Dec. 19, in London, the wife of Dr. Bernard Lennox—a son.

MACKEITH.—On Dec. 20, in London, the wife of Dr. R. C. MacKeith—a son.

MORGAN.—On Dec. 20, in London, the wife of Dr. G. O. Morgan [illegible]

[illegible] 24, the wife of Dr. M. C. Pennington [illegible]

[illegible] wife of Dr. Edward Pringle—a daughter.

[illegible] Barnstaple, to Dr. Mary Vowles, wife of [illegible] son.

[illegible] wife of Dr. M. F. C. Walker—a daughter.

MARRIAGE

CHIVERS—CORBISHLEY.—On Dec. 30, at High Lane, Cheshire, Charles Peter Chivers, M.B., to Jean Corbishley.

DEATHS

CHAPLIN.—On Dec. 25, Clement Woodthorpe Chaplin, M.D. Lond., aged 74.

CLARKSON.—On Dec. 16, at Watford, Colin Campbell Clarkson, M.B. Lond.

CRUDEN.—On Dec. 24, in London, Robert Cruden, M.A., M.B. Aberd.

LOVELOCK.—On Dec. 28, in New York, John Edward Lovelock, M.A., B.M. Oxfd, M.R.C.P.

MCROBERT.—On Dec. 28, at Rangoon, Burma, Ronald McRobert, M.B. Aberd., F.R.C.O.G., lieut.-colonel, I.M.S. retd, aged 53.

MAY.—On Dec. 22, at Westerham, P. M. May, M.R.C.S., surgeon captain, R.N. retd.

MULVANY.—On Dec. 23, in London, Thomas Edward Mulvany, M.R.C.S., aged 81.

MURRAY.—On Dec. 31, at Hythe, Kent, John George Patrick Murray, M.D. Edin., F.R.C.S.E.

NEWTON.—On Dec. 20, in Edinburgh, William Henry Newton, M.D. Manc., D.SC. Lond.

PARE.—On Dec. 25, at Harrogate, Henry Burton Pare, M.B. Manc.

PEAD.—On Dec. 21, at Bexhill-on-Sea, John Hunter Pead, B.A., M.B. Camb., surgeon captain, R.N. retd, aged 81.

PESEL.—On Dec. 29, Howard George Pesel, M.C., M.D. Edin., aged 72.

PLATT.—On Dec. 26, at Wilmslow, John Noble Platt, M.R.C.S., aged 78.

SCALES.—On Dec. 21, in London, Cuthbert Scales, M.C., M.B. Edin., colonel, R.A.M.C. retd.

UNITT.—On Dec. 22, at Leicester, James Arthur Unitt, L.R.C.P.E., aged 89.

UPCOTT-GILL.—On Dec. 31, at Ryde, I.O.W., Geoffrey Allen Upcott-Gill, F.R.C.S.E., aged 71.

WOLVERSON.—In December, at Folkestone, Frederick Wolverson, M.D. Glasg., aged 75.

average strength and vigour can be relied on to accomplish it. How to discover whether it does so, and what to do if it fails, is not so clear.

RESIDUAL MILK

Of the 400 women in the series, 312 were yielding 20 oz. or more by the tenth day, of whom 78 reached or exceeded 30 oz.: 200, or exactly half, the babies weighed 8 lb. or more at birth. These larger babies took on average, about 17 oz. by the tenth day: not many were taking more than 20 oz., and it is unusual for those of lower birth weights to do so. It follows that at this date many of the women had some residual milk after their babies had fed; and, when this is removed by hand, it is often surprising to find how small a proportion of the total yield the child can use. Indeed, the high figures of residual milk on many of our patients' charts sometimes provoke the comment that the practice of removing the excess may well be responsible for artificially raising the yield. In my belief this is not so: it does no more than allow the breasts to reach full secretion by lowering tension and easing the milk's outflow. The range of variation (fig. 3), with the great preponderance of those falling within the 20 oz. and 25 oz. groups, does not suggest an artificial effect, and there is support for this when we turn from averages to individuals.

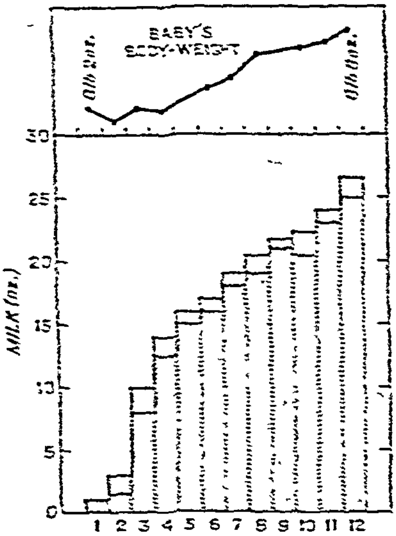

Fig. 4—Start of breast-feeding in a 3-para aged 25: hatched columns, milk taken by baby; stippled columns, residual milk. Baby was vigorous and milk outflow free. Almost whole yield was taken, and baby was getting 40 calories per lb. of body-weight by twelfth day. In such a case lactation is safe.

The example in fig. 4, a woman in her third lactation, is very typical of the start of breast-feeding when the yield is sufficient, the flow easy, and a vigorous baby takes practically the whole contents of the breasts. Here indeed the residue is so small that there is no need for it to be taken off, though in practice it is wise to ascertain for a few days consecutively that the child does achieve this degree of emptying. (This does not involve measuring either intake or residue, but merely testing if the breasts have been drained at the end of the feeds.) By contrast fig. 5 is from one of the high yielders, and here, though the baby takes a full allowance and is getting 63 calories per lb. on the tenth day, the residual milk removed in twelve days exceeded what was taken by 55 oz. It will be seen that expression of the small surplus from the first of these two women does not send up her yield to anything approaching that of the second; and further, that when secretion is truly deficient (as in fig. 6), no amount of stripping by hand will increase productivity: nor do I know anything that will. These extremes of high and low yield represent differences in the amount of glandular tissue present, as Engel[3] has shown, and I believe we can assume that a woman's potential yield is decided by the time she reaches term, and indeed earlier, as we see after premature delivery, and that it has been determined by the degree of hormonal preparation during pregnancy.

The course of breast-feeding in this series of women cannot be given: the figures were taken from patients who had passed through the hospital some months previously, and were collected with the sole object of calculating the early yield. Two other series of primiparæ, one of 100 and one of 300, have been closely followed, and of the whole number 77% were found to be successfully breast-feeding at six months without the necessity of using supplementary milk. This corresponds almost exactly to the number of those in the present series who were yielding 20 oz. or more at the tenth day. It will be remembered that the number feeding at six months has been estimated at 40% for the country as a whole.[4] It is difficult to suppose that those coming to our hospital are endowed with powers of lactation superior to the average, and any advantage they may possess in maintaining their yield is, I suggest, more likely to depend on the steps taken to keep milk tension low in the early phase. It is commonly taught that overloading of the breasts in the puerperium is of little consequence beyond causing temporary discomfort: that, if they are "left well alone," secretion soon adapts itself to the needs of the child. Now, it is true that on this plan the yield always falls; but the contention that it declines conveniently and exactly to the point at which it coincides with the child's requirements, *and declines no further*, is seriously open to question. It needs to be subjected to very much more careful investigation than, so far as I am aware, it has received.

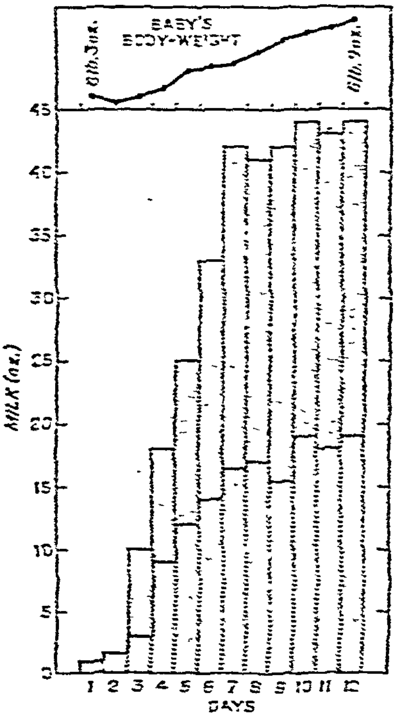

Fig. 5—Start of breast-feeding in a young primipara with a high yield of milk and small baby: hatched columns, milk taken by baby; stippled columns, residual milk. Ratio of intake to yield over first twelve days was 42%. Overloading was prevented by manual removal of residual milk. In such a case only with care is lactation safe.

At any infant welfare centre throughout the country can be met women whose infants are artificially fed by the age of a month or little more, and who give as the reason that their milk left them. It may take a little trouble to seek beyond this laconic statement for an account of what preceded the loss, but it is impressive how many tell of pain and overloading in the first week, of damage to the nipples and the difficulty of getting the

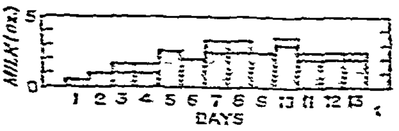

Fig. 6—Milk yield of a primipara aged 35, with virtual agalactia. Her baby weighed 8 lb. 14 oz. at birth. Only 22 oz. of milk was yielded in twelve days. In such a case breast-feeding is impossible.

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[3] Engel, S. Ergebn. inn. Med. Kinderheilk. 1925, 24, 210.

[4] Ministry of Health, Rep. publ. Hlth med. Subj. 1944, no. 91.

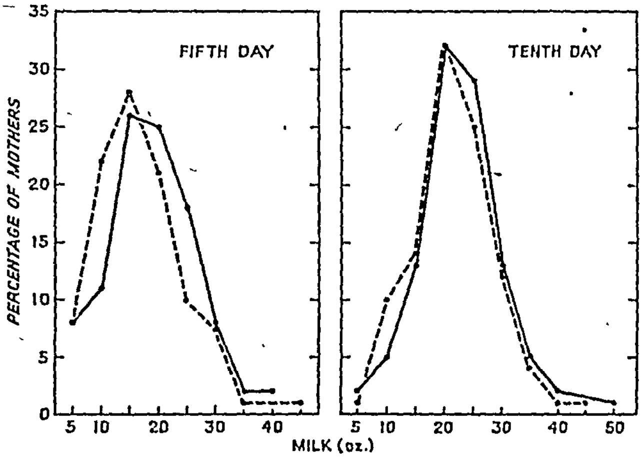

Fig. 2—Range in variation of milk yield: by fifth day 138 (69%) of primiparæ and 161 (80·5%) of multiparæ yield 15 oz. or more; and by tenth day 150 (75%) of primiparæ and 162 (81%) of multiparæ yield 20 oz. or more.

placenta prævia; and 38 had had postpartum hæmorrhage exceeding 20 oz. There was an average number of perineal lacerations needing repair. With few exceptions our patients are out of bed on the third day after delivery and move freely about the wards and nurseries by the sixth. The average stay in hospital after delivery was a fraction under thirteen days.

In fig. 1 the yield of both sets on the fifth and tenth days is shown, the women being placed in age-groups of five years. The younger produce more than the elder, and the multiparæ more than the primiparæ.

In fig. 2 is plotted the range of variation in yield, the salient points of which are as follows:

Yield	*Primiparæ*	*Multiparæ*
5th day:		
15 oz. or more	69%	80·5%
10–15 oz.	23%	11·5%
Less than 10 oz.	8%	8·0%
10th day:		
20 oz. or more	75%	81·0%
15–20 oz.	13%	12·0%
10–15 oz.	10%	5·5%
Less than 10 oz.	2%	1·5%

The proportion of the total yield which the babies take is shown in fig. 3, where the grouping is according to their birth weights. The findings are given in greater detail in the accompanying table.

The higher yield of the younger women has already been noted and reflects our general experience, as does the finding that women produce less in the first lactation than subsequently. The outstanding fact is that three-quarters of the primiparæ and four-fifths of the multiparæ (312 or 78% in all) are yielding 20 oz. or more by the tenth day—i.e., enough milk to provide a 9 lb. baby with 44 calories per lb. of its birth weight. Of the remainder, 50 (12·5%) yield 15–20 oz., which is comparatively low, and 38 (9·5%) must be called seriously deficient. There were 7 of these with virtual agalactia.

PROPORTION OF TOTAL YIELD OF MILK TAKEN BY BABIES

No. of babies	Birth weight (lb.)	Av. intake on 5th day (oz.)	Proportion of yield (%)	Av. intake on 10th day (oz.)	Proportion of yield (%)
Primiparæ					
37	6	8·6	58	13·6	73
79	7	8·6	65	14·2	75
63	8	9·8	67	14·8	78
21	9	9·2	67	15·8	83
Multiparæ					
24	6	8·5	59	13·7	71
60	7	10·6	69	15·7	83
69	8	11·7	73	16·6	83
47	9	12·4	69	17·1	83

Turning to the ratio of the babies' intake to the mothers' yield (fig. 3), with one exception the proportion on the fifth day is low for both small and large babies, ranging between 58% and 69%. By the tenth day the ratio has risen: those in four of the heaviest groups are all taking over four-fifths (83% of the yield); those in the next heaviest group about three-quarters (75–78%); the 6 lb. babies take less (71–73%). Converting these amounts into calories, the 6 lb. babies, both first and later born, are getting on average 48 calories per lb. on the tenth day, whereas the heaviest firstborns get 35 and the later born 38 calories per lb.

To summarise, these figures, so far as they go, lend no support to the opinion that a high proportion of women are physiologically incapable of producing enough milk to nourish their babies. Rather do they point to most failures being dependent on an inability to maintain an initially high yield. At the tenth day of life the smallest babies are the best nourished but take the lowest proportion of what their mothers are yielding; the converse applies to the largest babies.

It is mainly the second of these two findings—the ratio of the amount the babies take to what their mothers yield—which I propose to discuss, and, since I have not been able to find other figures for comparison, it must be assumed that they are reasonably representative. If anything, the ratio is likely to be above rather than below the average, from the care taken to keep milk tension low. The significance placed on the ratio is based on the fact, well-established in dairy science, that regular emptying of the mammary gland is a condition of continued milk secretion, and that insufficient removal of milk lowers the yield and can bring production to an end. This sequence seems to be closely related to the degree of milk-pressure within the alveoli; there seems to be a level above which it should not rise or, at any rate, above which it should not persist. Sections of the gland loaded with milk show that the secreting cells are flattened, in which state their nutrition is probably lowered and their productivity reduced, for it is known that the rate of secretion slows down progressively as the hours after milking extend.

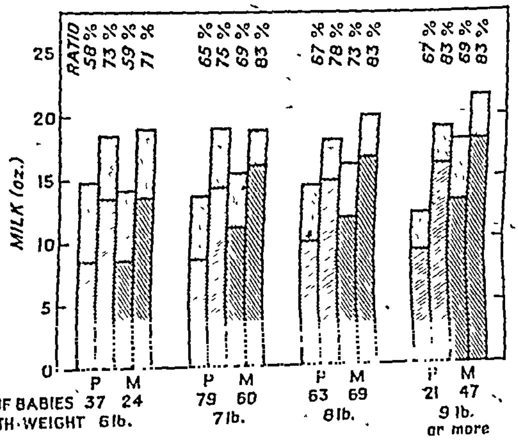

Fig. 3—Ratio of milk taken by babies to total yield by mothers on fifth and tenth days: hatched columns, milk taken; stippled columns, residual milk; P, primiparæ; M, multiparæ. Alternate columns are for fifth and tenth days.

In women, therefore, we may assume that the breasts should be drained when, or soon after, the optimal amount of milk has accumulated, and that a threat to production arises if the optimum is exceeded, or if emptying is incomplete. The time-honoured maxim that the baby should empty the breasts when it feeds is thus sound; but the usual implication is, I think, that any infant of wide-bore needle. The exudate was usually turbid, often clotted, and had a pH of about 7·4; under the microscope it was seen to contain leucocytes and small oily droplets. Turpentine might be expected to cause some pain at the sites of injection, but careful observation of the animals throughout the experiments clearly showed that the small amounts used did not produce any appreciable discomfort.

The exudate did not inhibit the growth of the strain of hæmolytic streptococcus used in the penicillin assay. Samples of exudates withdrawn in the preliminary tests from three rabbits, to which 1 unit of penicillin per ml. was added, did not inactivate the penicillin in 6 hours at 37°C.

Penicillin K and the mixture of F and dihydro F were obtained by chromatography on a buffered silica column and extraction and precipitation with cyclohexylamine. hey were identified by the microchromatographic nalytical technique now regularly used on production atches.

RESULTS

Aqueous Solutions.—In the first experiment the enicillin contents of blood and exudate were estimated after intramuscular injection of 30,000 units of aqueous solutions of crystalline sodium or amorphous calcium penicillin into rabbits each weighing about 2·5 kg. The results (table I) show that detectable amounts of penicillin remain in the blood-stream for about 3 hours, but that they are present in the damaged tissue for 8 or 9 hours. Injections of crystalline and of amorphous penicillin produced similar levels in both the blood and the tissues

Suspensions in Oil and Beeswax.—In table II are given the penicillin levels found in blood and tissue exudate after intramuscular injection of 30,000 units of penicillin suspensions (crystalline sodium or amorphous calcium) in oil and beeswax. Penicillin levels were recorded in the blood up to 12 hours and in the tissue exudate for more than 18 hours. The penicillin levels were higher in the exudates after 11 or 12 hours than after 7 or 8 hours; this may be explained by the fact that the former were taken at night, when the rabbits were resting. In this experiment, again, no appreciable difference was noted between the effects of crystalline and of amorphous penicillin.

Procaine Penicillin.—Similarly, the concentrations of penicillin were determined in blood and tissue exudates after the intramuscular injection of procaine penicillin

ABLE I—PENICILLIN LEVELS IN BLOOD AND EXUDATE OF RABBITS AFTER INTRAMUSCULAR INJECTION OF 30,000 UNITS IN AQUEOUS SOLUTION

No of abbits	Penicillin injected	Sample	Penicillin levels (units per ml.) at hours												
			1/2	1	1 1/2	2	2 1/2	3	4	5	6	7	8	9	24
12	Crystalline sodium penicillin	Blood	4–2	3–1	2·0–0·5	0·5–0·06	0·2–trace	0·1–0	0	..	..	..	..	..	..
			(3·1)	(2·25)	(1)	(0·246)	(0·02)	(0 02)	(0)	..	..	..	..	..	..
		Exudate	2	2·0–0·5	..	2·0–0·5	..	1·0–0·5	0·25–0·1	0·25–0 05	0·125–0·03	0·125–0·03	0·06–0·03	0·03–0	0
			(2)	(1)	..	(1)	..	(0·65)	(0·11)	(0·069)	(0·06)	(0·06)	(0·04)	(0 01)	(0)
8	Yellow calcium penicillin	Blood	4–2	4·0–0·5	2·0–0·25	0·5–0·125	0·125–0·06	0·125–0	0·06–0	..	..	..	..	..	..
			(2·7)	(1·8)	(0·54)	(0·175)	(0·08)	(0·05)	(0·06)	..	..	..	..	..	..
		Exudate	2–1	2·0–0·5	..	2 0–0·25	..	1·0–0·125	0·3–0·06	0·25–0·06	0·125–0 05	0·125–0·06	0·05–0·03	0·03–0	0
			(1·8)	(0·8)	..	(0·6)	..	(0·2)	(0·2)	(0 07)	(0·07)	(0·04)	(0·01)	(0)	(0)

Means are given in parentheses.

TABLE II—PENICILLIN LEVELS IN BLOOD AND EXUDATE OF RABBITS AFTER INTRAMUSCULAR INJECTION OF 30,000 UNITS IN OIL AND BEESWAX

No. of rabbits	Penicillin injected	Sample	Penicillin levels (units per ml.) at hours								
			6	7	8	11	12	14	16	18	24
5	Crystalline sodium penicillin	Blood	1·0–0·06 (0·58)	1·0–0·03 (0·5)	0·125–0 (0·09)	0·125–0·03 (0·08)	0·125–0 (0·08)	0 (0)	0 (0)	0 (0)	0 (0)
		Exudate	1·0–0·12 (0·9)	0·25–0·125 (0·225)	0·25–0·125 (0·19)	0·5–0·125 (0·4)	0·25–0·125 (0·21)	0·25–0·06 (0·2)	0·25–0·03 (0·06)	0·25–0·03 (0·06)	0 (0)
5	Yellow calcium penicillin	Blood	1·0–0·06 (0·52)	0·5–0·06 (0·45)	0·5–0·03 (0·26)	0·25–0·03 (0·14)	0·25–0 (0·08)	0·06–0 (0·02)	0 (0)	0 (0)	0 (0)
		Exudate	1·0–0·25 (0 69)	0·25 (0·25)	0·25–0·125 (0·19)	0·5–0·25 (0·37)	0·25–0·125 (0·15)	0·5–0·06 (0·22)	0·125–0·03 (0·07)	0·25–0·03 (0·09)	0 (0)

Means are given in parentheses.

TABLE III—PENICILLIN LEVELS IN BLOOD AND EXUDATE OF RABBITS AFTER INTRAMUSCULAR INJECTION OF PROCAINE PENICILLIN IN OIL

Dose (units)	Rabbit no.	Penicillin levels (units per ml.) at hours															
		2		4		6		8		10		24		31		48	
		Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.
30,000	1	32	0·5	32	0·5	1·0	0·5	1·0	1·0	0·5	1·0	0	trace	0	0·125	0	0
	2	> 32	0·5	16	0·25	0·25	0·25	0·5	1·0	0·25	0·25	0	0·5	0	0·25	0	0
	3	> 32	0·5	16	0·5	0·25	0·25	0·125	1·0	0·06	1·0	0	0·25	0	0	0	0
50,000	4	> 32	0·5	16	0·5	1·0	0·25	0·25	1·0	0·25	0·5	0	0·25	0	0·25	0	0
	5	> 32	1·0	16	0·5	1·0	0·5	1·0	2·0	0·25	1·0	0	0·25	0	0·125	0	0
	6	> 32	0·5	16	0·5	1·0	0·5	1·0	2·0	0·5	1·0	0	0·25	0	0·25	0	0

newborn to feed; how often they say "he didn't seem able to get the milk out." Later came the discovery of a considerable loss of weight, test-feeds that recorded negligible amounts, and supplementary milk given to make good the deficiency. Soon afterwards the breasts were noted to have got smaller, and we are told "I could see he was not getting on." His reluctance to feed there and strong preference for bottle-feeds was the deciding factor. Relief at the improvement in the baby's behaviour may well mask a genuine regret at having failed to breast-feed. I have already said it may be impossible to judge whether a woman's resort to artificial feeding was optional or necessary, but when this history is obtained, especially if the skin covering the breasts shows evidence of having been recently stretched, and if involution has been rapid, it strongly suggests that failure has been the result of overloading and stasis. It should at least be borne in mind before hastily concluding that she was unwilling to persevere, was too "highly strung," or was unequal to resuming her household tasks. Of the failures which occur somewhat later and help to swell the number at three months, I suspect that many represent a more gradual decline in yield from incomplete emptying and the substitution of one or two bottle feeds, thus instituting the changes which normally accompany weaning.

If the facts presented here are correct, the variations in yield, and the small contribution to emptying the breasts which many newborn infants can make call for reconsideration of the customary management during the lying-in period. This involves the acceptance by those in charge of a greater responsibility for the results of breast-feeding beyond this stage; the more so since so many women are discharged from maternity wards while still in this critical phase of lactation. Until this acceptance becomes general I can see no prospect of an improvement in the proportion of babies likely to be breast-fed for as long as three months. To a mother the immediate progress of her newborn is always a matter of urgency, yet in present conditions the resort to artificial milk is by far the easiest solution of any difficulty she encounters in her attempt to breast-feed.

SUMMARY

The early yield of milk in 400 women was measured at the fifth and tenth days after delivery. The figures reveal considerable variation both in yield and the proportion taken by the newborn.

Of the 400 women, 78% were producing enough milk at the tenth day to provide sufficient for a baby weighing 9 lb. at birth. Failure to maintain an adequate yield is thus a more usual cause of artificial feeding than failure to secrete enough at the start of lactation.

It is suggested that insufficient emptying of the breasts in the early days after delivery is a common reason for a rapid decline in yield and may lead to its early suppression.

"... My optimism is based on the hope that all 67 nations who at the end of 1949 were members of W.H.O. and others still to join them will participate wholeheartedly, without reservations, with courage and imagination, in this great crusade for better health. I can think of no greater field for earnest, determined work. I can think of none in which it should be easier to set aside political, economic, and social differences which still divide a world which should be one world. If there is one aim which must unite us, it is surely that of making our children physically, mentally, and socially healthy. I trust that in 1950 we shall move another step forward towards building a healthier society and that in doing so we shall also give encouragement to all those who in this vital period of human history refuse to despair of mankind's destiny."—Dr. BROCK CHISHOLM, director-general, World Health Organisation, *United Nations Bulletin*, January, 1950.

PENICILLIN IN TISSUE EXUDATES AFTE INJECTION

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IN the early days of penicillin therapy it was generall believed that its effect depended on the maintenance a threshold bacteriostatic level in the blood-strea for a sufficient time. Since penicillin is highly diffusibl aqueous solutions had to be injected continuously (b intramuscular or intravenous drip), or more usuall at intervals of 3 or 4 hours, in order to maintain th desired plasma penicillin levels throughout the course o treatment.

More recently, penicillin has been extensively used a a suspension in arachis oil containing a small proportion of beeswax or of procaine penicillin. An adequate dos of this preparation, given as a single subcutaneou injection, leaves in the tissues a depot from which th slower and continuous release of the penicillin keeps th concentration of penicillin in the blood at or abov the bacteriostatic level for a long time.

It has occasionally been reported—e.g., by Bigg (1944)—that the amounts of penicillin demonstrabl in the blood have been insufficient to explain it therapeutic effect. Experiments on laboratory animal infected with streptococci or pneumococci (Jawetz 194 White et al. 1946, Zubrod 1947) showed that the duratio of the animal's survival depends more on the total dos of penicillin injected than on the interval betwee injections. These results seemed inconsistent with th supposed need for maintaining a continuous threshol bacteriostatic level, as also did the successful treatmen of pneumonia by Tillett et al. (1944) with aqueous solu tions of penicillin given at longer intervals than thos previously recommended. This last report provided th experimental background for injecting larger doses o aqueous penicillin solutions at intervals of 12 or eve 24 hours.

Little attention seems lately to have been paid to th finding of Florey et al. (1946) that penicillin injected after severe tissue damage can be detected in the wound much longer than in the blood. Since their experience seemed also highly relevant to the beneficial effect observed with large doses given at long intervals, we undertook some experiments to show how single doses of penicillin are distributed in diseased tissues and blood.

METHOD

The method involved the production of artificial œdema in the tissue, followed by intramuscular injection of penicillin and withdrawal of blood and œdema fluid at suitable intervals for the assay of penicillin content. We first injected into guineapigs several different substances in an attempt to produce suitable localised lesions with œdema. Small amounts of turpentine gave the best results. The use of guineapigs, though satisfactory for the production of lesions, was not entirely successful, because the serum from some test animals inhibited, at higher concentrations, the growth of a strain of the highly sensitive hæmolytic streptococcus used for the assay of penicillin. Rabbits were more satisfactory, because their serum did not inhibit the test organism and blood samples in sufficient quantities could be taken from them. Moreover, in our experience the results obtained with penicillin in rabbits have reflected our findings in man.

After the injection of 0·5 ml. of oil of turpentine (*B.P.*) into the muscle of the hind leg of a rabbit, sufficient damage and œdema were produced in about 24 hours for exudate to be withdrawn. Quantities of 0·2–0·3 ml. of the exudate were aspirated with a syringe fitted with a wide-bore needle. The exudate was usually turbid, often clotted, and had a pH of about 7·4; under the microscope it was seen to contain leucocytes and small oily droplets. Turpentine might be expected to cause some pain at the sites of injection, but careful observation of the animals throughout the experiments clearly showed that the small amounts used did not produce any appreciable discomfort.

The exudate did not inhibit the growth of the strain of hæmolytic streptococcus used in the penicillin assay. Samples of exudates withdrawn in the preliminary tests from three rabbits, to which 1 unit of penicillin per ml. was added, did not inactivate the penicillin in 6 hours at 37°C.

Penicillin K and the mixture of F and dihydro F were obtained by chromatography on a buffered silica column and extraction and precipitation with cyclohexylamine. They were identified by the microchromatographic analytical technique now regularly used on production batches.

RESULTS

Aqueous Solutions.—In the first experiment the penicillin contents of blood and exudate were estimated after intramuscular injection of 30,000 units of aqueous solutions of crystalline sodium or amorphous calcium penicillin into rabbits each weighing about 2·5 kg. The results (table I) show that detectable amounts of penicillin remain in the blood-stream for about 3 hours, but that they are present in the damaged tissue for 8 or 9 hours. Injections of crystalline and of amorphous penicillin produced similar levels in both the blood and the tissues.

Suspensions in Oil and Beeswax.—In table II are given the penicillin levels found in blood and tissue exudate after intramuscular injection of 30,000 units of penicillin suspensions (crystalline sodium or amorphous calcium) in oil and beeswax. Penicillin levels were recorded in the blood up to 12 hours and in the tissue exudate for more than 18 hours. The penicillin levels were higher in the exudates after 11 or 12 hours than after 7 or 8 hours; this may be explained by the fact that the former were taken at night, when the rabbits were resting. In this experiment, again, no appreciable difference was noted between the effects of crystalline and of amorphous penicillin.

Procaine Penicillin.—Similarly, the concentrations of penicillin were determined in blood and tissue exudates after the intramuscular injection of procaine penicillin

TABLE I—PENICILLIN LEVELS IN BLOOD AND EXUDATE OF RABBITS AFTER INTRAMUSCULAR INJECTION OF 30,000 UNITS IN AQUEOUS SOLUTION

No of rabbits	Penicillin injected	Sample	Penicillin levels (units per ml.) at hours												
			½	1	1½	2	2½	3	4	5	6	7	8	9	24
12	Crystalline sodium penicillin	Blood	4–2	3–1	2·0–0·5	0·5–0·06	0·2–trace	0·1–0	0	..	..	..	..	..	..
			(3·1)	(2·25)	(1)	(0·246)	(0·02)	(0·02)	(0)	..	..	..	..	..	..
		Exudate	2	2·0–0·5	..	2·0–0·5	..	1·0–0·5	0·25–0·1	0·25–0·05	0·125–0·03	0·125–0·03	0·06–0 03	0·03–0	0
			(2)	(1)	..	(1)	..	(0·65)	(0·11)	(0·069)	(0·06)	(0·06)	(0·04)	(0 01)	(0)
8	Yellow calcium penicillin	Blood	4–2	4·0–0·5	2·0–0·25	0·5–0·125	0·125–0 06	0·125–0	0·06–0	..	..	..	..	..	..
			(2·7)	(1·8)	(0·54)	(0·175)	(0·08)	(0·05)	(0·06)	..	..	..	..	..	..
		Exudate	2–1	2·0–0·5	..	2·0–0·25	..	1·0–0·125	0·3–0·06	0·25–0·06	0·125–0·05	0·125–0·06	0·05–0·03	0·03–0	0
			(1·8)	(0·8)	..	(0·6)	..	(0·2)	(0·2)	(0·07)	(0·07)	(0·04)	(0·01)	(0)	(0)

Means are given in parentheses.

TABLE II—PENICILLIN LEVELS IN BLOOD AND EXUDATE OF RABBITS AFTER INTRAMUSCULAR INJECTION OF 30,000 UNITS IN OIL AND BEESWAX

No. of rabbits	Penicillin injected	Sample	Penicillin levels (units per ml.) at hours								
			6	7	8	11	12	14	16	18	24
5	Crystalline sodium penicillin	Blood	1·0–0 06 (0·58)	1·0–0·03 (0·5)	0·125–0 (0·09)	0·125–0·03 (0·08)	0·125–0 (0·08)	0 (0)	0 (0)	0 (0)	0 (0)
		Exudate	1·0–0·12 (0·9)	0·25–0·125 (0·225)	0·25–0·125 (0·19)	0·5–0·125 (0·4)	0·25–0·125 (0·21)	0·25–0·06 (0·2)	0·25–0·03 (0·06)	0·25–0·03 (0·06)	0 (0)
5	Yellow calcium penicillin	Blood	1·0–0·06 (0·52)	0·5–0·06 (0·45)	0·5–0·03 (0·26)	0·25–0·03 (0·14)	0·25–0 (0·08)	0 06–0 (0·02)	0 (0)	0 (0)	0 (0)
		Exudate	1·0–0·25 (0·69)	0·25 (0·25)	0·25–0·125 (0·19)	0·5–0·25 (0·37)	0·25–0·125 (0·15)	0·5–0·06 (0·22)	0·125–0·03 (0·07)	0·25–0·03 (0·09)	0 (0)

Means are given in parentheses.

TABLE III—PENICILLIN LEVELS IN BLOOD AND EXUDATE OF RABBITS AFTER INTRAMUSCULAR INJECTION OF PROCAINE PENICILLIN IN OIL

Dose (units)	Rabbit no.	Penicillin levels (units per ml.) at hours															
		2		4		6		8		10		24		31		48	
		Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.	Bl.	Ex.
30,000	1	32	0·5	32	0·5	1·0	0·5	1·0	1·0	0·5	1·0	0	trace	0	0·125	0	0
	2	> 32	0·5	16	0·25	0·25	0·25	0·5	1·0	0·25	0·25	0	0·5	0	0·25	0	0
	3	> 32	0·5	16	0·5	0·25	0·25	0·125	1·0	0·06	1·0	0	0·25	0	0	0	0
50,000	4	> 32	0·5	16	0·5	1·0	0·25	0·25	1·0	0·25	0·5	0	0·25	0	0·25	0	0
	5	> 32	1·0	16	0·5	1·0	0·5	1·0	2·0	0·25	1·0	0	0·25	0	0·125	0	0
	6	> 32	0·5	16	0·5	1·0	0·5	1·0	2·0	0·5	1·0	0	0·25	0	0·25	0	0

suspensions in oil. Six rabbits received 0·5 ml. of turpentine in the right hind leg; 48 hours later three of them were injected with 30,000 units of procaine penicillin, and the other three with 50,000 units, all in the left hind leg. Samples of blood and exudate were taken at intervals and assayed for the presence of penicillin. The results are shown in table III. In this experiment effective levels of penicillin were found in the exudate for at least 31 hours, whereas penicillin had disappeared from the blood in less than 24 hours.

Effect of Larger Doses.—Table IV records penicillin levels after the intramuscular injection of an aqueous solution of amorphous penicillin at three different doses. It seems that the largest dose of penicillin (100,000 units) did not much increase the time during which penicillin was found in the blood, but it produced higher penicillin levels in the exudate than did the smaller doses.

Distribution in Different Organs.—To determine the rate of distribution of penicillin in different organs and in the œdema fluid, six rabbits were injected intramuscularly with 0·6 ml. of turpentine; 24 hours later they were injected intramuscularly with 30,000 units of amorphous penicillin and killed, three 3 hours and three 5 hours later. At the time of killing, samples of blood and exudate from the damaged muscle were taken, and liver, lungs, spleen, normal muscle, and kidneys were removed. Weighed quantities were ground with sharp sand and transferred to 1 oz. bottles, 2 ml. of saline solution being added for each gramme of tissue. The bottles were shaken mechanically for 15 minutes and then left to stand at room temperature for 1½ hours. The penicillin was extracted with amyl acetate according to the method described by Florey et al. (1946). The penicillin was assayed by the serial dilution method in papain digest broth, *Staph. aureus* strain 663 being used as the test organism.

No detectable amounts of penicillin were found in any of the organs, except for traces in the kidney after 5 hours, but the exudate in the damaged muscle showed penicillin levels of 0·5–0·25 unit per ml. after 3 hours and 0·25–0·06 unit per ml. after 5 hours.

Penicillins F, G, and K.—The behaviour of the three penicillins F, G, and K was investigated. Groups of four rabbits, previously injected with turpentine, were injected intramuscularly with 30,000 units of the respective penicillins in aqueous solutions, and samples of blood and exudate were taken at regular intervals. The results (table V) confirm the known fact that penicillin G, and to a similar extent the mixture of penicillins F and dihydro F, give blood levels after intramuscular injection for about 2–3 hours, whereas penicillin K cannot be detected after 2 hours. The same relationship is found in the penicillin levels in the exudate after injection of the respective penicillins. Penicillin G can be detected up to 8 hours and the mixture of penicillins F and dihydro F up to 6 hours, but penicillin K only up to 2 hours.

DISCUSSION

Our observations support the findings of Florey et al. (1946) regarding the penicillin content of wounds. After single intramuscular injections penicillin levels are maintained much longer in the tissue exudate than in the blood. The results provide further justification for injecting penicillin in large doses at longer intervals. Adequate antibacterial levels of penicillin are maintained in the inflamed tissue for hours, despite its disappearance from the blood. Moreover, though no penicillin was detected in the organs of rabbits 3 or 5 hours after the injection of a single dose of penicillin, comparatively high levels were found in the inflamed tissue. Earlier experiments showed that the concentration of penicillin at the focus of inflammation is much higher in the first hour or two than in other tissues of the animal after a single injection of penicillin (Sorsby and Ungar 1946). This selective accumulation of penicillin in the inflamed area is one of the most important factors in the therapeutic effect of single massive doses of penicillin: it occurs with penicillins G, F, and K, and the therapeutic properties of the different penicillins are reflected in the levels of penicillin produced in the exudate by similar doses.

TABLE IV—PENICILLIN LEVELS IN BLOOD AND EXUDATE OF RABBITS AFTER DIFFERENT INTRAMUSCULAR DOSES OF AMORPHOUS PENICILLIN IN AQUEOUS SOLUTION

Dose (units)	Rabbit no.	Penicillin levels (units per ml.) at hours																
		In blood							In exudate									
		½	1	2	3	4	5	6	3	4	5	7	7½	8	10	12	15	24
100,000	1	..	4·0	0·5	..	0·6	..	0	..	0·5	..	..	0·125	..	..	..	..	..
	2	..	8·0	2·0	..	0·03	..	0	..	0·25	..	..	0·5	..	..	..	..	0
	3	..	> 10·0	1·25	..	0·125	..	0	..	2·0	..	..	2·0	..	..	..	..	0
	4	..	> 10·0	1·0	..	0·06	..	0·06	..	1·0	..	..	0·125	..	..	..	..	..
50,000	1	..	6·0	1·5	0·3	0	0	..	..	0·5	..	..	0·03	..	0·03	..	0	0
	2	..	4·0	0·5	0·5	0·03	0	..	..	0·25	..	..	0·03	..	0	..	0	0
	3	..	5·0	0·6	0·06	0	0	..	..	0·5	..	..	0·06	..	0·03	..	0	0
	4	..	> 10·0	0·5	0·06	0	0	..	..	0·25	..	..	0·06	..	0·03	..	0	0
30,000	1	4·0	3·0	0·2	0·06	0·06	0	..	0·25	0·12	0·06	0·06	..	0	..	0	..	0
	2	4·0	2·5	0·15	0·06	0	0	..	0·125	0·125	0·125	0·03	..	0	..	0	..	..
	3	4·0	2·5	0·2	0·03	0	0	..	0·5	0·4	0·12	0·06	..	0·03	..	0	..	..

TABLE V—PENICILLIN LEVELS IN BLOOD AND EXUDATE OF RABBITS AFTER INTRAMUSCULAR INJECTIONS OF 30,000 UNITS OF PENICILLIN G, A MIXTURE OF PENICILLINS F AND DIHYDRO F, AND PENICILLIN K

Penicillin given	Penicillin levels (units per ml.) at hours										
	In blood					In exudate					
	1	2	3	4	5	1	2	3	4	6	8
G	4·0–1·0	0·25–0·125	0·125–0	0	0	0·5–0·125	0·5–0·125	0·125–0·06	0·25–0·06	0·125–0·06	0·06–0·03
F-dihydro F	2·0–0·5	0·25–0·125	0	0	0	1·0–0·25	1·0–0·125	0·25–0	0·25–0	0·03–0	0
K	0·5–0·125	0	0	0	0	0·125	0·03–0	0	0	0	0

SUMMARY

The intramuscular injection of small amounts of turpentine into animals is a convenient method of obtaining frequent samples of sterile exudate.

After intramuscular injection of penicillin, detectable amounts remain in the fluid of damaged tissue for about twice as long as in the blood-stream.

The therapeutic effect of single massive doses of penicillin is partly explained by the prolonged accumulation of penicillin in the inflamed tissue.

My thanks are due to Dr. E. Lester Smith for preparing and supplying purified penicillins F, dihydro F, and K, and to Mr. P. W. Muggleton and Mr. B. I. Helliwell for their technical assistance.

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TREATMENT OF TUBERCULOUS MENINGITIS WITH STREPTOMYCIN

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THE following observations on tuberculous meningitis and its treatment with streptomycin are based on case-records made in the Royal Hospital for Sick Children, Glasgow, between January, 1947, and September, 1949. The number of children is small, but the period of observation is now 2½ years in some of the cases, so the results may be of interest to others working in the same field. The results at the end of 5 years may well be more gloomy than the present findings indicate, because of the unfavourable outcome in most of the children who relapse.

Between January, 1947, when the clinical trials of streptomycin in miliary and meningeal tuberculosis were instituted by the Medical Research Council, and September, 1949, thirty-three children have been given streptomycin treatment for tuberculous meningitis in this hospital. The present series includes only those children who were admitted to the hospital before the end of September, 1948, so the minimum observation period is 12 months.

DOSAGE

The dosage of streptomycin varied considerably. At the beginning of the trials very large doses were given both intramuscularly and intrathecally. The total intramuscular dosage was from 1 to 2 g. a day given 6-hourly. For several of the children this was truly heroic dosage; in one instance the allowance of streptomycin per lb. of body-weight was 70 mg. On this régime toxic effects on the kidneys—i.e., albuminuria, hæmaturia, and cylindruria—were encountered, all of which cleared readily when streptomycin was withheld. After the first few weeks the dosage of streptomycin by the intramuscular route was reduced, the total daily requirements being calculated on a basis of about 20 mg. per lb. of body-weight. This system was followed throughout the remainder of the series. A change was also made in the frequency of the intramuscular injections. It was found that equally satisfactory blood-streptomycin levels were obtained when injections were given twice daily as when they were given four times daily.

Experimental work on guineapigs has shown that the administration of streptomycin once or twice daily gives as good results as do 6-hourly injections (Feldman et al. 1947). Barnwell et al. (1947) consider that two injections daily, given 12-hourly, are just as effective as the earlier routine of more frequent administration and less inclined to damage the eighth cranial nerve.

At the outset of the trials relatively large amounts of streptomycin were also given intrathecally, the initial scheme being to inject a daily dose of 100 mg. dissolved in 5 ml. of physiological saline solution. Later the intrathecal dosage was reduced to 50 mg. daily for children over the age of 3 years, and 25 mg. daily for children under that age. The volume of each injection has varied between 5 and 10 ml. It is now generally agreed that larger intrathecal dosage is unnecessary and may even be harmful. The irritant effect of streptomycin on the theca is substantiated by the necropsy findings in case 1, a child who died after 22 days' treatment, during which streptomycin 100 mg. had been injected into the theca every day. The spinal cord was intensely congested, and the lumbar and thoracic leptomeninges were thickened.

ABSORPTION AND EXCRETION

The blood-streptomycin level reached its peak an hour after the intramuscular injection of half the total daily dose and fell gradually during the next 12 hours. At the end of 12 hours there was still 1–16 µg. of streptomycin per ml. of blood (fig. 1). Similar results were obtained by Cathie (1948) with 12-hourly injections.

Streptomycin is excreted chiefly by the kidneys; Corper and Cohn (1948) found that 41–86% was excreted in the urine in 12 hours; and the National Research Council (1946a) found that 60–80% of one injection appeared in the urine in 24 hours. No attempt was made in the present series to estimate the amount of streptomycin excreted in the urine after a single injection, but 24-hour collections of urine saved from some children receiving intramuscular streptomycin contained 320–3200 µg. per ml.

STREPTOMYCIN IN CEREBROSPINAL FLUID

After intramuscular injection streptomycin appears in the cerebrospinal fluid (C.S.F.) in small amounts if the meninges are normal, and in larger amounts if meningitis is present (Medical Research Council 1948). In the present series 8 µg. of streptomycin per ml. of C.S.F. was commonly found during the active stage of the meningitis at intervals of 1–4 hours after an intramuscular injection. In several children given only one intramuscular injection on the day of the estimation 1 µg. per ml. was detected at the end of 24 hours.

The relative impermeability of the meninges to streptomycin in the absence of meningitis was observed in two instances. Case 24, while being treated for miliary tuberculosis before the onset of her meningitis, had 0·5 µg. of streptomycin per ml. of C.S.F. 4 hours after the intramuscular injection. Case 11, who in the first few weeks responded very promptly to treatment for

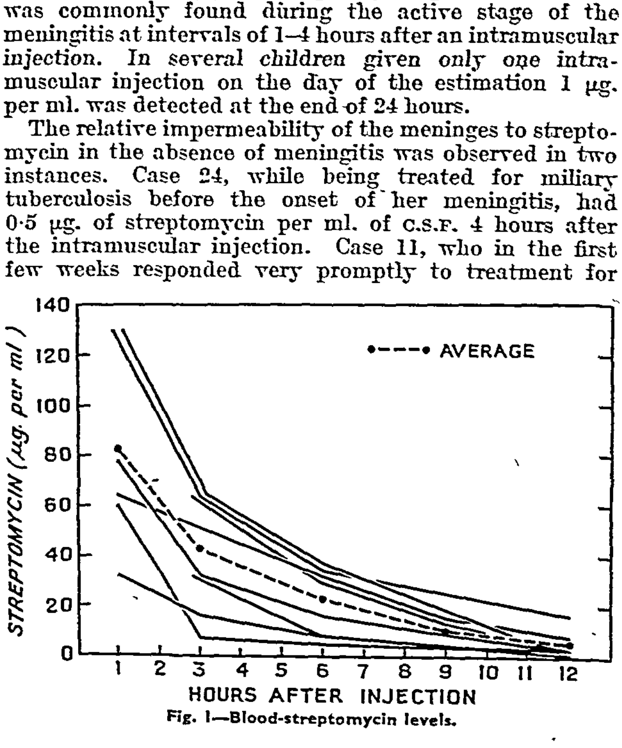

Fig. 1—Blood-streptomycin levels.

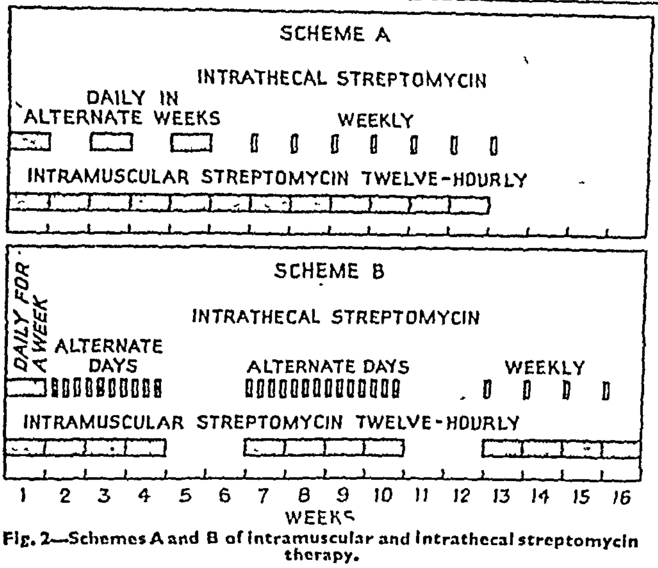

Fig. 2—Schemes A and B of intramuscular and intrathecal streptomycin therapy.

meningitis, thereafter never had more than 1 µg. of streptomycin per ml. of C.S.F. an hour after injection. It has been impossible to use the C.S.F.-streptomycin level as a prognostic index, as was suggested by the Medical Research Council (1948).

The length of time during which streptomycin remained in the C.S.F. after intrathecal injection was investigated in one child. Intramuscular treatment was stopped for 48 hours before the injection of 50 mg. intrathecally. The C.S.F. contained no streptomycin before the injection, 8 µg. per ml. 6 hours after injection, and no detectable concentration 12 and 24 hours after injection. No observations were made on the absorption of streptomycin into the blood-stream from the subarachnoid space.

SCHEDULES OF TREATMENT

At the beginning of the trials streptomycin was given for long periods, both intramuscularly and intrathecally, and temporarily stopped on the appearance of toxic effects. Later, however, two schemes of treatment were evolved (fig. 2)

Scheme A begins with an initial course of 12 weeks' continuous intramuscular treatment. During this period intrathecal injections are given daily during the first, third, and sometimes the fifth weeks of the schedule—i.e., on alternate weeks the child receives no intrathecal streptomycin. For the remainder of the period injections are given once weekly into the subarachnoid space. After the initial 12 weeks' course no further treatment is given unless indicated by the clinical condition or by a rising cell count in the C.S.F.

Scheme B consists of three or sometimes four separate periods of treatment, each lasting four weeks, with intervals of 14 days. Throughout each of these periods intramuscular treatment is given daily. During the first period intrathecal injections are given daily for the first week and on alternate days for the remainder of the period; during the second period the intrathecal injections are given on alternate days; and during subsequent periods they are given once weekly.

In both schedules of treatment intensive intrathecal treatment is given for a short period at the beginning of treatment and is followed by less frequent injections throughout the course. Experience suggests that long intensive intrathecal treatment is unnecessary. This conclusion is borne out particularly by case 11, who is normal mentally and physically, has a normal C.S.F. 25 months after the start of treatment and 19 months since her last intramuscular course, and received a total of 22 intrathecal injections—a short intensive course.

INTRAMUSCULAR STREPTOMYCIN ALONE

In five cases the tuberculous meningitis was treated with intramuscular streptomycin alone:

Case 12 completed a course of 1 g. daily for 150 days 24 months ago, and remained very well and without any evidence of active infection until 2 months ago, when he had a relapse of typical tuberculous meningitis, from which he is again making an excellent recovery, but this time with intrathecal as well as intramuscular streptomycin therapy. He suffered no toxic effects attributable to the streptomycin and showed no pathological sequelæ until his relapse.

Case 13 remained on intramuscular streptomycin and got steadily worse until death occurred after 49 days.

Case 16 received intrathecal streptomycin for only 2 days before death, after 41 days' unsuccessful intramuscular therapy.

In cases 15 and 18 intrathecal treatment was begun when 10 weeks' and 5 weeks' intramuscular therapy respectively had proved unsuccessful. Both children thereupon began to improve gradually as regards both mental and physical health, but case 18 had a relapse and died.

From this limited experience it is obvious that intramuscular streptomycin given alone is often inadequate for the treatment of tuberculous meningitis, a finding which is recorded by most other workers—e.g., Hinshaw et al. (1946) and the Medical Research Council (1948).

RESULTS

The results obtained in these thirty-three patients in the past 2½ years are recorded in table I. The figures indicating the duration of meningitis before the start of treatment are necessarily approximations, since it was not always possible to trace the precise day when the child became ill.

The assessment of the stage of the disease at the onset of treatment was based on the advice given by the Streptomycin in Tuberculous Meningitis Committee of the Department of Health for Scotland and was as follows:

Early: minimal physical signs; no neurological signs; no coma; not bad mental confusion.

TABLE I—TUBERCULOUS MENINGITIS TREATED WITH STREPTOMYCIN

Case no.	Sex	Age (yr.)	Duration of illness before treatment (days)	Stage of disease at start of treatment	Duration of observation (months)	Period since end of treatment (months)	Snowstorm radiogram	Choroidal tubercles	Spinal block	Result	Most recent C.S.F. in survivors (lumbar C.S.F.)		
											Cells (per c.mm.)	Protein (mg. per 100 ml.)	Chloride (mg. per 100 ml.)
1	F	3	14	L	1	..	..	..	..	Dead	..	..	..
2	F	4	9	E	32	21	..	..	..	Dis.	4	19	690
3	M	6	7	I	14	..	..	..	B	Dead	..	..	..
4	M	4	6	L	2	..	..	..	..	Dead	..	..	..
5	F	4	17	E	7	..	+	+	..	Dead	..	..	..
6	M	1¾	1	I	8	..	..	..	..	Dead	..	..	..
7	F	2¼	14	I	4	..	+	+	B	Dead	..	..	..
8	F	3	7	I	29	19	..	..	..	Well	4	9	[illegible]
9	M	6	2	I	28	26	..	..	..	Well	31	26	727
10	M	2	9	E	27	23	..	..	..	Well	8	29	672
11	F	5	12	I	26	21	..	..	..	Well	5	30	722
12	M	2½	2	I	26	O.T.	..	..	..	Well	200	..	..
13	M	1½	8	I	1½	..	..	..	B	Dead	..	..	..
14	F	11	3	I	22	18	..	..	Bp	Well	7	35	650
15	M	3	3	I	22	4	..	..	..	Dis.	..	..	..
16	F	4	7	I	1½	..	+	+	..	Dead	..	..	..
17	F	12	10	E	4	..	+	+	..	Dead	..	..	..
18	F	2	14	L	11	..	..	..	..	Dead	..	..	..
19	F	2¾	?	E	2	..	+	+	..	Dead	..	..	..
20	F	3	21	I	2 days	..	+	+	..	Dead	..	..	..
21	F	5	8	I	5	..	..	..	..	Dead	..	..	..
22	M	4	15	E	19	13	..	..	B	Well	6	9	703*
23	M	8	10	I	2	..	..	..	..	Dead	..	..	..
24	F	6	3	E	17	14	+	..	..	Well	2	31	646
25	M	1	12	I	17	14	..	..	..	Dis.	21	14	650
26	F	8	8	I	4	..	..	..	Bp	Dead	..	..	..
27	M	1	18	I	6	..	..	..	B	Dead	..	..	..
28	M	3	6	E	15	11	..	..	..	Well	17	37	717
29	M	2½	7	I	15	9	..	..	..	Well	49	50	716
30	M	8	6	E	5	..	+	..	B	Dead	..	..	..
31	M	1¾	8	I	1	..	..	..	..	Dead	..	..	..
32	M	3	14	I	14	8	..	+	..	Dis.	10	72	676
33	M	7	12	E	12	3	+	+	..	Dis.	5	9	611

O.T., still on treatment; B, complete block; Bp., partial and temporary block; E, early; I, intermediate; L, late; Dis., disabled; *, ventricular C.S.F.

Intermediate: definite physical signs; neurological signs resent; confusion but no deep coma.

Late: deep coma, patient barely able to be roused.

Mortality.—Of the thirty-three children eighteen are dead, ten alive and well, and five alive but disabled. Of the twenty-seven who completed treatment more han a year ago, sixteen are dead, eight alive and well, nd three alive but disabled. Of the twelve who have been observed for more than 2 years, six are dead, five alive and well, and one alive but disabled.

Of the eighteen patients who died five did not benefit rom treatment, and one of these (case 20) died on the second day of treatment. No constant feature was recognised in these five patients as foretelling their complete lack of response to treatment. The necropsy findings in some of these patients have been described by Montgomery (1948).

Disability.—Five of the fifteen survivors are seriously disabled: case 2 has a right hemiplegia, aphasia, mental defect, and occasional generalised convulsions; case 15 developed a right-sided hemiplegia concurrently with a relapse of meningitis but is improving slowly; case 25 is backward in development; case 23 was found, 5 weeks after the successful completion of treatment, to be developing hydrocephalus; and case 33, who has had three courses of streptomycin, and from whose C.S.F. positive cultures have been obtained before each course, now has moderate ataxia. Nine of the ten who are alive and well are living more or less normal lives in their own homes and have no clinically recognisable defects; the tenth went home, apparently well, in December, 1949.

Stage of Disease.—Though disappointment was experienced with some patients who seemed to be promising subjects for treatment but did not respond, nevertheless, when all the patients are grouped according to the stage of the disease at the onset of treatment, it is seen that the prognosis is much better in those who are seen early:

Stage at start of treatment	*No. of patients*	*Dead*	*Alive*
Early	10	4	6
Intermediate	20	11	9
Late	3	3	0

Age.—The influence of age is less striking in the present series than in the material collected by the Medical Research Council (1948). Our figures are as follows:

Age	*No. of patients*	*Dead*	*Alive*
All ages	33	18	15
Under 4 yr.	17	9	8
4 yr. and over	16	9	7

There is no appreciable difference in the group under the age of 4 years and those aged 4–12 years. Perhaps this is because the dividing line at 4 years is too high, and a better indication of the bad prognosis in the very young can be obtained if the division is made at 2 years. Of the seven children under the age of 2 years, five have died.

Tubercles of Choroid Plexus and Snowstorm Radiogram.—The patients have also been analysed as regards the presence or absence of tubercles of the choroid plexus and as regards the presence or absence of the typical radiographical mottling of the lung fields which is often likened to a snowstorm:

Tubercles of the Choroid Plexus

	Dead	*Alive*
Without choroidal tubercles	12	13
With choroidal tubercles	6	2

"Snowstorm" Radiograms of the Lungs

	Dead	*Alive*
Without "snowstorm" lung	11	13
With "snowstorm" lung	7	2

The mortality among patients showing either of these features is higher than among those not showing them. Included in the group with snowstorm lung are three children (cases 24, 30, and 33) whose case-records are of special interest.

TABLE II—RELAPSES OF TUBERCULOUS MENINGITIS

Case no.	Present condition	Week of treatment when relapse occurred	Interval since last treatment course (weeks)	Last C.S.F. taken before relapse			
				Cells (per c.mm.)	Protein (mg. per 100 ml.)	Chloride (mg. per 100 ml.)	Sugar (mg. per 100 ml.)
3	Dead	46	36	40	76	719	38
5	Dead	27	3	20	57	764	1
10	Well	12	5	130	59	695	25
12	Well	101	80	12	24	702	—
15	Disabled	61	36	9	58	650	51
26	Dead	18	5	13	90	674	20
33	Disabled	18	5	42	83	686	18

These children were admitted to the centre with miliary tuberculosis, and treatment with intramuscular streptomycin was begun. In none of them did routine lumbar puncture at the onset of therapy reveal any evidence of meningitis, which developed on about the 16th, 32nd, and 14th day of treatment respectively. In cases 30 and 33 the diagnosis of tuberculous meningitis was proved bacteriologically, the bacilli being found both on culture and on guineapig inoculation. In one of them bacilli were isolated when the C.S.F. was normal as regards cell count and content of protein, chloride, and sugar. Of these children, case 24 is very well, case 30 is dead, and case 33, who has had three courses of treatment, has been classed as disabled because of moderate ataxia, which is gradually improving.

C.S.F. Block.—A block in the flow of C.S.F. from the ventricles to the spinal subarachnoid space, and from the ventricles and basal cisterns to the absorption area over the cerebral hemispheres, undoubtedly interferes with the efficacy of treatment and is a serious added danger, but even a persistent spinal block does not preclude a satisfactory result.

Relapses.—One of the most disappointing features experienced by all workers using this form of therapy is the possibility of relapse in cases which had been expected to progress satisfactorily. A relapse of meningitis occurred in seven of our children, all of whom had been progressing favourably for at least a month before the deterioration was noted. The relapses took place after various intervals (see table II). In none had the C.S.F. returned to normal, but this fact is not of prognostic significance, since considerable variation has been found in the speed with which the constituents of the C.S.F. return to normal after the end of therapy. In three cases, however, the sugar content had been low in successive specimens of C.S.F. for some time before the relapse, and in one child the sugar level had fallen after having become normal. Therefore a low C.S.F.-sugar level may indicate cases liable to deteriorate clinically.

Conclusion.—So far as can be judged from the present series the prognosis is relatively good in patients with tuberculous meningitis treated with streptomycin when the patient is seen at an early stage of the disease, when he is over the age of 2 years, and when a snowstorm radiogram and choroidal tubercles are absent. Most of such patients should recover. If, on the other hand, the child is already very ill, under the age of 2 years, has had meningitis for more than 7 days, or has a snowstorm lung, choroidal tubercles, or a spinal or tentorial block, the prognosis is bad, and few such patients can be expected to benefit from streptomycin therapy.

BACTERIOLOGICAL FINDINGS

At the start of streptomycin therapy, in all cases, some bacteriological investigations were carried out as a routine. Specimens of C.S.F. were used for guineapig inoculation and culture. Further cultures were set up at weekly intervals throughout the course of treatment. During the first 7–14 days of treatment an intensive search was made for tubercle bacilli in the pellicles formed in the C.S.F. and in films of its centrifuged deposit. In addition, at least three specimens of gastric washings were examined microscopically, cultured, and used for guineapig inoculation. Sputum, when available, was submitted to careful scrutiny for acid-fast organisms.

The above-mentioned investigations were made in all the cases except case 20, who died on the day after admission—acid-fast bacilli had, however, been found in the pellicle formed in her C.S.F. In all the other cases tubercle bacilli were obtained as follows:

	Film or pellicle	*Culture*	*Guineapig inoculation*
C.S.F.	24	28	24
Gastric washings ..	4	6	12

Only in case 24 was there complete failure to obtain bacteriological proof in the C.S.F., whether by film, culture, or guineapig inoculation.

This girl had been in frequent contact with a relation who had open pulmonary tuberculosis, and was admitted to the centre in April, 1948, with a history of listlessness and loss of weight for the preceding 8 weeks. Her skin tests were strongly positive, and the chest radiogram showed the typical snowstorm lung of miliary tuberculosis. Treatment with intramuscular streptomycin was therefore begun. Meningitis developed about the 15th day of therapy, judged clinically by the onset of vomiting and nuchal rigidity accompanied by pleocytosis and increase of protein in the C.S.F.

With one exception (case 19) the infecting organism was of the human or eugonic type.

Resistance tests were carried out on all cases which yielded a positive culture within the first few weeks of treatment. The sensitivity of the infecting organisms to streptomycin was similar to that of the standard culture (the H37RV strain) and ranged from 0·125 µg. per ml. to 0·5 µg. per ml. In two cases only was an increase of resistance detected in a culture isolated after treatment, but this was so slight as to be insignificant. Unfortunately it has been impossible to form any conclusion about the development of resistance in the seven cases in which there was a relapse. Positive cultures were obtained after the relapse or at necropsy in only three cases out of the seven, and in one of these the growth was so poor that the organisms tended to die out on subculture. In another child, however, two positive cultures (one from the C.S.F. before death, and one from a caseous gland post mortem) were found to be no more streptomycin-resistant than was the original culture isolated at the beginning of treatment. It is now widely recognised that tubercle bacilli very seldom develop resistance to streptomycin during treatment of tuberculous meningitis. Among the cases cited in the report of the Medical Research Council (1948), however, are three which developed resistant strains during treatment (two of them were not inhibited by a concentration of 1000 µg. of streptomycin per ml.). All these patients had miliary tuberculosis, and all died. Another instance in tuberculous meningitis is cited by Youmans and Karlson (1947), who record that in the course of 48 days' treatment the streptomycin sensitivity rose from 0·78 µg. to 500 µg. per ml.

The number of positive C.S.F. cultures obtained in each case varied from none to 7 in two cases and 13 in one. The results show that the cases with numerous positive cultures are those with a poor prognosis:

No. of positive cultures	*Cases* *Total*	*Deaths*
Not more than 1	15	5
Not more than 2	20	8
More than 2	12	8

Three children from whom 4 positive cultures were isolated are still alive and well (cases 9, 15, and 22). No patient whose C.S.F. yielded more than 4 positive cultures has survived.

The adverse effect exerted on prognosis by the number of positive cultures is also described by the Medical Research Council (1948), which states that the frequency of positive cultures was much lower among the patients making good progress than among those who died.

RADIOLOGY

In this series the study of changes in the lungs was subsidiary to the treatment of the meningitis, and the following observations have therefore been very briefly recorded. They were made by one of us, who reviewed all the available plates of each patient, knowing the order in which they were taken, and assessed the material as accurately as he could. Plates were taken at intervals of not more than four weeks, except when they were required weekly. Case 20, who died within 2 days of starting treatment is omitted from the present discussion. Her radiogram showed the snowstorm lung of miliary tuberculosis.

Of the thirty-two cases being considered, all showed appreciable enlargement of the hilar shadows, which did not regress throughout the period of observation. Similarly, no change was noted in the appearance of the calcified primary foci present in three cases.

In two children presenting with enlargement of the hilar shadows only, some extension of the disease was noted. In one of these children the right lower lobe collapsed after 10 months' treatment and re-expanded again within a month. In the other child the hilar shadows were somewhat broader after 16 months' observation.

In addition to broadening of the hilar shadows, certain other features were noted in sixteen of the children. Eight showed the snowstorm radiogram characteristic of gross miliary tuberculosis. This group revealed during treatment not only the most striking radiological improvement but also the most uniform clinical deterioration of this series. In one case there was no change in the radiographical appearance during 2 months' observation, whereas the other seven cases showed complete or almost complete clearing of shadows in 1–9 months. However, six of the patients have died, and two, observed 12 and 17 months, are still alive.

In another group, comprising seven children, the initial lesion consisted of an absorption collapse of part or whole of a lobe in addition to hilar adenitis. In three of these no change occurred during observation periods of 3 months for two and 1 month for the third. Of the remaining four, three showed complete and one partial expansion, all occurring within 2 weeks to 4 months of the start of treatment.

In one child radiological examination on admission showed a glandular mass in the right lower zone, with emphysema of the right lower lobe. During the period of observation he twice developed collapse. On one occasion this resolved spontaneously; on the second occasion bronchoscopy, with aspiration of caseous material, was followed by re-expansion.

These observations suggest that streptomycin exerts little or no effect on the course of the primary tuberculous complex in children, and that, though it has a striking influence on the radiogram of snowstorm lung, this influence is seldom sufficient to ensure the child's survival.

COMPLICATIONS AND TOXIC EFFECTS

Only brief reference is made here to the various aspects of streptomycin toxicity, since this subject has already been described in detail (National Research Council 1946b, Farrington et al. 1947, McDermott 1947, Madigan et al. 1947, Fowler and Seligman 1947, Council on Pharmacy and Chemistry 1947).

Most of the patients on streptomycin treatment showed some degree of drug fever, the duration varying considerably from case to case. Intrathecal injections caused greater pyrexia than did intramuscular. Recurrent vomiting occurred in fifteen patients, in ten of whom was associated with increased intracranial pressure, ereas in the remaining five it appeared to be due rectly to the streptomycin.

Evidence of renal damage was often detected in the rly cases receiving large doses of streptomycin but ldom after the adoption of the lower dosage already scribed. The signs of renal impairment were albuminia, with casts, red cells, and white cells. When reptomycin was withheld, these signs disappeared.

Sensitisation rashes developed in eight children; ey were morbilliform or maculopapular and were always neralised and not itchy. The effect of anti-histamine ugs was tried on four occasions with unsatisfactory sults. In one case the rash was accompanied by gioneurotic œdema of the face and urticaria of the unk and limbs. After the injections of streptomycin d been stopped, these rashes usually disappeared ithin 1–4 days. Eosinophilia of more than 5% was etected in five patients and was not associated with sensitisation rash.

The eighth nerve was affected in fourteen children. estibular dysfunction was more common than impairent of hearing, the latter occurring in three patients nly. Gross tremor occurred in ten cases, ataxia involvg the whole body in six cases, and circular nystagmus four. These phenomena have disappeared comletely in all the children who survive. Nerve deafness as noted in three patients, two of whom became stone eaf and remained so until death, whereas the third has hown some improvement though there is still a noticeable mpairment of hearing.

Local reactions to the intramuscular injection of treptomycin have proved of little significance. The hildren sometimes complained of pain at the site for ne or two hours, and in six cases red swollen tender nodes ppeared, which yielded to simple treatment. The reparation of the drug now used—streptomycin calcium hloride complex—does not seem to differ from the other alts—hydrochloride and sulphate—as regards pain n injection. Intrathecal injections may be painful if the olution used is cold, or after long-continued therapy hen adhesions have formed and referred pain in the egs and back may be caused by pressure and stretching f the nerve-roots. Intraventricular injections, on the ther hand, caused no pain and minimal inflammation n the C.S.F. Injections into the subarachnoid space nay produce considerable inflammation round the ord at the site of injection.

The development of blindness and of thromboses of erebral vessels leading to hemiplegia, &c., is probably lue mainly to the meningitis and not a toxic effect of treptomycin.

Obstruction to the flow of C.S.F. in the subarachnoid pace is an important complication of streptomycin herapy, and will be discussed more fully later. Eight hildren of the present series developed spinal block, which was only partial in two cases. Three children had a tentorial block, and two of these had also a spinal block. Both complications necessitate the making of cranial burr-holes through which the streptomycin can be injected into the ventricle, thus ensuring a more adequate circulation through the subarachnoid space and, in the event of tentorial block, reducing the C.S.F. pressure within the ventricular system.

DISCUSSION

Though the series is small and the follow-up brief, certain conclusions may be drawn.

The prognosis is relatively favourable where the meningitis is of short duration, the patient's clinical condition is good, he is over the age of 2 years, and he has no snowstorm radiogram, choroidal tubercles, or spinal or tentorial block. The converse of any of these conditions makes the prognosis bad. This fact emphasises once again the vital importance of early diagnosis and prompt institution of intramuscular and intrathecal streptomycin therapy if a larger proportion of children with tuberculous meningitis are to survive.

In the diagnosis chemical analysis of the C.S.F. is most important for differentiating serous from caseous tuberculous meningitis (Lincoln 1947); but, though the serous type has a better prognosis than has the classical caseous type, streptomycin therapy should be instituted in both types.

Continuing study of antibiotic agents and of the synergism between certain chemotherapeutic substances and antibiotics may well lead to the evolution of a much more effective means of treating miliary and meningeal tuberculosis, but for the time being most investigations are concerned with the technique of treatment and the prevention of complications. It is generally agreed that a total daily dosage of about 20 mg. of streptomycin base per lb. of body-weight provides a satisfactory basis for the treatment of children, and 12-hourly intramuscular injections seem as effective as 6-hourly or 4-hourly injections. The treatment should continue for 3–6 months, with or without short intermissions. Intrathecal injections should not exceed 50 mg., but the best frequency and number of these is not yet established.

Many efforts have been made to prevent the development of a block in the circulation of the C.S.F. The various mechanical devices investigated by Smith et al. (1948) have not led to any great improvement in results, though they have done much to clarify the mechanism whereby these disasters occur. Cathie (1949) has introduced a streptococcal fibrinolysin, which has shown promising effects in preliminary clinical trials.

Finally, it is claimed that in spite of lack of response of some cases to treatment when circumstances seem propitious, it is possible in many instances to make a reasonably accurate forecast of the immediate outcome of any individual case of tuberculous meningitis. Unfortunately the eventual fate of those who survive is more uncertain, and constitutes a problem of considerable sociological importance, when it is realised that about a third of the survivors are left with serious permanent sequelæ.

SUMMARY

The systems of treatment with streptomycin for tuberculous meningitis now in force in this hospital are described and the results obtained in the treatment of thirty-three children are recorded and analysed. The period of observation of these children varied from 32 to 12 months. When treatment is started early and there are no complicating factors most of the patients recover.

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INFLUENZA IN AN ISOLATED COMMUNITY

AN EPIDEMIC ON OCEAN ISLAND

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Ocean Island is a British Colony in the Gilbert group of islands, situated about 3000 miles north-east of Melbourne. Most of the island is given over to phosphate mining. The British Phosphate Company employs either native labourers transported from the neighbouring Gilbert and Ellice Isles in groups of 100–800 or Chinese labour imported from Hong-Kong. Usually labourers are kept on the island for 6–18 months and then replaced.

It is well known to some of the lay members of the phosphate company's permanent staff on the island that after the arrival of Chinese labourers severe influenza is liable to break out among the native Gilbert and Ellice Islanders. Thus, in 1930 Chinese labourers arrived on Ocean Island in March and September. The incidence of cases of clinical influenza in 1930 was as follows: April 444, May 92, June 57, July 186, October 648, November 144. The racial incidence of these outbreaks has been characteristic; natives who have presumably had no previous contact with influenza have shown an almost 100% incidence, whereas Chinese or whites have shown either a low incidence or an absence of clinical infections.

These unusual features have prompted an investigation into an epidemic which occurred in October, 1948, and followed the characteristic pattern of previous outbreaks. Clinical examination of the cases on the island was combined with investigation of garglings and sera from some of the cases and contacts.

EPIDEMIOLOGY

In September, 1947, 800 fresh Gilbert and 300 Ellice Islanders arrived on Ocean Island. In June, 1948, most of these were repatriated except for 290 Ellice Islanders and 10 Gilbertese. Until the present outbreak there was no significant disease among the natives on the island. They were housed in huts 16 ft. by 8 ft. with a partition down the middle, four men to each hut. The huts are all situated together in a compound covering several acres.

On Oct. 3, 1948, a ship arrived from Hong-Kong with 803 Chinese labourers aboard. The journey from Hong-Kong had taken 3 weeks, conditions of overcrowding were bad, and coughs were prevalent, but there had been no clinical influenza. On arrival the Chinese were admitted to quarantine, from which they were released 24 hours later after examination by the island medical officer. They were housed in two compounds similar to the native compound and about half a mile away. There was ample opportunity for contact between natives and Chinese at work.

On Oct. 13, a ship arrived from Australia with 10 European passengers and an Indian crew. The natives of the island had contact with the Indians, but there was not even minor sickness among the crew. On the same day the first case of upper respiratory tract infection was admitted to hospital; 271 cases were admitted in the next fortnight. The daily case-incidence as judged by hospital admissions is shown in the accompanying figure.

The racial incidence was particularly interesting. Not one Chinese was admitted to hospital; but 12 Europeans were admitted out of about 90 on the island. The few Gilbertese were not seriously affected, but the incidence among Ellice Islanders was exceptionally high. Among these, almost all the men, about half the women, and 10% of the children on the island became ill.

CLINICAL FEATURES

The onset was usually sudden, with a rigor as the most common presenting symptom. Temperatures were high —103–105°F—and the patients often complained of feeling faint. Pain in the back and limbs and sore eyes were common, and there was usually an irritating unproductive cough.

Out of 271 admissions the average stay in hospital was 9·4 days, with a minimum of 2 days and a maximum of 35 days. There were five deaths—on the 9th, 10th, 12th, 13th, and 26th days of illness—the fatal cases showing jaundice. Necropsies could not be done.

ISOLATION OF VIRUS

Garglings were collected on Oct. 17 from 12 cases with a temperature higher than 101°F and within 36 hours of the onset of symptoms. Patients were asked to gargle with 10 ml. of sterile saline solution, and the washings were mixed with an equal volume of 10% serum-broth and stored in the refrigerator until they could be transferred to the cool room of a ship sailing for Australia. The garglings took 5 weeks to reach the laboratory. On arrival they were inoculated amniotically into 13-day-old chick embryos by the method of Burnet (1940); penicillin and sodium sulphadiazine were added to the inoculum to reduce bacterial growth. Sera were collected from the patients at the same time as the garglings were taken and again two weeks later, during convalescence. In the laboratory the sera were examined for their anti-hæmagglutinin content by a modification (Burnet 1942) of the method of Hirst (1942).

Influenza virus was isolated from ten out of twelve garglings. The virus was present in the O phase (Burnet and Bull 1943)—i.e., infected fluids agglutinated guinea-

TABLE I—ANTI-HÆMAGGLUTININ TITRES OF ACUTE AND CONVALESCENT SERA FROM SIX PATIENTS IN THE OCEAN ISLAND EPIDEMIC TESTED AGAINST EIGHT VIRUS STRAINS

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MEL	Australia	1935	10–10	10–320	10–80	20–640	10–320	< 10–160
BEL	Australia	1942	10–20	20–160	20–80	20–80	20–160	< 10–80
CAM	Australia	1946	30–80	20–640	20–320	60–480	40–480	80–480
FMI	America	1947	80–160	120–1280	80–480	120–1280	80–1280	20–960
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INFLUENZA IN AN ISOLATED COMMUNITY

AN EPIDEMIC ON OCEAN ISLAND

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WSE	England	1933	160–160	120–610	160–320	320–610	320–1280	320–128
MEL	Australia	1935	10–10	10–320	10–80	20–610	10–320	< 10–160
BEL	Australia	1942	10–20	20–160	20–80	20–80	20–160	< 10–80
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pig and human cells to relatively high titre but did not agglutinate fowl cells. Serological investigation showed that the virus was an influenza type A strain. Table I shows the anti-hæmagglutinin titres of pairs of acute and convalescent sera of six patients from the present epidemic tested against six laboratory strains of influenza A and a strain of swine-influenza virus.

Dried allantoic fluid of a strain of Ocean Island virus was sent to the World Influenza Centre (W.H.O.), Hampstead, London, where the virus was examined with the electron microscope. Chu et al. (1949) have reported that recently isolated strains of influenza virus A, including the Ocean Island strain, showed numerous elongated forms, unlike previously isolated strains, where these forms were uncommon. Dr. C. H. Andrewes (personal communication) has suggested that long forms could be seen with dark-ground illumination in an ordinary microscope. By this means it was found that Ocean Island virus and strains CAM, FJS, and FMI (see table I), unlike strains BEL and MEL, showed numerous long forms. These results provide evidence of morphological and serological similarity among recently isolated strains.

At the same time as the convalescent sera were taken, single specimens of serum were collected from 12 Chinese. The Chinese and Ellice Islanders' sera were tested for complement-fixing antibody to influenza viruses A and B by the method of Donnelley (1950). The results are shown in table II. It can be seen that the Ellice Islanders' sera showed a reaction diagnostic of infection with influenza virus A, and a negative reaction to influenza B. Moderately high titres of complement-fixing antibody to influenza A were also found in most of the Chinese sera. With the technique used these titres strongly suggest recent infection with influenza virus A.

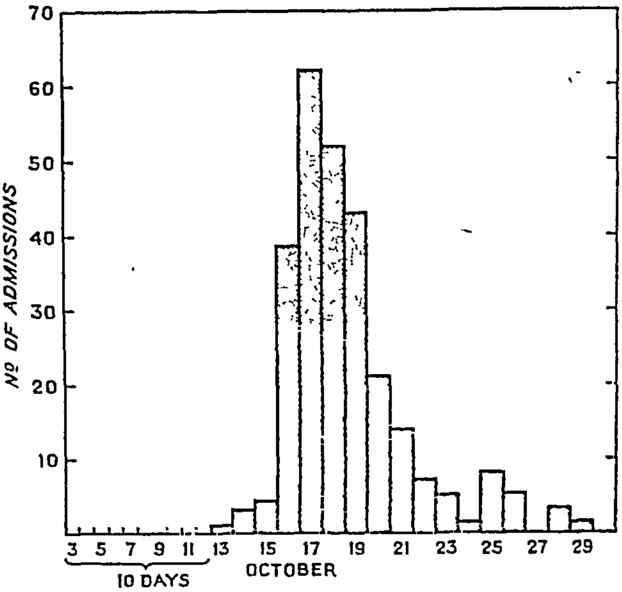
TABLE II—COMPLEMENT-FIXING TITRES OF SERA TESTED AGAINST INFLUENZA VIRUSES A AND B

Race	Serum no.	Anti-A		Anti-B	
		I	II	I	II
Ellice Islander	A5	—	10	—	—
,,	A23	a–c	8	a–c	7
,,	88	—	40	5	4
,,	94	—	80	—	—
,,	102	—	30	—	—
,,	109	—	10	—	—
,,	132	a–c	..	a–c	..
,,	168	a–c	a–c	a–c	a–c
,,	178	—	8	—	—
,,	191	—	120	—	3
,,	203	—	13	—	—
,,	327	—	13	—	—
Chinese	408	..	a–c	..	a–c
,,	458	..	10	..	—
,,	616	..	a–c	..	a–c
,,	692	..	7	..	—
,,	706	..	a–c	..	a–c
,,	781	..	8	..	—
,,	821	..	7	..	—
,,	874	..	15	..	—
,,	883	..	27	..	—
,,	908	..	a–c	..	a–c
,,	973	..	—	..	—
,,	1045	..	13	..	—

I, acute bleed sera; II, convalescent bleed sera; —, titre of less than 2; a–c, anticomplementary serum.

DISCUSSION

An interesting aspect of the epidemic is the difference in the response of whites, Chinese, and Ellice Islanders to the same infecting agent. At the time of the epidemic the white population showed a 15% incidence of clinical influenza. This does not differ greatly from that shown in other countries during the last 2 years to infection with a serologically identical strain of influenza virus A. The Chinese showed no clinical disease, though there was serological evidence of recent infection with influenza virus A. So far as the Ellice Islanders were concerned, the Ocean Island outbreak was typical of a "virgin soil" epidemic in its high case-incidence. In agreement with this none of the sera showed any evidence of complement-fixing antibody at the time of onset of symptoms.



Daily case-incidence.

All acute-stage sera tested gave a high non-specific titre against the homologous strain in the anti-hæmagglutination test; most of the convalescent sera showed a "broad" anti-hæmagglutinin response. None showed the specific type of response observed by Anderson (1947) in a proportion of sera from adolescents in a recent Melbourne outbreak of influenza A. An interesting point is that none gave any significant anti-hæmagglutinin response to a strain of swine virus. In 1933–42 most convalescent sera from influenza-A cases showed a sharp rise in titre with this strain. It seems likely that the more recent strains are more "distant" serologically from swine than were those of the earlier period.

The part played by the Chinese in this epidemic is particularly noteworthy. The epidemiological data taken with the account of the island's past experience are consistent with the view that the infection was introduced with the shipload of Chinese labourers who were released from quarantine 9 days before the first case was admitted to hospital. No Chinese were admitted to hospital during the epidemic, indicating a high level of resistance to clinical infection. The sera taken from a random group of Chinese 3–4 weeks after the start of the epidemic nearly all showed a moderately high complement-fixing antibody titre against A antigen but none against B. In the absence of any clinical influenza on the voyage from China we are strongly inclined to view this as evidence of subclinical infection by A virus during the island epidemic. If it represented merely evidence of fairly recent casual infection in China or on the voyage we should have expected fewer positive A titres and a more or less similar proportion of reactions with the B antigen. One of the outstanding problems in influenza is to know why some people become infected, excrete virus (Crowley et al. 1944), and develop anti-hæmagglutinin and/or complement-fixing antibody without showing clinical symptoms. If our interpretation is correct, a striking example of this phenomenon involving almost all the Chinese occurred on Ocean Island.

Epidemics have appeared on this island in the past almost as predicted. This would provide an excellent opportunity for studying the effect of immunisation in a population highly sensitive to influenza infection.

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FM1	America	1947	80–160	120–1280	80–480	120–1280	80–1280	20–960
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SUMMARY

Epidemics of influenza are known to develop in Ocean Island soon after the periodic arrivals of Chinese labourers from Hong-Kong.

An epidemic of influenza A in the island in 1948 was studied clinically and bacteriologically.

The incidence of clinical cases was about 15% among whites, and almost 100% in native Ellice Islanders, but no clinical cases appeared among the 800 Chinese.

Serological evidence suggests that there was a high incidence of subclinical infection in the Chinese.

The island would provide suitable material for testing the effects of immunisation against influenza.

We wish to thank Prof. F. M. Burnet, F.R.S., for his advice and criticism, and the British Phosphate Co. for their collaboration.

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PEMPHIGUS VULGARIS TREATED WITH AUREOMYCIN

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THE curative treatment of pemphigus vulgaris has been so unsatisfactory that it is inevitable that new remedies, particularly antibiotics, will constantly be tried. In the following case 'Aureomycin' appeared to be effective.

CASE-REPORT

A middle-aged woman of German Jewish origin, whom I first saw on Sept. 5, 1949, then complained of sores inside the mouth since about the beginning of July, followed a month later by blisters and sores on the trunk. At that time there were very many superficial erosions on the mucous membrane of the cheeks, gums, and lips. A few scattered blisters up to $1^1/_2$ inches in diameter were to be seen on the back of the trunk, together with a few groups of smaller vesicles. The clinical diagnosis was pemphigus vulgaris; hospital admission was refused, and liquor arsenicalis, 3 minims t.d.s. by mouth, was started.

The patient's condition deteriorated considerably, and on Sept. 20 she was admitted to hospital. The clinical picture of pemphigus vulgaris was then well developed. Blisters, and the sores resulting from them, covered a large part of the trunk, scalp, thighs, and legs. There was also a purulent paronychia of staphylococcal type; for this reason, more than because of the pemphigus, procaine penicillin was given. A week's treatment (450,000 units twice daily) was without apparent effect on the pemphigus, fresh lesions of which were appearing every day. For the next week suramin was given intravenously every other day, also without effect on the pemphigus. Local treatment consisted of the application of penicillin cream when secondary sepsis was prominent, and anæsthetic ointments at other times. 'Nestosyl,' benzocaine ointment, and 'Anthisan' cream were found to relieve pain from the skin.

During the first fortnight of October the patient's general condition became steadily worse. Her temperature slowly rose from an average of 99°F to the region of 100–102°, heavy sedation was necessary because of pain, and this, together with the sores in the mouth, reduced her consumption of food to almost nothing.

On Oct. 13 aureomycin was started by mouth, 250 mg. being given on the first day; 250 mg. twice daily on the second day; 250 mg. four times on the third day; and thereafter 500 mg. six-hourly (four doses per day, total 2 g. daily). Within twenty-four hours of starting this treatment the improvement in the patient's general condition was very striking. Her temperature started to go down and, though it afterwards fluctuated, it reached normal on the third day of aureomycin treatment. No fresh blisters appeared after aureomycin was started, nor have there been any subsequently.

Aureomycin was continued at the same dosage until Nov. 25. During the six weeks' period of its administration there were two short breaks owing to difficulty in obtaining supplies, and occasional doses were omitted because of nausea. This was a prominent symptom; no doubt it can partly be attributed to heavy sedation, but the patient's appetite improved so strikingly within a few hours of stopping aureomycin that most of the nausea and anorexia must be blamed on the antibiotic. Throughout the period of treatment, up to the time of her discharge, the patient's temperature did not settle completely but fluctuated between 98° and 100°F for no evident reason.

On Nov. 8 the patient developed a deep femoral thrombosis. Treatment with heparin, kindly suggested by Prof. A. Kekwick, was followed by uninterrupted recovery. All the skin lesions were healed by the middle of November, and the patient was discharged from hospital on Dec. 6. By this time she felt well, though naturally weak.

COMMENT

Spontaneous remission is a familiar occurrence in bullous diseases and it would be most rash to claim that this patient's apparent recovery resulted from the administration of aureomycin. The first few days of this treatment, however, coincided with such a dramatic change as to leave a strong clinical impression that the antibiotic produced the improvement. Immediately before treatment was started the prognosis was indeed grave; after the first dose of aureomycin not one single fresh lesion appeared, and within forty-eight hours the patient's condition had enormously improved. Remission was complete and the patient left hospital apparently cured. It seems, therefore, that a further trial of aureomycin in the treatment of pemphigus is warranted.

CARBON TETRACHLORIDE POISONING

R. W. E. WATTS
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LATE CAPTAIN, R.A.M.C., GRADED PHYSICIAN

CARBON tetrachloride is a well-known hepatotoxic agent. The following case, in which damage to the heart and kidneys dominated the picture, is recorded to emphasise the less widely appreciated toxic actions of this substance, and the clinical manifestations to which they may give rise.

Apart from injury to the skin and conjunctiva caused by direct contact, poisoning by carbon tetrachloride may occur by inhalation (McGuire 1932, Gautier et al. 1933, Dudley 1935, Graham 1938, Clinton 1947, Squires 1948) and by ingestion (Massachusetts General Hospital 1948, Burns 1946).

CASE-RECORD

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SUMMARY

Epidemics of influenza are known to develop in Ocean Island soon after the periodic arrivals of Chinese labourers from Hong-Kong.

An epidemic of influenza A in the island in 1948 was studied clinically and bacteriologically.

The incidence of clinical cases was about 15% among whites, and almost 100% in native Ellice Islanders, but no clinical cases appeared among the 800 Chinese.

Serological evidence suggests that there was a high incidence of subclinical infection in the Chinese.

The island would provide suitable material for testing the effects of immunisation against influenza.

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PEMPHIGUS VULGARIS TREATED WITH AUREOMYCIN

F. Ray Bettley
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DERMATOLOGIST TO THE MIDDLESEX HOSPITAL

The curative treatment of pemphigus vulgaris has been so unsatisfactory that it is inevitable that new remedies, particularly antibiotics, will constantly be tried. In the following case 'Aureomycin' appeared to be effective.

CASE-REPORT

A middle-aged woman of German Jewish origin, whom I first saw on Sept. 5, 1949, then complained of sores inside the mouth since about the beginning of July, followed a month later by blisters and sores on the trunk. At that time there were very many superficial erosions on the mucous membrane of the cheeks, gums, and lips. A few scattered blisters up to $1^1/_2$ inches in diameter were to be seen on the back of the trunk, together with a few groups of smaller vesicles. The clinical diagnosis was pemphigus vulgaris; hospital admission was refused, and liquor arsenicalis, 3 minims t.d.s. by mouth, was started.

The patient's condition deteriorated considerably, and on Sept. 20 she was admitted to hospital. The clinical picture of pemphigus vulgaris was then well developed. Blisters, and the sores resulting from them, covered a large part of the trunk, scalp, thighs, and legs. There was also a purulent paronychia of staphylococcal type; for this reason, more than because of the pemphigus, procaine penicillin was given. A week's treatment (450,000 units twice daily) was without apparent effect on the pemphigus, fresh lesions of which were appearing every day. For the next week suramin was given intravenously every other day, also without effect on the pemphigus. Local treatment consisted of the application of penicillin cream when secondary sepsis was prominent, and anæsthetic ointments at other times. 'Nestosyl,' benzocaine ointment, and 'Anthisan' cream were found to relieve pain from the skin.

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A FIXED SKIN ERUPTION DUE TO PHENYTOIN SODIUM

R. D. Sweet
M.B. Camb., M.R.C.P.
SENIOR REGISTRAR, SKIN DEPARTMENT, ST. THOMAS'S HOSPITAL, LONDON

Since phenytoin sodium or 'Epanutin' (sodium diphenyl hydantoinate) was first introduced by Merritt and Putnam [1] it has been known to cause skin lesions in some patients. Skin eruptions seem more common in children and probably occur in some degree in 5–10% of all people treated with this drug.

Merritt and Putnam [1] stated that the commonest skin changes were scarlatiniform and morbilliform rashes, which usually appeared about a fortnight after the beginning of treatment and were often accompanied by fever and sometimes by eosinophilia. In some mild cases the phenytoin sodium was continued and the rash disappeared; in many it was withheld until the rash faded and then given again without further trouble; but in a few cases the rash recurred each time phenytoin sodium was given. In one case the rash was severe enough to be classed as an exfoliative dermatitis, but this cleared within three weeks of stopping treatment. In another case purpura developed but faded although the phenytoin sodium was continued. Later Merritt and Putnam [2] mentioned a case, not their own, in which there was a "severe generalised dermatitis with bleb formation, and with subsequent desquamation."

Between 1939 and 1942 there were numerous reports of clinical trials with phenytoin sodium and hypertrophic gingivitis became well known as a complication, but no others came to light until 1943, when Barton and O'Leary [3] reported a "fixed" eruption due to phenytoin sodium—a fixed eruption being one in which the same areas of skin always react to a certain drug. Their case is very similar to the present one, and is the only previously published case of this type that I have been able to trace. In both cases the patient was an adult who had been taking phenytoin sodium regularly for some months (and then for two years spasmodically in their case), and in both the eruption was reproduced within an hour or two by a single dose of 0·1 g. Though such cases are very rare, it is important to recognise them. The fact that the patient has been taking phenytoin sodium with impunity for some time may lead him not to mention it when giving his history.

CASE-RECORD

The man was first seen in April, 1946, when he was aged 77 and gave a month's history of recurring blisters on his scalp, forehead, and right shin. He was in excellent health for his age until his skin trouble began, apart from occasional attacks of petit mal, for which he had been taking phenytoin sodium for two months. The differential diagnosis lay between pemphigus vulgaris and a drug eruption, and as a first step the patient was advised to stop any form of internal medication.

Within three weeks his rash cleared completely, and he remained well until March 26, 1949. Three days later he was admitted to hospital with a severe extensive bullous eruption. His forehead and the anterior half of his scalp were covered with large bullæ, many of which had broken leaving raw areas up to 2 in. in diameter. There were also single bullæ on each cheek, the back of his chest, the lumbar region, the dorsum of his left hand, and his right shin. The day after his admission further lesions appeared on his left shin and on his penis.

The bullæ were thin-walled and $^{1}/_{2}$–2 in. in diameter, and mostly broke within twenty-four hours of their appearance. They arose from skin which had first assumed a dusky plum colour, so that the fully developed lesion was surrounded by a dark halo. This had the effect, because of the extensive involvement of his face, of making him look extremely cyanosed as he lay in bed, and it was surprising to find that his unaffected skin was a normal colour.

Apart from his rash the patient was well. He had no fever, and his pulse-rate and respiration-rate were unaffected. His mental condition had, however, deteriorated considerably since he was first seen in 1946. This was ascribed to progressive cerebral arteriosclerosis. His memory had become greatly impaired. He could remember neither how long he had had his blisters nor any of the events leading to their appearance, and he denied ever having the trouble before or previously attending this hospital. His blood-count was within normal limits, except for an eosinophilia of 8%.

Once again the diagnosis lay between pemphigus and a drug eruption. Tulle gras was applied. No drugs were given.

In three weeks all the lesions had healed, and there was no further spread. During his first week in hospital the patient had two "blackouts" lasting a few seconds, in one of which he wetted his bed. These attacks may have been petit mal, but they may equally well have been due to his impoverished cerebral circulation.

As soon as his lesions had healed, the patient was given a test dose of phenobarbitone gr. $^{1}/_{2}$ without ill effect. Next day he was given phenolphthalein gr. $^{1}/_{8}$, as his eruption much resembled that occasionally produced by that drug, but again without effect. Finally, on the next afternoon, he was given phenytoin sodium gr. $1^{1}/_{2}$. The result was dramatic—within three hours all the previously affected areas on his face and scalp became a dusky plum colour, and next day he had a bulla an inch in diameter on his forehead and sharply demarcated plum-coloured macules, also about an inch in diameter, on the back of his left hand and on his right shin. The lesions ceased to progress after twenty-four hours and were beginning to fade four days later, when he was discharged.

COMMENT

The reproduction of the eruption, even to the appearance of the bullæ, seems conclusive proof that this man's pemphigus-like eruption was due to phenytoin sodium. Further, the rash produced by the test dose was confined to sites previously affected, though not all these were involved the second time. The original attack three years ago also had the same limited distribution. It is therefore justifiable to class this case as a fixed eruption caused by phenytoin sodium.

I wish to thank Dr. G. B. Dowling for permission to publish this case.

REDUCTION OF SUPRACONDYLAR FRACTURES OF THE HUMERUS

WITH BACKWARD DISPLACEMENT

J. J. Shipman
M.B. Lond., F.R.C.S.
ASSISTANT LECTURER IN SURGERY, POSTGRADUATE MEDICAL SCHOOL OF LONDON

There are two varieties of supracondylar fracture of the humerus. In one the distal fragment is displaced backwards and the cleavage line passes from the anterior surface of the humeral shaft upwards and backwards; in the other the distal fragment is displaced forwards and the line of fracture is downwards and backwards. I am concerned here with the first of these—the backward displacement.

Several methods have been evolved for reducing this variety of supracondylar fracture and the similar displacement which occurs in posterior dislocation of the elbow-joint. These methods have been well tried and are usually successful; but difficulty on several occasions has prompted the development of still another method, which has succeeded where the standard ones have failed. Skeletal traction and open reduction have been avoided because of the stiff elbow which still follows their use.

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A FIXED SKIN ERUPTION DUE TO PHENYTOIN SODIUM

R. D. SWEET
M.B. Camb., M.R.C.P.
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SINCE phenytoin sodium or 'Epanutin' (sodium diphenyl hydantoinate) was first introduced by Merritt and Putnam [1] it has been known to cause skin lesions in some patients. Skin eruptions seem more common in children and probably occur in some degree in 5–10% of all people treated with this drug.

Merritt and Putnam [1] stated that the commonest skin changes were scarlatiniform and morbilliform rashes, which usually appeared about a fortnight after the beginning of treatment and were often accompanied by fever and sometimes by eosinophilia. In some mild cases the phenytoin sodium was continued and the rash disappeared; in many it was withheld until the rash faded and then given again without further trouble; but in a few cases the rash recurred each time phenytoin sodium was given. In one case the rash was severe enough to be classed as an exfoliative dermatitis, but this cleared within three weeks of stopping treatment. In another case purpura developed but faded although the phenytoin sodium was continued. Later Merritt and Putnam [2] mentioned a case, not their own, in which there was a "severe generalised dermatitis with bleb formation, and with subsequent desquamation."

Between 1939 and 1942 there were numerous reports of clinical trials with phenytoin sodium and hypertrophic gingivitis became well known as a complication, but no others came to light until 1943, when Barton and O'Leary [3] reported a "fixed" eruption due to phenytoin sodium—a fixed eruption being one in which the same areas of skin always react to a certain drug. Their case is very similar to the present one, and is the only previously published case of this type that I have been able to trace. In both cases the patient was an adult who had been taking phenytoin sodium regularly for some months (and then for two years spasmodically in their case), and in both the eruption was reproduced within an hour or two by a single dose of 0·1 g. Though such cases are very rare, it is important to recognise them. The fact that the patient has been taking phenytoin sodium with impunity for some time may lead him not to mention it when giving his history.

CASE-RECORD

The man was first seen in April, 1946, when he was aged 77 and gave a month's history of recurring blisters on his scalp, forehead, and right shin. He was in excellent health for his age until his skin trouble began, apart from occasional attacks of petit mal, for which he had been taking phenytoin sodium for two months. The differential diagnosis lay between pemphigus vulgaris and a drug eruption, and as a first step the patient was advised to stop any form of internal *medication*.

Within three weeks his rash cleared completely, and he remained well until March 26, 1949. Three days later he was admitted to hospital with a severe extensive bullous eruption. His forehead and the anterior half of his scalp were covered with large bullæ, many of which had broken leaving raw areas up to 2 in. in diameter. There were also single bullæ on each cheek, the back of his chest, the lumbar region, the dorsum of his left hand, and his right shin. The day after his admission further lesions appeared on his left shin and on his penis.

The bullæ were thin-walled and $^1/_2$–2 in. in diameter, and mostly broke within twenty-four hours of their appearance. They arose from skin which had first assumed a dusky plum colour, so that the fully developed lesion was surrounded by a dark halo. This had the effect, because of the extensive involvement of his face, of making him look extremely cyanosed as he lay in bed, and it was surprising to find that his unaffected skin was a normal colour.

Apart from his rash the patient was well. He had no fever, and his pulse-rate and respiration-rate were unaffected. His mental condition had, however, deteriorated considerably since he was first seen in 1946. This was ascribed to progressive cerebral arteriosclerosis. His memory had become greatly impaired. He could remember neither how long he had had his blisters nor any of the events leading to their appearance, and he denied ever having the trouble before or previously attending this hospital. His blood-count was within normal limits, except for an eosinophilia of 8%.

Once again the diagnosis lay between pemphigus and a drug eruption. Tulle gras was applied. No drugs were given.

In three weeks all the lesions had healed, and there was no further spread. During his first week in hospital the patient had two "blackouts" lasting a few seconds, in one of which he wetted his bed. These attacks may have been petit mal, but they may equally well have been due to his impoverished cerebral circulation.

As soon as his lesions had healed, the patient was given a test dose of phenobarbitone gr. $^1/_2$ without ill effect. Next day he was given phenolphthalein gr. $^1/_8$, as his eruption much resembled that occasionally produced by that drug, but again without effect. Finally, on the next afternoon, he was given phenytoin sodium gr. $1^1/_2$. The result was dramatic—within three hours all the previously affected areas on his face and scalp became a dusky plum colour, and next day he had a bulla an inch in diameter on his forehead and sharply demarcated plum-coloured macules, also about an inch in diameter, on the back of his left hand and on his right shin. The lesions ceased to progress after twenty-four hours and were beginning to fade four days later, when he was discharged.

COMMENT

The reproduction of the eruption, even to the appea ance of the bullæ, seems conclusive proof that this man pemphigus-like eruption was due to phenytoin sodiun Further, the rash produced by the test dose was confine to sites previously affected, though not all these we involved the second time. The original attack thre years ago also had the same limited distribution. It i therefore justifiable to class this case as a fixed eruptio caused by phenytoin sodium.

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REDUCTION OF SUPRACONDYLAR FRACTURES OF THE HUMERUS

WITH BACKWARD DISPLACEMENT

J. J. SHIPMAN
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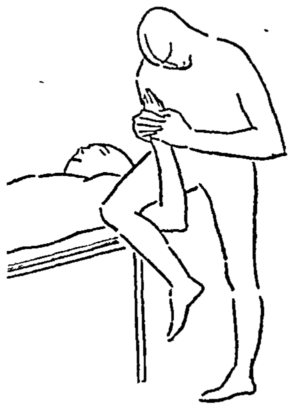
TECHNIQUE

The method described requires no assistant or appliances. The patient is placed on a low table and a eneral anæsthetic is administered. Unhurried traction applied to the limb in line with its long axis and is hen continued while the arm is brought into flexion; his avoids damage to the neurovascular structures in front of the elbow-joint which lie dangerously near the sharp anterior edge of the proximal fragment.



The shoulder is abducted to 45°, and the arm is placed in the plane of the body. The manipulator stands above the shoulder and passes his flexed thigh astride the patient's arm just above the fracture line. The thigh now maintains downward fixed pressure against the anterior aspect of the lower end of the upper fragment while the hand is pulled vertically upwards against it by both hands of the manipulator (see figure). The opposed broad and fleshy thigh muscles exert a firm pressure on the fragment without damage to vessels, nerves, or traumatised tissues.

Lateral malalignment can be remedied by applying pressure with the flat of the hand. The arm is put up with the elbow flexed, provided the pulse is present, at an angle of 45°. A deep posterior plaster gutter is applied to prevent subsequent anteroposterior and lateral displacement.

FATAL CHRONIC TRACHEOBRONCHITIS DUE TO PSEUDOMONAS PYOCYANEA IN TWO SIBLINGS

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Pseudomonas pyocyanea and the green pus it produces in the body have long attracted attention. The published work, which goes back to the nineteenth century, has been reviewed by Fraenkel (1917), Lode (1929), Waite (1908), and Epstein and Grossman (1933), who all agree that the infection is most common in infants and children, in whom it is far more serious than in adults. Almost all organs can be infected, the commonest site being the skin, where chronic ulcers are produced, the so-called ecthyma gangrænosum; otitis media, particularly in children, is not infrequently due to this organism. Lung infection usually produces a rapidly fatal hæmorrhagic bronchopneumonia, and bronchitis may occur, but only as an incident in rapid pulmonary spread. Ritchie (1901) found *Ps. pyocyanea* together with hæmolytic streptococci and staphylococci in three cases of bronchitis; his case 47 might have been similar to those I am reporting, but the bacillus observed was not cultured. The alimentary tract (where the organism is a fairly common benign saprophyte), the meninges, the urinary tract, and the bones, may all be the seat of infection, a terminal septicæmia being common.

CASE-RECORDS

Case 1.—A boy, the third child in the family, who had been born normally with a birth weight of 7 lb. 9 oz., passed green stools at the age of 14 days, wherefore the quantity of breast-milk was reduced. At the age of 3 weeks he developed a frequent and exhausting cough of a moist laryngeal type; at the age of 5 weeks he began to vomit and have diarrhœa.

On admission at the age of 10 weeks he weighed 8 oz. less than at birth. He was almost afebrile, with pulse-rate 130 and respirations about 35 per min.

Progress.—Throughout his stay in hospital his condition remained almost unaltered. The cough and occasional attacks of vomiting persisted, and his stools were at times formed and yellow and at others frequent (up to two per feed), loose, green, and offensive. He barely maintained his birth weight, and his weight at death was only 6 lb. 15 oz. During the last week of his life he became increasingly weak and unable to cough, with terminal œdema of hands and feet. The right ear-drum appeared a little red and bulging, and a myringotomy was done. The boy died, after 8 weeks in hospital, at the age of 18 weeks.

Investigations.—When he was 10 weeks old a profuse growth of *Ps. pyocyanea* was grown from the baby's stool. A barium meal and laryngoscopy showed no abnormality. At 12 weeks a postnasal swab grew a pure culture of *Ps. pyocyanea*; the same organisms and *Bact. coli* were isolated from the urine but, since no pus cells were seen, these may well have been fæcal contaminants. Radiography of the chest at this time showed evidence of emphysema and peribronchial inflammation. At 15 weeks a pharyngeal swab grew a practically pure culture of *Ps. pyocyanea*, which was inhibited in vitro by sulphadiazine and very slightly by sulphacetamide, but not by sulphathiazole, sulphadimidine, sulphanilamide, sulphapyridine, or penicillin. The child's hæmoglobin varied between 80% and 100%, and the total white-cell count between 17,000 and 22,000 (11,000 once) per c.mm. The differential counts averaged: band forms 17%, segmented neutrophils 23%, lymphocytes 45%, monocytes 10%, and eosinophils 5%.

Treatment.—On admission the patient was given sulphadiazine 0·5 g. four-hourly by mouth for 5 days. During his third week in hospital, when 13 weeks old, he was given 5000 units of penicillin intramuscularly three-hourly for six days, and later sulphadiazine 0·25 g. four-hourly and intratracheal 'Phenoxetol' (Gough et al. 1944) for eight days, a watery solution of phenoxetol being placed in a Collinson inhaler, which atomises the solution. No treatment seemed to have any effect. A slow transfusion of blood and plasma was given two days before death.

Necropsy Findings.—Only the significant findings are reported here. The larynx and trachea were filled with greenish purulent material; the bronchi and lower end of the trachea were congested; and both lungs showed massive bronchitis and bronchiolitis and pneumonia. Thick greenish pus was squeezed from the cut ends of the bronchi. A swab from the cut surface of the lung showed few pus cells and numerous gram-negative rods, which proved on culture to be *Ps. pyocyanea.*

Case 2.—The fourth child, a daughter, was born 10 months after the death of her brother (case 1). Her birth and neonatal life were not remarkable until she was 6 weeks, when she developed a cough. By the age of 11 weeks she started whooping and continued to whoop for about a fortnight, and occasionally she vomited as well. The cough then became worse, but the baby was gaining weight. She was admitted when 18 weeks old because she had recently developed severe attacks of paroxysmal coughing and choking during which she brought up thick white sputum and became cyanosed and limp.

On admission her temperature was 100°F, pulse-rate 140, respirations 60 a minute. She weighed 12 lb. and was a well-nourished baby with slight subcostal diaphragmatic traction during inspiration. On auscultation of her lungs patches of crepitations were heard, but radiologically the lungs appeared normal.

Progress.—Throughout her stay in hospital her sleep and feeding-times were often interrupted by bouts of distressing coughing, during which she became cyanosed and exhausted and sometimes vomited. She often brought up stringy frothy whitish-green purulent sputum. The patches of crepitations in her lungs came and went, but the radiological appearances remained normal. The fever on admission persisted for a week, with an occasional reading of 103°F, after which it fell by lysis to normal levels and remained so throughout her stay in hospital. Her pulse-rate remained about 140, and the respiration-rate fell during a month to 35 a minute and then slowly rose again to about 50. Her condition remained stationary, her weight on discharge being 11 lb. 14½ oz.; no treatment appeared to have had any beneficial effect. She was discharged, after 10 weeks in hospital, because it was felt that no active treatment could help her, and she died at home at the age of 9½ months, some 5 months after the onset of the infection. No necropsy was done.

Treatment.—On admission the patient was given sulphadiazine 1 g. six-hourly by mouth for 3 days and intramuscular injections of 20,000 units of penicillin three-hourly for a month. After the sulphadiazine had been stopped, 50,000 units (equivalent to 50,000 µg.) of streptomycin was given six-hourly for 4 days. Just over a month later a second course of 50,000 units of streptomycin six-hourly was given for 4 days and 125,000 units for a further 3 days. At the same time, but continuing for a month, intratracheal streptomycin was given with a Collinson inhaler, using a solution containing 50,000 units of streptomycin per ml. The inhalations were given for 10 minutes at a time either after every feed or two-hourly. Scarcity of streptomycin prevented our giving the drug for as long as we would have liked. The patient was also given a course of aerosporin (polymyxin A; Ainsworth et al. 1947), 4·8 mg. being injected subcutaneously three-hourly. After 48 hours of this treatment the patient's urine contained 80 mg. of protein per 100 ml., whereas in previous repeated examinations of "clean" urine I had found 10–20 mg. per 100 ml. It was decided to continue treatment, but next day, after 72 hours' treatment, the urine contained more than 1000 mg. of protein per 100 ml., and over 1000 cells of renal epithelial type and numerous granular casts per c.mm. Treatment was stopped, but the patient passed no urine for 14 hours. When diuresis was re-established, the protein content of the urine fell quickly to 100 mg. per 100 ml., which level was maintained till her discharge 9 days after the end of treatment. On the patient's discharge her urine still contained 20 epithelial cells per c.mm., a few pus cells, and an occasional cellular cast. She was also given a week's course of short-wave diathermy to the upper part of her chest and neck. Apart from the serious toxic effects of the aerosporin, no treatment appeared to influence her clinical condition. The amount of sputum and the frequency of paroxysms of coughing varied slightly but did not seem to be attributable to the treatment she was receiving at the time.

Investigations.—On admission the patient's sputum contained pus cells and very numerous gram-negative rods, which proved on culture to be *Ps. pyocyanea.* This organism was sensitive to aerosporin 2·5 µg. per ml. but not sensitive to streptomycin 5 µg. per ml. On fourteen other occasions *Ps. pyocyanea* was recovered, usually in large numbers, from the sputum or from laryngeal swabs. On two occasions no *Ps. pyocyanea* was grown, but swabs taken next day gave a heavy growth. On the three occasions that her stools were cultured they gave a profuse growth of *Ps. pyocyanea.* Her hæmoglobin level remained within normal limits, and the total white-cell count was 11,000–20,000 per c.mm. Throughout the period of observation she had a lymphocyte-count of between 5000 and 10,000 per c.mm.

INVESTIGATION OF FAMILY

The mother and father and the two elder sisters seemed to be well; *Ps. pyocyanea* was never isolated from nose or throat swabs, nor was it isolated from the stools of the mother, father, and one daughter, but on the one occasion on which they were examined the stools of the other daughter produced a moderate growth of *Ps. pyocyanea.*

SUMMARY AND COMMENT

A baby boy, aged 10 weeks, was admitted to hospital with a very troublesome, exhausting, and productive cough. He was found to have a tracheitis and bronchitis due to *Ps. pyocyanea*; all treatment was unavailing, but he survived for 8 more weeks.

Almost within a year a newborn sister of his developed whooping-cough at the age of 6 weeks. She never completely recovered; the cough persisted, and she was admitted when 18 weeks old with an identical type of productive and exhausting cough and the same tracheal flora. No treatment had any effect, and she died at the age of 9½ months.

Treatment included sulphadiazine, penicillin, streptomycin, phenoxetol, aerosporin, radiant heat, and blood-transfusion. Several of the drugs were given by inhalation as well as systemically. The toxic effect of aerosporin (polymyxin A) on the kidneys—at least in an emaciated baby—were well demonstrated.

The clinical picture of these two siblings was almost identical, and it is remarkable that they both survived so long with such an extensive infection, *Ps. pyocyanea* respiratory infection being usually soon fatal in a baby.

The second baby was infected more than a year after the first had died, and no obvious common source of infection was found. One of the older children in the family produced a moderate growth of *Ps. pyocyanea* on the one occasion when her stools were examined, but such a finding is not uncommon in the normal population. One can only guess whether there exists here a high familial resistance to what is usually a rapidly fatal infection, or whether the two children were infected by a relatively benign strain of *Ps. pyocyanea* which had survived for a year in some common source.

I have to thank Dr. Victoria Smallpeice for permission to report these cases, for most of the clinical data, and for helpful criticism in the preparation of this paper; and Dr. R. L. Vollum for carrying out the sensitivity tests on the organisms isolated. The Wellcome Foundation Ltd. supplied the aerosporin.

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URINARY EXCRETION OF PHENOBARBITONE

AFTER A SINGLE LARGE DOSE

A. THOMPSON
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SENIOR SCIENTIFIC OFFICER AND STAFF CHEMIST, HOME OFFICE FORENSIC SCIENCE LABORATORY, PRESTON

A RECENT fatal case of self-inflicted poisoning provided a unique opportunity of following the rate of excretion in the urine of the barbituric-acid derivative, phenobarbitone.

A man, aged 62, who had been given a prescription allowing him gr. 18 of phenobarbitone a week, was alleged to have taken a large dose of the drug during the afternoon of May 2, 1949; this was followed by unconsciousness and coma from which he never recovered. He was admitted to hospital the same day; there he immediately had a stomach washout and was thereafter given stimulants including picrotoxin, strychnine, and nikethamide. He survived five days, but then developed bronchopneumonia and died on May 7. Necropsy confirmed the terminal bronchopneumonia.

Technique.—The urine was examined by precipitating with basic lead acetate, filtering, removing excess lead with sulphuric acid until acid to Congo red, filtering, and extracting with ether (Bamford 1947). The barbiturate was isolated from the other organs by Valov's (1946) sodium tungstate method, in which proteins, &c., are removed by precipitation with sodium tungstate, filtering, and extracting the filtrate with a large volume of ether. Residues were purified with charcoal (Turfitt 1948) and the estimations carried out colorimetrically against known quantities of barbitone using 1% cobaltous acetate and 5% isopropylamine (Koppanyi et al. 1934), both in methyl alcohol.

Findings.—Urine, obtained each day, was found to contain a barbiturate in the following quantities (calculated as barbitone):

Date	*Vol. of urine (ml.)*	*Barbiturate (mg. per 100 ml.)*
May 2	115	1·8
" 3	125	2·4
" 4	176	3·2
" 5	176	4·0
" 6	180	6·0
" 6 (3 P.M.)	360	3·6
" 7	180	2·4

The quantities of barbiturate found in other organs submitted for analysis were:

Organ	*Weight (g.)*	*Barbiturate (mg. per 100 g.)*
Liver	1232	2·7
Kidneys	268	2 0
Spleen	98	2·6
Stomach contents ..	109	trace

These last results agree with the findings of Andrew and Neubauer (1947) that barbiturates are evenly distributed throughout the body.

I wish to thank Dr. A. A. Miller, group pathologist, Preston Royal Infirmary, for the clinical history.

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URINARY INCONTINENCE CURED BY OPERATION

AN UNCOMMON CASE

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A DIVORCED parous woman, now aged 49, was seen by the late Sir Comyns Berkeley in November, 1937. He found that her cervix uteri was replaced by an ulcer spreading on to the vagina in all directions, the uterus being fixed, with infiltration to the pelvic wall on both sides. This stage-III cancer was treated by the Stockholm method in Lambeth Hospital, radium and X rays being used. I am indebted to Dr. T. Robb, director of radiotherapy there, for his note on the original condition and the progress after treatment. For a year the patient was symptom-free; then rectal tenesmus developed, and during 1939 a horseshoe-shaped fibrous stricture gradually encircled the rectum. By 1942 there were signs of chronic obstruction and fæces were passed per vaginam. A colostomy was done in December of that year. The woman remained very well until early in 1947, when she became incontinent of urine. A vesicovaginal fistula was discovered and slowly increased in size.

In July, 1949, the woman was referred to me by Mr. J. H. Carver, F.R.C.S.

She was in good health, and surface biopsy and vaginal cytology showed apparent complete cure of the cancer. However, save for a thready band about the external orifice, the whole urethra had disappeared; the entire anterior vaginal wall was absent; the ureters opened into a little shrunken pouch near the remains of the cervix; and the rectovaginal septum did not exist. The anal sphincter alone remained intact. Urine constantly flowed over the sore and ulcerated skin of the vulva.

Transplantation of the ureters into the colon seemed to be the obvious treatment, but the seven-year-old colostomy was on the side of the abdomen, near the iliac crest. The comfort of the patient with a "wet" colostomy depends on her being able to wear a bag which can be closely applied to the abdominal wall. This is possible only when the colostomy is central, and best when the abdominal wall has been flattened by removal of the umbilicus.

The only useful structure preserved was the good anus. Therefore, fashioning flaps by splitting the skin of the nymphæ, I closed the whole urogenital orifice and left a large de Pezzer catheter in the anus, where it was tightly held by the sphincter. Constant drainage was maintained for eleven days with twice-daily lavage of the cavity. Healing was perfect. Eventually the patient voided urine through the anus with complete control of the act, and catheterisation thereafter produced a negligible quantity of residual urine. The atresia of the remains of the rectum is apparently so complete as to prevent organisms from the bowel infecting the urine, which has so far remained clear. Thus the prognosis, so far as renal function is concerned, is probably much better than if colonic implantation of the ureters had been done.

Since skin rather than vaginal epithelium has been used to effect the closure, the progressing atrophy of the tissues exposed to radium should not mar the result. The patient is very content.

VOLVULUS OF THE SMALL INTESTINE

THE POSITION OF RELIEF

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THE following case of small-intestine volvulus is reported because it was of the idiopathic type, which is rare in this country, and because it clearly demonstrated the clinical sign of "position of relief." Early diagnosis is essential for successful treatment, and this sign, when present, is of great value.

CASE-RECORD

A retired plumber, aged 67, was admitted to the Royal East Sussex Hospital at 8 A.M. on Aug. 15, 1948. At 7 A.M. he had taken a glass of effervescent salt mixture. Shortly afterwards he had felt a sudden pain in the right iliac fossa, accompanied by the eructation of gas. As soon as the pain started he had passed a small stool, after which he had passed neither fæces nor flatus. He had vomited small quantities once or twice. The pain, which was agonising, was steady, not colicky, and did not go through to the back. The most comfortable position for the patient was face downwards with the trunk supported, clear of the bed, on his knees and elbows.

During the previous year he had had one or two attacks of similar pain, but these had lasted only two or three minutes.

Examination.—The patient was thin though not emaciated, and was in great pain. When first seen he was in the knee-elbow position; and he returned to this position as soon as his examination was over.

His temperature was 96·4°F; pulse-rate 52 and respirations 20 per min. The abdomen was slightly distended, and there was severe tenderness and some rigidity in the right iliac fossa. These signs were also present—though less prominently—in the right upper quadrant. Peristaltic sounds were normal in quantity but rather hollow, suggesting distension of the gut. An easily reducible right femoral hernia was present. On rectal examination nothing abnormal was detected. The tongue was moist and not furred; there was no fœtor oris. Nothing abnormal was found in the respiratory and cardiovascular systems. The provisional diagnosis was volvulus of the cæcum.

Operation.—At 11.30 A.M., under general anæsthesia, a right paramedian incision was made at the level of the umbilicus. The peritoneal cavity contained straw-coloured fluid. The cæcum was normal in size and position. Almost all the small intestine was dark-blue and slightly distended. It was rotated anti-clockwise on its mesentery through 360°. This volvulus was reduced and the colour of the intestine was immediately restored to normal. The mesentery did not appear to be unduly long or in any way abnormal. The gut was replaced in the abdomen. A band of omentum adherent in the right femoral hernial sac was divided; this band did not appear to be responsible for the volvulus. The abdomen was closed without drainage.

Recovery from the operation was uneventful, apart from some diarrhœa on the 4th day. The patient was discharged to his home, in good health, 12 days after the operation.

Re-admission.—On Dec. 6, 1948, the patient was re-admitted to hospital, complaining once more of abdominal pain. This had come on gradually; it was severe and colicky and was situated around and below the umbilicus. The patient passed flatus while the pain was present. There had been one or two similar attacks since his discharge from hospital. He was found to have slight lower abdominal distension, and some muscle guarding and tenderness were noted at a point 1 in.

below and to the right of the umbilicus; peristaltic sounds were normal. A small, tender, irreducible right femoral hernia was present. There was no position of relief. The patient was observed for some days. His bowels were open regularly; he did not vomit; his pain gradually disappeared.

Second Operation.—On Dec. 22 Mr. D. N. Wilson undertook a Lothiesen repair of the right femoral hernia. The sac was much fibrosed; it was empty. There was a small amount of clear, pale-yellow fluid in the peritoneal cavity. Recovery was uneventful.

When seen at follow-up four months later, the patient reported that he was very well except that after meals he often had a feeling of fullness associated with a dull ache centred around and just above the umbilicus. Physical examination revealed no abnormality. A barium meal, followed through, showed no abnormality.

DISCUSSION

Incidence

McKechnie and Priestley (1936) found that at the Mayo Clinic between 1910 and 1935 there were 37 operations for small-intestine volvulus. In only 3 of these could no cause be demonstrated. Of the 34 patients operated on in this series 22 were males and 12 females.

The disease is rare in Europe and America but much more common in other parts of the world. Kerr and Kirkaldy-Willis (1946), in Kenya, treated, in one year, 21 cases of acute intestinal obstruction in Africans, and in a third of these the obstruction was due to volvulus of the small intestine. McWatters (1945) reports that the disorder is fairly common in India.

Pathology

Abnormal length of narrowness of the mesentery, Meckel's diverticulum with or without an umbilical band, malrotation of the large intestine leaving an abnormally long small-intestine mesentery, and exomphalos are the congenital lesions which have been found in association with small-intestine volvulus. One of these lesions was present in 8 of the 37 in the Mayo Clinic series. Dott (1923) has described the gross developmental errors which are the cause of intestinal volvulus neonatorum.

Where incomplete midgut rotation is the basic lesion one can expect to find that the mesenteric attachment of the small intestine or cæcum is abnormal. The normal rotation of the midgut is in an anti-clockwise direction; clockwise rotation sometimes causes intestinal obstruction. In the present case all mesenteric attachments appeared normal and the rotation of the mesentery was anti-clockwise; thus it seems unlikely that a congenital error in midgut rotation was concerned in causing the volvulus.

Cases arising from acquired causes numbered 26 of the 37 in the series of McKechnie and Priestley; there were 14 with postoperative adhesions, 2 with inflammatory adhesions, 5 with adhesions of unknown cause, and 2 with internal herniæ, while in 3 cases the patients were still in hospital after a recent operation. Allen and Welch (1947) say that foreign bodies, such as food boli and masses of worms, or tumours of the small intestine, can cause volvulus.

Kerr and Kirkaldy-Willis (1946) and McWatters (1945) agree that the frequency of small intestine volvulus among their patients is attributable to the bulky, farinaceous nature of their diet, which causes intestinal distension. In the case reported here pain started very shortly after swallowing an effervescent salt mixture, which would be quite capable of causing sudden and extensive dilatation of the small intestine. The patient's history suggested that during the previous year there had been one or two episodes of incomplete or temporary volvulus. Probably his small intestine lay permanently in a position of partial rotation, not enough to cause pain or interfere with the blood-supply. The sudden distension by the gas of the effervescing mixture caused the rotation to increase to one complete turn. Sweet (1935) believes that meteorism of dietary origin is a contributory cause of volvulus of the cæcum.

The volvulus may reduce itself spontaneously; but if this does not happen the mesenteric blood vessels become blocked, necrosis of the gut rapidly follows, and the patient dies from peritonitis.

Symptoms

In the present case and in Woods's (1945) case, there had been minor attacks of abdominal pain during the year before the final catastrophe. McKechnie and Priestley (1936) report a case in which attacks of pain had recurred for the thirty years before the main attack. Gardiner (1947) mentions that acute volvulus of the cæcum is sometimes preceded by a number of minor attacks.

The onset of the pain depends on the pathological lesion, but is usually sudden. In idiopathic cases, where no band or other cause is present, very sudden onset —as in the case reported here—would be expected.

An important factor in the origin of the pain is tension on the mesentery. Pain from such tension very commonly goes through to the back, and is steady, not colicky. Whether the pain with volvulus is predominantly steady or colicky depends upon the relative contributions to its severity from abnormal obstructive peristalsis and from mesenteric tension.

In the early stages, frequent small reflex vomits are usual; obstructive vomiting follows later.

The Position of Relief

An outstanding clinical feature is the effect of assuming the position of relief, to which the patient returns whenever he is left alone. This position is often, as in the case reported here, the knee-elbow position; but Evans and Bigger (1947), who first described the sign, which, they said, is very common with small-intestine volvulus, reported that the patient may be found lying on his right or left side. For each patient the position is constant and any change from it increases his discomfort.

This sign is important in diagnosis; but it is not always present, for where the volvulus is caused by a tight band which holds the gut firmly in position, no alteration in the position of the patient will cause any change in mesenteric tension with accompanying relief of pain. Where, however, there is no tight band or constriction and rotation alone is the cause of the condition, change in position is likely to relieve the tension on the mesentery with consequent lessening of the pain.

EXAMINATION

In the present case the patient's clean moist tongue and slow pulse gave no indication of the gravity of his condition.

In the early stages abdominal examination reveals nothing very characteristic. The signs are those of early small-intestine obstruction with some tenderness and rigidity; in the present case, this was most pronounced in the right lower quadrant. When this patient was examined within two hours of the onset of complete volvulus, peristaltic sounds were still audible, but were hollow. The abdomen was silent in 5 of the 7 cases reported by Kerr and Kirkaldy-Willis, even though most of them reached hospital within a few hours of onset.

Treatment

Immediate operation is essential. With idiopathic volvulus, the treatment consists of untwisting the mesentery, with or without resection of gut. Where a cause is found, this should, if possible be corrected. If the condition is far advanced intestinal suction, parenteral replacement of body fluids, electrolytes, and colloids, and chemotherapy may be necessary.

Prognosis

The immediate prognosis depends very largely on the speed with which the diagnosis is made and treatment started. If, as in the case here reported, the condition is relieved within a few hours, the immediate outlook s excellent. When operation is not performed until necrosis of the gut and peritonitis have set in, the risk of death is high.

Of the 31 cases surviving the original operation in the series of McKechnie and Priestley, 19 (60%) were subsequently quite free of symptoms. In 12 (38%) abdominal pain recurred; and in 5 of these a further operation was necessary. In 2 patients (6%) the volvulus was found to have recurred: and in 1 of these it recurred twice.

A complete volvulus is very commonly preceded, over a period of years, by attacks of subacute or incomplete volvulus. The evidence suggests that this partial volvulus can be transformed into complete torsion by sudden distension of the small intestine. Patients in whom this disorder has been recognised should therefore be warned that it is dangerous for them to drink rapidly a large quantity of fluid, and that effervescent drinks may constitute for them a particular peril.

SUMMARY

A case of idiopathic volvulus of the small intestine is reported. The causes of small intestine volvulus are enumerated, and the importance of early operation emphasised.

The sign of "position of relief" is described. When present this is of great diagnostic value.

I wish to thank Mr. D. N. Wilson, under whose care the patient was admitted, for permission to treat the case and to publish this report.

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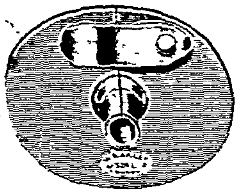
New Inventions

A NEW SUPRAPUBIC SHIELD

THE operation of suprapubic cystostomy may be less used now as a preliminary to prostatectomy, but there remains the group of patients who fare better with the two-stage operation, and there are also many patients who require permanent suprapubic cystostomy for such conditions as inoperable carcinoma of the prostate, injuries of the spinal cord, tabes dorsalis, and disseminated sclerosis. Successful management of the aftercare of these unfortunates is not made any easier by the suprapubic shield in current use—as anyone who has had to persuade a catheter (de Pezzer or Malécot) to slide through the spout of the shield will know.


The modified shield.

The accompanying figure shows a simple modification which permits the catheter and shield to be changed with ease. The upper half of the shield is slit down as far as the spout, which is also slit along its upper surface. This enables the spout to be fitted round the catheter after it has been introduced into the bladder, and then by means of an overlap and stud the spout is made to grip the catheter securely. In this way the patient is saved from feeling any pain and the nurse (or doctor) can change the catheter with a minimum of trouble.

This suprapubic shield is made of steam-cured rubber, and is boilable. The makers are W. H. Bailey & Son Ltd., of 45, Oxford Street, London, W.1.

I wish to thank Sister H. C. Fabian for her help in devising this modification of the shield, and Mr. D. J. Pugh, L.I.B.S.T., of Messrs. W. H. Bailey & Son, for his help in its production.

London, N.W.1. PHILIP HOPKINS, M.R.C.S.

Reviews of Books

Pharmacology and Toxicology of Uranium Compounds

Editors: CARL VOEGTLIN, PH.D., formerly chief of division of pharmacology, National Institute of Health, U.S. Public Health Service: HAROLD D. HODGE, PH.D., professor of pharmacology and toxicology, University of Rochester. New York and London: McGraw-Hill 1949. 2 vols. Pp. 1084. 60s.

THESE two large volumes record an immense amount of investigation, urgently performed, between 1943 and 1946, to determine the risk to, and establish safeguards for, the health of workers concerned with the industrial and scientific use of uranium compounds in relation to the production of atomic energy. The pharmacology division of the University of Rochester undertook the project, with numerous collaborating groups of technical experts—analytical chemists, pathologists, geneticists, engineers—and manifold administrative sections. The result is an admirably complete and detailed account, replete with bibliographies, tables, diagrams, and colour photographs (e.g., of renal histopathology). It should serve as a pattern and as a source-book of techniques for future studies of industrial toxicology. Several prefaces explain the relation of the work to the other U.S. projects on nuclear energy. The 46-page introduction gives the plan of the work and summarises the chief results of each section.

The early chapters deal with the chemistry of uranium compounds, analytical methods, and statistical methods. The main part of the record is concerned with the toxic effects on animals of uranium compounds, administered by various routes. Parenteral and oral administration, and application to skin and to eye, have a chapter each, and much space is given to toxic symptoms after inhalation. The pathology section, chiefly on renal damage, is important. Detailed information is presented on the effects of uranium poisoning, the general pharmacology of uranium, and the development of tolerance. The actions of uranium compounds on enzymes and proteins are recorded, and the measurements of catalase activity of urine is shown to be a sensitive test for their early toxic effect on the kidney. The mechanism of the toxic actions is discussed; evidently particle size, an important factor in the inhalation of a toxic dust, requires further study.

No experiments were permitted on human subjects, but reports are given of the effects of accidental acute exposure, fatal and non-fatal. Protective arrangements were instituted from the beginning of the project, and the findings so far recorded for studies of chronic exposure of workers to uranium are fortunately negative. The pharmacology and toxicity of fluorine and hydrogen fluoride are surveyed in the last chapter.

Paul Ehrlich

MARTHA MARQUARDT. Foreword by SIR HENRY DALE, O.M., F.R.C.P., F.R.S. London: Heinemann Medical Books. 1949. Pp. 255. 25s.

Miss Marquardt, for many years Paul Ehrlich's secretary, has written a notable book about her revered master. In a foreword Sir Henry Dale makes clear to us the achievements of this man of prophetic vision from whose work, as he himself foresaw, modern chemotherapy has developed. Of Ehrlich—lovable, absent-minded, burning with enthusiasm, gesticulating, and loquacious, with a hundred endearing little tricks of speech and manner—Miss Marquardt draws for us a revealing portrait. It is a picture by one who viewed the excitable little man with an adoring love, but who is not blind to his faults. A Jew, Ehrlich was yet a German. Therefore as *Geheimrat*—autocrat of the great institute over which, after long neglect, he was set to preside—he ruled not only by love but by fear. The charming friendliness of the man was sometimes interrupted by bursts of hot anger at what he considered slackness or disobedience, before which all his staff grew pale with fear, and which sometimes ended in the breaking of the culprit's career that others might take warning. When the credit and the immense financial rewards of his great work in the concentration of antitoxins went not to him but to his aristocratic co-worker, Emil von

Behring, his outcry was equal to his indignation. But if the author tells us of these things she does so only to make more clear the blend of virtues which together make up a most unusual and intriguing personality. Nor is she alone in her admiration. Sir Henry Dale, the late Prof. William Bulloch, and Prof. Carl Browning in turn spent some years working with him and all here testify to the enduring affection with which they came to regard him. Miss Marquardt's English book, fascinating in its unexpected details, is worthy of her great German master.

Isotopic Tracers and Nuclear Radiations

with applications to biology and medicine. WILLIAM E. SIRI, University of California. New York and London: McGraw-Hill. 1949. Pp. 653. £5 6*s.* 6*d.*

THIS volume comes from the departments of medical physics and physics and the radiation laboratory at the University of California. Only one section—about a tenth of the whole—is concerned with actual biological and medical applications of tracers. The rest of the book contains a section on essential theoretical conceptions and numerical and mathematical data about isotopes and nuclear radiations; a fairly detailed outline, again with much mathematical data, of the methods and instruments employed in tracer research; and 91 pages of references. The first section seems specially designed to frighten off any non-physicist who thinks of working with tracers. It abounds in statements like:

> The complete expression for the total binding energy may now be written
>
> $$E = aA + bA^{2/3} + cZ(Z-1)A^{1/3} + dI^2A^{-1} + \Delta E$$
>
> where
>
> $$\Delta E = \begin{cases} 0, \text{ for } A \text{ odd} \\ \pm cA^{3/4}, \text{ for } A \text{ even } \begin{bmatrix} Z \text{ even} \\ Z \text{ odd} \end{bmatrix} \end{cases}$$

Such is the formidable jargon of the nuclear physicist. This section contains numerous tables and graphs of essential data; one table—the well-known Seaborg and Perlman table of isotopes—takes up 72 pages. The section on methods is also difficult for the uninitiated, but there are interesting sections on the standardisation of radioactive samples and on the safe handling of radioactive materials. The actual biological and medical section is a disappointing catalogue: this subject has been much better handled by Hevesy, in his book on radioactive indicators.

In a foreword Dr. J. H. Lawrence says of this volume: "For those persons yet unfamiliar with the physical and biological literature in this field, it would appear to provide much of the fundamental material with which he must familiarise himself before attempting intelligent and useful investigations with isotopic tracers and nuclear radiations." He may well be right, and then one glance at this book will convince most medical men that the subject is best left to the specialist; who will probably be glad to get the information in one volume.

Mysterious Marriage

E. GRAHAM HOWE. London: Faber & Faber. 1949. Pp. 320. 15*s.*

IN stating his philosophy of life Dr. Graham Howe is both enlightening and irritating—the first because he has many acute things to say, the second because of the form in which he clothes his argument. The place of the individual in the dynamics of society, and of the "I" in the dynamics of the self, must be the starting-point of any modern philosophy of human conduct. In his study of the spoilt child, who has failed to make the initial adjustment between wish and reality, and between self and other, Dr. Howe is on ground which must be incorporated into our ideas of man. The irritating element in his presentation is that the argument repeatedly takes a mystical or a whimsical turn, in which the clinical observation is submerged; and the effect he leaves is of a man in search of a system on the medieval model. Little cabalistic diagrams, reminiscent of those used by Ouspensky, increase rather than resolve the confusion. Such phenomena as the compulsion neurosis or the asocial behaviour of individuals in modern cultures are suitable subjects for exact investigation, but exactness is the one thing which Dr. Howe nowhere approaches. The result is a blend of interesting speculation, establishe fact, and annoying woolliness. The fairies at the bott of the garden whom Jung invited into the presentatio of social and individual psychology have long outstaye their welcome.

Chemical Activities of Fungi

JACKSON W. FOSTER, professor of bacteriology, Universit of Texas. New York: Academic Press. 1949. Pp. 6 $9.50.

CHEMICAL mycology has now become so vast tha no wonder Professor Foster deliberately chose to lim his monograph to the lower fungi commonly known a moulds. His decision, though wise, may neverthele be regretted by the reader deprived of the chance t become acquainted with mycological problems in th widest sense. However, here we have a book, th first of its kind, which will soon establish itself as standard work on the biochemical activities of th moulds. It is an authoritative, highly critical, an exhaustive treatise dealing with manifold aspects o metabolic processes in moulds. The topics include, fo example, methodology, the chemical nature of th mycelium, biochemical syntheses by mutants, th application of moulds to micro-analysis of metals an vitamins, trace-element nutrition of fungi, formatio of organic acids, extraction and purification of penicilli and enzyme preparations. Professor Foster writ well, and will be admired for the skill and precision wit which he has tackled his difficult and fascinating subjec

Œdipus: Myth and Complex

PATRICK MULLAHY. With an introduction by Eric FROMM. London: Allen & Unwin. 1949. Pp. 53 37*s.* 6*d.*

THIS book starts with the idea that a thorough know ledge of the whole Œdipus myth and its setting are nece sary to evaluate the Œdipus complex; but it makes contribution to such knowledge. To find the Sophocl trilogy reprinted as the second part of the book may a convenience to readers who have no other access it, but at least some comment on it would be welcom from the author. The first part of the book is an accoun as seen through his eyes, of the work of the seve most distinguished psycho-analysts. One is astonishe to learn that these are Freud, Jung, Adler, Otto Ran Karen Horney, Erich Fromm, and Harry Stac Sullivan. One misses Stekel in this galère. In conclusion, the work of these authors—with th exception of the last two—is depreciated in magisterial tone which the interpolation of a fe compliments does little to mitigate.

Surveys of Anatomical Fields

JOSEPH L. SHELLSHEAR, D.S.O., M.D., M.S., researc professor of anatomy, University of Sydney; N. W. G MACINTOSH, M.B., senior lecturer in anatomy at th university. Sydney: Grahame Book Company. 1949 Pp. 172.

DURING the last war Professor Shellshear and Dr Macintosh conducted a correspondence course on anatomy for medical officers on active service by providing dossiers, consisting of essays illustrated by drawings and X-ray [illegible] elve of these essays have now been [illegible] and rewritten in book form. The [illegible] discusses the teaching of anatomy, and emphasises the importance of orthogonal drawings made in the correct anatomical position. The other essays deal with the anatomy of certain selected regions, such as the forearm, pharynx, and pelvis. In most of them some particular landmark is chosen as a foundation for describing the morphology of a given anatomical region. Thus the iliopsoas muscle and the inguinal ligament are discussed as an introduction to the structure of the inguinal region, and the transverse process of the fifth lumbar vertebra as a point from which to correlate the anatomy of the lumbosacral region. The essays were originally designed to stimulate the postgraduate student in anatomy to write similar essays displaying exact expression in writing; by their adherence to topographical minutiæ and emphasis on the synthetic method of approach to anatomy, the authors probably go far towards accomplishing this object.

THE LANCET

LONDON: SATURDAY, JAN. 14, 1950

Civil Service Anomalies

OUR Civil Service is powerful and of high repute: and in return for responsibility, prestige, and security its senior officials have been willing to forgo some of the money their abilities would generally command elsewhere. Even before the war, however, substantial increases in the salaries for the higher posts were overdue: and the expansion of other national services, offering higher rates of pay, has made it less and less defensible that the key men at the centre should be given so little. It is not surprising, therefore, that the First Division Association[1] should have approached the Prime Minister with a request for immediate action on the Chorley Committee's recommendations.[2] In September, 1948, this independent committee proposed that a further £200,000–£400,000 per annum should be allotted to the senior Civil Servants, and the Government agreed to this addition, proceeding by instalments to begin last October. But at the last moment the Chancellor of the Exchequer deferred the new rates until 1951 because devaluation made it urgently necessary not to raise incomes. Since Civil Servants have good reason to understand the dangers of inflation and the value of their example, they might have accepted this decision stoically if it had been generally applied. But they have been galled by the subsequent increase of university salaries, provided out of public funds, and by the offer of salaries at the proposed new rates to technicians urgently required in atomic-energy projects. As the *Manchester Guardian* says:

> "They are the unfortunate victims of circumstance. While the mass of wage-earners have had steady increases of wages over the last ten years the higher-paid civil servants (like the judges and, in less degree, the teachers) have had either no increases at all or relatively small ones. The full brunt of the pressure on the middle classes has fallen on them without any possibility of improving their situation."[3]

A striking example of the present anomalies is the difference between the pay of doctors in different branches of the public service. Salaries in the National Health Service, but not elsewhere, are based on the three Spens reports, which the Government have accepted. Efforts to bring medical salary scales outside the N.H.S. into harmony with the findings of the Spens committees are being made on behalf of doctors in the public-health service,[4] the Armed Forces[5] and the Colonial Service.[6] But the need is perhaps greatest—and the promise so far smallest—for those in the various civilian Government departments at home. Here are to be found discrepancies that would still need removal even without prompting by the Spens standards. For example, in the Ministry of Pensions service a large proportion of the doctors—eight out of ten in one hospital, we are informed—are not on the establishment, though some of these have served for years: and, while receiving the same salary and doing the same work as their established colleagues in comparable appointments, they get no compensation for the withholding of superannuation rights. Then again, this Ministry has been urged, without effect, to grade its more junior posts as in the N.H.S., so that when they later seek other employment these doctors may make their previous experience clear. As to salaries, the Ministry of Pensions pays senior specialists a maximum of only £1400: and similar anachronisms are to be found elsewhere. For example, on the prison service Mr. STANLEY MAYNE, general secretary of the Institution of Professional Civil Servants, has written:

> ". . . a psychiatrist in the prison service has a salary scale of £1000–£1400 a year. A similarly qualified officer in the National Health Service is on a scale of £1700 (linked to age 32) rising by increments of £125 and then of £150 to a maximum, reached in eight years, of £2750. Does this mean that salaries are fixed on a catch as catch can basis? Or that the Government have decided they do not want psychiatrists in the prison service but lack courage to announce the fact? Or, as similar parallels exist between every part of the medical Civil Service and the National Health Service, that it is Government policy to reduce the medical Civil Service to a cipher?"[7]

In conjunction with the British Medical Association and the Ministry of Health Medical Staff Association, the institution has drawn up a proposed scale to align the salaries of medical Civil Servants with those in the National Health Service. At the Ministry of Health the chief medical officer's salary would be increased from £3000 to £5000, and in certain other grades the maximum would be increased by close on £2000. A deputation asked the Treasury last September to express its views on this scale: but we hear that no reply has been received.

About the need for increasing salaries at the highest levels there can be no argument: it is intolerable that the chief medical officer of the Ministry, who is the most important personal link between the professional and the administrative sides of the health service, should have barely more remuneration than the consultant who has not yet gained a merit award. Below him, the existing salaries are such that it is hardly surprising that the Ministry has latterly lost a number of its carefully chosen medical staff—and this at a time when it has greater responsibilities, and greater need of ability, than ever before. There may be varying degrees of enthusiasm for the Civil Service: but if we have one at all—as of course we must—it should offer conditions that will continue to attract, and keep, first-rate men in the principal positions. For clinical work its payment should be substantially the same as is offered by the N.H.S. Mr. MAYNE, unfortunately, was hardly exaggerating the present disadvantages when he wrote:

> "Obviously no parent, knowing the facts, can conscientiously advise or encourage children to devote themselves to a scientific career or to any of the professions in the Civil Service. . . . If this is not what they intend then the Government should give Civil Service salaries that clear and coherent thought they so obviously urgently need."[7]

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[1] See *Times*, Jan. 6, p. 4.
[2] See *Lancet*, 1949, i, 378.
[3] *Manchester Guardian*, Jan. 9, p. 4.
[4] *Lancet*, 1949, ii, 246.
[5] *Ibid*, p. 597.
[6] *Brit. med. J.* 1949, ii, suppl. p. 278.
[7] *Times*, Oct. 18, 1949, p. 5.

Streptomycin in Joint Tuberculosis

As in nature, so in the arts and sciences, there are times of recession and times of growth. The treatment of surgical tuberculosis is now emerging from a time of recession. Which of the new methods now being tried will establish itself? In a disease in which recovery is so difficult to assess it may take years to answer this question.

In Johannesburg, STREETEN[1] has been treating tuberculous arthritis with intra-articular streptomycin. The injections of streptomycin, in doses of either 0·25 or 0·5 g., were given daily for ten days and were preceded by the injection of alkali (10–20 ml. of *N*/20 sodium hydroxide and 10–20 ml. of *M*/20 borax as buffer) into the joint to raise the pH of the synovial fluid to 9·0, which according to WAKSMAN and SCHATZ[2] is the optimum pH for streptomycin action. STREETEN reports on only five patients, only one of whom had tubercle bacilli cultured and confirmed on guineapig inoculation, and three others had positive Wassermann reactions. One patient was discharged from hospital as soon as the ten days' course of injections was over, while another had only outpatient treatment. The follow-up periods were very short, and even then a relapse was reported in one patient; but STREETEN was impressed by the relief of symptoms and amelioration in the patient's clinical condition. He refers to the statement of JONES[3] that the intra-articular route is the only satisfactory way of giving penicillin in joint wounds and infections, and certainly the direct application of streptomycin to the diseased area as well as intramuscularly has proved valuable in meningitis. The use of alkali and a buffer is based on STREETEN's observation that arthritic exudates are acidic: it also seems possible that the alkali itself, even without streptomycin, might depress the activity of tubercle bacilli in the joint lesion. Other results of the treatment of joint tuberculosis with streptomycin have been published, though most of this work is still in the speculative stage.

The treatment of sinuses from tuberculous lesions with streptomycin looks promising—DAVIS,[4] for example, finds that the response of sinuses originating in bone is dramatic. He, like BICKEL and his colleagues[5] at the Mayo Clinic, used only the intramuscular route. GALLAND,[6] of the Hôpital Franco-Americain, Berck-Plage, who has treated 40 cases of skeletal tuberculosis with streptomycin, also finds that its beneficial effect on sinuses is remarkable. The prevention of sinus formation or the healing of a persistent sinus from a tuberculous joint is itself a notable advance, and, with penicillin to counteract sepsis, patients with chronic suppuration and advancing amyloid disease should no longer be seen in surgical tuberculosis wards, provided that the first principles of surgery are not forgotten—that effective drainage is provided, sequestra are removed, and sterile dressings are applied.

The future will show what streptomycin can do in early joint lesions, where the cartilage is still intact and there is no caries of bone. MEDLAR[7] has said of pulmonary tuberculosis that once necrosis has occurred the way for the streptomycin to reach the bacillus is barred. What HADFIELD[8] has called the lymphoreticular apparatus must come into action in the defence of the joint against tuberculosis. ALLISON and GHORMLEY[9] have described the close interrelations between the tissue reactions against tuberculosis in the synovial membrane of joints and in the metaphyseal ends of the long bones. The macrophages in these situations are responsible for the destruction of tubercle bacilli. Absorbed by the synovial membrane, the streptomycin would reach the tubercle bacilli both in the membrane and in the metaphyseal bone and exert its bacteriostatic action. But the patient would not be cured of tuberculosis, the healing of which would still depend on the natural processes of repair. So patients will still need constitutional treatment to augment their resistance, though in the patients treated sufficiently early resolution may be more rapid and certain. Once the disease has reached the osseocaseous stage the natural barriers set up to limit its spread will also prevent streptomycin gaining access to bacilli enclosed in the lesion. In such cases streptomycin treatment might well be futile without supplementary surgery. By osteotomy and other surgical means the barriers set up by nature can be broken down, the necrotic areas revascularised, and the reparative processes of bone set in operation, under a protecting "umbrella" of streptomycin which will prevent miliary dissemination and sinus formation and can now also reach the lurking bacilli. If they are to be safe these surgical measures should be carried out only by surgeons with special experience of skeletal tuberculosis, and only after a preliminary period of constitutional treatment to raise the patients' resistance.

When new advances are made it is sometimes at the expense of the old and tried methods. We cannot afford to let this happen in skeletal tuberculosis. If treatment is to be fully effective it must still be based on the teaching of such men as CALVÉ, GAUVAIN, ROLLIER, CALOT, ROBERT JONES, GIRDLESTONE, and PUGH. In short, we must still treat the tuberculous patient and not only the tuberculous joint.

Penicillin and Modern Research

TEN years ago few people had heard of penicillin or of antibiotics, and fewer still were interested in them. Today penicillin is a familiar word throughout the civilised world, and the production of antibiotics has become a great industry, with huge factories and thousands of employees. The small group who were primarily responsible for this amazing transformation have gathered together what is known about these new remedies, and the volumes[10] prepared by FLOREY, CHAIN, and their colleagues, the first two of which have now been published, will be gratefully studied by scientific workers of many types and occupations. Even to summarise the non-clinical information has been a gargantuan task, requiring over 1700 pages, descriptions of 130 antibiotics, and references to 3000 original papers and 4000 authors. The third volume, which will deal with the clinical aspects, can hardly prove a less formidable task. Knowledge in this field is now advancing so rapidly that two of the most promising antibiotics—chloramphenicol and 'Aureomycin'—have appeared since the major portion of this book was written, and only preliminary accounts of them could be included. But these volumes review the subject up to 1948 so comprehensively that they will maintain their value for many years as a secure base for further advances.

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[1] Streeten, D. H. P. *S. Afr. med. J.* 1949, 23, 777, 850.
[2] Waksman, S. A., Schatz, A. *J. Amer. pharm. Ass.* 1945, 34, 273.
[3] Jones, G. B. *J. Bone Jt Surg.* 1948, 303, 106.
[4] Davis, R. H. *Lancet*, 1949, ii, 982.
[5] Bickel, W. H., Young, H. H., Pfuetze, K. H., Norley, T. *J. Amer. med. Ass.* 1948, 137, 682.
[6] Galland, M. *Rev. Orthoped.* 1949, 35, 56.
[7] Medlar, E. M. Streptomycin and Bistreptomycin in Tuberculosis. National Tuberculosis Association. New York, 1949; p. 100.
[8] Hadfield, G. *Ann. R. Coll. Surg. England*, 1949, 5, 89.
[9] Allison, N., Ghormley, R. K. Diagnosis in Joint Disease.
[10] Penicillin, Streptomycin, and other rom Fungi, Actinomycetes, Bacteria, LOREY, F.R.S., E. CHAIN, F.R.S., N. G. A. G. SANDERS, E. P. ABRAHAM, and M. E. FLOREY. London: Geoffrey Cumberlege, Oxford University Press. 1949. Two vols., pp. 1771, £8 8s.

Contrary to general impressions, the study of antibacterial remedies produced by other micro-organisms did not begin in 1929, when FLEMING observed that a contaminating mould dissolved adjacent colonies of staphylococci. By that time the subject had already been studied by scientists for over sixty years. Suggestions of this type of remedy can be found in folk medicine in various parts of the world, but the first clear description of bacterial antagonism was given in 1877 by PASTEUR and JOUBERT, who found that "common bacteria" in urine prevented the growth of anthrax bacilli and suggested that therapeutic use might be made of this fact. Similar observations were made by many of the other early workers on bacteria, and technical methods were developed by GARRE in 1887 for the study of bacterial antagonism. In the early years of this century illustrations were published, indistinguishable from those that are now so familiar, of petri dishes showing the growth of one organism being inhibited by colonies of another. In 1899 EMMERICH and LÖW introduced into medicine a bactericidal preparation called "pyocyanase," prepared from *Ps. pyocyanea.* During the next ten years this was used extensively as a local application for a great variety of conditions, especially diphtheria. But its reputation exceeded its true activity and after 1914 it passed out of use. Nevertheless, bacterial antagonisms and their underlying mechanisms were still widely studied, and FLEMING's description in 1929 of the action of *Penicillium notatum,* though of outstanding importance, was paralleled by many other papers. FLEMING investigated the antibacterial properties of his crude "mould broth filtrate" in some detail, noted that it was no more toxic to animals than plain broth, and even used it as a dressing for some septic wounds; but after 1932 its further development was abandoned, apparently because the preparation was so labile. Late in 1939, work on penicillin was taken up vigorously in Oxford by CHAIN, FLOREY, and HEATLEY. The subsequent development of penicillin makes a fascinating story, chequered as it was by the disturbances of post-Dunkirk Britain and enlivened by such romantic episodes as HEATLEY driving 200 miles through a snowstorm in a borrowed van to bring back the first consignment of porcelain vessels for "large-scale" (sic) production and their first sowing with the mould on Christmas Day, 1940. The story must be read in the discoverers' own words. As late as 1943 penicillin was still described in these columns as "unequalled but unobtainable"; and it was not until June, 1946, that the development of deep-culture methods of production here and in the U.S.A. made "penicillin for all" a practical possibility. Since January, 1947, the monthly production has risen in the U.S.A. from 3 to 11 million mega units and in Great Britain from 0·25 to 2 million mega units.

Why were the innumerable studies of microbial antagonism by the earlier observers not more fruitful? It was recognised in the last century that this antagonism might be due to the secretion of specific chemical substances, and one antibiotic (mycophenolic acid) was isolated in that period. The pioneer investigators had also envisaged the therapeutic use of antibiotics. And yet they obtained no products which found a permanent place in medicine. It was partly bad luck that they did not hit upon any substances with an activity and a freedom from toxicity comparable with penicillin. But the basic cause of their failure was the lack of that liaison between biologist and chemist which is now recognised as essential for rapid progress in this field. Bacteriologists alone seldom tried to elucidate the nature of the active principles they discovered; while the antibiotics which chemists sometimes isolated were examined only superficially from a biological point of view. Moreover, antibiotics which have the greatest biological interest are usually difficult and tedious to obtain in a pure state. Work on a large scale is required to obtain enough of them for detailed examination; and such work is not usually undertaken unless there is prospect of practical—if not actually financial—returns.

The story of penicillin is an instructive illustration of the character of modern research. In the first place there is the close collaboration between bacteriologists, chemists, and many other kinds of research-workers, who confirm and amplify the original observations made in one particular field. These carry their laboratory work far enough to show that a potentially important discovery has been made; thus FLOREY and his associates established that penicillin would cure experimental infections in mice and that it had a valuable therapeutic effect in a tiny group of patients. From this point there is usually a long interval before the discovery or new remedy can be generally applied in practice—the treatment of rheumatoid arthritis with 'Cortisone' is the current example of this. The large commercial or government institutions must then be called in to help with the "development" of the discovery, and their work involves the application of as much intellectual power and far more capital expenditure than the original discovery. To American organisations goes most of the credit for the commercial development of penicillin, at a time when our British institutions were handicapped by total war. The relative costs of the two stages are illuminating. FLEMING's original work was incidental to his post as professor and a hypothetical costing might be about £500 a year. The laboratory and some of the salaries and materials of the Oxford workers were supplied by Oxford University out of its current resources, which are relatively modest, supplemented by grants from scientific bodies averaging about £4000 a year between 1940 and 1945. On the commercial development of penicillin and other antibiotics about £3,000,000 had been spent by 1946 in the United Kingdom, and over $25,000,000 in the United States. The observations and experiments of brilliant individuals have played and will continue to play an essential part in scientific progress; but the development and extension of their work calls increasingly for large teams, complex organisations, and great financial resources.

Annotations

RISKS OF ANTI-HISTAMINE PREPARATIONS

Last week we said that "several children have died from eating sugar-coated anti-histamine tablets as sweets." Apparently this is not generally known; for one writer, suggesting that the deaths we mentioned must have been outside this country, says: "The Home Office doesn't know of any. Neither does the Ministry of Health. Nor the B.M.A. Nor the manufacturers. Nor the Registrar-General's Department."[1] This is surprising, since a fatal case in the Home Counties was the subject of an inquest recently reported in the local press,[2] and another was recorded in the *British Medical Journal*.[3] In France at least three similar fatalities in children were described[4] as long ago as 1947 and objection was raised to the sale of these drugs in pharmacies without a label indicating their toxicity.

Our proposal that histamine should be used as an antidote has been challenged by several correspondents, one of whose letters we publish on p. 95.

FERTILITY AND FAMILY PLANNING

Some blame family limitation for a declining birth-rate; some assert that the decline has been, until recently, too steep to be accounted for entirely in that way. The Royal Commission on Population[5] had some reassuring things to say: first, that the main cause of the decline is certainly deliberate family limitation, and not some failure in the reproductive capacity of the nation; secondly, that though our average of 2·2 children per family will not replace the race, it comes near it, the deficiency being only about 6%; and thirdly, though in the next ten years there will be an absolute fall in the number of men between 15 and 40 years old, a small rise in family size would quickly redress this. Much of the evidence on which they based these statements was supplied by the council of the Royal College of Obstetricians and Gynæcologists, whose investigations have now been published as a separate report.[6] In the months August, 1946, to June, 1947, questionaries were completed for 11,078 married women in the general wards of hospitals. Some 3000 of them were grouped into "marriage cohorts" according to the years in which they were married, beginning with those marrying before 1910 and ending with those marrying between 1940 and 1947. The percentage using contraception rose from 15 in the "before 1910" group to 66 in those married between 1935 and 1939. After 1940 the figure fell to 55%, but this figure is certainly too low, because some of the women who had not used contraception at the time of the survey will doubtless use it later. There was a falling-off in pregnancy-rates as married life progressed, and it is noteworthy that the rates at every stage of married life were lowest in those who had never used contraceptives: in other words, many of the women in this group were subfertile. It is interesting that the pregnancy-rates after control had been tried and abandoned were "consistently and markedly higher than those of entirely uncontrolled exposure." This indicates, the report says, that "the use of birth control does not appreciably reduce the power to reproduce." Nor is the proportion of subfertile women apparently increasing. In this study, between 6·9 and 8·2% of women were "apparently non-fecund"—a proportion no greater than that (8%) of childless women married in the years round 1860.

It is rare, seemingly, for the childless woman to consult a doctor, and still rarer for her husband to seek advic on sterility. No less than 40% who did seek medic help stated that no treatment was advised. This more than unfortunate, since nowadays sterility ca often be successfully treated. Of women who ha reached the menopause, 45% said they wished they ha had more children, 9% would have liked fewer, and 43 were satisfied with the number they had. The reason given for using birth control were that more childre could not be afforded, that spacing of pregnancies wa desired, that health should be preserved, or that th parental instincts were satisfied with children alread born. This seems to bear out the finding of R. M Titmuss and others that in our society *children, unlik the tiger, do not well repay the trouble and expense* It is also clear that the expense is a far stronger deterrent to childbearing than the trouble.

VAGOTOMY FOR ULCERATIVE COLITIS

Dennis,[1] of Minneapolis, who has contributed a grea deal to the surgery of ulcerative colitis, has publishe some figures which strengthen the case for electiv ileostomy.[2] In a group of 72 patients treated medicall there was an initial mortality of over 20%; in ten year 67% were dead and of the 8 patients (11%) known t be alive only one was in good health. On the other hand in a group of 41 patients treated by ileostomy (with o without colectomy) during a twelve-year period ther was an initial mortality of 7·3%, and 75% were aliv at the end of the period. The results of ileostomy followed by colectomy were better than those o ileostomy alone.

In the last three years Dennis[3] has introduce vagotomy as a method of treatment in ulcerative colitis He decided to try this method for the following reasons (1) Vagotomy reduces bowel spasm and bowel motility (2) Engorgement of the mucosa in all parts of the bowel including the rectum, can be observed through a sigmoidoscope as a result of strong emotion, and division of the vagus nerves, by cutting off impulses from the central nervous system to the gut, abolishes this response to emotion. (3) Fatal diarrhœa, closely resembling human ulcerative colitis, is produced by excision of the prevertebral sympathetic ganglia in dogs and can be prevented by simultaneous vagotomy. Dennis claims that 22 of the first 30 patients on whom he has performed vagotomy are either symptom-free or very much improved, and his barium enema X-ray films show a striking improvement in some of the early cases.

These findings are surprising, since so far as is known the vagus supplies only the ascending colon and two-thirds of the transverse colon, the remainder of the colon and the rectum being thought to be supplied by the pelvic splanchnic nerves. It may be, of course, that this view of the nerve supply is wrong, and that the vagus *does* contribute branches to the lower colon. Or the vagi may be concerned in some other way in the pathogenesis of ulcerative colitis. In this connexion the work of Portis,[4] which was reviewed in these columns[5] not long ago, is worth recalling. He has produced evidence that emotional stimuli in the hypothalamus are conveyed by the parasympathetic nerves to the bowel, causing hypermotility of the ileum, with rapid discharge of its contents into the colon, and an over-production of lysozyme. This enzyme destroys the mucin which normally protects the colonic mucosa from the action of the digestive enzymes. Since the production of lysozyme is considerably reduced by vagotomy, this work provides an alternative or additional reason for this operation in ulcerative colitis, though Portis himself does not advocate it. It would be rational to attempt a surgical interruption of the sacral autonomic system.

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[1] Brickhill, P. *Sunday Express*, Jan. 8.
[2] *Leighton Buzzard Observer*, Dec. 6, p. 7.
[3] Tobias, M., 1949, i, 1098.
[4] *Soc. Méd. mil. franç.* 1947, 9, 210; *Sem. Hôp. Paris*, 1947, **23**, 635.
[5] H.M. Stationery Office, 1949; see *Lancet*, 1949, ii, 1110, 1105.
[6] Family Limitation and its Influence on Human Fertility During the Past Fifty Years. H.M. Stationery Office, 1949. Pp. 202. 4*s*.

[1] Dennis, C. *J. Amer. med. Ass.* 1949, **139**, 206.
[2] See Hardy, T. L., Brooke, B. N., Hawkins, C. F. *Lancet*, 1949, ii, 5; leading article, *Ibid*, p. 17.
[3] Dennis, C., Eddy, F. D. *Proc. Soc. exp. Biol., N.Y.* 1947, **65**, 306. Dennis, C., Eddy, F. D., Westover, D. E. *Minn. Med.* 1948, **31**, 253. Dennis, C., Eddy, F. D., Frykman, H. M., McCarthy, A. M., Westover, D. E. *Ann. Surg.* 1948, **128**, 479.
[4] Portis, S. A. *J. Amer. med. Ass.* 1949, **139**, 208.
[5] Leading article, *Lancet*, 1949, i, 739.

Vagotomy has the attraction of sparing the patient the unpleasantness of an ileostomy. But much more work is required over a period of years before we can say whether it deserves a permanent place in the treatment of ulcerative colitis, and whether it should be used alone or in conjunction with other forms of surgery.

HOME CARE AGAIN

DOMICILIARY treatment of the infirm aged is being tried here and there in this country with success; but the pioneer of this form of care is Dr. E. M. Bluestone, director of the Montefiore Hospital, New York. In some ways the problem is different in the United States: for example, Dr. Bluestone deals with a group of patients who have no general practitioner attending them and rely entirely on his hospital. This treats long-term cases; and for many years now the approach to patients has been at once humane and scientific. The programme followed is described in a new symposium.[1]

In Dr. Bluestone's experience, patients fall into three groups: first, those who ought to have been kept in acute hospitals until treatment was complete, and who come to him, as he puts it, as "unfinished business"; secondly, patients who could be cared for at home, and who are admitted for social rather than medical reasons; and, thirdly, patients with a residual handicap, the result of a burnt-out disease, who need care either at home or in an institution. When admitted the patient is investigated and treated as fully as his condition demands; then, if he is medically suitable, and if his home conditions are approved, he is sent home and looked after by the hospital department of home care. Dr. Martin Cherkasky, executive in this department, notes that this care includes "medical service, around the clock, seven days a week." Specialists are available for the patient in the home, and such procedures as tapping and blood-transfusion are undertaken if necessary. (These advantages are, of course, at the disposal of all patients under our own National Health Service.) The Montefiore patient has in addition the help of a social worker, who visits him in his home; and of a housekeeping service provided by the hospital for 5–10 hours weekly. (In this country the health visitor and the home-help do similar work; and the district nurse gives the specialised nursing which the Montefiore patients receive from the Visiting Nurse Service of New York.) Ambulance transport to and from the hospital is provided, if the patient needs to go in again for any particular service; and any necessary equipment—such as a wheel-chair or mattress—is supplied by the hospital. A full-time occupational therapist visits him and teaches him simple activities in which he can correct faulty postures and strengthen weak muscles; usually she will get him to make small articles which can be sold to supplement his income. A physiotherapist also visits the patient at home, and any drugs he needs are provided by the hospital. It is interesting that this pattern of service has been very largely reproduced by St. Helier Hospital, with the help and coöperation of general practitioners, who supervise the patients medically, while the hospital provides equipment, physiotherapy, and transport, when necessary, to the special departments for investigation or treatment. The system has proved its value both here and in New York, and a general extension of the plan would mean better care for many of our chronic sick who are now neglected. At St. Helier the system has proved particularly useful for old rheumatic patients; but its scope is indicated by the case, described by Dr. Cherkasky, of a patient with cancer of the colon. The tumour was too far advanced to be removed, but a colostomy was done, and the patient went home with the certainty of getting nursing care, colostomy irrigations, watchful attention for complications, medication, and someone to advise on his diet. Instead of lingering, lonely and frightened, for six months, a year, or two years in a ward shared by other sick or dying people, he is at home, able to get about a bit, to take an interest in life rather than death, and to make his end in the company of people who are personally attached to him. The value of such a change can hardly be questioned, and there are no economic arguments to set against it. Indeed, a patient can be treated by the Montefiore home-care department for between a quarter and a third of the sum which would be spent in keeping him in a hospital bed.

THE CARE OF LABORATORY ANIMALS

THERE are various reasons, Major C. W. Hume says,[1] why laboratory animals may be maltreated. For example, they may belong to an unpopular species. Horses, dogs, and cats, being popular, are generally spared as much pain as possible, anyhow in Great Britain; but rats and other small animals are sometimes less considerately treated. It is possible to cite experiments done on anæsthetised dogs which have been repeated on less popular animals without anæsthesia. Then, a scientist who has to judge between the claims of his research and those of the animals he is using cannot be wholly unbiased: moreover, his training teaches him to value the well-being of patients above every other consideration, which increases his bias still further. There is a danger, too, that the necessity to inflict some pain may harden him in time, or at least blunt his sensibility towards the animals he uses, though he may be humane enough in other respects. In general, however, Major Hume finds the average biologist more, rather than less, humane than the average layman, especially about unpopular species. Finally animals occasionally come into the hands of psychopaths who derive pleasure from watching their pain. This type of cruelty may also appear in the use of far more animals than are necessary for the purpose in view.

In Great Britain animals are better protected than elsewhere, for though some other countries have laws about animal experiments, only Switzerland, Sweden, and Eire have any machinery for enforcing them. The complicated British law on the subject is summarised in the UFAW Handbook on the Care of Laboratory Animals; in practice, "a kind of traditional gentleman's agreement," Major Hume says, "has grown up between scientists and the Home Office, and though one may wish it to be improved in various ways it affords a unique degree of protection to laboratory animals." Over 90% of experiments do not involve any operation, and many produce no suffering at all. Nevertheless, some experiments induce seriously distressing symptoms; and though these probably form only a small proportion of the whole "their absolute number may nevertheless be considerable." The Home Office rule requiring that any animal suffering severe pain which is likely to endure must forthwith be painlessly killed, whether the main result of the experiment has been achieved or not, is usually well observed; but he has read some reports which made him uneasy; and some in which it was clear that the pain rule had been neglected. The four Home Office inspectors who visit the laboratories should, he points out, be able to consider experiments minutely, review precedents, and study the qualifications—humane as well as technical—of applicants for licences; but their task has outgrown their number. Experiments apart, animals may suffer from poor care and housing. Major Hume holds that the affection and care shown to animals in the animal-room will be reflected in the consideration shown to them in the laboratory. Kindly attitudes are infectious.

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[1] Home Care. Origin, Organisation and Present Status of the Extramural Programme of Montifiore Hospital. New York, 1949. Pp. 56.

[1] How to Befriend Laboratory Animals. Published by the Universities Federation for Animal Welfare, 284, Regent's Park Road, Finchley, London, N.3. Pp. 16. 3*d*.

The time has come, he believes, for further advances, and those he suggests will be widely supported. In deciding whether an experiment is justifiable, the research-worker, he proposes, should ask himself: "Should I myself be willing to endure that degree of suffering *in order to attain the object in view?*" A negative answer will at once rule out painful experiments for trivial purposes. A large increase in the number of Home Office inspectors is needed, and experiments might well be classified according to their severity, licences for the most painful types being granted only exceptionally, and after elaborate inquiry. He also makes the constructive suggestion that animal-protectionists should give up the untenable position that all forms of animal experiment should be abolished, and should instead coöperate with doctors and research-workers to ensure fuller safeguards and better care for all laboratory animals. "What is needed is the frank discussion of the very difficult problems that arise, and that is impossible in the cut and thrust of controversy and mutual recrimination."

BURNS OF THE ŒSOPHAGUS

BURNING of the œsophagus by hot or corrosive fluids, if it is not rapidly fatal, may result in crippling strictures which are extremely difficult to alleviate and almost impossible to cure. Whether swallowed by accident or in attempts at suicide, the most common corrosives to cause damage are commercial solutions of caustic potash or soda, strong acids, and lysol: the less common ones include iodine, copper sulphate, and washing soda. Many of the accidental cases could be prevented by correct labelling and safe storage of dangerous liquids, and domestic laxity in this respect, especially where there are small children in the house, is often astonishing. When an alkaline or acid corrosive is swallowed the first-aid treatment is obviously neutralisation—weak vinegar for alkalis and sodium bicarbonate solution for acids—and the sooner this can be instituted the easier will be the patient's future life. Except when strong alkalis or acids have been taken (and lysol is *not* numbered among the strong acids) a very thorough and prolonged gastric lavage is then required. The acute phase of a severe œsophageal burn is fairly soon over, and patients can often swallow liquid foods in five or six days. During this interval intravenous medication will supply what is essential to life, and early gastrostomy should be avoided. Leary,[1] discussing the conservative management of these cases, recommends that at the earliest possible stage the patient should be induced to swallow a twisted silk thread which should be left in situ until swallowing is painless—a state which is often reached within a fortnight. Treatment with mercury bougies of increasing size is then started, the silk thread having ensured that the œsophageal lumen is not lost. Leary does not favour early œsophagoscopy, because he finds that it does not yield information of sufficient importance to counterbalance the risk of perforating the injured œsophagus. Mercury bouginage is repeated daily for a fortnight, and thereafter at longer intervals until it is being done once a week in the third month, twice a month in the sixth month, once a month in the ninth month, and then two or three times a year for several years. Between the subsidence of the acute phase and the onset of a stricture there is often a deceptive lull lasting some months, during which nothing is done in the belief that nothing is wrong. In fact dense collagen may be forming; only treatment which is begun early and continued without interruption will then prevent that life-long tragedy, a benign œsophageal stricture.

IN AYRSHIRE

How many hospital beds we need is still a subject for academic debate, rather like the famous controversy about angels on a needle's point. In 1948 the Nuffield Provincial Hospitals Trust, in an attempt to get some firm figures about hospital-treated sickness, reviewed the use made of hospitals by the people of Stirlingshire, and published scrupulously detailed figures.[1] In 1949 they made a companion study of conditions in Ayrshire, which they have now published.[2] The county covers 1132 square miles, has two large towns, Ayr and Kilmarnock, and in 1948 had a population of 315,500. Staffed hospital beds in the whole area then amounted to 1867 in general and special hospitals, and a further 781 in mental hospitals. Patients are treated sometimes inside and sometimes outside the county. Records were collected from 53 Scottish hospitals and 1 English hospital; and all the sick from Ayrshire during the year are thought to have been covered. They numbered 22,349 inpatients and 31,626 outpatients, plus 462 new outpatients se at venereal-disease centres in Ayr and Kilmarnoc More than 1 person in 7 of the population was treated hospital during the year. About a seventh of the 46,6 cases treated were concerned with pregnancy, childbir and its complications, and infants born in hospita Apart from pregnancy and its complications, digesti diseases were responsible for more admissions to hospita than any other disorders, and nervous and mental illness for the longest periods of hospital care. Injuries we the commonest cause of outpatient attendances. Patien most commonly sent for care outside the county we those with neoplasms, diseases of the nervous syste or injuries. The average stay of patients in Ayrshi hospitals was shorter than that of patients treate outside the county—perhaps because the severer injurie were sent to Glasgow, perhaps because local hospitals i small places can watch over their outpatients mor effectively than city hospitals.

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In comparing the findings in Ayrshire with the previous findings in Stirlingshire the committee noted that the Ayrshire figures for inpatients and patient bed-days were substantially higher, but that outpatient rates were very similar in the two counties. In both, the hospital load was found to increase with the degree of overcrowding in houses in the neighbourhood. A "formidable proportion" of patients (more than half) left hospital in "less than established good health"; and the proportion transferred to convalescent homes was very low—only 0·4%.

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[1] Leary, W. V. *Proc. Mayo Clin.* 1949, 24, 506.

[1] See *Lancet*, 1948, ii, 422.

[2] Hospital and Community. II, Hospital Treated Sickness amongst the People of Ayrshire. To be had from the Nuffield Provincial Hospitals Trust, 12 and 13, Mecklenburgh Square, London, W.C.1. Pp. 85. 3*s.* 6*d.*

Many additional figures are given in tables and appendices, and the report should repay close study by those who are considering our hospital-bed needs. The average reader will regret that the diligent compilers have not drawn more inferences from their findings. What must we do to be saved?

DEATH TO THE MOSQUITO

Cyprus claims to be the first endemic malarial country in the world to have freed itself from anopheline mosquitoes. Last Monday the island celebrated the successful conclusion of a three-year campaign directed to this end; and in London Mr. Arthur Creech Jones, Secretary of State for the Colonies, presided over a press conference at which the story of it was outlined.

In 1942 the incidence of malaria was 18·73 per 1000 population and the infant-mortality rate 185 per 1000 live births: by 1948 the rates had fallen to 0·87 and 67: and in 1949, of the hundred or so cases of malaria not one was a fresh infection. For the purpose of mosquito eradication Cyprus benefited by its insulation from other lands and by its comparatively small area—3500 square miles. But much of the terrain is difficult of access, and the successful outcome was, it seems, due largely to the skill and drive of Mr. Mehmed Aziz, the chief health inspector. At one time he had under his control 770 workers, using mostly D.D.T., but other agents on occasion. The cost worked out at 13*s*. per head of the population.

DISABLED MINER

Professor Browne and his associates in the Nuffield department of industrial health at King's College, Newcastle upon Tyne, record a study[1] of the first 100 patients seen in the department. These were all men, and 69 of them were coalminers. Pneumoconiosis and chronic bronchitis were the conditions diagnosed in 44, and siderosis, silicosis, pulmonary tuberculosis, and other chest conditions in a further 13. There were 15 cases of poisoning, mostly from fumes, 6 skin conditions, 6 cardiovascular disorders, 7 psychiatric cases, 2 cases of miners' nystagmus, and 7 miscellaneous conditions.

The social effect of disabling illness on these men proved to be very serious: "mining was a way of life to most of them, so that the thought of leaving it struck at the very roots of their communal existence." Dr. Browne and his colleagues found that less than 40% of the whole group were able to return to their original jobs, and only about 20% of those with chest trouble were able to do so; 27 who changed their jobs were better off than those (23) who remained idle. Seeing that men disabled by pneumoconiosis are legally debarred from working underground, it is remarkable that not one of those so disabled became preoccupied with compensation. Yet the consequences for them were very serious, for in a pit village mining is the only available work. The writers of the article suggest that more elastic legislation is needed about underground work for those who are not disabled by their pneumoconiosis; and that light industries should be established in mining areas, to offer alternative employment. Preoccupation with compensation was seen most often in patients suffering from diseases which could not be compensated. Well-meaning people—doctors among them—had often encouraged these unlucky patients to blame their work for their illness, and to fight a losing battle, "until they had become so obsessed with their grievances that they were permanently unemployable." Men with chronic bronchitis, in particular, found it hard to be told that their trouble was not caused by dust, and felt it unjust that they received no compensation, ceased to get free coal, and were not allowed to remain indefinitely in their colliery houses—privileges reserved for those with pneumoconiosis. But severe emotional disturbances of any kind were seen in only 5 men with chronic bronchitis and 1 with pneumoconiosis. "The most impressive finding was the resilience with which so many men disabled by one or other of these diseases made the best of extremely unpleasant situations."

RACIAL SUSCEPTIBILITY TO INFLUENZA

An episode related in this issue by Dr. Isaacs and his colleagues raises the question of varying racial susceptibility to attack by influenza virus. Ocean Island, one of the Gilbert group in the Pacific, is a site of phosphate mines to which come at intervals batches of labourers—either Gilbert or Ellice island natives, or Chinese from Hong-Kong. Local experience tells of attacks of influenza in the native workers following the arrival of Chinese labourers. Isaacs and his co-workers had the opportunity of studying such an outbreak, and they found that it was in truth an epidemic due to influenza-A virus.

In October, 1948, 800 Chinese labourers arrived at Ocean Island, where there were already some 300 natives—mostly Ellice Islanders. Ten days later an epidemic of influenza broke out, and it affected almost all the native men, half their womenfolk, and 10% of their children; in all there were 271 cases with 3 deaths. This group is thought to have had no previous contact with influenza, and the epidemic is what might perhaps be expected in an unsalted population. Of the 90 Europeans on the island, 12 were attacked—an incidence such as might be expected in other European communities exposed to infection. The remarkable part of the story concerns the 800 Chinese; not one was admitted to hospital, though in a number there was serological evidence of recent contact with virus A; and there was no hint of influenza on the boat during its three-week journey from Hong-Kong. Unfortunately the story does not record whether influenza had been prevalent in Hong-Kong just before the boat left, and so we cannot say whether this apparent immunity may have been due to recent experience of an outbreak. The alternative explanation merits further study. It is that here we have a racial tolerance to infection—a tolerance which permits the carrying of virus and its introduction to a more susceptible community. Such a state of affairs would be highly important to those now investigating the epidemiology of influenza on a world-wide basis.

THE HOSPITALS

The Hospitals Year Book for 1949–50 opens with an article on the first year's administration under the National Health Service.

> The regional boards, it says, have tried to steer between the twin perils of remoteness and interference, and play their part as policy-directing and coordinating authorities. But they have in fact "been pushed into a position where they are interfering unduly . . . and, what is worse, they themselves may well be subject to a greater degree of control than had been envisaged, so that there will be reached the one position which should at all costs have been avoided, where a chain of reference upwards paralyses that sense of responsibility on the part of the man on the spot which alone can ensure the full and proper development of the hospital service." The original conception was one of global budgets within whose limits the authorities immediately responsible should plan their expenditure "but we are now getting very far away from both the method and the reality."

The yearbook, now taken over by the Institute of Hospital Administrators and edited by Mr. J. F. Milne, is full of valuable information. It is obtainable from the institute at Tavistock House North, Tavistock Square, London, W.C.1, at 37*s*. 6*d*.

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[1] Browne, R. C., Beck, I. F., McCallum, R. I. *Brit. J. Soc. Med.* 1949, 3, 77.

which made him uneasy ; and some in which it was clear that the pain rule had been neglected. The four Home Office inspectors who visit the laboratories should, he points out, be able to consider experiments minutely, review precedents, and study the qualifications—humane as well as technical—of applicants for licences ; but their task has outgrown their number. Experiments apart, animals may suffer from poor care and housing. Major Hume holds that the affection and care shown to animals in the animal-room will be reflected in the consideration shown to them in the laboratory. Kindly attitudes are infectious.

The time has come, he believes, for further advances, and those he suggests will be widely supported. In deciding whether an experiment is justifiable, the research-worker, he proposes, should ask himself: "Should I myself be willing to endure that degree of suffering *in order to attain the object in view ?*" A negative answer will at once rule out painful experiments for trivial purposes. A large increase in the number of Home Office inspectors is needed, and experiments might well be classified according to their severity, licences for the most painful types being granted only exceptionally, and after elaborate inquiry. He also makes the constructive suggestion that animal-protectionists should give up the untenable position that all forms of animal experiment should be abolished, and should instead cooperate with doctors and research-workers to ensure fuller safeguards and better care for all laboratory animals. "What is needed is the frank discussion of the very difficult problems that arise, and that is impossible in the cut and thrust of controversy and mutual recrimination."

BURNS OF THE ŒSOPHAGUS

BURNING of the œsophagus by hot or corrosive fluids, if it is not rapidly fatal, may result in crippling strictures which are extremely difficult to alleviate and almost impossible to cure. Whether swallowed by accident or in attempts at suicide, the most common corrosives to cause damage are commercial solutions of caustic potash or soda, strong acids, and lysol: the less common ones include iodine, copper sulphate, and washing soda. Many of the accidental cases could be prevented by correct labelling and safe storage of dangerous liquids, and domestic laxity in this respect, especially where there are small children in the house, is often astonishing. When an alkaline or acid corrosive is swallowed the first-aid treatment is obviously neutralisation—weak vinegar for alkalis and sodium bicarbonate solution for acids—and the sooner this can be instituted the easier will be the patient's future life. Except when strong alkalis or acids have been taken (and lysol is *not* numbered among the strong acids) a very thorough and prolonged gastric lavage is then required. The acute phase of a severe œsophageal burn is fairly soon over, and patients can often swallow liquid foods in five or six days. During this interval intravenous medication will supply what is essential to life, and early gastrostomy should be avoided. Leary,[1] discussing the conservative management of these cases, recommends that at the earliest possible stage the patient should be induced to swallow a twisted silk thread which should be left in situ until swallowing is painless—a state which is often reached within a fortnight. Treatment with mercury bougies of increasing size is then started, the silk thread having ensured that the œsophageal lumen is not lost. Leary does not favour early œsophagoscopy, because he finds that it does not yield information of sufficient importance to counterbalance the risk of perforating the injured œsophagus. Mercury bouginage is repeated daily for a fortnight, and thereafter at longer intervals until it is being done once a week in the third month, twice a month in the sixth month, once a month in the ninth month, and then two or three times a year for several years. Between the subsidence of the acute phase and the onset of a stricture there is often a deceptive lull lasting some months, during which nothing is done in the belief that nothing is wrong. In fact dense collagen may be forming ; only treatment which is begun early and continued without interruption will then prevent that life-long tragedy, a benign œsophageal stricture.

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Staphylococcus species had been examined (after purification if necessary). Misnamed strains were translated to the correct genus and species; new strains were added to take the place of atypical strains that had been discarded and to fill gaps in the collection.

In July, 1949, the N.C.T.C. moved to a new laboratory in the grounds of the Central Public Health Laboratory at Colindale. With the additional space and apparatus available the second stage of the reorganisation began, and is now in full swing. Cultures are re-examined in detail and are dried in large numbers on a new drying plant. After drying, ampoules are opened and tested for viability, purity, and the maintenance of typical cultural characters. The specialised reference laboratories of the Public Health Laboratory Service are coöperating in this work either by supplying typical strains or by checking those dried in the collection.

When strains are examined the cultural characters are recorded on specially printed cards, and eventually the collection should be able to supply a fairly complete description of every organism in it. Attention is being directed to the cytology of bacteria, and the routine examination of a strain includes the study of its nuclear material and recording the presence or absence of septa.

COÖPERATION WITH OTHER COLLECTIONS

The N.C.T.C. has always worked in close association with collections in other parts of the world, and immediately after the late war helped to restock several collections in what had been Occupied Europe.

In 1947 a specialist conference of Commonwealth microbiologists was held in London, and the British Commonwealth Collections of Micro-organisms organisation was set up to develop culture collections in all parts of the Commonwealth.[2] The N.C.T.C. is an integral part of this organisation and is supplying cultures to the new collections established by the A.R.C. and D.S.I.R. in this country, and will send cultures that may be needed to collections in other parts of the Commonwealth.

Though direct contact with recipients of cultures is preferred, the N.C.T.C. sends cultures on behalf of the Centre de Collection de Types Microbiens to workers in Europe. However, the N.C.T.C. is not a part of this organisation and is not subsidised by UNESCO.

PROBABLE EFFECTS OF REORGANISATION

From the beginning of 1950 the N.C.T.C. will maintain and distribute only those bacteria that are likely to interest medical and veterinary workers. Workers who want other micro-organisms will have to seek them from other collections; to make this easier the N.C.T.C. will serve as a bureau of information of organisms maintained in the United Kingdom, a task which has been lightened by the publication of a directory[3] of culture collections in this country. Non-medical workers should be able to obtain more typical cultures from these specialised collections than they could in the past from the N.C.T.C., staffed mainly by medically trained bacteriologists.

Within a few months it should be possible for a worker to obtain from the N.C.T.C. carefully checked cultures of the organisms used for teaching; many of these cultures will have been authenticated by experts on the particular organisms. It is intended to issue all cultures in dried form as soon as adequate stocks have been built up. Recipients should receive their cultures by return of post, since the time needed for subcultures to grow will be eliminated.

With the continued coöperation of bacteriologists of this country the non-medical collections and the N.C.T.C. should be able to offer a much improved service.

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[2] *Lancet*, 1947, ii, 846.
[3] Obtainable from the Secretary, U.K. National Committee, Commonwealth Collections of Micro-organisms, 38, Old Queen Street, Westminster, S.W.1.

IN A NORWEGIAN HOSPITAL

FROM A CORRESPONDENT

To be admitted to hospital the day you arrive in a foreign country might seem a depressing beginning to a holiday—and yet in fact I enjoyed the nine days I spent in the second largest hospital in Scandinavia. Everyone was kind and helpful, and it was an interesting experience to one familiar with the inside of English hospitals. In the main, of course, it was much the same—the same great ugly buildings, long, high corridors, shining chromium apparatus, and white-coated figures with stethoscopes hung round their necks. The same tests, treatment, skill, and care too—the difference lay in the small details, some important to the patient, others only noticeable because they were different.

FIRST IMPRESSIONS

I was admitted late at night, with pneumonia. From the ambulance I was taken to a bathroom on the ground floor, and there parted from my own night-clothes and inserted into hospital garments, designed with as little regard to feminine elegance as our own. They consisted of a sort of long pyjama-jacket of a smooth woollen material, with a cotton bed-jacket on top. I found them more comfortable than the cotton garments I have worn in an English hospital, because later, when I sweated my way down from 102° to a bare 99° in a few hours, they did not become cold and clammy. For a visit to the X-ray department, a pair of short trousers and a pair of long woollen bedsocks were added to the outfit, and when I was allowed out of bed I was provided with a becoming blue and white striped dressing-gown.

The second stage of my admission was a journey along a familiar type of corridor and in a familiar type of lift, after which I found myself transferred from my stretcher to a bed in a beautifully fitted treatment-room, where I was examined by a doctor on night call. When he had finished, the bed was wheeled along the corridor and into the ward. It was a comfortable bed; the main difference from an English one was that instead of blankets it had the usual Norwegian eiderdown, in a white linen cover. I found this both light and warm—it has a pleasant way of wrapping itself round one and excluding draughts—and the best thing about it was that it had a sensible pocket, nicely placed just where one's hand naturally falls, so that there was none of that searching round newly arranged pillows for an ever-disappearing handkerchief.

There were only 2 beds in the ward, and this, at least in the block to which I was admitted, was the general rule, though there were some of 3 or 4 beds, and one of 10. Double doors separated me from the corridor, almost entirely shutting out the noise and bustle which, in a ward of 30 beds inevitably goes on day and night, and which I have found nerve-racking in England. A bellcord was attached to the side of my bed, which the nurse, whose English was limited, described as my "alarm," which it certainly was: for I soon discovered that, once pressed, it continued to ring until the nurse's arrival in the ward stopped it. Sometimes I used to hear three or four of these bells ringing away together in the distance, which must have been trying for the nurses, though I never heard a complaint.

At about 10 the next morning, seven or eight white-coated figures filed into my room, and I thought that a teaching round was in progress: however these were all staff directly concerned in caring for me, who came so that they should be familiar with me and my case. There was the specialist whose bed I occupied, and his deputy, three house-physicians, one of whom was primarily in charge of me, the other two visiting me when he was off duty. There was the sister in charge of the ward and her assistant, and there was a medical clerk, carrying a great pile of documents, from which he extracted my case-history. Though I had only been admitted during the night, this was already typed and enclosed in a folder. There was also the sister in charge of administration, who visited me often afterwards and was always ready to help in any practical problem: she seemed to be half sister and half almoner. The specialist read out my case-notes to the assembled company, examined me, announced his diagnosis, and outlined the

Special Articles

THE NATIONAL COLLECTION OF TYPE CULTURES

S. T. Cowan
M.D. Manc., Dipl. Bact.
CURATOR OF THE COLLECTION

THE National Collection of Type Cultures was thirty years old on Jan. 1, 1950, and has just undergone a major reorganisation. So it is opportune to consider the development of the collection, to show how, as it expanded, its interests covered a wider field, and to estimate the probable effects of the changes that have taken place within the last few years.

FORMATION AND DEVELOPMENT

In the early part of this century the bacteriology department of the Lister Institute built up a small collection of bacteria that were useful for reference work; towards the end of the 1914–18 war an arrangement was made between the institute and the Medical Research Committee (later Council) to maintain and enlarge this collection for the benefit of all scientific workers. The institute agreed to provide accommodation and services, the Medical Research Council the staff and equipment. Thus, on Jan. 1, 1920, the National Collection of Type Cultures came into being, Dr. (later Sir John) Ledingham, chief bacteriologist to the institute, was honorary director, Dr. R. St. John-Brooks was curator, and Miss Mabel Rhodes was assistant curator. About 200 cultures from the institute formed the original National Collection; some of these were of historic interest and included Escherich's original strain of *Bacterium coli*, Pfeiffer's *Bacterium aerogenes*, and the type strains of *Shigella flexneri* of Andrewes and Inman.

In the early years expansion was rapid; Miss Muriel Robertson added her collection of spore-forming anaerobes, strains were received from the American Museum of Natural History (whose collection later formed the nucleus of the American Type Culture Collection), and individual workers sent strains for conservation. Originally a collection of bacteria of interest to medical workers, it was extended to non-medical fields; plant pathogens, fungi and yeasts, mostly of industrial importance, were added, and eventually outnumbered the animal pathogens. The result was that the small staff became less competent to deal with the increasing diversity of the micro-organisms in its care. Even in the 1930s it was apparent that decentralisation to specialised laboratories was needed; wood-rotting fungi, listed in the 4th edition of the N.C.T.C. catalogue, were kept at the Forest Products Research Laboratories at Princes Risborough.

MAINTENANCE OF CULTURES

In the early days all cultures were kept on nutrient media, so regular subculture was needed. The risks of loss, contamination, and replacement were great, and in 1933 experiments were made with Swift's[1] method of drying cultures. Results were not entirely satisfactory, but a few cultures dried in 1933 were viable in 1948. Professor Sordelli, of Buenos Aires, visited the collection in 1934 and described a simple method of drying cultures in vacuo over phosphorus pentoxide; this method was tried, was found satisfactory, and has been used ever since. About 80% of tubes remain viable up to twelve years; the detailed results are to be described in two papers by Miss Rhodes. Between 1935 and 1939 almost all cultures in the collection were dried in duplicate, and the amount of routine subculturing was thus greatly reduced. Cultures were not distributed in dried form, but the dried stock formed the basis of the collection.

LATER DEVELOPMENT

In September, 1939, the collection was moved from Chelsea Bridge Road to the Lister Institute's farm laboratories at Elstree. At first, with only one room available for all the work of the collection, it was fortunate that at this time the demand for cultures was much reduced. Later, benches were put up in the bathroom and a bedroom of an 18th-century house, and though these rooms were not ideal as laboratories the additional space brought relief to the scientific staff. During this period the hazards of the collection were not solely those of infection—thus on one occasion Miss Rhodes was accused of trading with the enemy because she had sent a culture to a black-listed firm in South America.

By 1944 the collection had increased to about 5000 cultures, and the work was beyond the capacity of the staff. The Medical Research Council decided that the time was ripe for a complete overhaul of the collection, that there should be greater decentralisation of cultures among specialist laboratories, and that the main emphasis should once again be on organisms of interest to medical and veterinary workers. Dr. R. St. John-Brooks retired from the curatorship in 1946, and it has been my responsibility to carry out the new policy.

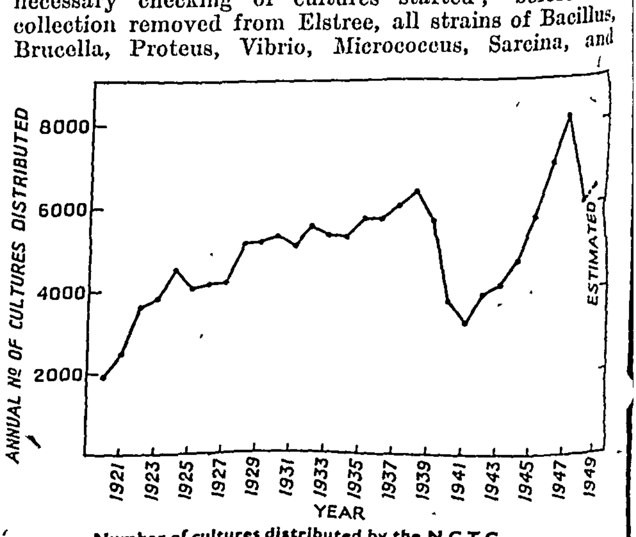
DISTRIBUTION OF CULTURES

The number of cultures distributed by the N.C.T.C. is shown in the accompanying graph; about a quarter went to laboratories outside the United Kingdom. From 1948 the collection only maintained bacteria, and the elimination of large numbers of fungus cultures formerly sent to schools produced the first reduction in activities that could not be attributed to war conditions.

REORGANISATION

In 1947 arrangements were made for the transfer of animal pathogenic fungi and yeasts to the subdepartment of mycology at the London School of Hygiene and Tropical Medicine, and of the plant pathogenic and non-pathogenic fungi to the Imperial (now Commonwealth) Mycological Institute at Kew. Non-pathogenic yeasts were sent to the Institute of Brewing in 1948. Responsibility for bacteria solely of interest to agricultural and industrial workers has been accepted by the Agricultural Research Council (A.R.C.) and the Department of Scientific and Industrial Research (D.S.I.R.) respectively; after Jan. 1, 1950, such bacteria will no longer be obtainable from the N.C.T.C.

The staff of the collection was increased and some necessary checking of cultures started; before the collection removed from Elstree, all strains of Bacillus, Brucella, Proteus, Vibrio, Micrococcus, Sarcina, and



Number of cultures distributed by the N.C.T.C.

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1. Swift, H. *J. exp. Med.* 1921, 33, 69.

speak frankly and confidentially, and that her private affairs will never be laid open to discussion, however well intentioned, either in her presence or behind her back. It should therefore be arranged that when the school health visitor or the gymnast assists the doctor she should not be present throughout the entire interview. The health visitor can easily and unobtrusively occupy herself for a few moments elsewhere during some part of the examination. Thus she can busy herself obtaining some necessary details from the mother, whose attention may also need to be distracted temporarily so that the girl may have the opportunity of speaking privately to the doctor. It is important that the girl should know, like, and trust the medical officer.

Next in importance is the *mother*. The school medical inspection provides the doctor's best opportunity for educating the parent as well as the girl in the principles of physical and mental health as applied to children and adolescents. This individual teaching of the mother, no matter how brief, should be one of the chief objects of the routine school medical examination. The mother also should be given the opportunity for a few moments' private conversation with the medical officer. This can most easily be arranged while the girl is dressing and the doctor is summing up the case. Every effort should be made to secure the mother's attendance at the medical inspection. If she cannot be present, a report on a suitably designed form should be sent home. To ignore the parent's right to know the result of the interview is neither satisfactory nor courteous. Even when the girl is perfectly healthy the parent will be glad to be informed of the fact. Moreover, this note of findings and treatment advised can conveniently provide the means of establishing friendly liaison with the family doctor.

Good relations with the *school staff* are also important. All the girl's teachers are involved since each one can give the medical officer valuable information concerning the girl's health, attitudes, and abilities. The staff should be given the opportunity of reporting on the girls due for examination to the headmistress who will summarise their observations for the doctor. The sympathetic understanding and coöperation of the headmistress is therefore of paramount importance. She determines the physical environment of the examination and minimises the difficulties of premises and clerical assistance. She can influence the parents' attendance, supply the social history, explain educational problems, mitigate academic anxieties, facilitate medical treatment, and ensure a good follow-up. The medical officer should make a practice of discussing with the headmistress after each session all the findings of the medical examination which are not by their intimate nature precluded from discussion, such as illegitimacy or venereal disease. The value of these discussions is out of all proportion to the little extra time and trouble involved. The necessity for good relations with the gymnast, who will be able to report upon and treat the common postural defects of adolescence, needs no emphasis.

The *family doctor* should always be informed through the parent of any active treatment arising out of the school examination, not only to preserve good professional relationships, but also because there is otherwise a genuine risk of duplication or contradiction in treatment. This is most conveniently achieved by marking the medical report which is sent to the parent " Please show this to your family doctor." The question of his coöperation in referring problems to consultants, hospitals, and clinics also needs consideration. Difficulties arise over medical treatment, exclusion from school, permission to swim and play games, and so on, because there is no recognised machinery for friendly interchange between officials of the school health service and the general practitioner with whom the family has registered.

The experienced *school health visitor* is the doctor's most valuable asset. She prepares for the inspection and assists at it. She compiles the social history, acts as liaison officer between all the people concerned, visits the homes, follows up, and makes reports. She also plays her own part in educating the girls and the school staff. A good school health visitor can reduce the doctor's labour so that the time saved is available for conversation with the girl and instruction of the parent.

The *medical officer* should be experienced in clinical pædiatrics and in child health, and should have the opportunity of periodic hospital observation as well as public-health practice. Whether the doctor is a man or a woman does not matter very much; but it is probably easier for a woman to establish rapport with adolescent girls in the brief time allocated to each inspection. So far as possible, there should be continuity of medical care so that the visiting doctor may be able to make good personal contacts with the school and with the neighbouring practitioners and hospitals, thereby securing interchange of information in the child's interest. Experience shows that to ensure continuity of medical supervision it is best that the doctor should combine maternity and child-welfare work with school medical work. In this type of work the part-time married woman doctor can make a valuable contribution, particularly when she is young and has children. These women should be encouraged to undertake it despite any administrative difficulties.

PRACTICAL CONSIDERATIONS

Three routine medical examinations of school-children are at present required by the Ministry of Education: the first on admission; the second at 10 + on leaving the junior school; the third at 14. We do not consider three examinations are sufficient and would suggest four: at 5 years on entering the infant school; at 7 on entering the junior school; at 11 on entering the secondary school; and finally during the last 18 months—i.e., about $13^1/_2$ years—so that there is time to follow up and correct any defect found before the child leaves school at 15. In grammar schools where the girls remain longer and eventually proceed to colleges and universities, a fifth examination during the last year is desirable. All adolescents should not only have a routine chest X-ray examination before they leave school but also a Mantoux test. The importance of recording this reaction is increasing with the later age of conversion. The prospect of routine B.C.G. vaccination of negative reactors does not appear to be far distant.

Record cards are confidential documents and should never be available to scrutiny by unauthorised persons. This is particularly necessary in small communities where knowledge of the doctor's private notes could easily give rise to gossip. The new Ministry of Education form omits all reference to menstruation, although the average age of the menarche in this country is $13^1/_2$ years. This omission is serious and should be remedied. When the child enters school the maternity and child-welfare records should be passed on so that the school doctor may have the complete health picture. After leaving school the child's records should be made available to the family doctor unless they are needed for statistical survey. There is now no standard ruling concerning disposal, so all the material laboriously collected is of little practical service once the child has left school.

The conditions of examination vary widely, and medical officers are often obliged to work under conditions so adverse that much of the value of the examination is lost. It is important that the room should be warm and well lit, and that there should be facilities for handwashing. If we seem to labour the obvious, it should be remembered that some schools still lack a water-supply and artificial lighting. The room should be quiet: noisy course of treatment to be followed and the tests he wished carried out, while the house-physician in charge of me and the medical clerk took notes. While the company filed out, the specialist summoned his best English to assure me that he was satisfied and hoped to have me well in a few days. Subsequent rounds, which were usually between 10 A.M. and 11 A.M., consisted only of the deputy specialist, the house-physician, and one sister. As my recovery was rapid and uneventful, I did not see the Great Man again.

Hospital routine seemed to be much the same as at home. The usual tests were carried out, including a routine Mantoux test on admission. But it was something of a shock to be roused from the comfortable doze which follows the business of washing and bedmaking in the morning, and precedes breakfast, to find a familiar figure in a short white coat carrying a tray of test-tubes and assorted apparatus demanding my blood at 7 A.M. When I remarked that in England these things were done after breakfast, they replied with truth that by starting early it was possible to have results ready in time for the morning round.

It was noticeable throughout that pressure was far less acute than in England. Tests or special examinations were carried out within a few hours, instead of a few days. Only in the X-ray department was there the same air of stress as in England, and there I noticed a lack of adequate space and equipment, and saw a small staff struggling with too many patients in too small a space, just as they do at home.

The shortage of nurses too seemed less acute; nor did they seem so overworked. They worked one of two shifts on day-duty—either from 7 A.M. to 4 P.M., with one and a half hours off for meals during the shift; or from 4 P.M. to midnight, with the same time off. They all liked this system, because it gave them either the greatest part of the day, or the whole evening, free. Their training lasts three years, and did not seem to differ in any important respect from ours. Many of them looked forward to working in an English hospital after finishing their training. The staff of the hospital, both medical and nursing, are in the employ of the municipality.

THE PATIENT'S ROUND

My day started between 5·15 A.M. and 6·15 A.M. with the usual thermometer and basin of washing-water; but not, alas, with a cup of tea. This was perhaps what I missed most, especially during the first night, when I was fairly ill and did not sleep. Then I remembered how the weary sleepless nights in an English hospital are helped on, just when they seem interminable, by tea, hot and sweet and wonderfully comforting. Breakfast arrived at about 7.35 A.M., dinner at midday, a cup of coffee at 1.30 P.M., and high tea at 5.30 P.M. I found the food good. It was hot, pleasantly served, and quite sufficient. It seemed to me much better than that offered in a large and important London hospital where, though I was less ill, I found the food so unappetising that my small appetite evaporated and I subsisted on eggs brought by kind friends. The evening temperature, washing, and bedmaking round was at about 4.30 P.M., and the house-physician usually looked in between 6 P.M. and 7 P.M.; but this may have been to get a little practice in English conversation!

The ward cleaning was done by a woman who morning and evening swabbed over the floor with a mop and a pailful of disinfectant. The floors were of stone, so that the heavy, exhausting task of polishing a vast acreage of linoleum was avoided. The dusting was done by the nurses, but in the clean atmosphere there was wonderfully little dust, and in the absence of blankets no fluff accumulated under the beds. Visitors seemed to be allowed every afternoon.

As in England, sickness does not place a financial burden on the Norwegian family. There is compulsory sickness insurance for the lower-income group. Above this level the wage-earner pays to an insurance society a small weekly contribution which covers the whole family. After paying the expenses of an illness, the patient submits a claim and receives about nine-tenths of the amount paid.

There were no religious services in the hospital on Sunday, nor was my ward visited by a clergyman. I do not think there was a chaplain attached to the hospital; nor did I see any facilities for listening-in. One evening, however, a choir giving concerts in the town came and sang very beautifully in the corridor outside, while we listened with our double doors thrown open. On another occasion a group of students conducted a short service in the same way, dividing up to come into the wards to read the Bible and talk to such patients as wished to hear them.

I left the hospital, not only with a sense that I had been excellently cared for, but also with a feeling that I had been treated far more as a person than I was in an English hospital. It may be that because I was a foreigner they took special care to make me feel at home, but certainly I never suffered from the sense of losing my individuality which is a common sensation with patients in the larger hospitals at home. Perhaps the fact that when you first arrive each nurse and doctor introduces himself or herself and shakes you by the hand, had something to do with the feeling. It was a comforting sensation, and one which gives special warmth to the gratitude with which I shall always remember my short stay in hospital in Norway.

Public Health

SCOPE AND OPPORTUNITIES OF THE SCHOOL HEALTH SERVICE IN RELATION TO SCHOOLGIRLS

REPORT BY A COMMITTEE OF THE MEDICAL WOMEN'S FEDERATION *

THE raising of the school-leaving age to 15 has brought within the scope of the school health services almost every girl in the country at the most significant stage of her development. Moreover, now for the first time every child will be on the list of a family doctor, with whom, in her interest, friendly professional relationship should be established. Most of these girls are well grown and healthy, showing only minor defects. The school medical examination, if it is viewed solely as an occasion for finding and documenting defects, can easily become a mere routine inspection—thorough perhaps, but uninspired and leading nowhere. Obviously, however, the opportunities provided by the routine medical inspection are an important part of preventive medicine, and so far-reaching in their potential effect that this examination should be regarded rather as a survey of growth and development, with all that this implies for the girl herself, for her entire age-group, and for her future children.

PERSONAL RELATIONSHIPS

The examination time allocated to each girl can rarely exceed 10 minutes, and must sometimes be reduced to 6 or 7 minutes for the straightforward cases, to allow longer time for the more complicated ones. Re-examinations are sometimes still scheduled at 18 to the hour. Within this all too narrow space the medical officer must provide opportunity not only for the actual physical examination, but also for private interviews and discussions with the various people concerned. This economical apportioning of minutes alone demands experience and considerable skill.

The most important person is the *girl* herself. In deciding who else should or should not be present at any part of the examination—the mother, the school nurse, the headmistress, the gymnast—it is the girl's needs and susceptibilities which must be the doctor's first concern. It is essential that there should be good rapport between the medical officer and the girl. She must feel that the interview is designed for her welfare, that she is free to

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* The following members have served: ANNIS GILLIE, M.B., M.R.C.P. (chairman); MARY BOYD, M.B.; MARY SELLAR, M.B.; MARY SHERIDAN, M.D., D.C.H. (secretary); JESSIE SYM, M.D., D.P.H.

In England Now

A Running Commentary by Peripatetic Correspondents

ONE of the joys of spending Christmas at home in the country is renewing acquaintance with that epidemiological horror of horrors—RAW MILK. I always suspect our producer-retailer of having had a part in my positive Mantoux test and immunity from subsequent attack by the acid-fast bacillus, so I welcome the annual opportunity of imbibing another dose of his special antigen. Incidentally, to me the taste of raw milk is exquisite.

On Boxing Day I met him with the float in which I had often ridden as a boy; but, alas, he was unshaven and had not had a good Christmas. An irritating barber's rash had made it a misery. Had he had any treatment, I inquired. He had, but he didn't make much of this penicillin cream, and it ran down his neck too. He thought the old-fashioned remedies were the best and he proposed to use one which his father had often used with a hundred per cent. success. "What is that?" I ventured. "Fresh cow-muck and home-rendered lard," said he.

I agreed that prima facie this mixture had potentialities denied to penicillin, and after an exchange of pleasantries he continued on his way. "Mind you, though," he said, half-turning in the float, "it's got to be fresh."

* * *

Talking of secretaries, in our hospital this admirable group of young ladies, is presided over by Mrs. B (the orthopod and pædiatrician), who, besides being able to concoct a coherent letter from a series of disjointed and apparently unrelated statements, can recite from memory a goodly portion of Dorland's *Medical Dictionary*. You can almost pick the specialty of each secretary at a glance, as you can at a meeting of doctors. The midder and gynæ secretary is a sleek blonde type with impeccable nylons, the medical secretary looks studious and intense, the surgical secretary is brisk and business-like, and finally we have a prosperous-looking "specials" secretary.

In spite of the stern supervision of Mrs. B, some typographical errors inevitably escape attention. So the practitioner who sent a patient to the obstetrician to diagnose a ? pregnancy was perturbed to hear that "The beasts were active. . . ." Another doctor was gratified to learn that a marasmic baby was "pale and thin and had no subcutaneous feet." The advice from the medical specialist, that "This patient is now much better and I suggest you carry on with her for three months," was, I trust, not taken too literally. The aural surgeon who saw a "bus in this man's ear" was neither intoxicated nor suffering from a delusion. And we hope the practitioner who was told that "This patient's testicle has almost disappeared" realised that "testicular swelling" was intended. In spite of their occasional lapses—which now go into a book of howlers—these young ladies, by translating into respectable English the mutterings of doctors whose accents vary from that of a Canadian backwoodsman to the polished tones of the visiting specialist from London, play an important part in keeping the N.H.S. going. Could they not be given a degree in recognition of their services—perhaps a F.F.M.S. (Fellow of the Faculty of Medical Stenographers)?

* * *

We were a small company at our hotel for Christmas—all adults except one schoolboy and four-year old Bessy. Bessy was an extreme case of long-standing adenoids, which completely blocked her upper respiratory passages, and caused considerable difficulty in swallowing. Her voice was thick and her appetite fickle; she was thin, restless, and impatient. Every meal was a struggle between her and her weary-looking mother, who incessantly entreated her "darling" to eat. Bessy won every contest hands down.

The preparations for Christmas had clearly cost Bessy's parents much toil and expense, for their main object seemed to be to give Bessy as many presents as possible. She had so many that she did not look at half of them. Her chief delight was in disturbing everyone in the hotel, so it was not long before the sitting-room was left to Bessy and her family.

A typical example of the spoilt only child, one would say. But Bessy's mother ingenuously gave us her explanation on the last morning of their stay. It appeared that at home Bessy was frequently beaten with a stick, which was laid on the table at every meal as a reminder. Over Christmas the stick had been left at home, and Bessy had seized this Heaven-sent opportunity to prove herself a problem-child of the most irresponsible and uncontrollable variety. Any one of her fellow guests would gladly have missed his Christmas dinner and made the journey to Bessy's home to fetch that stick. Which only shows how far we have to go before the troubles of childhood get considered objectively.

* * *

Whether excitement and suspense increase the secretion of urine, make the bladder intolerant of expansion, or accentuate the trigger mechanism is for the physiologists to explain. My small son only provided evidence of the excretory phase of the process at his first visit to the pantomime. On the first occasion when Nature interrupted his enjoyment Mummy was next to the gangway and the procedure followed the usual channels, though tuppence had to be thrown as a sop to Cerberus. In the second act when tension again made knocks on consciousness Daddy occupied the conductor's seat, and, despite protests, the boy was firmly led through a symmetrically placed doorway. The glistening slabs of porcelain created a bigger stir in his mind than all the gold and tinsel on the stage. Excited before, this denouement transported him to heights of ecstasy. Hurrying back with firm and manly steps, instead of subsiding into his seat with some bashfulness, as does the bridge-player, he stood on it and gave a whoop to signal his majority, during one of the few periods when the rest of the audience were quiet. He is just at the age when memory begins; what will the psychologists say if his earliest recollection is of a white urinal?

* * *

It was 2.30 on the afternoon of New Year's Day. The telephone rang. Would I go at once to Mrs. Tubb who kept urging (retching) and, the neighbour said, was like to die?

One glance at Mrs. Tubb was enough to make the diagnosis of hangover a pretty confident one. "You were at a party last night?" "Yes, doctor." "What did you have?" "Not much," interposed Mr. Tubb, "I only give 'er a coupla of beers—." "Yes, Fred, but arter you went to play cards I 'ad two more beers, three sherries, a whisky, a gin, and a drop o' brandy to top orf."

"Speaking not so much as a doctor," I said, "but with the bitter experience of a medical student, I can assure you that there is no cure for this disease. You have had the jam; now you are having the powder. Take nothing but drinks of sweetened water between now and tomorrow morning and you will be better." She was.

* * *

The misadventure to my small son when he was thrown out of our sports car at 40 m.p.h. and escaped with abrasions on his knees and one hand (*I.E.N.* Dec. 24) has had a sequel. Apparently his form-mates at school followed the progress of the grazed knees with enormous interest, which my lad stimulated by exhibiting a hand enclosed in plaster because of a chronic paronychia quite unrelated to his accident. My wife met the parents of one of his best school friends a few days ago and learned how their son, an only child, had been enthralled by the mass of bandages and plaster-of-paris. Each day he would come home and deliver a bulletin on the case. When some minor fracas developed in their home and their son was having the worst of it, he burst into tears and ejaculated between his sobs: "I'm nobody's favourite. I don't even fall out of a motor-car—I'm always too careful!"

Moral: Better a lacerating love than cold caution. (Child psychologists probably know all about this.)

school activities in the near vicinity are a serious distraction. It should be large enough for accurate vision tests to be made, and for the girl to be seen walking. Windows and glass door-panels should be curtained, and screens will also be needed to ensure privacy for undressing and during examination.

The school health visitor will start the examination by charting the height, weight, and vision, and will record as much of the history as she can obtain. The girl should strip to the waist and remove shoes and stockings. If she is obliged to wait for a few moments, she should wear her blazer. The health visitor will unobtrusively engage the girl's attention when the doctor wishes to speak privately to the mother, and vice versa. It will also be the nurse's duty to follow up the recommendations given, to report progress, and to act as liaison officer between the doctor, the school, and the home.

Although well-designed and well-equipped schools are planned for the future, many school premises at present are so defective that they are an offence against public health. We would urge the responsible authorities, in the interest of the health of the nation's children, to give the provision of civilised conditions in schools the highest priority. It is not luxury that is required, but common decency. The excuse that these buildings are intended only for temporary use is not valid. Childhood itself is temporary.

Adequate washing and toilet facilities must be provided for all children, but adolescent girls need special consideration. Means of obtaining and disposing of sanitary towels without distress or embarrassment to the girl can be devised. The lavatories should be provided with suitable bins or an incinerator out of the way of the younger children—an additional cloakroom for the older girls is very desirable. Supplies of soap, towels, and toilet-paper are essentials that are not invariably provided. A sick-room (better called a rest-room) with a couch is desirable, and to ensure adequate supervision this should be near the headmistress's room or the staff room, in preference to being a part of the sanitary unit.

We would also stress the necessity for periodic radiographic and clinical examination of staff. Women staff need facilities for their own personal hygiene,[1] and many schools are deficient in this respect.

EDUCATIONAL IMPLICATIONS

While the medical examination affords the best opportunity for instruction in the management of menstrual difficulties, there are other aspects of personal hygiene—e.g., the general principles of healthy living, cleanliness, food, fresh air, and clothing—which can most conveniently be taught in class. There are also certain delicate matters such as body odour, head lice, dirty necks, feet, and finger-nails, and soiled torn untidy clothing, which are best dealt with in groups, since each girl is less likely to imagine that she is being subjected to personal insult.

We are of the opinion that girls should receive straightforward instruction in the biological facts of reproduction from a class teacher who has some knowledge of biology. Instruction in menstrual hygiene is most suitably given by the mother, but if she lacks accurate knowledge, or does not find it easy to express herself in words, this duty may be delegated to the school health visitor. To introduce a medical officer specially for this purpose might give a suggestion of morbidity to a normal physiological process. Instruction with regard to sex behaviour is primarily the duty of the parent, but talks from an experienced doctor are often needed. These talks may be given to individuals or to groups but not as part of the routine medical examination.

The adolescent schoolgirls of today will be the wives and mothers of tomorrow, but the need to include mothercraft and domestic subjects in the curriculum of all secondary schools for girls is not always appreciated. This is particularly true of grammar schools where the study of household science is often sacrificed in favour of academic examination subjects. Since many of these clever girls will themselves become the teachers and leaders of the next generation, they should understand the dignity and social value of intelligent housekeeping.

If the girl is to appreciate the necessity for learning health, child care, and homemaking, her teacher must be adequately instructed. The subject of the training of the teacher is too vast to open here, but the person who knows most about the health of the school-child is the school medical officer, and it seems a waste of opportunity not to put this expert knowledge and skill to better use in the training of teachers.

We do not claim in this paper to have made any original contribution to the study of school health problems, but we feel, as medical women, that we have a special interest and responsibility in the health, development, and happiness of school-children and particularly of adolescent girls. We therefore offer these suggestions for consideration and discussion.

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[1] 1. *Lancet*, 1949, i, 925.

Poliomyelitis in 1949

Corrected figures for poliomyelitis notifications and deaths in England and Wales during 1949 are not yet available; and in the following table, which gives poliomyelitis and polioencephalitis together, the figures for the last quarter have been estimated from the uncorrected notifications and the weekly returns of deaths in the great towns:

	1926		*1938*		*1947*		*1948*		*1949*
Notifications ..	1297*	..	1585*	..	7766†	..	1859†	..	5800‡
Rate per 100,000	3	..	4	..	18	..	4	..	13
Deaths	235	..	256	..	707	..	241	..	600‡
Rate per million	6	..	6	..	16	..	6	..	14

* Uncorrected. † Corrected. ‡ Estimated on the assumption that the ratios $\frac{\text{corrected notifications}}{\text{uncorrected notifications}}$ and de [illegible] were the same in the fourth quarter as in the third.

The epidemic of 1949 was second only to that of 1947 and considerably exceeded those of pre-war years. The years 1926 and 1938 have been included because they had the highest recorded incidences up to 1947.

As in 1947, distribution in 1949 was widespread, but in contrast to 1947 incidence was relatively high in the south-west and relatively low in the north-east.

Infectious Diseases in England and Wales

Disease	Week ended Dec.				
	3	10	17	24	31*
Cerebrospinal fever..	26	37	38	28	22
Diphtheria	90	87	92	81	102
Dysentery	159	133	197	221	197
Encephalitis lethargica	..	..	..	1	1
Food-poisoning	121	95	49	37	42
Measles, excluding rubella ..	1672	1613	1797	1685	1973
Ophthalmia neonatorum	38	38	31	35	23
Paratyphoid fever	7	5	8	5	2
Pneumonia, primary or influenzal..	718	734	676	631	842
Polioencephalitis	15	10	6	10	5
Poliomyelitis	142	124	87	71	61
Puerperal pyrexia	70	57	73	72	50
Scarlet fever..	2756	2856	2831	2421	2327
Smallpox	..	..	..	..	..
Typhoid fever	9	4	5	3	28
Whooping-cough	982	895	985	936	1018

* Not including late returns.

the nature of the work to be undertaken, as Dr. Todd appears to assume. The object to be attained, especially in these days of shortage of labour, is placement; and few applicants for work are in fact rejected. It is a practice which, properly used, increases human happiness and productive efficiency. Dr. Todd does much less than justice to British industry and, it may be said, to the doctors engaged in carrying out placement medical examinations when he suggests that the information gained by these means is used in such a way that it causes "as a rule a grave interference with the liberty of the subject."

Ripley, Derby. G. F. KEATINGE.

PNEUMOCONIOSIS AFTER EXPOSURE TO SULPHUR DIOXIDE FUMES AND DUST FROM COKE FIRES

SIR,—The article by Dr. Dunner and his colleagues in the issue of Dec. 31 raises very important questions.

If the conclusions implicit in the article are valid, it would seem that 17–20% of men with respiratory disease sufficient to bring them to a chest clinic and employed in such occupations as boiler-stoking with coke, blacksmithing, gas-stoking, and the like, are suffering from industrial pneumoconiosis. These trades have a sizable proportion of the men employed in heavy industry, and it would therefore follow that there must be an immense amount of industrial pneumoconiosis undiscovered in the country as a whole—many thousands of cases and (presumably) hundreds of deaths each year. As a corollary the trades mentioned must be regarded as dangerous trades. If this were true the implications would be serious indeed.

I suggest, however, that the authors' conclusions should be taken with reserve. There are many reasons for this, of which the following may be mentioned:

1. Ten cases are hardly adequate evidence when, if the authors are right, there must be many thousands.
2. By what means was tuberculosis "excluded with certainty"? Surely the fact that a search for tubercle bacilli was unsuccessful and that there was apparently no evidence of toxæmia could not exclude the possibility that the fibrosis had been caused by tubercular infection?
3. No count of atmospheric dust appears to have been made and it would appear that the only analysis made was of a sample of dust collected from an unspecified place by a workman. Moreover, the analysis gives no indication of the proportion of the dust which was of potentially pathogenic size.
4. How many of the jobs were actually inspected and the alleged exposure confirmed?
5. In the absence of pathological evidence of any kind one would have expected some more detailed clinical evidence, such as reports on bronchograms or bronchoscopies.
6. Careful industrial-health supervision of a large number of works presumably at risk has been carried out in this undertaking, among many others, for many years, but no such cases have come to light.

It is, of course, possible that pneumoconiosis can arise in exceptional circumstances. This, however, would not explain the authors' finding that out of 50–60 men employed in the relevant trades no less than 10 were the victims of pneumoconiosis caused by their work.

I can, however, agree with the authors in their statement that more examinations of workers in these trades are needed. When adequate numbers of apparently healthy men and of men with known respiratory disease have been investigated, the matter will not be in doubt. Until then I am sure that the authors would agree that these conclusions should be taken as at most tentative.

I must make it clear that I am not writing officially on behalf of the South Eastern Gas Board but as one with some experience of this industry.

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ACADEMIC SALARIES

SIR,—The implementation of Mr. Whittaker's plea last week (p. 45) that "medical" salaries should be applied only to those with definite clinical responsibility, and not to medically qualified members of other university departments, could only lead to a draining of medically qualified persons out of the pathology, bacteriology, biochemistry, physiology, anatomy, and pharmacology departments into clinical work.

Perhaps this does not alarm Mr. Whittaker. To me it is much more alarming than his fears that the paying of "medical" salaries to medically qualified persons in these departments will deter young men from entering them by a route other than that provided by a medical course, and encourage older men to waste time becoming medically qualified.

It is difficult to see why the existence of two salary scales should be held to check the development of the medical sciences. Under this arrangement the non-medically qualified scientist makes no financial sacrifice if, for example, he elects to work in a physiology department instead of a chemistry department. If the medically qualified scientist elects to work in a physiology department instead of in a clinical department, he may make a sacrifice, but it is smaller than Mr. Whittaker desires.

The main objection to the dual scales is, of course, the possibility of internal discontent within a department. At least one university has avoided this trouble by paying "medical" salaries to all members of the pre-clinical departments irrespective of medical qualifications. This has been criticised on the grounds that the non-medically qualified scientists might thereby be attracted into these departments, and diverted from work for which they have greater abilities. It might equally well be argued that the prospect of high medical salaries, against which no voice has been raised, may divert an undue number of the most able students entering a university to the faculty of medicine.

Had Mr. Whittaker extended his claim for equality at the "non-medical" level to include clinical departments, it would at least have had the merit of consistency. In the absence of such equality it is essential for medically qualified scientists to receive the same treatment as all other doctors.

While everyone will wish to acknowledge the contribution to medical teaching and research made by non-medically qualified scientists, it cannot be admitted that those who are medically qualified, a great many of whom have also a primary and higher degree in one of the physical and biological sciences, are any less able than those not so qualified to provide students with the "scientific outlook."

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A. D. M. GREENFIELD.

INFLUENCE OF HEART-RATE ON CARDIAC OUTPUT

SIR,—Your informed readers will find the answers to Dr. Plesch's letter of Dec. 31 in the article[1] which he criticises. They will understand that my colleagues paid special attention to the influence of heart-rate change on the hæmodynamic effects of digitalis. They will also be aware that there has been in this country an important school of thought, led by Mackenzie and Lewis, that the reduction of ventricular rate by digitalis in auricular fibrillation was of major importance in the production of clinical improvement.

On the technical side, Dr. Plesch lacks experience of modern laboratory work on cardiac output. His remarks on the unreliability of the Haldane blood-gas method and of spirometry are simply to be categorically denied, particularly since the introduction of the water-immersed

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[1] Kelly, H. G., Bayliss, R. I. S. *Lancet*, 1949, ii, 1071.

Letters to the Editor

ARMY MEDICINE IN THE LATE WAR

SIR,—The instalment of Dr. Todd's article published in your issue of Dec. 17 has already attracted criticism. The realisation that there was more to come prevented me from taking up the cudgels immediately, although arguments used by Dr. de Burca, Dr. Woodruff, and Dr. Dimson (Dec. 31) to refute certain of his statements I had already noted myself in considering a full-scale attack on this essentially provocative and tendentious paper.

It is true that directives on treatment always seemed to cause irritation, especially among more highly qualified and responsible medical officers. Such directives, however, were not the work of ignorant or junior staff officers, but were invariably produced by experienced consultants after full consideration and conference; moreover they were intended—at all events so far as India and Burma were concerned—not so much for the instruction of the skilled physician as to prevent inefficient treatment by the very large number of ignorant medical officers employed in the Forces at that time.

It is perhaps forgotten that in 1942 the old Indian Medical Department with its British and Indian cadres of assistant and subassistant surgeons was absorbed into the Indian Army Medical Corps, and warrant officer and Viceroy-commissioned medical officers, by the hundred, overnight became fully fledged medical officers. Change of status, however, did not mean change of capability or intellect.

The emphasis always laid on laboratory diagnosis of malaria and amœbic dysentery was, of course, intentional, and was designed to underline the essential importance of the laboratory and the clinical side-room. It in no way precluded the early treatment of "clinical" malaria or amœbiasis, both of which, in the hands of the efficient and experienced medical officer, received full recognition. Dr. Todd himself, however, has expressed horrified disapproval of prolonged retention in hospital of chronic and undiagnosed, or partially diagnosed, sick. The first essential in any approach to disease must surely be a scientific determination of its true nature, and this seldom delays the initiation of treatment. Failure to submit cases of malaria in particular to the full therapeutic course meant an enormous loss of man-power by subsequent relapses and subhealth; and for this reason, if for no other, insistence was placed on the official régime. The application of this rule in the early days of 1942 and 1943 certainly implied evacuation, often over the most difficult country and in shocking conditions, climatic and other. It was for this reason that in 1944 many of us fought so hard for the adoption of the principle of forward treatment—a principle eventually vindicated in its entirety.

Dr. Todd unfortunately has not fully grasped what is meant by forward treatment. For purposes of practical application in Assam and Burma all medical units within a corps area came to be regarded as affording this. In certain cases the regimental medical officer could hold his own sick, especially those likely to be fit for duty within two or three days; the fact that large supplies of sulphaguanidine were officially made available for use in the regimental aid post is positive evidence that such treatment was encouraged. The excellent work done by the field ambulances, with their usually capable medical staffs, has not been forgotten; and they were never discouraged from holding the sick of their own divisions in "peace-time" conditions. But when actual fighting was in hand (as it generally was) the ideal level for holding the acute or subacute medical case *with reasonable hope of early return to his unit* was the "corps medical centre," composed of one or more casualty-clearing stations and one or more malaria forward-treatment units, with ancillary services (dental, transfusion, pathological, neurosurgical, psychiatric, &c.).

It cannot be gainsaid that, right up to the end of the war, there was a certain amount of opposition to this policy. This was evidenced in many ways, perhaps most strikingly by a reluctance to provide enough nursing sisters and other female personnel, and, for a time at least, by the imposition of severe restrictions on the way in which they should be used. However, all these difficulties were very largely overcome and there is little doubt that the consequent enormous saving in man-power contributed not a little to the comparatively rapid completion of the Burma campaign. It is, therefore, with considerable resentment that one reads the concluding paragraph of Dr. Todd's second instalment (Dec. 24). In this he states:

> "In Burma . . . far greater efforts should have been made to prevent it [evacuation] from proceeding *beyond field-ambulance level* . . . air evacuation to base hospitals . . . should, in general, have been reserved for the severely wounded and those with grave diseases such as typhus fever."

To this I would reply that every possible effort was made to prevent unnecessary evacuation; that air evacuation was a help rather than a hindrance in that it made it possible to use corps medical units for retaining suitable cases and to evacuate those long-term cases which could not have withstood the rigours of ground evacuation and would otherwise have blocked the bed potential; and finally that the one category of patients never evacuated were those suffering from scrub-typhus. Bitter experience taught us that the only way to avoid a high mortality in this serious disease (which incidentally had a most profound effect on morale) was to hold cases as near as possible to the place in which they fell sick. It was directly owing to this policy that the mortality-rate from this disease was reduced to less than 10%.

In conclusion, I would register a strong protest against the all too prevalent theory that administrative medical officers were, of necessity, near-morons. As a "non-regular" administrator, I had the good fortune to come into close contact with a very large number of hard-working enthusiasts, many of whom were endowed with foresight, drive, and personality. Furthermore, our high-ranking consultants—that is to say, those responsible for technical direction—were almost without exception militarised civilians of the utmost distinction. While fully agreeing that the Army Medical Services were in many details far from perfect, I suggest that they did a magnificent job of work in all theatres of war—and one which was appreciated not only by the individual soldier, but also by all those responsible for the maintenance of morale, the control of man-power, and the furtherance of operational efficiency.

G. J. V. CROSBY

Folkestone.

Late D.D.M.S., 33 Indian Corps and Twelfth Army.

PLACEMENT MEDICAL EXAMINATIONS

SIR,—In his most interesting article concluded in your issue of Dec. 31, Dr. Todd expresses the view that "there is no real place for a medical examination as a part of the selection of adults for jobs." Elsewhere in the same paper, medical examination is clearly advocated for selecting men for training in certain occupations in the Services; consideration, it is stated, should be given to "separate bodily functions."

It is hard to see why the same procedure should be denied to workers in civil life. It is disappointing for the trainee and expensive for the employer if bitter experience is to be the only test of a person's fitness for undertaking work requiring, say, high visual efficiency. However this may be, medical examination in industry is not as a rule based on a rigid standard of fitness unrelated to pressure is to fill shallow domestic baking-trays with talcum, wrap in brown kraft paper, and then sterilise by dry heat in an oven, allowing sufficient time for the whole of the contents to be at 150°C for at least two hours.

One practice I have met which is particularly undesirable consists in putting up a relatively large quantity of unsterile talcum (up to 25 g.) in a gauze bag; one such bag is then placed inside each pair of gloves, with the idea that it can be repeatedly used and resterilised, thus avoiding the labour of refilling each time. It is permissible, however, to use very small quantities of talcum in gauze folders packed inside the cuffs of gloves.

Dr. Sevitt mentions the desirability of ensuring the easy entry of "superheated steam" when he presumably means "saturated steam," which is a better sterilising agent.[10] His excellent article emphasises once again the necessity for all sterilising processes to be supervised by responsible and trained personnel. In this connexion I have found Carl Walter's textbook[9] invaluable.

Hertford. JOHN C. H. HANSON.

GRAPHITE PNEUMOCONIOSIS

SIR,—In his comments on my letter of Nov. 19, Dr. Dunner (Dec. 3) claims to refute the possibility of an infective origin for massive lesions in graphite pneumoconiosis, on the basis of his clinical and radiological findings in 9 cases (so far as I can determine from his articles), including post-mortem observations on one of them.

I agree with Dr. Dunner that the "miliary snowstorm" appearance on the X-ray film probably reflects the changes produced by dust alone, but because massive shadows sometimes develop subsequently to the miliary ones it does not necessarily follow that the massive fibrosis represents a later stage in the development of the focal dust lesions. The results of radiological investigations into coal-workers' pneumoconiosis show that large localised shadows, representing massive lesions, quite commonly develop in cases showing the generalised X-ray appearances known to result from simple pneumoconiosis; and the conclusion of Davies et al.[11] favours the view that such massive shadows are infective in nature and often tuberculous. Dr. Dunner's cases follow a similar radiological course and hence on this ground the infective origin of massive shadows in graphite workers cannot be lightly dismissed.

For the pathological and bacteriological reasons previously given, there is justification in the case of coal workers for regarding massive fibrosis as the result of another disease process superimposed on the purely dust lesions. All the available evidence points to the added process being infective and often this is clearly tuberculous. Even in the absence of specific evidence of tuberculosis, the general pathological appearances of massive lesions are so consistent as to suggest that the pathogenesis is fundamentally similar in all cases. It may well be that in some cases the infection is ultimately overcome, just as occurs in uncomplicated tuberculosis. Although the operation of some other infection than tuberculosis cannot be excluded, this appears to me unlikely. From the pathological evidence in graphite workers provided by Gloyne et al.,[12] Harding and Oliver,[13] and Dr. Dunner, as well as from a case personally observed, there is a close correspondence between the disease in these workers and that in coal workers, and hence the distinction between infective and simple dust lesions also appears applicable to graphite pneumoconiosis. Post-mortem study directed to the isolation of the tubercle bacillus from massive lesions in graphite pneumoconiosis is a prime requirement, of which as yet I know no record.

It is known that in coal workers tubercle bacilli occur much less frequently in the sputum than in the lesions post mortem.[14] Thus in this connexion clinical evidence is not as reliable as post-mortem evidence. Dr. Dunner's failure to find tubercle bacilli in the sputum of one or two of his cases is therefore not surprising.

Dr. Dunner is right in demanding prolonged animal experiments to assist in deciding the rôles of graphite dust and infection in the genesis of pulmonary disease. As graphite and coal dust are not very dissimilar in their silica contents, my experience in connexion with the inhalation of airborne coal dust by rabbits underground for over $3^1/_2$ years is relevant. Massive fibrosis of the lungs does not occur, but focal dust lesions with very little tissue reaction do develop. This is quite a different type of response to that induced by the inhalation of silica dust.

The purpose of my former letter was to draw attention to an alternative interpretation of the pathogenesis of graphite pneumoconiosis to that put forward by other investigators. In this department over 700 autopsies have now been performed on coal workers from many of whom X-ray films are available.[15] When therefore another industrial dust hazard is found to produce very similar radiological and pathological appearances in the lungs, there is good reason for considering the possibility that its pathogenesis resembles that now believed to operate in coal workers.

Department of Pathology,
Welsh National School of Medicine,
Cardiff.
A. G. HEPPLESTON.

PRINCESS TSAHAI MEMORIAL HOSPITAL

SIR,—I was delighted to observe the support for Lord Winster's appeal on behalf of this hospital which Dr. Goodman gave in his letter of Dec. 31. I am glad to observe his testimony that there is no doubt of the potential value of the hospital, "especially as a training centre for nurses." I cannot, however, concur in his suggestion that the scheme should be abandoned unless the hospital is opened forthwith.

Four years is a long time to wait; yet the period is not very long for carrying through so important and ambitious a scheme as a hospital involving the raising of £100,000 by purely voluntary subscriptions. I observe that even in pre-war days an offer of £60,000 for an annexe to one of our great British hospitals was made on the condition that a further £60,000 was raised by voluntary subscriptions within five years. That was for a British hospital; the sum which had to be collected in easier times than these was considerably less than £100,000. The council of the Princess Tsahai Memorial Hospital has had to contend with very difficult circumstances in raising funds in Britain; in the first instance, the competing claims of a host of war charities for countries in which the war was still being actively waged, whereas in Ethiopia the war had ceased; then the very heavy cost of paying for the war, which has fallen to so disproportionate an extent on the shoulders of the people of Britain.

Our council appreciates to the full the sums which have been contributed towards the hospital fund in Ethiopia, but Dr. Goodman is in error in describing these as coming solely from the British and Ethiopian communities. The Greeks, the Armenians, and the Indians have contributed very substantial sums, and of course the Ethiopians themselves, including His Imperial Majesty, who has given very substantially, as well as providing the site and the partly constructed building.

My knowledge of the sources of the large contributions to the fund which have been raised and expended on the building itself in Ethiopia is by no means complete, but so far as that knowledge goes it would appear that the non-British communities have taken the lead in this matter inside Ethiopia.

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[10] Savage, R. M. *Quart. J. Pharm.* 1937, 10, 451.
[11] Davies, I., Fletcher, C. M., Mann, K. J., Stewart, A. Proceedings of the Ninth International Congress of Industrial Medicine. London, 1948; p. 773.
[12] Gloyne, S. R., Marshall, G., Hoyle, C. *Thorax*, 1949, 4, 31.
[13] Harding, H. E., Oliver, G. B. *Brit. J. industr. Med.* 1949, 6, 91.
[14] Fletcher, C. M. *Brit. med. J.* 1948, i, 1015.
[15] Gough, J., James, W. R. L., Wentworth, J. E. *J. Fac. Radiol.* 1949, 1, 28.

Haldane apparatus. He seems to imagine that the cardiac catheter is a coiled spring resisting the contractions of the heart. It is, in fact, flexible and imposes no mechanical obstacle. Incidentally, Starling's law is quite different from the "all-or-nothing" principle.

Dr. Plesch seems to "know" that cardiac output averages 4 litres per minute, and has apparently been satisfied with this figure since 1909. He sees no reason to change his mind either on the average figure (which is over 5 litres per minute) or on the possible range in health and disease. "It was not to be expected that drugs should influence the minute volume . . ." We regret that this satisfying thought is not in keeping with the many facts now adduced by numerous investigators using similar methods to our own in different parts of the world. Digitalis bodies either relieve venous congestion, or increase the resting cardiac output, or both, in those cases of cardiac failure which make a favourable clinical response.

The manner in which digitalis brings about relief is surely a matter worthy of serious study and research effort. In view of past speculations on the influence of heart-rate in producing clinical improvement, the investigations of Kelly and Bayliss seem well worth while. We welcome any helpful and constructive commentary, but we hestitate to reply to sarcasm and ill-informed criticism.

Postgraduate Medical School of London, W.12.

JOHN MCMICHAEL.

HÆMOLYTIC EFFECTS OF MYANESIN

SIR,—Intravascular hæmolysis after intravenous administration of 'Myanesin' has lately been discussed by Clendon and Penfold.[1]

The hæmolytic action of myanesin is the same in vivo and in vitro: concentrations greater than about 1 in 100 will cause hæmolysis within a few minutes. The occurrence of intravascular hæmolysis after intravenous injection depends on the concentration of the solution used, on the presence of other hæmolytic agents used as solvents (such as ethanol), and on the rate of injection. It is independent of the total amount of myanesin injected. Thus Zamboni and Gori[2] showed that a 10% solution of myanesin in 20% sodium hippurate (which by itself is not hæmolytic) may produce hæmaturia in doses of 40 mg. per kg. body-weight, whereas a 0·5% solution of myanesin in saline solution did not cause hæmolysis even at dose-levels of 150 mg. per kg. Both solutions were injected into rabbits at the rate of 30 mg. per kg. per minute.

I do not know of any evidence for the view[1] that serious hæmolysis is more likely with larger doses of myanesin. It is possible to inject considerable amounts of myanesin intravenously without causing hæmolysis, as has been observed by Davison[3] and others, provided that injection is carried out slowly enough to keep the concentration of myanesin in the blood below the critical level. The contention that hæmolysis and hæmaturia depend on the concentration of myanesin in the blood, and not on the total amount of myanesin given, is further supported by the absence of hæmoglobinuria and hæmaturia after the administration of very large oral doses of myanesin.[4] After oral administration, absorption is gradual and for this reason hæmolytic levels are not reached.

Schlesinger et al.[5] have shown that intravenous administration of 2% solutions of the drug is safe and does not cause hæmolysis. The intravenous use of more concentrated solutions is potentially dangerous and should be avoided. The intravenous infusion of a larg volume of a dilute solution of the drug is, of course, nuisance, but it is worth trying in strychnine poisonin status epilepticus, and certain cases of tetanus. Ofte the same therapeutic results can be achieved by th intramuscular or oral route, by which large amounts the drug can be given with relative safety.

Wyngaarden et al.[6] have shown in dogs that a 10 solution of myanesin in 40% aqueous propylene glyc does not produce hæmolysis when given intramuscular in doses up to 25 mg. per kg. body-weight. I hav given many intramuscular injections of myanesin, usin 10% of the drug in an aqueous solution containing 6% ethanol and 6% propylene glycol. This solution require warming to body-temperature before administration, t dissolve this amount of myanesin. Hæmaturia has neve been observed; the drug is readily absorbed from th muscle, and the injection is not painful. In many instances oral administration suffices, as has been shown by Godman and Adriani,[7] who were able to control satisfactorily seven cases of tetanus in children by the oral administration of the drug.

Ginzel et al.[8] observed that the *o*-methoxypheny ether of glycerol had only one-quarter of the hæmolyti action of myanesin. This congener had about one-hal the activity of myanesin. These findings indicate that i should be possible to find a soluble myanesin-like compound which would have negligible hæmolytic propertie and would be suitable for intravenous administratio Until such a compound is found, it would be advisable t limit the use of myanesin to the oral and intramuscula routes of administration.

Wallace Laboratories Inc.,
New Brunswick, New Jersey.

F. M. BERGER.

STEAM STERILISATION

SIR,—Dr. Sevitt, in his article of Dec. 10, has made notable contribution to the study of maintaining asepsi in surgical treatment. His comments on the sterilisatio of talcum powder and surgeons' gloves prompt me t offer some views of my own which are the result o investigations in this field. It is perhaps best to begi with a statement of first principles:

1. Efficient sterilisation by steam depends upon effectua clearance of air from the autoclave chamber and from the materials being processed. To confirm this there should be a thermometer, or, better still, a recording thermograph in a condensate drain leading from the lowest point in the chamber.
2. All sterilisation processes should be subjected to bacteriological checks. A suitable method, using a standardised earth, is described by Ecker.[9]
3. It is particularly difficult to ensure clearance of air from rubber articles since folds and wrinkles may retain pockets of air. I have found a great variety of drums in use for sterilising gloves. Many have definitely hindered the clearance of air, and there is a tendency to pack in as many pairs of gloves as possible. If drums have perforations in the sides, it is essential to place them on their sides for sterilising, otherwise there may be a pocket of air trapped in the bottom of the drum. The British Standards Institution will be doing a useful service if it sponsors a standard glove-drum, which should bear a statement of the maximum load of gloves and an indication of how it should be placed in the autoclave.
4. To assist in air clearance, the upper portion of the autoclave should be used for gloves and other articles which are to be sterilised at relatively low temperatures and steam-pressures.
5. It is desirable, as Dr. Sevitt points out, to use sterilised talcum powder for dusting gloves and other rubber articles which are to be subjected to reduced sterilisation procedures. An alternative to his suggestion of autoclaving at 20 lb.

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1. Clendon, D. R. T., Penfold, J. B. *Lancet*, 1949, ii, 987.
2. Zamboni, P., Gori, E. *Giorn. Ital. Anestesiol.* 1948, 14, 81.
3. Davison, M. H. A. *Lancet*, 1949, ii, 1110.
4. Berger, F. M. *J. Pharmacol.* 1949, 96, 243.
5. Schlesinger, E. B., Drew, A. L., Wood, B. *Amer. J. Med.* 1948, 4, 365.
6. Wyngaarden, J. B., Tieche, H. L., Seevers, M. H. *Anesthesiol.* 1949, 10, 529.
7. Godman, H. E., Adriani, J. *J. Amer. med. Ass.* 1949, 141, 754.
8. Ginzel, K. H., Leopold-Lowenthal, H., Weis, W. *Wien. med. Wschr.* 1949, 99, 299.
9. Walter, C. *Aseptic Treatment of Wounds.* London, 1948; p. 86.

children received their course of penicillin in the same hospital and at about the same time.

The circumstantial evidence in all cases is, I feel, in favour of the lesions being produced by the introduction of tubercle bacilli at the time of the penicillin injections; but it must be emphasised that we have no definite proof of this. For the reasons already stated it has not been possible to investigate fully the details of the penicillin injection technique. It is clear that the penicillin may be contaminated at any time between preparation and injection. Apart from careful control in the preparation of the penicillin solution in the hospital, I would like to make a further plea for a general improvement in syringe sterilisation technique, which, I feel, is far from satisfactory in many institutions and has probably played a large part in producing the lesions described in this letter.

I should be most interested to know whether others are coming across this most unfortunate but highly important complication of penicillin therapy.

Royal Hospital for Sick Children, Edinburgh. DONALD M. DOUGLAS.

RELIEF IN RHEUMATOID ARTHRITIS

SIR,—Professor Spies and Dr. Stone, in their article last week, tell of water retention with improvement in joint conditions and diuresis with relapse.

Twelve years ago, while doing a "locum" in Norfolk, I had a patient, an elderly woman, with rheumatoid arthritis of the "don't-touch-the-bed" type. She had had one kidney removed for stone, and during my tenency the sole ureter was blocked by a stone for three or four days, with complete anuria. During this time she lost her pain, got back some movement, and—what amazed me, expecting uræmia—became almost cheerful. After she had passed the stone the old symptoms returned. I gathered from Dr. Harrison, of North Elmham, whose work I was doing, that this sequence had occurred several times.

It would seem possible that in the chain of causation between the injecting of adrenocorticotropic hormone and the loss of pain, fluid retention is a link—and might be a short-cut.

Beckley, Rye. C. G. LEAROYD.

PERAXILLARY APPROACH TO THE STELLATE AND UPPER THORACIC SYMPATHETIC GANGLIA

SIR,—I read with interest Mr. Atkins's description (Dec. 17) of the peraxillary approach suggested to him by Professor Goetz. I have used this approach on several occasions but I have now abandoned it for the following reasons:

1. The skin in the axilla does not seem to heal nicely and has left prominent and rather ugly scars in my cases (see picture), whereas a scar over the lower part of the neck anteriorly usually heals almost invisibly if the platysma is sutured and if the skin sutures are removed very early.

2. If a strictly preganglionic section is done via the axillary route, it is impossible to suture the upper chain in such a position that regeneration cannot occur—with the anterior approach this may be avoided by stitching the upper chain into the substance of the scalenus anterior.

3. Should the superior intercostal artery be damaged during operation by the axillary approach, an embarrassing situation would arise. It would be impossible to tie the vessel through the small incision in the chest wall, working at a depth of four or five inches. The diathermy current might be used, but the superior intercostal artery is often quite large and hæmorrhage from it is alarming. Operating by the anterior route it is wise to tie the superior intercostal artery at its origin from the first part of the subclavian artery, or the costocervical trunk. Even if this important step is not taken and the vessel is damaged over the neck of the first or second ribs, hæmorrhage can be well controlled by firm gauze packing for ten minutes or so, after which it can be easily secured.

Having tried all three approaches, my own preference is for the anterior route. I cannot agree that it is not always possible to divide the chain below the third thoracic ganglion. In one of my patients I made an anterior approach on one side and an axillary approach on the other side, and the patient was quite definite that she preferred the former. With the axillary approach I have noticed more than once a rather trying, though temporary, postoperative intercostal pain.

Hammersmith Hospital, London, W.12. PETER MARTIN.

SIR,—Mr. Atkins's letter is interesting, not alone as a clear technical exposition, but because it demonstrates the dissatisfaction frequently experienced when either the anterior supraclavicular or the posterior approach is used for upper-limb sympathectomy.

I agree with the objections instanced by Mr. Atkins, and I should like further to add that if intradural section of the associated intercostal nerves is considered necessary it can be done only with much trauma by the posterior approach, and not at all if the anterior supraclavicular approach is employed. In short, the anterior approach is nice but not enough, and the posterior is enough but not nice.

The Goetz approach, as described by Mr. Atkins, is undoubtedly a workmanlike job, and an improvement except that it is a transpleural procedure, in which respect it is, I think, objectionable. Operations, which may be prolonged and which may cut small blood-vessels, particularly if ganglionic root-section is performed, are, in my opinion, better performed by an extrapleural procedure if at all possible.

Attracted by this possibility, during the last year I denervated the upper limb by the anterior infraclavicular approach recommended to me by Prof. A. K. Henry and published by him last autumn.[1] The view is excellent, both for the chain and the blood-vessels; and as any one can see by consulting his account, an exceptional view of the dorsal-root ganglia can readily be obtained. My only objection to this anteromedial approach has been a marked tendency to rupture the pleura when reflecting it from the mediastinum, particularly in the elderly. This has stimulated me to approach the chain by an extrapleural anterolateral method which I find most satisfactory. When the chain is reached the further procedure is in general similar to that advocated by Professor Henry. At the risk of adding unduly to the methods, I shall describe it very briefly.

With the patient in the position described by Mr. Atkins, I make a slightly curved incision from near the inferior scapular angle to within 2 in. of the third dorsal spine. Some of the fibres of the trapezius and the scapular slip of the latissimus are cut, the rhomboids are split, and the third rib identified and removed from the posterior axillary line almost to its neck. A finger opens up the extrapleural space back along the line of the third rib, and gradually enlarges the space so that the hand can slip in and depress the pleural dome, which can be done from behind with great ease and with little danger of pleural rupture. Any surgeons who have watched the operation in progress have remarked on the directness and adequacy of view. Any of the approved techniques—stellectomy, excision or isolation of second and third dorsal sympathetic ganglia, with or without associated somatic nerve section, or indeed section of the sympathetic chain

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[1] Garry, T. P., Henry, A. K. *Irish J. med. Sci.* October, 1949 p. 757.

In this country, there has been a valiant British effort, and valiant efforts are still being made, but suggestions that the scheme should be abandoned for any consideration are by no means helpful.

Dr. Goodman refers to the Russian hospital; but the Russian contribution came from the Russian Government, and was not raised by private subscription. The memorial hospital council in Britain has had no Government grant. Her Majesty the Queen early signified her sympathy by a gracious donation of £100; but it was not until 1948, when the proceeds of B.B.C. appeals had greatly diminished owing to the heavy taxation now borne by the British people, that an appeal for the Princess Tsahai Memorial Hospital was broadcast as the "Week's Good Cause."

In the spring of last year the council was led to hope that £10,000 which was collected by the late Dr. John Melly for medical work in Ethiopia, and is now in the keeping of the British Red Cross Society, would be granted to the hospital. This would have enabled the council to proceed with the remaining purchases, and to open the hospital as soon as the interior finishings and the fitting of the equipment are complete. Unfortunately, this hope has been deferred. The harder way of raising the fund pound by pound, shilling by shilling, must proceed.

Apart from the raising of funds, it has taken approximately three years after the orders were placed to secure delivery of the electrical equipment made for the hospital in this country. As the equipment is paid for in this country, it does not receive the facilities granted to dollar-earning goods.

For the comfort and encouragement of the many who have generously contributed to the memorial hospital fund, and all who desire it to be opened at an early date, I would add that though approximately £15,000 is required to complete the scheme, £5000 would enable the hospital to be opened. My appeal to Dr. Goodman, and all who desire the early success of the effort, is for cheerfulness and confidence in the project, and practical assistance to "see it through." Practical assistance at the present stage involves donations, which will be gratefully acknowledged by the hon. treasurers, Lord Horder and Lord Amulree, c/o Messrs. Gould & Prideaux, 88, Bishopsgate, London, E.C.2.

3, Charteris Road,
Woodford Green, Essex.

E. SYLVIA PANKHURST
Hon. Secretary.

THERAPEUTIC INTERCOSTAL BLOCK

SIR,—In these days, when therapeutic blocks form part of an anæsthetist's routine work, the following case-report may be of some interest.

A man, aged 69, with a history of chronic bronchitis, pleurisy, emphysema, and secondary cardiac failure was referred to our nerve-block clinic because of intractable pain along his right costal margin following a fall from his bicycle twelve months previously. He was ambulatory and had a good colour, and there was no dyspnœa at rest. There was, however, some œdema round his ankles with pitting on pressure. His chest was clinically clear, and on Aug. 31, 1949, radiographs revealed a normal diaphragm, no cardiac enlargement, clear lung-fields, and no bony injury.

On Sept. 7 a block of the 8th–12th right intercostal nerves was performed in the posterior axillary line; 'Proctocaine' 10 ml. was used for each nerve. The patient complained of no symptoms and showed no signs of distress during any of the injections, and at the end volunteered that his pain had gone. He was transferred on a theatre-trolley to the recovery-room and was told he could get dressed in a few minutes if he continued to feel all right. Shortly afterwards, however, he became cyanosed and dyspnœic with some bronchospasm and pain in the right lower chest on inspiration. Oxygen was administered, and an hour later he was referred to the X-ray department where a radiograph of the chest revealed evidence of a small effusion on the right side and some generalised hyperæmia in the lungs, particularly at the right base. There was no evidence of pneumothorax.

He was admitted to the ward, where oxygen therapy was continued. Penicillin was administered, and heroin, adrenaline, and ephedrine were given to relieve his pain and bronchospasm. Two days later, on Sept. 9, he developed severe pain in the right side of his chest and collapsed. The following day he coughed up some blood, was distressed and slightly pyrexial, and had well-marked tachycardia. There was a gross pleural rub on the right side suggesting a pulmonary infarct. On Sept. 11 a further radiograph showed that the diaphragm was flattened; there was evidence of pleurisy, but the congestive changes had improved.

He was discharged on Sept. 15, symptom-free and radiographically clear except for a small amount of fluid in the right costophrenic angle.

Normally, when performing an intercostal block on the conscious or unconscious patient, if the needle penetrates the pleura a warning cough is elicited, and, as a rule, provided that the needle is of small bore and aseptic precautions have been taken, no harm results. It would seem that in the aged, and particularly those with a history of chronic bronchitis, pleurisy, and emphysema, no warning signals are to be expected; and the anæsthetist must exercise greater caution in performing intercostal blocks on these cases, especially when proctocaine is used.

Scunthorpe, Lincs. W. N. ROLLASON.

TUBERCULOUS ABSCESS AT SITE OF PENICILLIN INJECTIONS

SIR,—Elek[1] believes that the appearance of tuberculous abscesses at the site of penicillin injections is by no means so rare as the paucity of reported cases may suggest. I feel sure that he is right. I have to hand the records of nine children, who for one reason or another were given soluble penicillin intramuscularly at some period during the last 2 years, and who subsequently developed tuberculous abscesses at the site of the injections. As none of them were under my care at the time the penicillin was given (they had been treated in a number of different hospitals), the difficulty in reporting them in full will be appreciated; and it may be that others have been presented with the same problem!

My series comprises children varying from the age of 1 month to 7 years at the time of the penicillin injections. In all cases soluble penicillin had been given intramuscularly. In five cases solitary abscesses appeared 5–7 weeks after the completion of the penicillin course; in four cases multiple abscesses appeared 6–18 weeks afterwards. In all cases tubercle bacilli were isolated from the lesions. In no case was there a history of contact with tuberculosis. In no case was evidence found of tuberculosis elsewhere in the body at the time the abscesses were first noted. In those cases in which a single abscess occurred the regional lymph-glands were much enlarged, but this was not so in the cases with multiple abscesses. Unfortunately, Mantoux reactions had not been carried out before the penicillin courses were given, but they were all positive by the time the abscesses were diagnosed. One child died of miliary tuberculosis. Six have chronically discharging ulcers or sinuses. Two were treated by radical excision of all the abscesses as soon as the diagnosis was made, and these children have done well. (The regional lymph-glands in these two cases were apparently not involved.) I am convinced that in early cases this is the treatment of choice.

The ætiology has been discussed by Ebrill and Elek,[2] Hounslow,[3] Hindenach,[4] and Forbes and Strange.[5] The five cases with solitary abscesses in this series which had enlarged regional lymph-nodes suggest at once that primary tuberculous complexes had been produced, and this is supported by the fact that one of these children was only 2 months old when the tuberculous lesion first appeared. The four cases with multiple abscesses and no lymph-gland enlargement looked clinically less like primary lesions, but it so happened that these

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1. Elek, S. D. *Lancet*, 1949, i, 628.
2. Ebrill, D., Elek, S. D. *Ibid*, 1946, ii, 379.
3. Hounslow, A. G. *Ibid*, p. 617.
4. Hindenach, J. C. R. *Proc. R. Soc. Med.* 1947, 40, 161.
5. Forbes, G. B., Strange, F. G. St.C. *Lancet*, 1949, i, 178.

ble to wash and feed himself for the next five days; he received crystalline penicillin G and heparin in saline two bottles every 24 hours), each bottle being separately buffered with phosphate to a pH of about 7·2. Even so, the vein thrombosed after five days and was red and tender. In fact, in all cases where this method has been used during the past eighteen months, my longest record has been only eight days for one vein, no matter what the fluid administered or what the rate of flow. The shortest periods were with glucose-saline and a slow rate.

I understand that more satisfactory results than this are being achieved elsewhere, and especially in America, and that intravenous drips through plastic tubing can continue for several weeks at a time. I would be very interested to hear from anyone who has had more success than I. Nevertheless, I shall continue to use this method in selected cases, since I feel that an average duration of even five or six days is an advance, and the lack of splintage pleases patient and nursing staff alike.

South Devon and East
Cornwall Hospital, Plymouth.

H. T. N. SEARS
Senior Registrar

RISKS OF ANTI-HISTAMINE MEDICATION

SIR,—Your leading article of Jan. 7 says: "In cases of acute poisoning by anti-histamines the obvious antidote is histamine acid phosphate, injected subcutaneously in doses of 0·1 mg. per kg. of body-weight." It is generally held, however, that the anti-histamines do not antagonise histamine by combining with it chemically or by inducing opposite pharmacological responses, as does adrenaline. The most widely accepted view of the action of these drugs is that they block histamine receptors in the tissues. Moreover, the side-effects of the anti-histamines, such as drowsiness and giddiness, seem to be due to a mechanism other than the histamine-receptor blocking one. Burn[1] has pointed out that the anti-histamines have properties in common with spasmolytics like 'Trasentin' and 'Syntropan,' analgesics like pethidine and papaverine, and local anæsthetics like procaine and atropine-like substances. It therefore seems doubtful whether histamine can be effective in anti-histamine overdosage. In some people, notably asthmatics, even though they were saturated with an anti-histamine, it is possible that injections of histamine would produce severe reactions.

Parke, Davis & Co.,
Hounslow.

J. STANLEY WHITE.

Obituary

HENRY CORSI

M.A., M.B. CAMB., F.R.C.S.

Mr. Henry Corsi, physician to St. John's Hospital for skin diseases, London, died in Switzerland on Jan. 1 at the age of 56.

He came to medicine by way of Uppingham and Pembroke College, Cambridge, qualifying from St. Bartholomew's Hospital in 1918. For a time he toyed with the idea of becoming a surgeon and in 1921 he took the F.R.C.S. But he soon decided that the study and practice of skin diseases was his particular bent. He served his apprenticeship with Dr. H. G. Adamson and he was for many years chief assistant in the skin department at St. Bartholomew's, where he was a well-known figure. Later he joined the staff of St. John's Hospital and he probably regarded this hospital as his professional home, for when a few years ago, dogged by ill health after a motor accident, he gave up his other appointments, he retained this one and the presidency of the St. John's Hospital Dermatological Association. At the last annual dinner of the association he was in his element, and made one of his delightful after-dinner speeches.

He was assiduous in his attendances at the meetings of the British Association of Dermatology and the skin section of the Royal Society of Medicine where anything he had to say was always well worth listening to. He was a sound teacher and ever ready to help his juniors. Also an expert venereologist he was for many years a surgeon to the London Lock Hospital, where his great natural sympathy, kindness, and understanding of human nature stood him in good stead.

J. L. F. writes: "Although not a researcher Corsi became one of the soundest of dermatologists, for he had an inquiring and original mind and never accepted any new-fangled methods until he had thoroughly tested them. In an age of stunts it was his lot to do a great deal of debunking. A fine linguist it delighted him to talk to patients from foreign lands in their native tongues. He was a good and keen bridge-player and as a host he was without equal, as those who were guests of 'Our Whist Club' when it met at his house in Harley Street will readily testify. We shall miss Henry Corsi very much."

JOHN SPENCE LAW

M.B. EDIN.

Dr. J. Spence Law, who died in Norwich on Dec. 23, at the age of 86, was for over 25 years assistant medical officer and deputy superintendent at St. Andrew's Mental Hospital, Thorpe, Norwich.

He was educated at Dumfries Academy, where James Barrie was a fellow scholar, and in 1883 he graduated M.B. at the University of Edinburgh. Before settling in Norfolk he had held appointments at the North Riding Asylum at York and at the Borough Asylum, Birmingham. When the War Office took over St. Andrew's Hospital during the 1914–18 war he held the rank of major in the R.A.M.C. After his retirement in 1919 he lived at Lowestoft, where he was a member of the Royal Norfolk and Suffolk Yacht Club. An enthusiastic bridge-player, he also used to take an active part in all outdoor sport, and he was specially interested in both cricket and golf. In his early days at St. Andrew's Hospital he kept goal for the Thorpe football club. Till 1939, he enjoyed a yearly holiday in Italy.

C. N. writes: "During the whole of his time as resident Spence Law worked under David Thomson, and he acquired an excellent knowledge in his own specialty of mental diseases. His shrewd common sense enabled him to deal satisfactorily with all types of cases, and he was never at a loss to know how to act in any emergency. He could always be relied on to do his best for any patient entrusted to his care."

Births, Marriages, and Deaths

BIRTHS

ATHERTON.—On Nov. 30, at Durham, the wife of Dr. R. A. Atherton—a daughter.

COSH.—On Jan. 2, at Bristol, the wife of Dr. John Cosh—a son.

COX.—On Jan. 2, the wife of Dr. Michael Cox—a son.

FOWLER.—On Dec. 23, in London, the wife of Dr. P. B. S. Fowler—a daughter.

INGHAM.—On Jan. 1, wife of Major F. J. Ingham, R.A.M.C.—a son.

JAMES.—On Dec. 31, in Birmingham, the wife of Dr. A. R. James—twin sons.

LUNT.—On Jan. 4, in Manchester, the wife of Dr. Reginald Lunt—a son.

SHEILD.—On Dec. 19, in Singapore, the wife of Mr. A. L. Sheild, F.R.C.S.—a daughter.

WADDELL.—On Jan. 3, in Manchester, the wife of Dr. James Waddell—a daughter.

MARRIAGES

HUGHES—CRESSALL.—On Dec. 31, at Alvechurch, Worcs, John Philip Wyndham Hughes, M.D., to Daphne Cressall.

SOLOMONS—EDGAR.—On Nov. 22, in London, Bethel Solomons jun., M.D., M.R.C.P.I., to Gillian Edgar.

DEATHS

BOURDILLON.—On Jan. 4, at Goring-on-Thames, Lancelot Gerard Bourdillon, D.S.O., M.C., M.B. Lond., D.P.H.

BRODY.—On Dec. 30, in Sheffield, Morris Benjamin Brody, M.D. Sheff., D.P.M., aged 37.

CARMICHAEL.—On Jan. 8, in Edinburgh, Archibald Nathaniel Shirley Carmichael, M.B. Edin., F.R.C.P.E., aged 82.

CORSI.—On Jan. 1, in Switzerland, Henry Corsi, M.A., M.B. Camb., F.R.C.S.

EDMOND.—On Jan. 8, William Square Edmond, F.R.C.S.

FARR.—On Jan. 2, at Brighton, Valentine Francis Farr, M.B. Lond., aged 53.

LIVINGSTONE.—On Jan. 3, in London, William Livingstone, M.B. Glasg., aged 88.

MIDDLEWEEK.—On Jan. 3, Frederick Francis Middleweek, L.R.C.P.E., aged 79.

MILNE.—On Jan. 6, James Alexander Milne, M.D., Lond., D.P.H.

NELSON.—On Jan. 6, in London, Wallace Nelson, M.B. Edin.

TUCKETT.—On Jan. 4, at Woodhouse Eaves, Leicestershire, Walter Reginald Tuckett, O.B.E., M.R.C.S., aged 90.

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[1] Burn, J. H. Background of Therapeutics. London, 1948; p. 98.

from D2 to D5 as in cardiac denervation—can be performed with ease and safety.

I feel that surgeons who employ this method will be gratified by the increased ease and success of their upper-limb sympathectomies. I hope to publish a more detailed account in the near future.

Dublin. PATRICK FITZGERALD.

SIR,—Following the publication of my letter of Dec. 17, I have been informed that this approach was originally suggested by Mr. W. G. Schulze, of Cape Town, a young surgeon now working in this country. Mr. Schulze did all the preliminary investigation on the cadaver, and eventually introduced the operation to the surgical unit at Cape Town. He informs me that an article will shortly be published, in conjunction with Professor Goetz, which will include a full account of the procedure.

Guy's Hospital. H. J. B. ATKINS
Director, Department of Surgery.

EPILEPSY AND ORGANIC DISEASE

SIR,—Professor Nattrass, in his address to the Manchester Medical Society (*Lancet*, 1949, ii, 994), very rightly emphasised the importance of remembering the existence of organic disease as a possible cause of epilepsy. He quoted the results of post-mortem examinations on 25 cases of patients who had their first fit after the age of 40. In no less than 10 of these the cause of the fits was found to be intracranial tumour.

It should be impressed on all patients who have their first fit after reaching adult life that they should see a neurologist frequently. Epilepsy is a symptom and not a disease *sui generis*. It is high time now to stop confusing ourselves by describing a symptom as an "idiopathic" disease. The word "idiopathic" is defined in the *Shorter Oxford English Dictionary* as "Of the nature of a primary morbid state; not consequent upon another disease." What word could be more defeatist in diagnosis or research? If the cause in any particular case has not been discovered, let it be called "epilepsy of unknown origin."

Dublin. H. W. DALTON.

HEINZ-BODY ANÆMIA AFTER SULPHETRONE

SIR,—Dr. Morlock and Dr. Livingstone, in their article of Dec. 24, mention the known tendency to "hypochromic hæmolytic anæmia, which develops and continues throughout the administration of sulphetrone."

Perhaps it is not generally known that this hæmolytic anæmia is related to the formation of Heinz-Ehrlich bodies in the red corpuscles ("tagged" cells).

Recently a 7-year-old child was given 1 g. of 'Sulphetrone' thrice daily for three and a half days. Two days later (Dec. 19) polychromatic macrocytes and Howell Jolly bodies were present in the blood-film. Further blood-counts showed:

	Dec. 22	*Dec. 23*	*Dec. 28*	*Jan. 3*
Hb, g. per 100 ml. ..	13·5	11·1	9·62	9·99
Red cells, millions per c.mm.	4·2	3·52	2·64	2·86
Colour-index	1·08	1·07	1·2	1·19
"Tagged" red cells, % ..	77·2	67·8	5·4	0
Reticulocytes, % ..	7·4	14·3	23·2	9·6

This hæmolytic anæmia, despite the high reticulocytosis, due to the rapid elimination of the "tagged" cells by the reticulo-endothelial system, was associated with only a slight rise in the blood-bilirubin (0·9 mg. per 100 ml.), and was not accompanied by methæmoglobinæmia. The leaden blue discoloration of the skin was very pronounced. It is unlikely that the administration of iron could counteract the development of this anæmia, which, however, will gradually disappear when the sulphetrone and its split products have been eliminated from the tissues.

By a coincidence your previous issue—that of contained an article, by Dr. Bourne, on the a action of 'Cryogenine.' It is worth mentio similar hæmolytic anæmias occur after cryoge observed in tuberculous patients some years a cryogenine anæmia is due to the formation o hydrazine from the administered phenylsemica

Severe anæmia from these products, both are being used in the treatment of the same —tuberculosis—though with different purposes, averted by withholding the drugs on the appea a high percentage of "tagged" cells.

City General Hospital,
Sheffield, 5.

S. VA
Hæmat

DEOXYCORTONE ACETATE AND ASCORBIC IN RHEUMATOID ARTHRITIS

SIR,—Like other rheumatologists we were anxi confirm the good results recorded by Lewin and Wa in treating rheumatoid arthritis with deoxyco acetate and ascorbic acid.

Our results agree with those of Kellgren.[3] patients have been treated. All were undoul suffering from rheumatoid arthritis and all sl signs of activity. The treatment was carried out e as described. All were carefully examined befor after the treatment; accurate measurements recorded of the maximum circumference of sw joints (where feasible) and of the range of active m ment. The erythrocyte-sedimentation rate (E.S.R. recorded before and after. No changes in signs observed in any of these cases, and the E.S.R. rema unchanged. One patient said he felt better afte injections and another that he felt dopey; the o felt no change. The one who felt better had a se treatment without any benefit.

ERNEST FLETCHER
Physician-in-Char

BRANDON LUSH
Physician-in-Traini

J. F. BUCHAN
Medical Registra

S. WOLFF
House Physician.

Unit of Rheumatology,
The Royal Free Hospital,
North Western Branch, London,
N.W.3.

INTRAVENOUS INFUSIONS

SIR,—During the past few weeks, some most interesti and helpful notes have been published in your journ concerning the technique of administering intraveno fluids and also the sterilisation of 'Polythene' tubing.

For the past eighteen months, I have been usi polythene tubing (sterilised by boiling) for intraveno therapy, and have found it particularly useful for babie rendering cumbersome splints and difficult immobilisatio of the foot unnecessary, and making nursing muc easier. In adults, I introduce it into a forearm vei through a needle, or by cutting down on a vein an tying it off in the usual way. So far, I believe, m results are better than those obtained by the olde methods. The method allows the patient freedom o movement, and I can usually keep the same vein in use for five or six days. The end-result, however, is always the same; thrombophlebitis develops, necessitating the removal of the tubing.

I have been trying to perfect this technique for the continuous administration of penicillin in cases of subacute bacterial endocarditis. In my last patient, I introduced the tubing through a needle into a forearm vein with strict aseptic technique. The patient was

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1. Ungricht, M. *Folia hæmat., Lpz.* 1938, 60, 115.
2. Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.
3. Kellgren, J. H. *Ibid*, p. 1108.

University of London

At recent examinations the following were successful:

M.S., Branch I (surgery).—B. G. A. Lilwall, B. E. C. Stanley.

M.S., Branch IV (laryngology, otology, and rhinology).—Mohammud Marzook Abdul Cader.

C.P.H.—K. J. Adams, A. S. Beadel, H. E. A. Carson, H. D. Conway, P. R. Cooper, David Crichton, Naomi Doron, J. J. Duffy, C. C. Draper, F. O. Fernando, Michael Gelfand, F. C. Griggs, L. F. Gunaratna, F. J. Ingham, I. S. Kadama, Doreen Landreth-Smith, M. M. Lewis, Low Chin Seang, Muriel J. Lowe, R. W. McConnachie, Alison D. McDonald, Renato Malan, Abdulmajid Hajimahamed-ramzan Memon, F. W. Mount, K. C. D. Perera, W. S. Perera, H. T. Phillips, Eileen M. Ring, G. E. de S. Rupasingha, Lore M. Schulte-Frohlinde, W. D. L. Smith, G. H. Stuart, Ping-Ming Teng, D. A. Thamotheram, J. D. Tonkinson, W. C. Turner, J. M. Urquhart, P. A. M. van de Linde, P. H. Vernon, J. L. Walsh, F. L. Wheaton, W. A. Young.

Mr. E. H. F. Baldwin, PH.D., has been appointed to the chair of biochemistry at University College.

On Monday, Jan. 23, at 5.30 P.M., at the London School of Hygiene, Keppel Street, W.C 1, Prof. P. Grabar, of the Pasteur Institute, Paris, will give a lecture on Origins and Functions of Globulins and Antibodies. On Tuesday, Feb. 7, at 5 P.M. at Westminster Medical School, Dr. J. G. Borst, professor of internal medicine in the University of Amsterdam, is to give a lecture on the Circulation in Disease.

The following courses have also been arranged: Mr. F. Bergel, D.SC., four lectures on Pharmacological Chemistry (beginning on Friday, Jan. 20, at 5.15 P.M.); Dr. L. C. Thomson, three lectures on Visual Physiology (beginning on Tuesday, Feb. 7, at 5.15 P.M.); Dr. Tudor Jones, three lectures on the Peptide Bond in Biochemistry (beginning on Thursday, Feb. 23, at 4.45 P.M.). All the lectures will be held at University College, Gower Street, W.C.1.

Order of St. John of Jerusalem

The King has sanctioned the following promotions in, and appointments to, this order:

As Knight.— Colonel J. L. Hamilton, M.C., M.D.

As Commanders.—H. E. Skeete, O.B.E., M.D.; F. R. B. H. Kennedy, M.B.E., L.R.C.P.E.; James Lamberton, M.B.; E. H. Shaw, M.D.; O. T. J. C. de H. Clayre, M.R.C.S.; F. H. Edwards, F.R.C.S.E.; Lieut.-Colonel William George, M.C., M.B.; W. F. J. Whitley, M.D; Hon. Paul Boffa, O.B.E., M.D.; Arthur Percy Spark, M.B.

As Associate Commander.—Gopal Haridas, M.R.C.P.

As Officers.—C. P. Craggs, M.B.; Paul Grima, M.D.; F. L. Firkin, M.B.; Major A. R. Home, M.B.; B. S. Collings, M.R.C.S.; R. H. O. Garbutt, L.R.C.P.E.; A. J. Owston, M.R.C.S.; E. H. Capel, M.D.; Brigadier A. L. Dawkins, O.B.E., F.R.C.S.

As Associate Officer.—B. C. Cohen, M.B.

Appointments to Boards of Teaching Hospitals

The Minister of Health has made the following appointments to the boards of governors of London teaching hospitals:

University College Hospital.—Dr. J. C. Hawksley, F.R.C.P.

Hospital for Sick Children.—Dr. G. H. Newns.

Hospital for Diseases of the Chest.—Dr. A. Hope Gosse, F.R.C.P.

Congress on Gastroenterology

The second European congress of the National Association of Gastroenterology will be held in Madrid from May 4 to 7, when there will be discussions on all diseases of the biliary tract except lithiasis and cancer. The speakers will include Prof. R. A. Gregory and Dr. A. H. Douthwaite. Further information may be had from the general secretary, Jorge Juan 41, Madrid.

Congress on Diseases of the Chest

The first International Congress on Diseases of the Chest will be held at the Carlo Forlanini Institute, Rome, from Sept. 17 to 20, under the auspices of the council on international affairs of the American College of Chest Physicians and the Carlo Forlanini Institute. Further information may be had from Prof. A. Omodei Zorini, Carlo Forlanini Institute, Rome, Italy, or from Dr. Chevalier L. Jackson, 500, North Dearborn Street, Chicago 10, Illinois, U.S.A.

Midland Institute of Otology

This institute, which was founded in 1947, held its annual general meeting in Birmingham on Oct. 27. The following were elected as officers for the ensuing year: president, Mr. W. Stirk Adams; vice-president, Mr. W. L. Thomas; honorary secretary, Mr. Reginald S. Strang; honorary treasurer, Mr. W. H. Lomas; members of council, Mr. B. S. Carter, Mr. J. B. Cavenagh, Mr. E. Collins, Mr. Robert Evans, Mr. F. Brayshaw Gilhespey, Mr. Hamilton Baynes, and Mr. Sydney Vernon.

Fellowship for Freedom in Medicine

The membership of this fellowship now exceeds 3000.

R.A.F. Appointment

Air Commodore W. E. Barnes has been appointed principal medical officer of Technical Training Command with the acting rank of air vice-marshal.

British Association of Plastic Surgeons

The following officers have been elected for 1950: president, Mr. Rainsford Mowlem; hon. treasurer, Mr. R. P. Osborne; hon. secretary, Mr. J. P. Reidy; editor of journal, Mr. A. B. Wallace; council, Mr. J. N. Barron, Mr. R. J. V. Battle, Sir Harold Gillies, Mr. W. Hynes, Prof. T. Pomfret Kilner, Sir Archibald McIndoe, Mr. J. S. Tough.

King Edward's Hospital Fund for London

The Fund has received a further instalment of £100,000 from the Nuffield Trust for the Special Areas. Lord Nuffield provided that any sums which might later be available from this trust should pass to the King's Fund. A total of £1¼ million has now been received.

Incidence of Sickness Claims

In England and Wales new claims to sickness benefit under the National Insurance Act during the weeks ended Dec. 6, 13, 20, and 27, 1949, numbered 119,100, 109,300, 99,700, and 58,900. The weekly averages in the months from January to November, 1949, were as follows: 157,900, 179,800, 185,200, 114,400, 97,700, 83,500, 78,600, 88,800, 100,900, 119,100, and 136,200. These figures are given in the Registrar-General's return of births and deaths for the week ended Dec. 31.

Teaching-hospital Secretaries

The Industrial Court has awarded secretaries of undergraduate teaching hospitals a salary of £1750 on appointment, rising by steps to £2000 after four years; the scale is to apply from July 5, 1949. The Minister of Health, in a letter to boards of governors, has expressed the view that each of these secretaries "should normally have direct administrative responsibility for one or more of the hospitals in the teaching group, as well as acting as Secretary to the Board and chief administrative officer of the hospital group."

Salaries of Hospital Pharmacists

The following scales for hospital pharmacists have been agreed following an award by the Industrial Court:

	£
Pharmacist	425–25–525
Senior pharmacist	475–25–575
Deputy chief pharmacist	525–25–625
Chief pharmacist:	
Category I	525–25–625
Category II	575–25–675
Category III	625–25–725
Category IV	675–25–825

Employment of the Tuberculous at Sanatoria

In a memorandum to hospital authorities the Ministry of Health suggests that "the practice of employing tuberculous persons on the staffs of sanatoria is a valuable contribution to the provision of suitable employment for those whose condition restricts the scope of work which they can undertake without detriment to their own health or risk to others." The advantages of this practice, says the memorandum, "are that restored tuberculosis patients are enabled to earn a livelihood in a familiar environment under constant medical supervision and to have the amount and nature of their work adjusted to individual needs and capabilities; that the tuberculosis hospital service is helped by using men and women with personal experience of the disease; and that in such persons, especially when acting as nurses, patients under treatment find a particular degree of sympathy and understanding." There are, however, difficulties. The health of these tuberculous people "may be precarious and prevent them doing as much as a completely fit person. There is also the possibility that their employment may give rise to a fear of infection among others working with them who are not tuberculous. At large institutions experience has shown that this difficulty may be largely met by arranging separate living accommodation; and at smaller institutions an expedient might be to arrange for the healthy staff to be mainly non-resident."

Notes and News

ANOTHER CASE OF POISONING

THE Ministry of Health, with the collaboration of the Central Council for Health Education and with the advice of Prof. Robert Cruickshank, have sponsored a new Central Office of Information film on the need for cleanliness in handling food. *Another Case of Poisoning*, a 15-minute sound film, is built around a patient to whom everything seems to happen (including having his abdomen palpated through his pyjama jacket), and draws attention to the sources of food contamination in home, factory, and shop. First the danger of not washing the hands after using the lavatory is emphatically stressed, and then all the other faults—the housewife who is not particular about her cleanliness in preparing meals; a butcher who fondles animals and handles meat with his hand in a dirty bandage, and who keeps meat pies in the window with flies crawling over them; the café with the cutlery standing in dirty water, and unclean waitresses and kitchen staff; the barmaid who wipes the counter and then the glasses with the same cloth; the girl in the food factory who sneezes over the cream buns that she is preparing; the man handling trays of food and letting the ash from his cigarette drop over them.

The film has been available, without charge, from Jan. 1, and the Ministry hope that medical officers of health, catering firms, and other institutions employing food-handlers will arrange to show it. They consider its value will be greatly increased if it is included in a lecture, or preceded by a background talk given by someone who could deal with questions from the audience. Although the film has been made primarily for food-handlers, it is hoped that showings for housewives will also be arranged. Borrowers who have a 16 mm. sound projector should apply to the Central Film Library, S.W.7; others to the films division of the Central Office of Information, 83, Baker Street, W.1. An earlier film, *The Good Housewife in the Kitchen*, which deals with hygienic storage of food in the larder and kitchen, is also available.

The Ministry of Health have also sponsored three trailers: *Handkerchief Drill*, *Scalding Hot* (hints on prevention of such accidents in the home), and *Nothing in the Bottle* (a plea for a return of the 2 million medicine bottles issued each week under the National Health Service).

ROYAL MEDICAL BENEVOLENT FUND

THE Christmas Gift appeal made by Lord Webb-Johnson, president of the R.M.B.F., brought in £2591 7*s.* 7*d.*—a better response than ever before. The committee decided that in present circumstances the gifts ought to be larger than the usual £5, and they authorised a distribution of £10 to each beneficiary. This cost £4590, made up as follows:

	£	s.	d.
Donations to the Christmas Appeal ..	£2591	7	7
From the general funds	£1998	12	5
	£4590	0	0

The gratitude expressed by all the recipients proved how greatly this work of extra benevolence during the winter months is appreciated and valued.

CORTISONE FROM A BOTANICAL SOURCE

LAST summer there seemed to be good hope that 'Cortisone' might be produced in increased quantities and at smaller cost from sarmentogenin, which is derived from the seeds of *Strophanthus sarmentosus*.[1] This vine is to be found in Liberia, but a recent report [2] indicates that here there exists no large ready source of the substance. The seed ripens in an elongated pod 11–12 months after the vine has flowered and fruited; but a research-worker living in Liberia has observed that a liane which grew beside his house, though it flowered profusely each year, fruited only twice in eight years. Africans use the seed pods to make hunting arrows and for medicinal purposes, and the best chance of successful collection is in uninhabited areas. Colonel Hildrus A. Poindexter, director of the United States Public Health Service mission in Liberia, has estimated that at least twenty years will be required to solve the botanical problems in its commercial growth as a source of cortisone.

A Medical Research Council expedition left for Nigeria last November.

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1. See *Lancet*, 1949, ii, 399.
2. *New York Times*, Jan. 2.

RESEARCH INTO DEAFNESS

THE trustees of the Alexander Pigot Wernher memori trust, through the Medical Research Council, have establish a research unit on deafness at the Institute of Laryngolo and Otology (University of London). Mr. T. S. Littler, PH.D., has been appointed director of the unit, and Miss E. Whetnal F.R.C.S. assistant director. The unit has also the assistan of Mr. D. B. Fry, consultant in phonetics to the institute, and of a staff of research registrars, physicists, and technician The unit is housed at the Golden Square Hospital, where it will work in close association with the deafness aid clinic of the Royal National Throat, Nose, and Ear Hospital. Its programme includes investigation of improved treatment of otitis media and of deafness developing with age; methods of measuring residual hearing for adults and children, and the various problems associated with the use and design of hearing-aids are also being studied. The unit has agreed to carry out research on behalf of the electro-acoustics committee of the Medical Research Council and the Ministry of Health.

AMENDMENTS TO THE NATIONAL FORMULARY 1949

THE Joint Formulary Committee has decided that, where preparations appear in the *National Formulary 1949* and the *British Pharmaceutical Codex 1949* under the same main title or synonym, they shall, with the exception of guttæ cocainæ and tabellæ ferri sulphatis compositæ, be dispensed or prepared according to the formula of the 1949 *Codex* from the date on which the Minister of Health decides that this shall replace the 1934 *Codex* for National Health Servic purposes. The following list gives those preparations of the *National Formulary* which are chiefly affected by this decisio (where the main titles are not identical, that of the corre sponding *B.P.C.* preparation is given in parentheses):

Applicatio dicophani.

Collodium acidi salicylici.

Collyrium: acidi borici, acidi citrici, boracis compositum hydrargyri oxycyanidi, sodii bicarbonatis, sodii chloridi, zinc compositum.

Conspersus: acidi salicylici compositus, hydrargyri subchlorid compositus, talci boricus (talci borici *B.P.C.*), zinci oxidi et amyl compositus.

i oxid

.P.C.

B..

mitis

sulphati-

inæ, lachesinæ, penicillini, physo-

, zinci sulphatis.

Insufflatio argenti picratis.

Liquor: boracis et formaldehydi, iodi simplex.

Lotio: calaminæ oleosa, cupro-zincica (cupri et zinci sulphatum *B.P.C.*), picis carbonis et plumbi, plumbi, plumbi et glycerini plumbi evaporans.

Mistura: ammoniæ ... ammonii chlorid et morphinæ, cascaræ ... tis, ipecacuanhæ alkalina, potassii bromi ... aleriane, potassii iodidi ammoniata, rhei

Pasta: picis carbonis, ... composita *B.P.C.*), resorcinolis mitis (resorcinolis composita mitis *B.P.C.*), zinci oxidi cum acido salicylico.

Pigmentum: iodi compositum, iodoformi compositum, podophylli, tinctorium.

Tabellæ ferri carbonatis.

Trochisci: ammonii chloridi, formaldehydi.

Unguentum: acidi benzoici compositu acidi salicylici et sulphuris, cinchocainæ forte, hydrargyri ammoniati et picis carb denigrescens, iodi denigrescens cum methylis salicylate.

Mistura pro infantibus: acidi acetylsalicylici, ipecacuanh ammoniata, stramonii et potassii iodidi.

University of Oxford

In a congregation held on Dec. 15, the following degrees were conferred:

D.M.—R. G. Harrison, C. W. M. Whitty.

B.M.—J. C. S. Ainley-Walker, M. de G. Gribble, Anthony Ryle, John Hamill, A. S. Welbourne, I. K. Anderson, J. H. Wakely, D. D. Stephens, M. T. Ashcroft, D. E. Freeland, R. W. Gilliatt, A. D. Munro-Faure, G. M. Robertson, J. F. T. Allison, Murray Brookes, H. I. Jory, A. M. O. Blood, W. H. J. Summerskill,* J. E. von Bergen, Lawrence Mackie, Arnold Cohen, H. V. James, M. C. Spencer, Sheila von Bergen, Elizabeth F. Browne, Honor E. Bambridge, Faye V. Tallack, Patricia J. A. Cooper, Joan Wheelwright, Edith M. W. Elliott.

* In absentia.

Royal College of Physicians of London

Sir Weldon Dalrymple-Champneys will deliver the Milroy lectures at the college, Pall Mall East, S.W.1, on Tuesday and Thursday, Feb. 14 and 16, at 5 P.M. He has chosen as his subject Undulant Fever, a Neglected Problem.

POSTOPERATIVE PARALYSIS IN THE UPPER EXTREMITY

REPORT OF FIVE CASES

M. R. EWING
M.B. Edin., F.R.C.S., F.R.C.S.E.
SENIOR LECTURER IN SURGERY, POSTGRADUATE MEDICAL SCHOOL OF LONDON

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The risk of these paralyses has been widely known since the turn of the century, but it is my impression, both from discreet inquiry and from the frank admissions of surgeons and anæsthetists elsewhere, that they have been increasingly frequent in recent years. Perhaps this paper may encourage others to report similar experiences.

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The patient's general condition after operation was not good, and it was nearly a week later, when he was somewhat better, that he complained of discomfort in the left upper arm. This was attributed at the time to phlebitis in a superficial vein following a protracted spell of infusion. Almost two months later (on Dec. 2) at a follow-up examination the patient complained of persisting weakness of the left arm, and was found to have a wasted and paralysed biceps. By Feb. 24, 1949, there was still no voluntary contraction of the left biceps and no response to faradism, but when last seen on Aug. 12, the patient had no disability and the wasting was less evident.

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General anæsthesia was induced with thiopentone, gas, oxygen, and ether by the endotracheal route, and this was supplemented throughout the operation with small repeated doses of curare. The operation, which involved resection of a portion of the bladder and prostate, took almost three hours.

The patient was very ill for some days subsequently, and almost every accessible vein in each arm was used at one time or another for infusion. When in the first week after operation he complained of discomfort in the muscles of the upper arm, it was, as in case 1, first attributed to thrombosis in these much abused superficial veins.

Later the patient developed an intractable urinary fistula and remained in hospital for many months, but it was not until Feb. 8, 1949, when he called my attention to his thin upper arm, that I discovered that his biceps on the left side was both weak and wasted. Elbow flexion and supination were severely impaired, the voluntary muscle power in the biceps being recorded on Feb. 28 as 2 (M.R.C. coding). There was no response to faradism. The patient also complained of some numbness on the dorsum of the thumb and along the radial border of the forearm, but no sensory dysfunction could be demonstrated. On being questioned at this stage he said (and he was most reliable and observant) that weakness had also appeared immediately after operation in the right arm, making shaving almost impossible. He had had at this time several accidents when lifting cups of tea or a water-jug from his bedside table. He had noted steady progressive recovery in the succeeding weeks, and there was no obvious impairment of motor power in this arm when I examined it on Feb. 8. The history, however, left me in no doubt that his musculocutaneous nerve had also been damaged on the right side, but had completely and spontaneously recovered. When the patient left hospital on June 15 recovery on the left side was still imperfect.

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On the day after operation the patient complained of weakness of the right hand and forearm, and could not extend the elbow to reach objects on her bedside table. The triceps (all three heads), the dorsiflexors of the wrist, and the extensors of the metacarpophalangeal joints were mainly affected, but there was also some weakness of the abductors of the 4th and 5th fingers and hyperæsthesia in the ulnar distribution. By the third postoperative day the patient could carry out all movements against gravity except extension at the metacarpophalangeal joints, and there was no sensory impairment. When last seen, in September, 1948, her recovery had long since been complete and there was no residual disability.

Case 4.—A short stout woman, aged 59, weighing 9 st. 2 lb., was operated on for resection of a carcinoma of the pelvic colon involving the bladder, on Jan. 10, 1949. Anæsthesia was induced with thiopentone and maintained with endotracheal gas and oxygen, supplemented with curare. The operation lasted for about $2\frac{1}{2}$ hours, for most of which time the patient was in a mild Trendelenburg tilt, with shoulder-rests in position. Both arms were abducted and extended at the shoulder and were secured in the "crucifix" position to a double arm-board, the right being used for blood-transfusion and the left for a sphygmomanometer cuff.

On recovering from the anæsthetic the patient complained of weakness of the right arm. There was complete loss of abduction at the shoulder, though the suprascapular and long thoracic nerves were unaffected. There was some feeble contraction of the triceps but none was perceptible in the biceps. The muscles supplied by the median and ulnar nerves were intact, but there was loss of supination of the forearm and of dorsiflexion at the wrist. There was no sensory loss.

From the beginning there was slow but steady improvement, and, when the patient was discharged home, on Feb. 2, the wrist-drop had virtually disappeared. The weakness of the biceps (especially) and of the other supinators was, however, still obvious.

Case 5.—A fit and well-nourished woman, aged 54, weighing 12 st. 1 lb., had a carcinoma high in the rectum; this was resected from the abdomen, with preservation of the sphincters, on March 14, 1949. Anæsthesia was induced with thiopentone and maintained with endotracheal cyclopropane,

Conference on Maternity and Child Welfare

The National Association for Maternity and Child Welfare will hold their annual conference on June 28, 29, and 30, at Friends House, Euston Road, London, N.W.1. Further information may be had from the secretary of the association, 5, Tavistock Place, W.C.1.

British Health Resorts Association

A meeting of the old council and members of this association will be held on Wednesday, Jan. 18, at 4.30 P.M., at 11, Chandos Street, London, W.1, to elect a new council and officers so that the association may be revived. Others who are interested are invited to attend. The acting hon. secretary is Dr. M. B. Ray.

British Standards of Hospital Equipment

Hospital authorities have been urged by the Ministry of Health to "use the published British Standards to the maximum practicable extent in purchasing equipment and supplies. Wherever possible, it should be a condition of contracts and orders that the quality of the goods to be supplied shall not be inferior to that specified in the appropriate British Standard and they shall be made to the standard dimensions laid down. This is the practice where purchases are made centrally."

Laboratory Animals

The Laboratory Animals Bureau is holding a congress of animal attendants on Thursday and Friday, March 30 and 31, at the Royal Veterinary College, Royal College Street, London, N.W.1. The congress is open to those, other than university graduates, whose work involves the use, care, and handling of laboratory animals; it is not restricted to senior animal attendants. Applications for tickets should be sent to the director of the bureau, at the college.

Sickness Benefit

According to the Ministry of National Insurance, some self-employed people are under the impression that they cannot draw sickness benefit during the first four weeks of illness. The self-employed are in fact in the same position as the employed: normally they can get sickness benefit after the third day of illness, and in some circumstances from the first day. Both self-employed and employed should send a medical certificate to the local National Insurance office within three days of the first day of incapacity; or, failing this, the office should be notified by letter, and the medical certificate should follow as soon as possible and certainly within ten days from the first day of incapacity.

Proposed Health Advisory Council for Manchester Region

Discussions have lately taken place between representatives of the Manchester regional hospital board, the board of governors of the United Manchester Hospitals, and some executive councils and local health authorities in the region to consider the best way of helping the different authorities providing health services in the region to work together. At a meeting held on Oct. 31 it was decided that an advisory council should be set up to discuss matters affecting the joint interests of two or more of the constituent bodies; to advise on the coördination of health services; and to disseminate information to the constituent bodies. The council will consist of 8 representatives of hospital interests (6 appointed by the regional hospital board, and 2 by the board of governors of the United Manchester Hospitals); 8 representatives appointed by the local health authorities; and 8 appointed by the executive councils.

Ministry of Food Bulletin.—This weekly bulletin is now available to the public through H.M. Stationery Office. It has been published for ten years but its circulation has been limited to the staff of the Ministry and other Government departments. The annual subscription is £1 1*s*. including postage, and single copies will be sold at 4*d*., postage 1*d*.

The Society of Chemical Industry is starting publication of a new monthly, the *Journal of the Science of Food and Agriculture*, which will contain original articles and reviews of recent work. It is obtainable by non-members at 30*s*. per annum, or 3*s*. for a single copy, on application to the society, 56, Victoria Street, London, S.W.1.

Appointments

BRITT, R. G., M.R.C.S., D.M.R.D.: senior registrar in radiolo Peterborough area.

HIGGINS, GEOFFREY, M.B., B.SC. Leeds, D.P.H.: M.O.H. and divisio M.O. to Thorne Rural District Council and County Council West Riding, Yorks.

JONES, D. H., M.B.E., M.R.C.S., D.P.M.: asst. psychiatrist (S.H.M grade), Pen-y-Val Hospital, Abergavenny.

MAILER, W. A. R., L.M.S.S.A.: regional M.O., Scottish region, Briti Railways.

QUINLAN, J. T., M.B., N.U.I., D.C.P.: consultant pathologi Wrexham area.

Diary of the Week

JAN. 15–21

Monday, 16th

HUNTERIAN SOCIETY
8.30 P.M. (Mansion House.) Prof. René A. Gutmann (Paris Early Diagnosis of Gastric Carcinoma. (Hunterian lectur

Tuesday, 17th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. F. Douglas Stephens: Hirschsprung's Disease. (Arr and Gale lecture.)
LONDON SCHOOL OF HYGIENE, Keppel Street, W.C.1
2 P.M. Prof. N. H. Swellengrebel (Amsterdam): Plague in Jav
INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: Histopathology of the Skin.
MIDDLESEX COUNTY MEDICAL SOCIETY
3 P.M. (West Middlesex Hospital, Isleworth.) Demonstration cases and specimens.
4.45 P.M. Dr. E. P. Quibell: Non-specific Mediastin Adenitis. Dr. D. P. M. McAllen: Potassium Metabol in Intestinal Disease.

Wednesday, 18th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. D. F. Ellison Nash: Surgical Aspects of Renal Dama in Childhood. (Arris and Gale lecture.)
LONDON SCHOOL OF HYGIENE
2 P.M. Professor Swellengrebel: How the Malaria Service Indonesia Came into Being.
INSTITUTE OF PSYCHIATRY, Maudsley Hospital, S.E.5
4.30 P.M. Dr. E. Stengel: lecture-demonstration.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. C. W. McKenny: X-ray Technique.
HARVEIAN SOCIETY OF LONDON
8 P.M. (11, Chandos Street, W.1.) Dr. Desmond MacManu Reflections on General Practice in the Last 30 Yea (Presidential address.)
MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
8.30 P.M. (Royal College of Surgeons, 18, Nicolson Stree Mr. Andrew Lowden, Dr. W. I. Card: Peptic Ulcer.

Thursday, 19th

ROYAL COLLEGE OF SURGEONS
5 P.M. Dr. Magnus Haines: Tumours of the Ovary. (Erasm Wilson demonstration.)
ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, Portlan Place, W.1
grebel: The Malaria Epidemic
land.
CINE, Horseferry Road, S.W.1
meeting on Pulmonary Mycosis.
ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Denis Williams: Neurology lecture-demonstratio

Friday, 20th

UNIVERSITY COLLEGE, Gower Street, W.C.1
5.15 P.M. Mr. F. Bergel, D.SC.: Aspects of Pharmacologica Chemistry. (First of four lectures.)
FACULTY OF RADIOLOGISTS
2.15 P.M. (Royal College of Surgeons.) Prof. Robert McWhirte Adnexal Tumours.
MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. W. Russell Brain: Neurological demonstration.
BRITISH TUBERCULOSIS ASSOCIATION
3.15 P.M. (26, Portland Place, W.1.) Dr. H. J. Ustvedt, Pr
Lionel ls, Dr. Alice Stewart:
That It not the Major Factor
in the I
BRITISH ASSOCIATION OF PHYSICAL MEDICINE
5 P.M. (St. George's Hospital.) Mr. A. H. M. Siddons: Some Modern Methods in Chest Surgery.

Saturday, 21st

BIOCHEMICAL SOCIETY
11 A.M. (Postgraduate Medical School of London, Ducane Road, W.12.) Short papers and demonstrations.

CORRIGENDUM.—*New Conceptions in Hirschsprung's Disease.* In our annotation of Jan. 7 the intramural ganglion cells found to be absent in the distal colonic segment should not be described (para. 2, line 16) as "sympathetic"; and ref. 3, to F. D. Stephens, should read: *Proc. R. Soc. Med.* 1949, **42**, 223.

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Case 5.—A fit and well-nourished woman, aged 54, weighing 12 st. 1 lb., had a carcinoma high in the rectum; this was resected from the abdomen, with preservation of the sphincters, on March 14, 1949. Anæsthesia was induced with thiopentone and maintained with endotracheal cyclopropane, supplemented with curare. The operation lasted $3^{1}/_{2}$ hours, and for most of this period the patient was in a slight head-down position, with the legs flexed at the knee and secured to the dropped end of the table, and the shoulders supported by padded rests. The left arm was used for blood-transfusion, being secured for this purpose in abduction, with the elbow extended and the forearm supinated.

On the morning after operation the patient had an almost complete paralysis of both upper extremities. On the right side she could feebly flex the fingers and adduct the thumb. The triceps too was contracting but could not extend the elbow against gravity. On the left side movement was limited to poor flexion of fingers 1–4 and to adduction of the thumb. There was also diminished sensation to pinprick on the radial border of each forearm. The patient was severely incapacitated, being totally unable to move in bed, feed herself, turn the pages of a book, or even hold a newspaper.

Recovery was steady from the start, beginning with the return of power in the long flexors and in the extensors of the elbow and wrist. Shoulder movements, including abduction, soon followed, and the last movements to return were elbow flexion and supination. The left arm lagged behind the right at all stages in the recovery. None of the muscle groups in either arm lost at any stage their response to faradism, but on April 28, voluntary power of the left biceps was still recorded as 1, and of the left supinator as 0. The patient at this stage could do all things for herself, including combing her hair and dressing her temporary colostomy. By June 2 there was almost complete recovery in the right arm. The left arm was, however, still weak especially the movements of elbow flexion and of supination of the forearm. The grip on this side was also deficient, especially flexion of the thumb and of the index and middle fingers. The patient reported that until recently these fingers had felt rather clumsy and useless, and sensation had been apparently dulled, but this was now returning.

DISCUSSION

Mechanism

The most comprehensive paper on postoperative nerve palsies that I have been able to trace among those written in recent years is that of Clausen (1942). He reported 9 such cases affecting the brachial plexus and put forward suggestions concerning the mechanism of this injury. Though he mentioned that in certain positions of the arm the plexus may be compressed between the clavicle and the first rib, he was not impressed with this as an important cause of damage, and with this view I heartily agree. It is well known that this complication is especially frequent after operations in which a Trendelenburg tilt has been used. This was certainly true in 4 out of 5 of my patients, in 6 out of the 9 Clausen reported, in all 3 of Baldwin's (1928), and in 3 of the 4 in Achard's (1946) series.

It is widely believed that the damage is caused in this position by the direct pressure of an inadequately padded and incorrectly placed shoulder-rest, which is presumed to bear directly on the plexus before it leaves the root of the neck to pass behind the clavicle. Care is accordingly taken, not only to make certain that the brace is generously covered with 'Sorbo' rubber and cotton-wool but also that it comes to lie opposite the acromion and not further medially, where it can press on the soft tissues over the posterior triangle. Baldwin was of the opinion that the rests were responsible in all of his cases, and was satisfied that the latter use of a carefully padded broad shoulder-yoke, which he described, had been responsible for the elimination of this complication from his gynæcological clinic.

I do not deny for a moment that it is wise to take such precautions, but in my view tension or stretching is much more important than direct compression. The plexus is deeply placed in the root of the neck, buffered by tough fascial layers, and sheltered from above and behind by the fairly generous muscle belly of trapezius. It is therefore difficult to bring pressure to bear directly on the plexus; or so at least it seems when one attempts this manœuvre in the cadaver. I find it hard to believe that an unpadded shoulder-rest, even of the not uncommon semicircular pattern, can press directly on the major nerve-trunks in the root of the neck. Moreover, as Denny-Brown and Brenner (1944) have made clear, the primary cause of the disturbance of nerve function which follows pressure on a nerve is obliteration of its vessels, with resulting ischæmia. It was, however, in their experience exceedingly difficult to cause any such disturbance in a major nerve-trunk: "its compartmented physical structure . . . is such as to protect some of the longitudinal vessels from exposed pressure." They found in fact that, even with direct pressure exerted on a bare nerve by a mercury bag, small blood-vessels could remain patent in the interstices between blanched nerve bundles. That direct pressure from the shoulder brace is not an important cause is also suggested by the occurrence of paralysis when the arms have been secured by the wrists, and when incorrectly placed shoulder-rests have not taken any of the body-weight in the Trendelenburg position (as was the case with one patient in Clausen's series).

Quite the most vulnerable position in our view is that of a Trendelenburg tilt combined with abduction at the shoulder. In many operations these days an arm vein is wanted for the giving of thiopentone or other drugs, or for the infusion of blood or saline, and often for this purpose the arm is brought out from the side and secured to an arm-board. This was certainly true in all 5 of my cases, and 4 of the 6 patients in Clausen's series had a venoclysis at operation in what was subsequently the paralysed limb. Every one of Baldwin's patients, too, was given, during the operation, a saline infusion. We are told that these operations were done with the patients' arms folded across the chest. It seems not unlikely, however, that the infusions were given into arm veins, and no doubt the limbs were, for a time at least, brought out into abduction. However, Baldwin was prepared to discount the rôle of the position of the arm during infusion, largely on the ground that it was a routine in all major pelvic operations, most of which, of course, escaped paralysis. In every one of the 4 cases reported by Achard (1946) the affected arm had been brought out into abduction during the operation, in 3 instances for blood-transfusion.

Denny-Brown and Doherty (1945) have shown that a nerve can be damaged by stretching. This is probably especially true of the major nerve-trunks, which are not so extensible as their more peripheral and smaller divisions. (Experimentally, however, these workers found it difficult to injure the bigger nerves by stretching.)

The nerve-trunks of the upper extremity are anchored at their points of emergence from the vertebral column and probably, too, at their ultimate points of distribution, or alternatively, as Clausen suggests, by their fascial attachments in the axilla. Though nerves are extensible, there is a limit to the amount of stretching they can withstand, and any position which involves, for long enough, too wide a separation of the fixed ends of the nerve is likely to be injurious. With the arm by the side, the separation of the two ends is at its maximum when the fingers and wrist are dorsiflexed, the elbow extended, and the forearm in full supination. Extension of the neck and pulling of the head over towards the opposite side may add a little more.

Now the nerve bundles pass distally along the medial aspect of the arm, so any limb movement in front of the coronal plane of the trunk and below the level of the shoulder is unlikely to cause any harm, excepting always some gross avulsing injury involving distraction at the shoulder-joint. When, however, the arm is pulled up into abduction at the shoulder, in the coronal plane of the trunk or behind it, there are several anatomical structures round which the nerve-trunks may become angulated with resulting stretching. Clausen holds that the tendinous arch formed by the insertion of pectoralis minor into the coracoid, by acting as a fulcrum in this way, is in part responsible. If the shoulder girdle is not allowed to rotate—e.g., by impact against a shoulder-rest—this may well be so, but the risk of stretching over the prominence of the head of the humerus in the axilla seems to us much more real. This was, in fact, noted by Clausen as a possible source of trouble, and was mentioned by Halstead as long ago as 1908.

When the humerus is abducted in lateral rotation, its head certainly forms a well-marked prominence in the axilla round which the nerve-trunks must pass as they run laterally across the subscapularis muscle. (This is often clearly seen during the axillary dissection in a radical mastectomy.) Now, this is just the position in which the arm is most often placed when an intravenous infusion is being given—i.e., abduction to 90°, often behind the coronal plane (if it is secured to an arm-board tucked in, for example, under the rubber table-cover), the elbow and wrist being extended and the forearm in supination.

What happens now, if with the arm in this position the patient is placed in a head-down tilt? In the Trendelenburg position we have what really amounts to a forcible pulling down of the shoulder girdle. In fact, the shoulders (and sometimes the wrists, too) are secured to the table, and that component of the body-weight which is all the time tending to push the patient downwards off the table is counterbalanced by the structures which sling the shoulder girdle from the trunk, and among these must be counted the nerve-trunks. The steeper the Trendelenburg tilt and the heavier the patient the greater this component will be; and the longer the position is maintained the longer it will operate.

Most of the strain is probably borne in a conscious person by the tonic contraction of the sling muscles of the shoulder girdle, especially by trapezius and the rhomboids, which together maintain the upper limb, for a time at least, in its normal relationship to the vertebral column. This was certainly true on the one occasion when we investigated this question in a healthy volunteer. A radiogram was taken of the root of the neck and of the shoulder girdle, first with the volunteer recumbent in the horizontal position, and then with the table at a Trendelenburg angle of 30° or thereabouts, the position of the tube in relation to the table remaining unchanged throughout. We had hoped to demonstrate some degree of depression of the shoulder but in this we were disappointed.

Conditions are, however, quite different in a conscious healthy volunteer from those in a deeply anæsthetised patient placed in the same position for a period which may amount even to several hours. I have not had an opportunity of taking comparable radiographs on the operating-table.

It is not unreasonable, however, to suppose that, during a long operation, the muscles, if not already rendered completely flaccid by the depth of anæsthesia, will soon become tired out if they are called on to withstand an excessive strain for too long. As they yield, some of the tension will be exerted on other structures, among them the vulnerable nerve-trunks.

When, in the early days of major abdominal surgery (in the 'nineties or thereabouts), these cases were first noticed, it became the custom to explain them away as being due to the particular narcotic agent then in vogue. There was, however, no real evidence against any of those agents, and we have no reason now to suspect that any of the newer anæsthetics are at all to blame. It does seem, however, that curare and its derivatives have been largely responsible for the increased prevalence of these injuries in recent years. This view has also been expressed by Slocum et al. (1948). The complete generalised muscular flaccidity which this valuable adjunct to general anæsthesia can achieve seems almost certain to increase the risk of tension on the nerve-trunks, as the trunk telescopes up between the restrained shoulders in the Trendelenburg position. It is noteworthy that in each of my cases the patient had received at least one dose of curare.

It might be anticipated that this complication would be especially frequent in patients who were overweight, but this was not the case, either in my experience or in Clausen's. It is interesting, however, that all of my cases were submitted to a long operation, and the shortest operation in Clausen's series took 2½ hours.

The tendency of the head-down tilt position to cause forcible depression of the shoulder girdle will have the effect of rendering still more evident the prominence formed by the head of the humerus. Moreover, in the Trendelenburg position we not only have abduction but we have abduction with a shoulder girdle which cannot readily rotate, so the acromion acts as a fulcrum pushing the humeral head still further down into the axilla. Nor is this all. In the course of an interesting operation (and this is especially true of a teaching hospital) there may well be a press of energetic assistants or of over-curious spectators who, in their eagerness to see what is going on, wedge themselves firmly in towards the operation field and convert the initial arm/trunk angle of 90° into something dangerously greater. With a double arm-board there is a similar danger when the opposite arm is thoughtlessly pushed into adduction.

Add to all this the forcible drawing (by the anæsthetist this time) of the patient's head and neck to the opposite side, and it is surely little wonder that plexus injuries occasionally occur—in fact, one wonders why they do not occur more often.

It has been suggested that the main risk of abduction of the arm when shoulder-rests are accurately in position is that of displacement of the whole trunk towards the abducted side, so that the shoulder-rest comes to press against the trapezius and the plexus (Slocum et al. 1948). I do not consider this an important mechanism in the causation of these nerve injuries.

But paralysis occurs after operations in the Trendelenburg position during which the arms have at no time been abducted. It is interesting that in case 5, in which the paralysis was bilateral, it was more severe, more extensive in its distribution, and also considerably slower in its complete recovery on the side of the abducted arm.

Paralysis also follows operations in which the table has remained throughout in the horizontal position, as in case 3. Its occurrence has been reported, too, after thoracic operations conducted with the patient lying on one side and with the uppermost (and subsequently affected) arm drawn up in full abduction (and usually in these cases in internal rotation) beside the patient's head (Clausen 1942), or even in the supine position with one or both arms drawn up in this way.

Turney (1899), in an admirable communication on this subject to the Society of Anæsthetists, said that such paralysis "depends on the nefarious practice of dragging the patient's arm or arms forcibly over his head, sometimes for convenience in feeling the pulse, but more often to get the limb out of the way of the surgeon." He was of the opinion that, with the arm in this position, the plexus became compressed between the clavicle and the scalene muscle or the first rib.

I believe that in all these circumstances the mechanism is likely to be the same—i.e., tension or overstretching of the plexus. In a patient whose back is extended over a double gall-bladder wedge and with his arms bound back in the crucifix position to a double arm-board, stress on the nerve bundles certainly is not unlikely.

Examination of the cadaver seems in some measure to support the above hypothesis, though

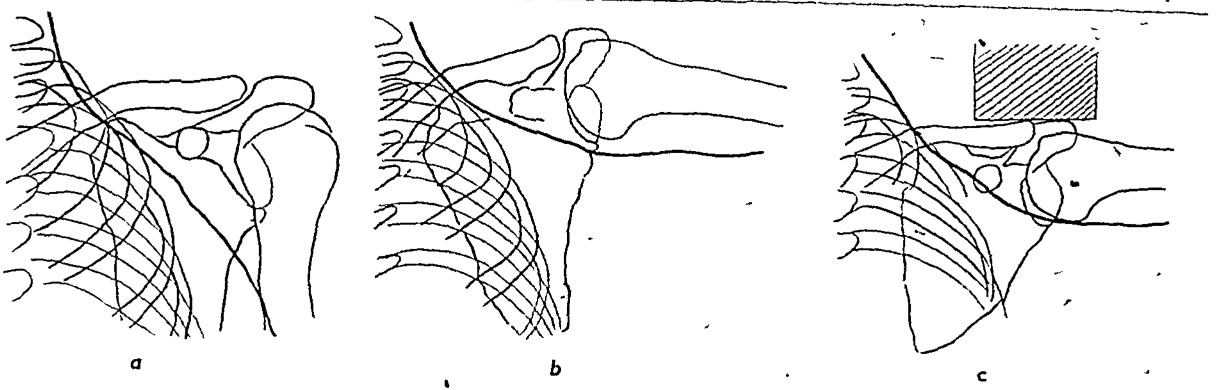

Fig. 1—Relation of brachial nerve-trunks (black line) to head of humerus in different positions of arm: *a*, arm adducted; *b*, arm abducted, extended, and laterally rotated; *c*, as in *b* but with weight applied to acromion.

makes the value of any such observations less real. The plexus and the main nerve-trunks in the axilla can be *fairly freely* exposed by three short incisions—one just above the clavicle, one along the lateral wall of the axilla, and a third, between these two, parallel with the fibres of pectoralis major, which can be gently separated with the blunt end of a scalpel. This exploration does not involve any considerable division of muscle, and it is possible in this way not only to feel but also to see how the nerves lie in different positions of the arm.

Downward *traction on the adducted arm seems to* put the plexus under some tension, but there is no sign in this position of the angulation over the first rib which Clausen believed to be important. The tightness of the nerve-trunks is, however, much greater when the shoulder is abducted and laterally rotated with the elbow in extension, and there now becomes clearly apparent the prominence of the humeral head in the axilla round which the nerve-trunks are seen to be stretched. At the prominence of this curve it is the musculo-cutaneous nerve which lies most closely against the subscapularis cushion, and the *apparent frequency of its involvement* in our cases (cases 1 and 2) may well be related to its position at this point. As the degree of abduction is increased (the arm still being held in full lateral rotation) so the tension mounts.

When, in addition to abduction, lateral rotation, and extension of the shoulder, the acromion was forcibly pushed caudally, the plexus and nerve-trunks became as tight as bow-strings. They seemed, in fact, as they crossed the unyielding fulcrum formed by the humeral head, to be bent as one would bend a green stick across one's knee. Extension of the head and neck to the opposite side did not seem to make matters noticeably worse.

With the arm in full abduction the clavicle falls backwards against the first rib, but any pressure on the plexus in this position is inconsiderable: in full adduction this space becomes opened out.

I have tried to record these observations radiologically by outlining the upper limit of the plexus and the line of the major nerve-trunks in the axilla with malleable wire secured by Michel clips, or with clips alone. Figs. 1 and 2 are tracings of radiograms obtained in this way. In fig. 1*a* the arm was lying adducted by the side; in fig. 1*b* it was brought out into abduction, extension, and full lateral rotation at the shoulder, the elbow being extended. The corrugations of the wire at this stage became rather less evident, but it was only when firm downward pressure was applied through a wooden block against the acromion that the fulcrum action of the humeral head against the plexus became apparent (fig. 1*c*).

Similar findings were obtained in a second cadaver, but in a third cadaver abduction of the arm did not stretch the plexus unduly; in fact, the plexus seemed to slip forwards across the anterior aspect of the rotated humeral head (fig. 2).

Most of the patients who develop these complications are women. This might suggest that there is some peculiarity in the arrangement of the nerves or in the configuration of the bony skeleton which renders the female plexus especially liable to this type of injury. It used to be said that "cervical rib" is more common in women, and it is still true that the "costoclavicular syndrome" (as it is now the fashion, maybe less in*correctly, to style the same complaint)* is more common in women. This is probably because in the female the shoulders are naturally more drooping than in the male and *that* this often becomes *pathological* in degree when the muscles supporting the shoulder girdle are overtired. Some of these arguments might also be put forward to explain the apparent high percentage of postoperative plexus injuries in women. I feel sure, however, that this high frequency is not so much related to structural abnormalities but is rather a direct result of the high proportion of gynæcological operations done in the Trendelenburg position. The reported high percentage of cases after pelvic operations can be similarly explained.

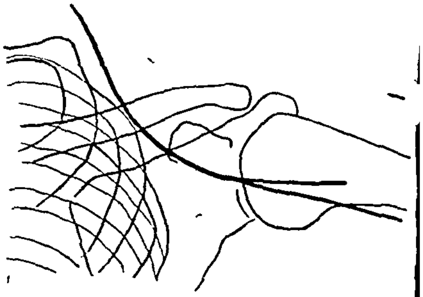

Fig. 2—Position as in 1b, but brachial plexus has slipped across head of humerus, avoiding pressure.

Prognosis

Complete recovery in these cases seems to be almost the rule but it may, as in our patients, take some months. The paralysis is predominantly motor, and the lesion is one of neurapraxia or of axonotmesis and never of neurotmesis. The upper part of the plexus is most commonly involved, but lesions affecting the 8th cervical and 1st dorsal root have also been reported.

Prevention

The prevention of this distressing postoperative complication involves avoiding, so far as possible, all the conditions which favour the development of the mechanisms of injury which I have elaborated above.

We must particularly anticipate trouble when the operation is a long one in the Trendelenburg position, the more so if curare is used as an aid to muscular relaxation. In no circumstance must the arm be abducted with the patient in this position. If it seems ikely to be necessary, a needle or cannula with a generous length of rubber tubing should be inserted into an arm vein (preferably one on the dorsal aspect of the wrist or forearm) before the operation begins, so that the arm can then safely be folded across the chest or tucked out of the way under the towels down by the side. Alternatively, use can be made of a convenient vein somewhere round the ankle.

In fact, wide abduction of the arm for long periods is to be avoided during any operation, and the arm should never be secured in extension to a single or, worse still, to a double arm-board. If it becomes urgent to bring the arm out from the side, whether for venoclysis or for the application of a sphygmomanometer cuff, care must be taken not to hold it in lateral rotation and with a fully extended elbow and supinated forearm.

Hyperabduction of the arm, too, must be studiously avoided, as should any manipulations under full anæsthesia which involve a sustained pull on the arm even in the adducted position.

Padding of the shoulder-rests alone, however desirable, will not prevent these paralyses, nor will the fashioning of *any alternative yoke*, however carefully it may be designed to fit the shoulders. Securing the wrists to the table is no better; what is wanted is some method of preventing the patient from slipping down the table which will act not from the upper arm to the trunk through the agency of the sling mechanism of the shoulder girdle. We can, of course, for some operations—and this is probably the practice in most gynæcological clinics—break the table and flex the knees, but undue pressure on the calf is undesirable as likely to increase the risk of deep venous thrombosis. It is not readily possible to adopt this manœuvre in a rectal excision, more especially since it is not our practice in most cases to do a synchronous combined abdominoperineal operation using the Lloyd-Davies leg supports. No doubt they contrive in some measure to prevent the patient from slipping down the table, but it seems that something more is needed. We now take good care not to tilt the table much down by the head, and recently we have taken to inserting under the upper part of the sacrum a thin but long sausage-shaped sandbag secured to the foot of the table; this seems to help considerably in preventing the trunk from pressing downward too hard against the shoulder-rests. If these accidents should unhappily continue, it may be necessary to devise some method of utilising the iliac crests as points of pressure, or of securing the thighs to the uprights of the leg supports.

SUMMARY

Five cases of upper-arm paralysis following operation are reported.

In two patients there was a partial brachial plexus lesion, and in one of them it was bilateral.

Recovery was in all cases almost complete within a few months.

The wide use of curare may be partly responsible for the present prevalence of this complication.

The various mechanisms of this injury are discussed, and some evidence is given that in this respect abduction of the arm in the Trendelenburg position is a particularly dangerous manœuvre.

My thanks are due to Prof. Ian Aird for his helpful criticism and to Dr. Duncan White for the X-ray photographs.

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BRACHIAL PLEXUS LESIONS AFTER CHOLECYSTECTOMY

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Lesions of the peripheral nervous system arising during anæsthesia are by no means uncommon. When the peripheral nerves themselves are injured, the mechanism is usually clear, and the relation of the damaged nerve to some source of pressure is apparent. The brachial plexus too is susceptible to injury but the factors involved are less obvious.

Büdinger (1894) published the first description of brachial-plexus lesions occurring during anæsthesia, and further cases were described by Krumm (1895), Garriques (1897), Horsley (1899), and Green (1902). In recent years relatively little attention appears to have been paid to the condition, but Clausen (1942) reviewed 9 cases and discussed the possible causes.

In most of the cases described, the lesion has been associated with the use of the Trendelenburg position. Injuries to the plexus are less common in other positions and consequently their occurrence is less widely recognised. Those following cholecystectomy show this same numerical relationship to the Trendelenburg position, though Clausen reports an example in which the operation was done in the horizontal supine position.

The present short series of cases occurred in two hospitals during a period of a year. They are described to draw attention to this disabling postoperative complication, which in spite of improvements in surgical and anæsthetic techniques still occurs too frequently.

Case 1.—A man, aged 66, had a cholecystectomy on Jan. 17, 1949. He was given 1·4 g. of thiopentone and 35 mg. of tubocurarine chloride, and anæsthesia was maintained with cyclopropane and oxygen. The patient was in the horizontal supine position and a gall-bladder rest was used. His arms were abducted to about 90° and during the operation a pint of saline and a pint of blood were given intravenously into the right arm. The operation lasted 135 minutes.

On his recovery from the anæsthetic the man's right upper limb was totally paralysed. The deep reflexes were lost but there was no sensory impairment.

Ten days later considerable recovery of power had occurred. He could abduct the arm to 90° but all movements were still weak. He now complained of pain in the right shoulder, radiating down the outside of the arm to the wrist. The muscles were tender.

Seven months after operation he still had difficulty in his work, which involved lifting heavy weights. He also complained of an aching pain in the upper arm and the muscles were tender. There was slight wasting of the volar aspect of the right forearm with slight weakness (4 to 4 + on the Medical Research Council scale) of the deltoid, supraspinatus, extensors of the wrist, supinators, pronators, the long flexor of the thumb, the thenar muscles, and the dorsal interossei. The deep reflexes in the two arms were equal and there was no sensory loss. X-ray films of the cervical spine showed no abnormality. It was difficult to obliterate the radial pulses, and in this respect there was no difference in the two arms.

In this case there was a complete brachial-plexus palsy without sensory loss. Initially recovery was rapid, but even after seven months it was not complete.

Case 2.—A man, aged 31, had a cholecystectomy on June 13, 1949. He received 'Omnopon' gr. $^1/_2$, scopolamine gr. $^1/_{150}$, and tubocurarine 45 mg., followed by gas, oxygen, and ether. The horizontal supine position was used, with a gall-bladder rest. The arms were abducted to about 90° in the plane of the trunk or a little behind it and externally rotated. In this case, and in case 3, a "gall-bladder harness" was used to maintain the position of the arms; this consists of two adjustable leather cuffs, joined by a piece of padded chain which, when the harness is in use, passes behind the patient's neck. The operation lasted 80 minutes.

On his recovery from the anæsthetic the man was found to have profound weakness in both arms, more marked on the right.

Next day he complained of pins and needles in both hands. Power began to return in both arms, but seven days after the operation examination revealed considerable weakness in all the muscles innervated via the two brachial plexuses, with the exception of the rhomboids. In general the weakness was greater on the right. The infraspinati (Rt 3 +, Lt 4), deltoids (Rt 2, Lt 4), triceps (Rt 3, Lt 4—), and small muscles of the hands (Rt 3 +, Lt 4) were particularly affected, and the muscles were all flabby and tender. The deep reflexes were absent in both arms but there was no sensory loss. There was well-marked tenderness over both plexuses. The radial pulses could be obliterated easily when the arms were abducted, but there was no radiological abnormality of the cervical spine. Ten days after the operation he complained of pain across the shoulders and down both arms to the elbows, which kept him awake at night. By five weeks after the operation, considerable recovery had occurred and the deep reflexes had returned.

Four months after the operation there was slight residual weakness of the extensors of the right wrist and fingers. He still complained of an aching pain in the upper right arm and the muscles were still tender.

This patient had a partial lesion of both brachial plexuses in which all roots were involved but without sensory loss. After four months, recovery in the left arm was complete and that in the right arm almost so.

Case 3.—A woman, aged 20, had a cholecystectomy on May 12, 1949. She was given thiopentone 0·65 g., 'C10' 7 mg., cyclopropane, and oxygen. Both a gall-bladder rest and a gall-bladder harness (see case 2) were used. The operation was performed in the horizontal supine position with the arms abducted to about 70° in the plane of the trunk and externally rotated. It lasted 75 minutes.

On her recovery from the anæsthetic the patient complained of gross weakness and numbness of the left arm.

After three days sensation began to return down the medial side of the arm and to the medial three fingers. Eight days after the operation she complained of a burning pain in the left shoulder and down the outer aspect of the limb to the thumb and index finger. There was considerable weakness of all muscles innervated by the left brachial plexus with the exception of the rhomboids, serratus anterior, and latissimus dorsi. The spinati (3), deltoid (2 +), biceps (3), and the small muscles of the hand (3 +) were affected more severely than the others. The deep reflexes were absent and there was some impairment of superficial sensation in the distribution of segments C5 and 6. The muscles were flabby and tender. The left thumb and index finger and brachial plexus were particularly tender. X-ray examination of the cervical spine revealed no abnormality. The left radial pulse could be obliterated easily with the arm abducted to 90° in the plane of the trunk. The right radial pulse was more difficult to abolish. Six weeks after the operation there was slight but definite wasting of the left thenar eminence, first interosseous space, forearm muscles, triceps, deltoid, and pectorals. Moderate weakness was still present. The deep reflexes were still absent but the sensory impairment was now confined to segment C6.

Five months after the operation only minimal wasting of the volar aspect of the forearm and first interosseous space was still evident, and, apart from slight weakness of extension of the wrist, power was normal. The deep reflexes had returned and there was no longer any sensory loss. She complained only of a tight feeling in her left arm and some tenderness of the left thumb. She could now type as well as before the operation but was disinclined to carry heavy weights.

In this case there was initially severe involvement of all roots of the brachial plexus. Recovery was virtually complete within five months.

Case 4.—A woman, aged 42, had a cholecystectomy on May 25, 1949. She was given 0·5 g. of thiopentone, 30 mg. of tubocurarine, cyclopropane, and oxygen. A gall-bladder rest was used. The left arm was abducted to 90°. At first the right arm was placed in the same position but later it was extended and externally rotated in addition. A pint of saline was given intravenously into the left arm during the operation, which lasted 80 minutes. On her recovery from the anæsthetic the patient was found to have a complete flaccid paral the right upper limb with a corresponding sensory loss.

Two weeks later the deltoid, spinati, pectorals, latis dorsi, biceps, brachioradialis, and triceps muscles were weak (3 —). The extensors of the wrist and hand (flexors (4), and small muscles of the hand (4 +) were less se affected. The deep reflexes were absent but the sensor was now confined to the area supplied by C5. Five after the operation considerable recovery had occurred b deltoid and spinati (4 —) were still weak enough to requi use of an abduction splint. The deep reflexes and se loss were unchanged.

Five months after operation the patient complained of a slight aching in her right shoulder. There was no ness or sensory loss, and the tendon reflexes in the two were equal.

This case showed a complete brachial-plexus l with sensory loss. The muscles supplied by the l roots recovered more rapidly than the others, but reco was complete in five months.

DISCUSSION

The occurrence of postoperative brachial-plexus les has been recognised for many years, but there is no gen agreement on their cause. The earlier workers ascri the damage of the plexus to pressure. Büdinger (1 contended that the lesion resulted from compres of the plexus between the clavicle and the first Krumm (1895) believed that in his cases the plexus compressed between the clavicle and the transv processes of the fifth and sixth cervical vertebræ, w Braun (quoted by Garriques 1897) thought that pres might be exerted on the plexus by the head of humerus when the arm was extended and extern rotated. An unquestionable example of a brach plexus lesion due to pressure is that related by Clau (1942), in which an inadequately padded shoulder impinged directly on the plexus of a patient in Trendelenburg position.

The alternative explanation, that the injury is due traction, was first advanced by Gerdy (quoted by Clau 1942). Horsley (1899) and others supported this vi and the more recent work of Stevens (1934) also favours The brachial plexus is fixed at each end, proximally, the level of the transverse processes by the preverteb fascia and distally by the axillary fascia. Tension in t plexus will develop therefore when distraction occ between these two attachments. A lesion following fall on the point of the shoulder is the most obvio example of this. Horsley (1899) indeed, by droppi cadavers on their heads so as to cause violent later flexion of the head and depression of the shoulder, show that actual disruption of the plexus could be produce Less severe but strictly comparable lesions of the plex may follow excessive lateral flexion of the neck of anæsthetised patient lying on his side.

Tension in the plexus may also be produced by placi the arms and neck in certain positions. In its course fro the neck to the arm, the plexus passes deep to the insertio of pectoralis minor into the coracoid process. Steven (1934) pointed out that this insertion acts as a pulley and that if the coracoid process is depressed the stra will fall on the upper roots of the plexus, whereas if it is raised the lower roots will suffer. When the arm abducted, extended, and externally rotated the head o the humerus becomes prominent, displacing the plexu forwards.

In 3 of the 4 cases described here, the affected lim (in 1 case both limbs) was abducted, extended, an externally rotated, while in the fourth it was abducte and extended only. These are positions which th anatomical studies quoted above have shown to b dangerous. Compression is likely to occur, the clavicl and first rib being the principal effective agents, an stretching of the plexus is inevitable. The theorie of pressure and traction are not mutually exclusive pure examples of each have been quoted from the published reports, but in most cases both play their ombined parts in varying degree.

Subsidiary factors, such as postfixation of the plexus, ervical ribs, or hypertrophied scalene muscles, which might be expected to predispose to plexus lesions, were not found in the cases described. The depth of anæshesia, with its resulting relaxation and loss of guarding muscle tone, is likely to influence the outcome, but the importance of this factor is extremely difficult to estimate accurately. It is noteworthy that all of the 4 patients discussed were given curare or allied drugs. In the same year 4 further cases of brachial-plexus palsies have been seen following the use of the Trendelenburg position, but they are not described in greater detail because this association is well recognised. They too, however, all received curare-like drugs. The frequency of these plexus injuries appears to have increased since the introduction of these substances into general anæsthetic practice.

Lastly there is the question of individual idiosyncrasy—perhaps the most important factor of all. The slope of the shoulders, the size of the cervico-axillary canal, the shape of the first rib, and other individual anatomical peculiarities, all within the limits of normality, may in combination render the brachial plexus vulnerable to pressure or traction.

It is unfortunate that in cholecystectomy the arms cannot be placed alongside the body if a gall-bladder rest be used, because of the danger of producing a lesion of the ulnar or radial nerve; such mishaps have been reported by Mullen (1939). Nor is the surgeon very willing to permit the hands to be folded across the chest, because they are liable to obstruct the field of operation. Some compromise is necessary between the surgeon's demands and the danger of damaging the patient's brachial plexus. The vulnerable position of the arms can be maintained in the great majority of patients without danger but an unpredictable few will develop a palsy. Safety can almost be guaranteed by keeping the arms adducted to the side with the forearms flexed and the hands supinated in front of the shoulders. This position can be achieved and maintained by applying the gall-bladder harness already described, taking care that the elbows are kept well into the side of the trunk. Briefly, safety can be ensured by avoiding such positions as produce discomfort in a conscious person.

Fortunately the prognosis in these cases is good and the 4 patients described have almost completely recovered. A persistent disability which may outlast the weakness is an aching pain in root distribution, associated with tenderness of muscles and in one case with tender finger-tips.

SUMMARY

Four cases of brachial-plexus lesions noted immediately after cholecystectomy are described.

The possible factors underlying the production of brachial-plexus lesions during anæsthesia are reviewed. The two main theories of their causation—pressure and traction—are not mutually exclusive, and in most cases the plexus has probably been submitted to both. The horizontal posture in itself is no safeguard against brachial-plexus lesions, and abduction of the arms, particularly when associated with extension and external rotation, is potentially dangerous.

The greater relaxation obtained with curare and similar drugs may in part be responsible for some increase in the incidence of brachial-plexus injuries.

I should like to thank those members of the staffs of King's College Hospital and Dulwich Hospital who have allowed me access to their cases. In particular I should like to express my gratitude to Dr. S. Nevin for his help and suggestions.

References at foot of next column

ÆTIOLOGY AND TREATMENT OF AURICULAR FLUTTER

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AURICULAR flutter was first differentiated from other types of arrhythmia by Jolley and Ritchie (1911). It has since been studied by many workers; in particular the physiopathology by Lewis (1912) and the clinical and therapeutic aspects by Parkinson and Bedford (1927). Our purpose is to discuss the ætiological factors, therapeutic results, and electrocardiographic features in 36 cases.

MATERIAL

Material for this study was selected from cases seen during recent years either in the department of cardiology of the Manchester Royal Infirmary or by Prof. Crighton Bramwell privately. Since a satisfactory definition of auricular flutter can only be made in terms of electrocardiography, we have included only cases in which the electrocardiogram showed constant and regular auricular activity with even spacing of the flutter or F waves. Neither the rate of auricular activity nor the amplitude of the F waves was regarded as important; for, though the auricular rate is usually more rapid, and the F waves smaller, in auricular fibrillation, this is not invariable, and no clear dividing line can be made on these grounds between the two arrhythmias.

Auricular flutter is usually divided into paroxysmal and permanent types. Parkinson and Bedford (1927) regarded flutter of less than fourteen days' duration as paroxysmal, whereas Blackford and Willius (1918) included under this heading only those cases in which there were paroxysms of palpitation lasting minutes or hours. Clinically it is impossible to distinguish paroxysms due to the onset of flutter from changes in the ratio of auricular to ventricular response occurring in cases of established flutter; for this reason we have not tried to divide our cases into paroxysmal and permanent types.

INCIDENCE OF AURICULAR FIBRILLATION AND FLUTTER AND RATIO OF FIBRILLATION TO FLUTTER

Observers	No. of cases	No. with fibrillation	No. with flutter	No. per 1000 cases		Ratio of fib. to flutt.
				Fib.	Flutt.	
Wedd (1924)	1300	137	9	100	7	14 : 1
Blackford and Willius (1918)	3500	363	16	103	5	20 : 1
Sprague and White (cited by White 1944)	10,000	1422	104	142	10	14 : 1
Present series.. ..	9458	715	16	77	1·7	45 : 1

INCIDENCE

These figures are based on cases seen in the department of cardiology in 1942–47, when 9458 patients were

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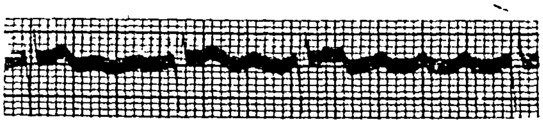

Fig. 1—Electrocardiogram (lead III) from a case of auricular fibrillation in which, for short periods, auricular activity is slow and regular, and which may therefore be confused with flutter.

examined electrocardiographically and 16 cases of auricular flutter were found. The incidence per 1000 cases, together with the incidence of auricular fibrillation, both in other workers' series and our own, is shown in the accompanying table. We were surprised to find that the flutter-fibrillation ratio in our series was much lower than that usually found, but this may be due to our criteria of selection, which exclude those cases of "impure flutter" in which auricular activity, though irregular, is sufficiently slow to cause confusion. Fig. 1 is an electrocardiogram (lead VR) from a case of auricular fibrillation of this kind, in which, for short periods, auricular activity is so slow and regular that it closely simulates flutter.

ÆTIOLOGY

Cases in which there was unequivocal clinical and radiological evidence of mitral stenosis were classified as rheumatic. Those with a persistent diastolic blood-pressure of 110 mm. Hg or more; with cardiac pain on effort; with clinical or electrocardiographic evidence of myocardial infarction; or with cardiac enlargement for which no other cause could be found, combined with peripheral arteriosclerosis, were classified as degenerative. The remaining cases were classified as miscellaneous.

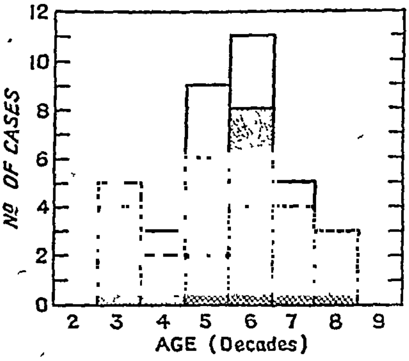

Fig. 2—Age-incidence and ætiology in 36 cases of auricular flutter: stippled columns, rheumatic; hatched columns, degenerative and hypertensive; blank columns, miscellaneous.

On this basis 14 cases were classified as rheumatic, 13 as degenerative, and 9 as miscellaneous. This last-named group comprised 2 patients with a history of rheumatic fever but no evidence of a valvular lesion; 2 with congenital heart-disease (1 pulmonary stenosis, and 1 an intra-atrial septal defect); 2 convalescent (1 after drainage of an empyema and 1 after pneumonectomy for a carcinoma bronchus); 1 thyrotoxic; 1 with active rheumatoid arthritis; and 1 case with a negative medical history and no objective evidence of heart-disease. In view of its interest this last case is reported here.

Case 1.—A clergyman, aged 45, was admitted to hospital on Dec. 28, 1934, with two weeks' history of palpitations and a rapid irregular heart action. He had had similar but shorter attacks on two previous occasions, in 1921 and 1923. His previous health had otherwise been excellent.

On examination the pulse was regular, rate 130 per min. The heart was clinically normal and the blood-pressure 105/70 mm. Hg. Radiography showed a heart of normal size and bilateral cervical ribs. The electrocardiogram showed auricular flutter with a 2:1 ventricular response.

Treatment was begun with digitalis, min. 735 of the tincture being given in 18 days without causing any change in the rhythm. A course of gr. 45 of quinidine was then given over 3 days without benefit, and the patient was discharged in January, 1935, on a maintenance dose of 'Digitalin Nativelle' gr. $^{1}/_{400}$ daily. The electrocardiogram still showed auricular flutter.

Follow-up.—In July, 1935, an electrocardiogram a normal sinus rhythm. In January, 1948, the wrote that he was symptom-free apart from occ bouts of palpitation.

The only abnormal findings in this case, apart fr arrhythmia, were bilateral cervical ribs, but it is i able that this abnormality was related to the condition. There was no clinical evidence of toxicosis but, since the patient was in the fifth when first seen, the possibility of degenerative disease cannot be excluded.

Fig. 2 shows the age-incidence and ætiology. greatest incidence is in the fifth and sixth decades, rheumatic heart-disease predominating in the younger age-groups, and degenerative and hypertensive disease in the elder.

The sex-incidence is 29 males to 7 females; this preponderance is partly explained by the liability of the male sex to degenerative c vascular disease, for all 13 cases in the degene group were in men.

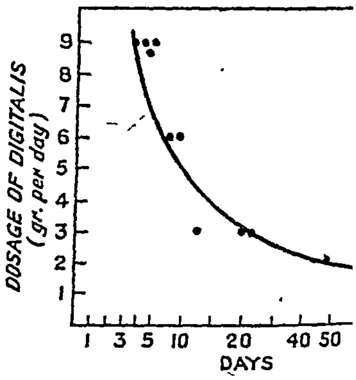

Fig. 3—Relation of dosage of digitalis to d of treatment before fibrillation superv 11 cases.

TREATMENT AND RESULTS

Digitalis alone was used in 14 cases, normal rh being induced in 8 (but 2 subsequently reverted to flu fibrillation supervening in 4, and flutter persisting in

In a further 9 cases treatment was initiated digitalis, fibrillation being induced in 4, and f persisting in 5. Quinidine was given to all 9 cases of the 4 which were fibrillating 1 regained normal rhy 2 reverted to flutter, and 1 continued to fibrillate. rhythm did not change in the 5 patients with persi flutter. Digitalis was continued in each case other the one converted to normal rhythm, and ultim normal rhythm was obtained in 3, persistent fibrill in 2, and the flutter continued in 3.

Quinidine alone was used in 3 cases, normal rhy being obtained in 1, and flutter persisting in the 2 ot

Thus, of 23 cases, digitalis caused normal rhyth be restored in 11 and induced permanent fibrillation Quinidine, given together with digitalis to 9 of patients, was responsible for restoration to no rhythm in 1. When quinidine was used alone further 3 cases, normal rhythm was restored in 1 and flutter persisted in the 2 others.

We found that the rapidity with which fibrillation could be induced varied with the dosage of digitalis used. In 5 cases given gr. 3 of the powdered leaf eight-hourly the change in rhythm occurred on the fourth da 4 (flutter persisted in the fifth), whereas in cases trea with only gr. 2 or 3 daily up to three months was necess In 11 cases electrocardiograms were taken often eno

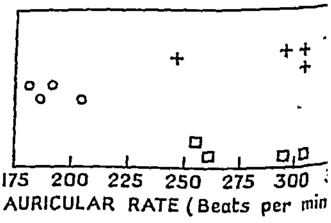

Fig. 4—Effect of digitalis and quinidin rate of auricular activity in 4 case persistent flutter: circles, after quinid crosses, after digitalis; squares, untre

or us to know when flutter changed to fibrillation and he time interval related to the dosage in these cases s shown in fig. 3. Fig. 4 shows the effect of digitalis and quinidine on the rate of auricular activity in 4 cases in which flutter persisted. The slowing produced by quinidine may permit a 1 : 1 ventricular response with the attendant risk of heart-failure; this happened in the following case.

Case 2.—A married woman, aged 58, was admitted to hospital on Feb. 28, 1947, with five months' history of palpitation and two years' history of attacks of rapid heart action, the longest having lasted nine months. She had had rheumatic fever at the age of 19.

On examination the pulse was irregular, rate 94 per min. There were no murmurs, but a third heart sound was audible at the apex. The blood-pressure was 150/90 mm. Hg. Radiography showed enlargement of the pulmonary conus and the left auricle. The electrocardiogram showed auricular flutter with a varying 4 : 1 ventricular response (fig. 5, upper record).

Treatment with digitalis gr. 1 t.i.d. was begun on March 3, but on the 13th flutter still persisted; so digitalis was discontinued. On March 18 quinidine was given in doses of gr. 6 two-hourly; but after the second dose severe palpitation and dyspnœa developed owing to a 1 : 1 ventricular response, the rate being 212 per min. (fig. 5, lower record). Quinidine was stopped, and digitalis was restarted in a dosage of gr. 3 daily and continued until March 24. Quinidine therapy was begun again on March 25, and gr. 90 was given in three days without causing distress but without affecting the arrhythmia.

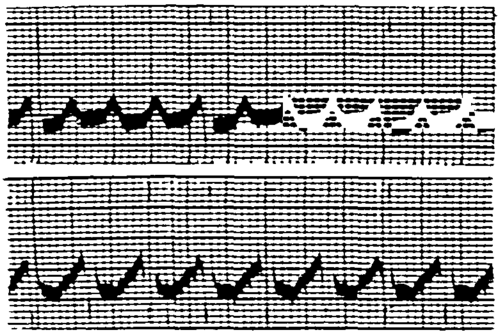

Fig. 5—Electrocardiograms (both CRI) from case 2: upper record, taken before treatment was begun, shows 4 : 1 ventricular response, auricular rate being 230 per minute; lower record, after gr. 12 of quinidine had been given, shows 1 : 1 ventricular response at a rate of 212 per minute.

Progress and Follow-up.—Flutter persisted, and the patient was discharged on April 2 on a maintenance dose of digitalis and feeling reasonably well. On July 3 she was symptom-free and well-controlled fibrillation was present.

It will be observed that in this case quinidine was tolerated only when the patient was fully digitalised.

In 10 of our 36 cases the therapeutic notes were insufficient to enable us to draw any conclusions.

ELECTROCARDIOGRAPHY

Auricular activity may not be shown equally well in each of the various leads. Of the bipolar limb leads we have found that lead II or lead III is the most satisfactory, but better records are often obtained with leads from the right præcordium.

Heard and Strauss (1917) noted that in some of their cases there was an iso-electric phase between each flutter wave, but Lewis (1912) had previously observed that auricular activity was continuous. We could not confirm the findings of Heard and Strauss, and have found that, though in one lead each auricular wave may be apparently discrete and separated from the adjacent wave by an iso-electric phase, a different lead taken immediately after will show continuous auricular activity. Fig. 6 shows serial leads (III and V₁) from a case of auricular flutter in which continuous auricular activity is evident in lead III, but the F waves are discrete in V₁. The auricular rate is 240 per minute.

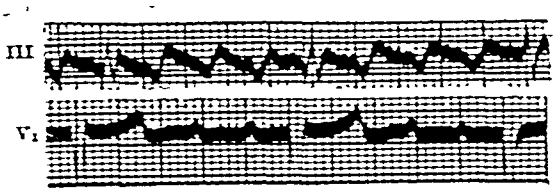

Fig. 6—Consecutive electrocardiograms (leads III and V₁) from a case of auricular flutter. Auricular activity is continuous in lead III, though in lead V₁ the F waves appear discrete and separated from each other by an iso-electric period.

In most cases we noted a constant time relation between the beginning of each ventricular complex and the preceding F wave, but occasionally there seemed to be a varying block and this relation was lost. Fig. 7 shows lead-III electrocardiograms from 2 cases illustrating this point.

DISCUSSION

The ætiological factors in our series correspond closely to those found by other workers (Ritchie 1914, Blackford and Willius 1918, Keating and Hajek 1922, Parkinson and Bedford 1927, Campbell 1947). All found evidence of organic heart-disease in 90% of cases, and the ætiology closely corresponds to that which White (1944) found in a large series of cases of auricular fibrillation. By contrast, in paroxysmal supraventricular tachycardia organic heart-disease is absent in 50% of cases (White 1944). Various workers (Wedd 1924, Parkinson and Bedford 1927, White 1944), have commented on the rarity of flutter in subacute bacterial endocarditis, acute rheumatic fever, and other febrile infections; we have not observed it in 60 cases of subacute bacterial endocarditis.

Our experience suggests that digitalis is the drug of choice, and our percentage of successful results corresponds closely to those of Blackford and Willius (1918) and Parkinson and Bedford (1927). We think it is important that full dosage should be used, not only because of the rapidity with which fibrillation may be induced but also because with small doses there is the danger that fibrillation, when it arises may not be adequately controlled. For this reason we did not withdraw digitalis when fibrillation arose, but we continued a maintenance dose indefinitely or, in successful cases, until normal rhythm supervened.

Quinidine we found to be ineffective, influencing the rhythm in only 2 of 12 cases. It is not without risk, but this risk may be minimised by first giving digitalis in full doses. Used in this way it may have a place in treatment; Tandowsky et al. (1946), giving quinidine after fibrillation had been induced with full doses of 1·5 mg. of lanatosid C intravenously, obtained conversion to normal rhythm in 14 out of 15 cases. It may, how-

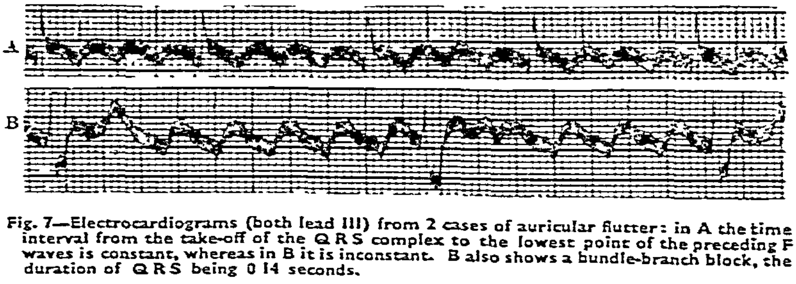

Fig. 7—Electrocardiograms (both lead III) from 2 cases of auricular flutter: in A the time interval from the take-off of the QRS complex to the lowest point of the preceding F waves is constant, whereas in B it is inconstant. B also shows a bundle-branch block, the duration of QRS being 0·14 seconds.

ever, as in 2 of our cases, produce reversion to flutter, and this was also observed by Parkinson and Bedford (1927). Both in their cases and in ours fibrillation was again induced by digitalis but Wolferth (1923) and Viko et al. (1923) have noted the production of a "fixed" flutter resisting all further treatment.

The likelihood of success in restoring normal rhythm does not seem to be related to the severity or type of associated organic heart-disease, an observation made also by *Parkinson and Bedford (1927)*.

We have noted how auricular activity can usually be demonstrated best by leads from the right præcordium. CR leads, in which the indifferent electrode is connected to the right arm, are often superior to V leads, in which the indifferent electrode is connected to a central terminal of about zero potential (Wilson et al. 1932), because the potential changes at the right arm summate with the potential changes at the exploring electrode, thus increasing the amplitude of deflection. With CF leads this effect will only be seen in those cases in which the heart is electrically vertical and consequently the left-arm electrode is facing the cavity of the ventricles.

SUMMARY

The ætiology and treatment, and some of the electrocardiographic features, of 36 cases of auricular flutter, selected by electrocardiography, are reported and discussed.

In 14 cases the ætiology was rheumatic and in 13 degenerative. In the remaining 9 cases various other ætiological factors were concerned.

In the treatment of auricular flutter digitalis is considered to be the drug of choice, normal rhythm having been restored in 11 of 23 cases so treated. The importance of adequate initial dosage is emphasised. *Quinidine has* proved much less effective, and some of its dangers are discussed.

Some features of the electrocardiogram are described.

We wish to thank Prof. Crighton Bramwell, at whose instigation this study was made, for his help and guidance; and Mr. T. Corless for technical help in the preparation of the electrocardiograms.

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"... The average working man in this country earns about £7 a week, and the national income presumably benefits by that amount of production whenever he is working. But when he is absent from illness or disability, that sum is lost and he receives in addition some £2–3 from the national exchequer for his maintenance, so that the national income is some £10 worse off for every week that he has to be away. Conversely, for every week that can be saved from his disability period by getting him back to work more quickly and more fit, some £10 is saved to the nation. This means that if you put 500 people through this rehabilitation department of yours and restore them to productive work one week earlier than would otherwise be the case, you will pay the whole cost of running the department; and every patient so restored beyond that figure of 500 will represent a net gain to the national economy."—Dr. HAROLD BALME, opening extensions to the department of physical medicine and rehabilitation, Bolton Royal Infirmary, on Dec. 1, 1949.

ARSINE POISONING IN INDUSTRY

REPORT OF A CASE

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ARSENIURETTED hydrogen, or arsine, is a colourle gas with the odour of garlic. It was first identified b Scheele in 1775, and its toxicity was strikingly demo strated in 1815, when Gehlen, a Munich chemist, die after inhaling it in his laboratory. Since then numero cases of poisoning in man have been described, most them resulting from industrial processes (Jones 190 Glaister 1908, 1913, Hake 1910, Dudley 1919, Wignall 192 Willcox 1922, Legge 1923, Zangger 1930, Bomford an Hunter 1932, Smith and Rardin 1939, Bulmer et al. 194 Hunter 1943, Wilson and Mangun 1943, Hawlick an Ley 1946); but in recent years the incidence has bee very low, and since 1935 only eight cases have bee reported to H.M. Chief Inspector of Factories. No cas has been *so reported since* 1941.

The highest incidence has been in metallurgical indu tries, including the cyanide process for extraction of gol (Jones 1907, Bulmer et al. 1940). Some cases have occurre in the manufacture of aniline dyes (Jones 1907). There h been a surprising frequency among chemists, presumabl due to failure to recognise the extreme toxicity the gas. A curious feature was the incidence in to balloon vendors, and in aeronauts during the ear days of ballooning, as a result of the use of hydrog contaminated with arsine (Glaister 1908, 1913).

Arsine is produced when nascent hydrogen is releas in the presence of arseniferous materials. This occu when water reacts with metallic arsenides, in the Mars test, in the electrolysis of arsenides or arsenic-aci solutions, and in the reaction between mineral aci and metals when either is contaminated with arsenic.

CLINICAL PICTURE

The clinical features of arsine poisoning were describe by Glaister (1908) as general malaise, giddiness, pains i the head and epigastrium, shivering, a sense of oppressio of breathing, sometimes accompanied by cyanosis, nause and vomiting. These are quickly followed by continuou vomiting of bloody material, occasionally diarrhœa jaundice, pain in the loins and hepatic area, hæmorrhages and bloody urine, which may be succeeded by oliguri and anuria. The intellect remains clear, except fo terminal coma or delirium. Hiccup and subnorma temperature are mentioned as late features. The tim of onset of symptoms depends on the concentration o arsine and to a slight extent on the previous condition o the patient. The average time from exposure to onse of symptoms is 3–6 hours, with extremes of a few minutes and 24 hours.

Other workers broadly agree with these findings, and it seems that the outstanding features are severe constitutional upset, bloody urine, jaundice, and rapidly developing anæmia. Pyrexia has been reported in some cases. The sequence of onset of the features has been recorded as bloody urine in 4–6 hours, jaundice in 16–24 hours (Hunter 1943, Hawlick and Ley 1946), and anæmia on the third day (Hunter 1943) after exposure. Death may take place with extreme rapidity, or the patient may linger for 30 days (Glaister 1908, 1913), but death usually occurs between the third and seventh days (Glaister 1908, 1913). The case-mortality is about 30% (Glaister 1908, 1913). In survivors complete recovery seems to be the rule. Cases of chronic arsine poisoning have been described (Dudley 1919, Bulmer et al. 1940); these presented an additional feature in the form of subjective phenomena which were attributed to peripheral neuritis.

PATHOLOGY

Pathological findings were described by Glaister (1908, 1913) in nineteen fatal cases. The salient features are an enlarged liver, which is sometimes bile-stained; enlarged dark kidneys with prominent glomeruli; a dark, congested, friable, and sometimes enlarged spleen; and hyperæmia of the stomach and intestines, which sometimes show submucous hæmorrhages.

Histologically the hepatic cells show cloudy swelling and fatty degeneration; the renal glomeruli show detachment and proliferative swelling of the epithelial lining of Bowman's capsule; the renal tubules are in a state of desquamative inflammation, containing breaking-down corpuscles and hyaline, bloody, and fatty casts; and brown pigmentation is present in the hepatic, renal, intestinal, and cardiac cells. Other descriptions are substantially the same, except that the glomerular changes do not appear to be constant (Smith and Rardin 1939).

Examination of the blood reveals acute intravascular hæmolysis. In thirty chronic cases (Dudley 1919), 200 complete blood examinations showed a decrease in red cells with poikilocytosis, punctate basophilia, and polychromasia, but no increase in fragility. The white cells showed little change, though there was a small absolute increase in lymphocytes. The blood non-protein nitrogen is raised, sometimes to very high levels.

The urinary findings include hæmoglobinuria, methæmoglobinuria, and excess urobilin. The urinary deposit contains red-cell debris, granular material, and hyaline, bloody, and fatty casts. Urinary arsenic estimations (as As_2O_3) show very high values in the acute phase (Wignall 1920).

Hair and Nails.—The arsenic content of hair and nails has been determined in chronic cases (Dudley 1919) and significant values found; but in view of the possibility of contamination by arsenical dust in many of these cases caution should be used in interpreting the results.

CASE-RECORD

A male chemical-factory worker, aged 37, became ill on Nov. 12, 1948. His health had been normal, except that in July, 1948, he had developed a left facial palsy, and a mild paresis remained at the time of his admission. The onset of this palsy had antedated any contact with chemical mixtures. He had been employed in various capacities in the mixing department of the factory for 2 months. This work had involved the handling of arsenical powders, but full protective precautions had been observed.

On the morning of Nov. 12 he was working with a mixing machine. A mixture for preserving wall-boards, containing powdered white arsenic (As_2O_3), was made in the machine. After this the machine was swept but not washed out, and it was then used to mix a soot-removing compound consisting of common salt 440 lb., borax 22 lb., ammonium sulphate 22 lb., powdered sulphur 22 lb., oxalic acid 33 lb., and zinc dust 44 lb. The machine was started at about 8.30 A.M. and operated for about 45 min. During most of this time the lid was off. The patient alone was exposed to fumes from the mixture. He was not wearing a mask. At midday he began to have mild colicky upper abdominal pain. At 2 P.M. he passed bloody urine and at about the same time felt cold, started to shiver, and had a slight epistaxis. Next day he began to vomit, and he continued to eject all food for 48 hours. On the 14th he was jaundiced, and this steadily deepened. On Nov. 15 his liver edge was palpable and tender, his urine was less bloody but contained albumin, and his blood-urea level was 95 mg. per 100 ml. On Nov. 12–15 his temperature rose each evening to about 100·4°F. He was transferred to University College Hospital on Nov. 16.

On admission his general condition was fair; he was active and of normal mentality; he was obviously anæmic and showed warm cyanosis of his nose, lobes of ears, and finger-tips. He was considerably jaundiced, the resultant skin colour being a pale dusky yellow. Temperature 99·6°F, pulse-rate 86, respirations 20 per min. Systematic examination revealed only a few rhonchi at his lung bases, slight hyperkeratosis of the skin over his knees, and the facial palsy noted above. His liver was no longer palpable or tender. There was no evidence of hæmorrhage into his skin or mucosæ. His urine contained a trace of albumin, occasional pus cells, 1 red cell per $^1/_6$ in. field, very occasional granular casts, no bile, excess urobilin, and no hæmoglobin.

Blood Examination.—Hb 40% (Haldane); the red cells showed hypochromia and moderate anisocytosis; white-cell count 7200 per c.mm. (polymorphs 72%, lymphocytes 16%, monocytes 11·5%, eosinophils 0·5%); reticulocyte-count 5 per 100 red cells.

Treatment and Progress.—The patient was given a drip transfusion of two bottles of packed red cells. He subsequently made an uninterrupted recovery. His liver edge was palpable 1 in. below his costal margin on Nov. 19 but it was not tender; it receded to the costal margin in a week. His urinary output was satisfactory throughout. Further treatment consisted of the administration of ferrous sulphate gr. 12 daily by mouth. The Hb rose steadily to 88% on Dec. 7. Reticulocytes remained at 5% until Nov. 26 and had dropped to 0·4% on Dec. 7. On Nov. 17 the van den Bergh test showed a positive direct reaction and an indirect reaction of 2·0 units. On Nov. 18 examination of the blood-serum showed methæmalbumin (Fairley 1941) and a pigment behaving like sulphæmoglobin but with absorption-spectrum (α line) at 624·5 mμ in place of the expected 620 mμ. It was considered that this might be due to interference by methæmalbumin. On the same day the urine contained no excess of porphyrins. The blood-urea level was 48 mg. per 100 ml. on Nov. 18, 36 mg. on the 26th, and 42 mg. on Dec. 7. On Dec. 2 the urine contained no albumin, occasional pus cells, 1 red cell per $^1/_6$ in. field, and no casts.

Renal-function Tests.—On Dec. 6 the concentration test showed a maximum specific gravity of 1·020, and the dilution test showed a minimum specific gravity of 1·002. On the 7th the Van Slyke urea-concentration test showed a standard clearance of 60% and a maximum clearance of 70%.

Liver-function Tests.—On Nov. 29 colloidal-red, cephalin-cholesterol, and thymol-turbidity tests were normal. On Dec. 1 the hippuric-acid excretion test was normal.

Arsenic Content.—On Nov. 18 blood was taken for estimation of its arsenic content, which was found to be 0·95 parts per million.

Follow-up.—When the patient attended for examination on March 28, 1949, he was feeling very well and doing a full day's work, with overtime. His blood-pressure was 144/80 mm. Hg, and blood-urea 27 mg. per 100 ml. His urine contained no albumin, cells, or casts. A blood-count showed red cells 4,800,000; Hb 96%. The colloidal-red, cephalin-cholesterol, and thymol-turbidity liver-function tests were normal.

FURTHER CHEMICAL INVESTIGATIONS

Tests were carried out by Prof. C. Rimington, using chemicals supplied by the patient's firm, in the British Pharmacopœia apparatus for the detection and determination of arsenic by the yellow stain produced on mercuric-chloride paper. The chemicals were mixed in the proportions noted above. A control experiment without addition of arsenious oxide revealed the release of a trace of arsine. The experiment was then repeated, 0·1 mg. of arsenious oxide being mixed in the solid state with the other ingredients. The stain after an hour corresponded to about 10–15% conversion of As_2O_3 into arsine. The conclusion seems warranted that, during the mixing on the day of the accident, the residue of arsenious oxide in the mixing machine was partially reduced to arsine by the hydrogen released when oxalic acid reacted with zinc dust.

DISCUSSION

Differential Diagnosis

Conditions which may be confused with arsine poisoning are paroxysmal hæmoglobinuria, Weil's disease, potassium chlorate poisoning, pyrogallic acid poisoning, and blackwater fever (Glaister 1908, 1913). In industrial poisoning, mixtures of gases may be present (Hake 1910) and may confuse the diagnosis in the early phases. The history and clinical features in the present case clearly indicated arsine poisoning, and the laboratory findings were in agreement with this diagnosis.

Concentration of Arsine

It was impossible to estimate the concentration of arsine to which the patient was exposed. It is said that concentrations of 3–10 parts per million in air will produce slight symptoms after several hours' exposure, and that 16–60 parts per million will be dangerous after half to one hour's exposure. A concentration of 250 parts per million may be fatal after half an hour's exposure (McNally 1937, Henderson and Haggard 1943).

Mode of Action

Several workers have tried to elucidate the mode of action of arsine. Naunyn (1868) showed that lysis of red cells in vitro by arsine occurred only if oxygen was present. Subsequent workers have confirmed his findings. Hæmoglobin is the only constituent of blood that will react vigorously with arsine, and arsine is fixed in blood in a non-volatile form (Meissner 1913). This fixation of arsine is ascribed to oxidation to arsenious acid and arsenites or arsenic acid, or to the formation of a complex compound (Meissner 1913, Graham et al. 1946, Levvy 1946, 1947). The fixed arsenic is largely confined to the erythrocytes up to the time of hæmolysis (Thauer 1934, Graham et al. 1946).

Of the arsenic in the blood of rabbits poisoned with arsine 50–100% has been shown to be non-dialysable. This non-dialysable fraction seems to exist in two forms, the major of which behaves as arsenite after treatment of the blood with ferricyanide. The dialysable fraction seems to be present as an arsenite (Graham et al. 1946).

In the belief that arsine is probably converted to arsenite in the red cells, the effect of intraperitoneal arsine and arsenites has been investigated, and the toxicity of arsine has been found to be much greater than that of arsenites. As an explanation of this effect it has been suggested that some arsine remains free and has a direct action on vital organs, or alternatively that a proportion forms an unknown compound, probably a trivalent intermediate between arsine and arsenite, and that this has a similar effect (Levvy 1946, 1947, Hughes and Levvy 1947).

There seems to be no record of observations on the rate of removal of arsenic compounds from the blood after arsine poisoning in man. Most persons are exposed in addition to arsenic in other forms, and this would vitiate results.

Treatment

Rest is important; sudden death has been attributed to early activity in convalescence (Glaister 1908). Blood-transfusion is often necessary to replace the hæmolysed cells (Glaister 1913, Bulmer et al. 1940, Hawlick and Ley 1946).

The urine should be kept alkaline to reduce the effects of the hæmolytic products in the renal tubules (Wilson and Mangun 1943).

The value of 2–3, dimercapto-propanol (dimercaprol or BAL) in experimental arsine poisoning has been investigated by Kensler et al. (1946). It has a protective effect, but this diminishes so rapidly with the lapse of time after exposure that it is of little therapeutic value. A related compound, 2–3, dimercaptopropyl-ethyl ether, is more effective in protecting animals (Kensler et al. 1946, Riker 1946) but suffers from the same defect and has no effect on mortality when administered more than 5–6 hours after exposure. This substance has been noted to damage the central nervous system in animals when given intravenously but not when given subcutaneously. There is no record of its use in arsine poisoning in man; but it has been given subcutaneously to normal persons in doses comparable with those used successfully in animals, and no ill effects have been noted. It has been postulated that the protective action of these compounds depends on their reaction with oxidation products of arsine, probably arsenites; but this has not been proved (Kensler et al. 1946).

The value of dimercaprol and its derivative is cle
very limited. The interval since exposure con
indicated their use in the present case. One case of ar
poisoning treated with dimercaprol within 24 hours
been reported (Garlick 1949). The patient recove
but (as Garlick states) this may well have been beca
he had been exposed to a sublethal dose.

SUMMARY

A case of industrial arsine poisoning is described.
clinical and laboratory findings were typical. The pati
assisted by transfusion therapy, made an uninterrup
recovery and remained well 4½ months later. Spec
therapy was considered to be contra-indicated.

The ætiological, clinical, pathological, and therapeu
aspects of arsine poisoning are discussed.

We wish to thank Dr. J. C. Hawksley, at whose suggest
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Medical Inspector of Factories, for information about t
industrial aspects of the history.

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SEVERE URTICARIA COMPLICATING STREPTOMYCIN THERAPY

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SKIN eruptions in the course of streptomycin treatme
are common, but usually they are transient and n
considered to be an indication to discontinue treatme
In the first controlled investigations of streptomycin
clinical use in America skin reactions occurred in 30 out
706 cases treated (de Bakey and Pulaski 1946).
none of these was it found necessary to stop the tre
ment, and the conclusion of these workers was th
"vestibular disturbance is the only complicati
presently considered to be an indication for terminati
of drug therapy." The Medical Research Council co
mittee (1948), reviewing 52 cases of pulmonary tuberc
losis treated with streptomycin, stated that "tox
effects of streptomycin were observed in many patient
but in no single case did they necessitate cessation
treatment." The same conclusion was reached by t
Ministry of Health Standing Advisory Committee
Tuberculosis (1949), which asserted: "Sensitisati
reactions, such as skin erupti

stages of treatment are usually relieved by anti-histamine drugs."

Where streptomycin has been studied specifically for its toxic effects skin eruptions have been considered to be sufficiently mild for the drug to be continued in spite of them or, if more severe, to be resumed after a short interruption. Farrington et al. (1947) studied the toxic effects of a preparation of streptomycin which was at least 95% pure. In 2 of 14 cases extensive rash and fever developed, necessitating stopping the streptomycin, but in both cases it was resumed without ill effect some weeks later. Steiner and Fishburn (1947) studied 6 cases of skin eruption occurring in 33 cases treated with streptomycin, in no case was it necessary to interrupt treatment for more than a week.

A note of warning, however, had been sounded by the committee of chemotherapeutics of the National Research Council (1946). In this investigation 49 of 1000 patients treated with streptomycin developed skin eruptions, which were more common and more severe in patients receiving more than 1 g. of streptomycin daily. In nearly all the cases streptomycin was continued, but in a few cases it had to be withheld. The report recommended: "In most instances it is well to stop the streptomycin if a skin eruption appears; certainly the dose should be reduced, and if treatment is continued it should be done with care and caution." Earlier workers had noted severe reactions, and Heilman et al. (1945) advised: "Although administration of streptomycin may be continued in the presence of these cutaneous eruptions, it is exceedingly important to remember that severe dermatitis may result." The Veterans Administration (1947) found that a maculopapular rash appeared in 41 of their 223 patients, and that "the pruritus was usually easily controlled with 'Benadryl' and the eruption disappeared with continued treatment. In three instances however, a severe exfoliative dermatitis developed, and in only one of these could therapy be resumed subsequently." Major E. Woolf, R.A.M.C. (personal communication), mentions a case under his care in which extensive urticaria occurred and streptomycin had to be withheld. The "sprue-like mouth and swelling of the lips" described by Thevathasan (1949) may also be a sensitisation phenomenon.

In the case described below the skin eruption was so severe that the streptomycin had to be discontinued.

CASE-RECORD

A National Serviceman, aged 18½, was admitted to the military wing of this hospital on April 21, 1949. He had been transferred from another military hospital, where treatment with streptomycin had been begun on April 4 for bilateral pulmonary tuberculosis with recent spread and tuberculous laryngitis. No symptoms had been noted which could be attributed to streptomycin toxicity. On admission he weighed 8 st. 4 lb. and his temperature range was 98–99°F. It was decided to continue streptomycin 0·5 g. twice daily, with the patient at strict rest in bed.

Skin Eruption.—On April 25 an itchy papular rash appeared on both forearms and legs, coming up after each injection of streptomycin. Benadryl 50 mg. was given before each injection, and by this means the rash was kept under control for a week. On May 3, however, it reappeared, and this time affected the chest and back also. There was a rise in temperature to 100°F. Streptomycin was continued, with benadryl, but during the next two days the rash slowly spread and the constitutional upset became more severe. On May 5 the rash covered the whole trunk and limbs and was now more blotchy. The face was red, œdematous, and peeling, and there was œdema of the external genitalia. Constitutional disturbance was severe, with drowsiness and photophobia, and the temperature had risen to 103–104°F. The white-cell count was 22,150 per c.mm., with an absolute lymphocytosis (polymorphs 27·5%, lymphocytes 69·5%, eosinophils 0·5%, monocytes 2·5%). Streptomycin was discontinued, and 50 mg. of 'Phenergan' at night was substituted for the benadryl. Next day the dose of phenergan was increased to 100 mg. twice daily, because the eruption had not improved when the streptomycin was stopped. The rash and general condition continued to worsen for the next two days.

On May 8 the rash had slightly improved, though the pyrexia continued. The face was still grossly swollen and was beginning to break down, with cracking about the mouth. There was a serous discharge from the scalp. The white-cell count now showed a polymorph leucocytosis superimposed on the lymphocytosis: white cells 43,750 per c.mm. (polymorphs 43·0%, lymphocytes 48·5%, eosinophils 4·5%, monocytes 4·5%): so penicillin 200,000 units eight-hourly was started.

Next day there was considerable improvement, with reduction in pyrexia to 99–100°F, and corresponding improvement in general condition. The rash had started to desquamate, and the face was much less swollen, though the infection about the mouth and on the scalp was unchanged. Phenergan was discontinued.

A slow recovery now took place, complicated, however, by the frequent appearance of septic spots in the skin, the nutrition of which had been much impaired. Additional complications were conjunctivitis and a small deep venous thrombosis in the left calf. The white-cell count at first reverted to an absolute lymphocytosis, and thereafter slowly returned to normal.

Intradermal testing was done two months after the eruption had cleared with a solution of streptomycin containing 50 µg. (50 units, Waksmann) in 1 ml. of sterile distilled water; 0·1 ml. was injected intradermally into the skin on the forearm, and as a control the same quantity of distilled water was injected into the opposite forearm. Reddening of the injection site was noted after about three hours, and reached a maximum after twelve hours, when it covered an area the size of a sixpence, thereafter fading slowly. No reaction occurred in the control site.

PARTICULARS OF STREPTOMYCIN USED

The preparation of streptomycin used at this hospital was the calcium chloride complex (Glaxo), and inquiry showed that the same had been used for this patient at the military hospital from which he was transferred. In neither case are records of batch numbers available, but it seems unlikely that the same batch would be in use at both hospitals, which are far apart. The dose at both hospitals was 1 g. daily in divided doses at twelve-hour intervals. The total dose was 32 g. The first sign of sensitisation appeared on the twenty-second day of treatment (fourth day at this hospital), and the drug was stopped on the thirty-second day.

DISCUSSION

Steiner and Fishburn (1947), from a consideration of 6 cases, regarded skin eruptions in the course of streptomycin therapy as allergic. They found a history of hay-fever in the patient or a near relation in 3 of their cases, and in 5 cases the symptoms had come on within the first ten days of treatment; in the 6th case the onset was on the twenty-sixth day. Eosinophilia was usually present and tended to persist with continued treatment, after the rash had disappeared, until the end of the course. If the streptomycin was withheld, the rash improved by next day. Other investigations have produced similar findings.

Pyrexia has often been noted in patients with skin reactions, though it was not a feature of the cases reported by Steiner and Fishburn. These workers observed œdema of the eyelids and lips in the patient whose reaction developed on the twenty-sixth day, but œdema does not seem to be very common.

In the present case the patient had been under treatment for twenty-two days before any rash was observed, but this may be because he had been transferred to a different hospital on the eighteenth day of treatment. There was no break in the streptomycin treatment, but a different batch was probably used. If so, the reaction could be regarded as developing on the fourth day of treatment; but, since Farrington et al. (1947) indicate that the causal factor is the streptomycin and not impurities, the onset seems to have been abnormally delayed, as in the case described by Steiner and Fishburn.

An absolute lymphocytosis is very unusual, and does not seem to have been noted previously as a reaction to streptomycin. No other cause for this blood picture was found, however, and it is significant that the lymphocytes slowly returned to normal during the patient's recovery.

The anti-histamine drugs at first controlled the rash adequately, and the use of benadryl enabled treatment to be continued for a week. When the rash reappeared, however, these drugs were of no value, and the eruption spread rapidly, even after streptomycin had been discontinued. No history of hay-fever in either the patient or his relations was obtained.

The response to stopping streptomycin therefore was not so immediate as is usually expected in a sensitisation reaction. The lack of improvement on stopping the streptomycin and increasing the dosage of phenergan may possibly have been due to streptomycin being held back by the œdema, when normally it would have been eliminated from the body.

The result of intradermal testing was not so definite as had been anticipated. This may have been because the solution of streptomycin used was very dilute—ten times more dilute than that used in the intradermal test described by Crofton and Foreman (1948). The long interval between the onset of the reaction and the test is also a factor, since most workers have found decreasing reaction to a test dose of streptomycin the longer the interval since the original reaction.

SUMMARY

A rash developing on the twenty-second day of streptomycin treatment was at first easily controlled with benadryl.

Streptomycin therapy was continued, as recommended by several workers, but it had subsequently to be stopped because of the severity of the skin reaction and the serious constitutional disturbance. Thereafter recovery was slow.

The tendency to regard skin reactions to streptomycin as mild and transient and easily controlled with anti-histamine drugs should be modified. They should always be regarded as potentially dangerous, and if the treatment is continued great caution should be observed.

My thanks are due to the Director-General, Army Medical Services, for permission to publish this case, and to Dr. H. G. Trayer, medical superintendent, Baguley Sanatorium, for much valuable advice and criticism.

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"... What can the medical school do to add new dimensions to medicine ? As a minimum, it can give students opportunity to study people throughout the medical course, in a natural setting, long enough at a time so that current impressions fall into perspective, and from every relevant point of view. ... At some schools the first step has been to bring a psychiatric component into the clinical departments, particularly medicine and pediatrics. This is done not primarily for the sake of better handling of mental disease, but to take advantage of the psychiatrist's skill in getting and evaluating the kind of information about patients that eludes conventional diagnostic methods, and in putting this information to good therapeutic use."—*Annual report of the Commonwealth Fund*, 1949.

EXFOLIATIVE DERMATITIS COMPLICATING STREPTOMYCIN THERAPY

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THE toxic effects of streptomycin are classifi Farringdon et al. (1947) into four main groups: mine reactions, anaphylactic reactions, nerve le and renal lesions. Skin reactions to streptomyci anaphylactic (McDermott 1947) and form, with feve eosinophilia, a triad whose members may occur tog or separately.

According to McDermott (1947) 5% of patients u going streptomycin therapy develop skin eruptio the second or third week. The rash is variabl distribution and character, is identical with that pro by other chemotherapeutic agents, is usually pruritic may go on to a superficial scaling. Bunn (1948), re ing 650 cases of various infections treated with str mycin for the Veterans Administration, states streptomycin may give rise to anaphylactic reac of which exfoliative dermatitis is the most impo though rare, but he does not mention its incid The report of the Council on Pharmacy and Chem (1947) gives more information about skin reactio streptomycin :

> "A pruritic, erythematous, maculopapular skin eru at first localised, appeared in a considerable percenta cases after about ten days of treatment. The pruritus usually relieved by 'Benadryl.' Treatment need no stopped because of the rash unless it develops in generalised exfoliative dermatitis . . . 7 such cases (0 occurred in the present series."

Heilman et al. (1945), reporting on 40 pati observed the development of dermatitis and sugge that, if streptomycin therapy is continued, a se condition may develop, but no specific mention is m of exfoliation. The only further mention of exfolia is by Albertal et al. (1948), who, reporting on 50 pati treated with streptomycin in private practice, men it as a complication but do not indicate its incide Three further papers which discuss skin reactions streptomycin—the National Research Council (1 report on 1000 patients and the articles of Steiner Fishburn (1947) and of Davies et al. (1948) do specifically mention exfoliation.

From all the published reports it seems that cutan reactions to streptomycin (apart from contact dermat though widely noted, are uncommon, and that exf tion is extremely rare. Neither dosage nor purity se to be important and McDermott (1947) noted the s sort of reaction in patients receiving highly pur streptomycin.

We have treated 60 tuberculous patients with stre mycin and have observed skin reactions in 3 (5%) of th In the first case a mild pruritic eruption appeared on extensor surfaces of the arms and thighs; it respon favourably to benadryl, and streptomycin therapy continued. In the second case there was a pleomorp and more generalised rash consisting of erythemat and maculopapular elements; it was pruritic a distressing to the patient and did not respond 'Antistin.' This developed on the eighth day of w was to have been a ten-day course of 2 g. daily, a because of the distress it caused, streptomycin thera was abandoned on the ninth day. Next day all infla mation and symptoms had subsided and by the eleven day the skin lesion had completely disappeared. T third case is reported below.

CASE-RECORD

A married woman, aged 45, was diagnosed as having pulmonary tuberculosis in January, 1941. At that time she had an infiltrating lesion in the upper zone of the right lung. She responded well to rest and graded activities, and in April, 1943, was regarded as quiescent with a fibrotic lesion in the right upper zone. She remained well and undertook full household activities, and when seen at the chest clinic in January, 1949, she was told to report again a year later.

In June she developed an acute febrile illness with chest symptoms, and her own doctor treated her for pneumonia with sulphadimidine ('Sulphamezathine'), the exact dosage of which we have not ascertained. During this course the patient developed a rash which she described as "just like measles." She did not respond to chemotherapy and was seen by Dr. Hugh Climie, who arranged for her admission to the West Middlesex Hospital on July 26.

On admission her general condition was very poor; she had dyspnœa at rest and mild cyanosis. Her temperature was swinging to 104°F, and she had a troublesome cough with purulent sputum. Radiography revealed an extensive spread of disease throughout the right lung, and the sputum contained tubercle bacilli. Blood-count: Hb 70%, red cells 3,500,000 and white cells 17,200 per c.mm. (polymorphs 91%, lymphocytes 8%, monocytes 1%). Streptomycin was started next day, 1 g. being given daily in a single intramuscular injection. By the third day there was slight improvement in the patient's general condition, and her temperature looked as if it might be settling (fig. 1). All seemed well until the ninth day, when her temperature rose again to 103°F and there was a further deterioration in her general condition.

Skin Reaction.—On the ninth day the first sign of skin reaction appeared as a dull red erythematous, but not pruritic, eruption on the upper abdomen. Next day the eruption had become a maculopapular rash extending to the dorsal surfaces of the arms. There was still no pruritis, and the patient was in no way troubled by the rash. At this stage it was decided that, in the absence of symptoms and in view of the severity of the tuberculosis, streptomycin therapy should be continued. It was thought that little benefit would be gained by giving anti-histamine drugs, so these were withheld.

The position remained much the same until the thirteenth day, when the patient complained of a sore mouth and sore eyes and was found to have a mild stomatitis, with cheilosis and conjunctivitis. Swabs were taken from both sites, but no significant organisms were grown. At this stage benadryl 50 mg. t.d.s. was started.

On the fifteenth day vesiculation was noted in the elbow region and the maculopapular eruption had become more general. On the appearance of vesiculation the streptomycin was stopped and the dosage of benadryl increased to 100 mg. t.d.s. 'Benerva' (vitamin B_1) 2 mg. b.d. was also given. With the development of vesiculation the stomatitis became severe, and the patient could take nothing but fluids.

The day after the streptomycin had been stopped the patient's temperature fell dramatically, but she remained extremely ill, and her skin condition progressed through the stages of vesiculation to complete exfoliation, which reached its height on the twentieth day. At this stage antistin was substituted for benadryl, the patient was also given one ampoule of 'Amytox' intramuscularly daily for seven days, 100 mg. of vitamin C daily, and 6 minims of 'Adexolin' (vitamin A 12,000 i.u., vitamin D 2000 i.u.) daily. From then on the condition subsided rapidly. Photographs (fig. 2) taken on the twenty-third day show the degree of denudation which took place. A blood-count at this stage revealed a complete absence of eosinophils—white cells 7600 per c.mm. (polymorphs 72%, lymphocytes 28%).

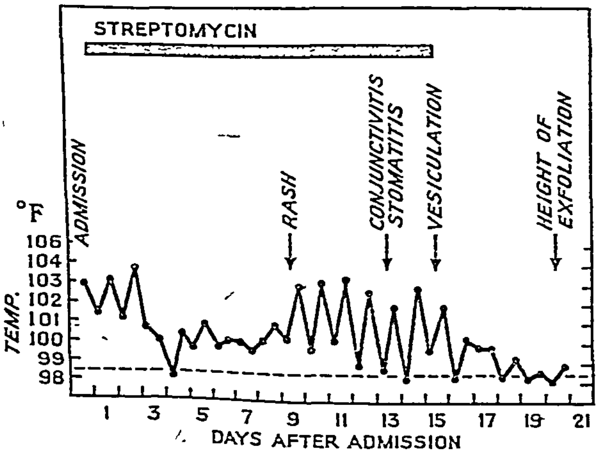

Fig. 1.—Chart showing onset and course of reaction to streptomycin.

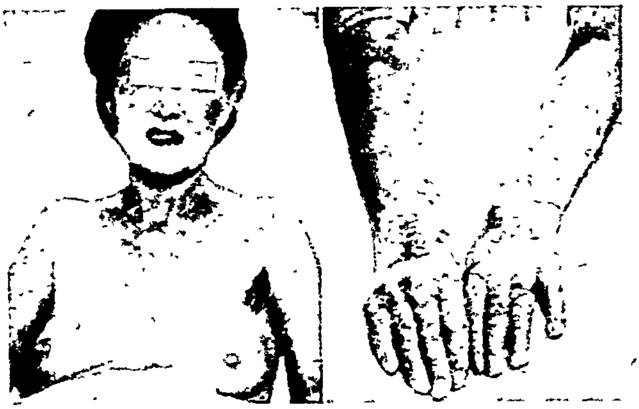

Fig. 2.—Exfoliation on twenty-third day from start of streptomycin treatment.

By the twenty-seventh day the inflammation had subsided completely, and desquamation only was present. The stomatitis and conjunctivitis had also cleared completely, and a full diet could be taken. The patient's general condition began to improve from the twenty-third day onwards, and her temperature remained at a lower level. Radiography on the thirtieth day revealed considerable clearing of the acute exudative element of the tuberculous lesion. By the thirty-fourth day the skin was clear, except for some mottled pigmentation on the abdomen.

DISCUSSION

As already stated, at the onset of the rash we felt justified in continuing with the streptomycin because of the absence of discomfort and the severity of the tuberculosis. But we are not so sure that it was justifiable to continue streptomycin therapy after the development of the stomatitis. At that time we did not realise that stomatitis was a known toxic effect. We have since found a report (Beham and Perr 1948) of three cases, two of which were associated with dermatitis, one of which later desquamated. Beham and Perr regard stomatitis as a severe anaphylactic reaction and advocate immediate cessation of the streptomycin. Perhaps we might have halted the exfoliation if we had withheld streptomycin at this stage.

A feature of the present case was the speed with which the skin cleared when streptomycin was withheld, though at its height this was a severe example of exfoliative dermatitis, comparable with that which may follow gold and arsenic therapy.

The fact that we have been unable to find any report of a fatal case of skin reaction to streptomycin in no way detracts from the seriousness of the condition. Obviously every effort must be made to avoid it; yet one can only be sure of doing so by withholding streptomycin at the first sign of a rash; this would not usually seem justifiable. A small risk is undoubtedly being taken every time it is decided to continue giving streptomycin once a skin reaction has developed, and in each case this risk must be balanced against the risk of stopping the treatment.

SUMMARY

Exfoliative dermatitis as a reaction to intramuscular streptomycin seems to be extremely rare; the only published report of its incidence gives the figure of 0·8% in 1000 cases.

In the present series 3 patients out of 60 (5%) treated with streptomycin for tuberculosis developed skin reactions, one of which went on to exfoliation and was associated with stomatitis and conjunctivitis.

The hazards of continuing streptomycin therapy in the face of a skin reaction are discussed, and it is suggested that these hazards must be considered in their relation to the disease for which streptomycin is indicated.

We wish to thank Dr. Climie, under whose care this patient was admitted for treatment, for permission to publish this report, and for his encouragement and advice; Dr. J. Morgan for his advice and help on treatment from the dermatological point of view; and the nurses, who did so much to help the patient tide over a very trying time.

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ACUTE DIVERTICULITIS OF THE CÆCUM AND ASCENDING COLON

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DIVERTICULA of the right side of the colon were previously regarded as rare compared with those of the left side. Bennett-Jones (1937) could find only 20 cases of acute diverticulitis of the cæcum published in this country. Since then, however, this condition has aroused much interest, and numerous workers have reported further examples and discussed their management. Anderson (1947) collected 91 published cases and added 8 from the records of the Mayo Clinic, and additional cases have been reported by Fairbank and Rob (1947), Perazo (1947), and Henry (1949). The increased interest in this condition may be attributed in part to the realisation that it is not so uncommon as was at one time thought and in part to an appreciation that it is an important surgical lesion. Not only is a preoperative diagnosis almost impossible but the surgeon may not recognise the acute diverticulitis at operation, and, confusing it with a perforating carcinoma of the cæcum, may perform an unnecessarily extensive resection.

A word is needed to clarify the nomenclature. Diverticula of the right side of the colon are found most often in the cæcum, and inflammation of these diverticula is usually termed acute diverticulitis of the cæcum. In many of the reported cases, however, the lesion has been above the ileocæcal valve; for the sake of accuracy, therefore, such lesions should be called diverticula of the ascending colon, though since they are low down, near the cæcum, the distinction is not important, so long as the point is borne in mind.

CASE-RECORD

A woman, aged 42, was admitted to the West Middlesex Hospital on Feb. 28, 1949, with forty-eight hours' history of pain in the right iliac fossa. The pain was fairly severe, did not radiate or change position, and was aggravated by movement. She experienced nausea without vomiting, and there had been diarrhœa since the onset, especially during the first twenty-four hours. She complained of slight scalding on micturition. Her menses were regular, with a rhythm of 5-6/28 days, but for two years she had had pain in the mid-abdomen for a week before the onset of menstruation. On the whole her symptoms appeared to be abating on admission. For some six weeks she had been away from work with bronchitis, and had only returned to it five days before admission. There was also a history of two attacks of "gastro-enteritis," each lasting two or three days, one in September, 1948, and the other in February, 1949, characterised by abdominal pain and diarrhœa. She had had rheumatic fever in childhood.

Physical Signs.—Temperature 98·2°F, pulse-rate 68, respiration 20 per min. The tongue was moist and clean. The abdomen moved fairly well on respiration, and there were tenderness and muscle guarding in the right iliac fossa, where it was thought that an indefinite mass could be felt, though opinion was divided on this point. Rectal examination was negative, and no abnormal signs were found in the cardiovascular and respiratory systems. The provisional diagnosis was acute appendicitis.

Operation.—The abdomen was explored through a lower right paramedian incision. The appendix appeared normal, but an inflammatory mass about an inch in diameter was found on the posteromedial wall of the ascending colon about half an inch above the ileocæcal junction. The peritoneum over the mass was incised and gently dissected free, revealing an inflamed diverticulum of the colon about half an inch deep. Its base was clamped, the diverticulum removed, and the stump ligated and oversewn. The appendix was removed and the abdomen closed.

Progress.—Convalescence was uneventful, and the patient was discharged home on March 15, 1949. A barium enema on April 19 showed no evidence of diverticula in any part of the colon.

Pathological Report (Dr. A. C. Counsel).—The specimen was a hemispherical diverticulum, ½ inch in circumference, and ½ inch long, lined with normal colonic mucosa which showed well-marked capillary hyperæmia. The interstitial tissue of the mucosa contained many lymphocytes and plasma cells and very few polymorphs. Beneath the mucosa was a well-marked layer of muscularis mucosæ which was penetrated by a few large lymph follicles. The muscularis was represented by a small single bundle of plain muscle. Otherwise this coat was completely deficient. The extramuscular fibrous tissue showed fairly recent hæmorrhages, with young fibroblasts and new capillaries, the result of organisation. This layer showed foci of sparse infiltration with lymphocytes and a few eosinophils.

DISCUSSION

Though usually described as solitary, diverticula of the cæcum are occasionally multiple. There are two varieties: (1) a true congenital type, with mucous, muscular, and serous layers in its wall; and (2) a false type without any muscular coat. The distinction may be significant in that the false variety, possessing no muscular coat, is less likely to be capable of ejecting a fæcolith or other obstructing agent, and may therefore be more liable to inflammation. Cæcal diverticula have usually been regarded as pulsion diverticula in the sense that they are related to a raised intracolonic pressure, but a few instances have been described of the traction variety, where the diverticulum has been produced by the contraction of adherent fibrous tissue—e.g., in association with calcified mesenteric glands (Dorling 1945). Fairbank and Rob (1947) suggest that the false variety may be a sequel of simple ulceration.

The average age of patients with this condition was 39·1 years in Anderson's (1947) collected series, and the sex-distribution was equal. In these two respects there is an interesting difference from diverticulitis of the sigmoid, which is found in an older age-group and is twice as common in men as in women.

A diverticulum of the cæcum, like the appendix, is liable to undergo inflammation, especially if its mouth is obstructed by a fæcolith, and the pathological course of the diverticulitis bears some resemblance to that of acute appendicitis. Resolution, local or general peritonitis, an abscess, perforation, or a fistula may result. General peritonitis is, however, rare, and the usual finding is a localised inflammatory mass round the cæcum. One instance of torsion of a diverticulum has been recorded (Thomsen 1935).

Diagnosis.—As in the present case, the preoperative diagnosis has most often been acute appendicitis. This was true in 84% of Anderson's (1947) collected cases. Indeed, as more than one writer has pointed out, there seems to be no way in which the two conditions can be distinguished clinically. A barium enema is contraindicated in acute appendicitis, and in any event the investigation would be of little value since the mouth of the diverticulum is often blocked by a fæcolith or by inflammation. Acute diverticulitis should be borne in mind as a possible diagnosis when a patient presents the clinical picture of acute appendicitis but the appendix has previously been removed. Some cases which receive conservative treatment as appendix abscesses, and undergo resolution, may really be examples of acute diverticulitis of the cæcum. For this reason, when delayed appendicectomy is performed on this type of case, the cæcum should be examined for diverticula, especially if the appendix does not appear grossly diseased. Even at operation the diagnosis may be in doubt and the condition not be recognised. In nearly every published case a mass related to the cæcum has been found on laparotomy, and a right hemicolectomy has often been done by the surgeon in the mistaken belief that he was dealing with a malignant condition of the cæcum. That this error should have been made so many times is not surprising, since carcinoma of the cæcum is much more common than diverticulitis; but, if diverticulitis is borne in mind, and if the mass is carefully examined to ascertain if the mouth of a diverticulum can be felt as a defect in the colonic wall an accurate diagnosis might be reached in a larger proportion of cases. In the present case the diagnosis was not made until the mass had been gently explored and dissected. The question of carcinoma did not, however, arise in this case, and exploration of the mass cannot be recommended as a routine, in view of the risk of disseminating infection or cancer cells.

Treatment.—When feasible, the correct treatment of acute diverticulitis of the cæcum is simple excision of the diverticulum, and in Anderson's (1947) 99 cases this was done 53 times, with a mortality of 4%. Where the inflammatory process is so extensive that a local excision of the diverticulum would be inadequate it has been suggested that either cæcectomy, with anastomosis of the ileum to the ascending colon, or a right hemicolectomy, should be done. These extensive procedures are, however, likely to carry a higher mortality, and Schnug (1943) has made a good case for conservative treatment. He points out that the diverticula have wide mouths opening into the colon, and discharge of their contents into the bowel and spontaneous resolution may be confidently anticipated. This reasoning appears sound, and conservative treatment is recommended when the inflammation is so extensive that simple diverticulectomy is impracticable. A delayed excision of the diverticulum may be done after an interval of about six months. Frehling (1945) suggested extraperitonealisation of the lesion so that a cæcostomy forms after forty-eight hours or so, when the diverticulum sloughs, but we feel that such a technique is unnecessarily untidy and can only rarely be indicated. When the lesion cannot be distinguished from carcinoma it should be treated as malignant and a right hemicolectomy done in one or two stages.

SUMMARY

A case of acute diverticulitis of the ascending colon is described.

The condition cannot be differentiated clinically from acute appendicitis and at operation often resembles carcinoma of the cæcum.

The correct treatment is diverticulectomy, when possible. For other cases conservative treatment is recommended, with diverticulectomy later.

We wish to thank Mr. John Scholefield, under whose care the patient was admitted, for advice and for permission to publish the case; and Dr. A. C. Counsel for the pathological report.

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RELAPSE IN TYPHOID FEVER AFTER TREATMENT WITH CHLORAMPHENICOL

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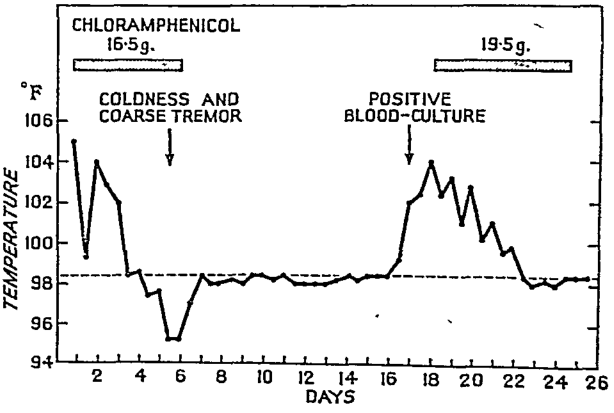
SINCE there seems to be no definite agreement about the dosage or duration of administration of chloramphenicol ('Chloromycetin'), and in view of the few cases so far treated with it, the following case is reported.

A Dutch soldier, aged 24, was admitted with ten days' history of fever, headache, anorexia, and initial constipation followed by diarrhœa. The spleen became palpable on the third day, and on the eighth day a rose rash appeared. The patient had apparently been inoculated with T.A.B.C. vaccine a fortnight before the onset of his illness.

On admission he was extremely ill and had a temperature of 105°F. His skin was dry, and his tongue was furred centrally and clear at the edges. His abdomen was slightly distended, the spleen was readily palpable, and there were some twenty rose spots on his chest and abdomen. His blood-pressure was 80/40 mm. Hg. Other systems were normal. Despite the fact that he had been inoculated with T.A.B.C. he was thought to have typhoid fever, blood was taken for culture and for Widal reaction, and treatment with chloramphenicol was started. A loading dose of 2·5 g. was given, followed by 0·25 g. two-hourly.

Progress.—Within twenty-four hours the patient's temperature (see figure) had fallen to 99·4°F, but it rose again to 104°F, and he had a profuse epistaxis; after this second rise the temperature subsided until, sixty hours from the start of treatment, it was 98·4°F. There was a striking disappearance of subjective symptoms, and the patient became less toxic, had an appetite, and no longer complained of severe headache. On the fifth day his temperature was 95°F, he complained of feeling cold, and a coarse tremor of his hands and legs appeared; no other signs were detected in his central nervous system. In the next few hours these symptoms became more intense, so the chloramphenicol was stopped when the patient had received 16·5 g.



Temperature chart showing relapse of typhoid fever after first course of chloramphenicol.

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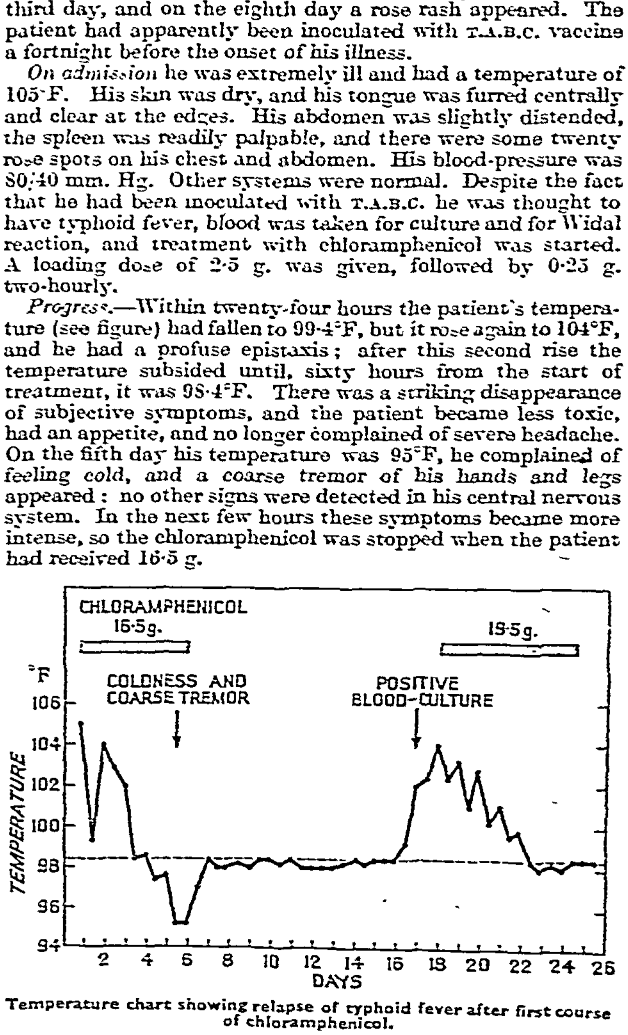
SINCE there seems to be no definite agreement about the dosage or duration of administration of chloramphenicol ('Chloromycetin'), and in view of the few cases so far treated with it, the following case is reported.

A Dutch soldier, aged 24, was admitted with ten days' history of fever, headache, anorexia, and initial constipation followed by diarrhœa. The spleen became palpable on the third day, and on the eighth day a rose rash appeared. The patient had apparently been inoculated with T.A.B.C. vaccine a fortnight before the onset of his illness.

On admission he was extremely ill and had a temperature of 105°F. His skin was dry, and his tongue was furred centrally and clear at the edges. His abdomen was slightly distended, the spleen was readily palpable, and there were some twenty rose spots on his chest and abdomen. His blood-pressure was 80/40 mm. Hg. Other systems were normal. Despite the fact that he had been inoculated with T.A.B.C. he was thought to have typhoid fever, blood was taken for culture and for Widal reaction, and treatment with chloramphenicol was started. A loading dose of 2·5 g. was given, followed by 0·25 g. two-hourly.

Progress.—Within twenty-four hours the patient's temperature (see figure) had fallen to 99·4°F, but it rose again to 104°F, and he had a profuse epistaxis; after this second rise the temperature subsided until, sixty hours from the start of treatment, it was 98·4°F. There was a striking disappearance of subjective symptoms, and the patient became less toxic, had an appetite, and no longer complained of severe headache. On the fifth day his temperature was 95°F, he complained of feeling cold, and a coarse tremor of his hands and legs appeared: no other signs were detected in his central nervous system. In the next few hours these symptoms became more intense, so the chloramphenicol was stopped when the patient had received 16·5 g.



Temperature chart showing relapse of typhoid fever after first course of chloramphenicol.

Laboratory Findings.—Widal reaction: *S. typhi* O 1/480, H nil; *S. paratyphi-B* O 1/240, H 1/120; *S. paratyphi-A* and *C* nil; Vi negative. Cultures from blood, fæces, and urine proved negative.

Relapse.—After twelve hours the patient's temperature rose to 98·4°F and his tremor ceased. During the whole time his general condition was maintained and his blood-pressure ranged from 90/60 to 80/50 mm. Hg. He remained afebrile and felt well for eight days. On the eighth day his temperature rose to 102°F, and after two further days it was still 102·6–104°F. His spleen, which had previously regressed, was again palpable, and he complained of headache and nausea. A blood-culture now grew *S. typhi*, and the Widal reaction gave *S. typhi* O 1/960, Vi negative, and the other titres as before. Stool and urine cultures were still negative. On the second day of his relapse the patient passed almost pure blood per rectum. A second course of chloramphenicol was therefore started, with a loading dose of 2·5 g., followed by 0·25 g. two-hourly. The temperature fell to normal within five days, and there was no reappearance of tremor and no hypothermia. The second course of chloramphenicol amounted to 19·5 g. and lasted six and a half days. From then on the patient was afebrile, three stool and urine cultures were negative, a repeat Vi test was negative, and he was discharged after thirty-eight days in hospital.

DISCUSSION

In this case there was a dramatic response to the first course of 16·5 g. of chloramphenicol, with cessation of subjective symptoms and a normal temperature after sixty hours. Nevertheless there was a relapse with positive blood-culture eight days later; this was controlled, and the typhoid infection apparently overcome, by a further 19·5 g. of chloramphenicol given in six and a half days.

Dosage

The views on dosage vary. Messrs. Parke, Davis & Co. cite the Kuala Lumpur workers and recommend a course of 19 g. Bradley (1949), in a preliminary communication, noted that signs of resolution of typhoid fever were obvious after 8 g. Douglas (1949) reported recovery after a single course of 20 g. Of the 6 proved cases of typhoid fever surveyed by Patel et al. (1949) 3 recovered after courses of 18, 16, and 12 g., but a remission of subjective symptoms was noted early in the course of treatment.

Despite these satisfactory results on fairly small dosage Woodward et al. (1948) had 2 relapses in 10 treated cases after the patients had been afebrile for ten and sixteen days, and both cases responded to a second course. Rumball and Moore (1949), treating a chronic typhoid carrier aged 9 years, found that the stools still contained *S. typhi* after a course of 10·5 g.; after a second course of 5·25 g. the stool cultures became negative, but two days after the cessation of treatment *S. typhi* was again present in the stools. Smadel et al. (1949) recommend a course lasting nine to fourteen days; of 19 of their cases treated for this length of time none relapsed, whereas of 13 treated for eight days or less 7 relapsed. The *British Medical Journal* (1949) recommends a loading dose of 4 g. followed by 1·5 g. b.d. until the patient is afebrile, and then 0·75 g. b.d. for a further seven days.

In the present case it seems that the first course was inadequate, but, despite an intestinal hæmorrhage, the second course led to complete recovery.

Toxic Effects

Other workers report such complications as cerebral irritation, transitory erythemopapular rashes, nausea, anorexia, diarrhœa, and circulatory failure (Shah 1949, Vakil 1949). In the present case the first course was stopped because the patient's temperature fell to 95°F and he developed a coarse tremor; whether these were toxic effects it is difficult to ascertain. There is no doubt that the tremor disappeared twenty-four hours after cessation of the chloramphenicol, but it did not return with the second course.

SUMMARY

A case of typhoid fever treated with 16·5 g. of chloramphenicol in five days relapsed eight days after the end of the course, but a second course of 19·5 g. in six and a half days led to complete recovery. The patient developed a low temperature and a coarse tremor during the first course; these may have been toxic effects of the drug but they did not recur in the second course.

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ABNORMALITY IN STEROID METABOLISM ASSOCIATED WITH RHEUMATOID ARTHRITIS

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It has recently been shown by Hench et al. (1949) that rheumatoid arthritics respond dramatically to treatment with 11-dehydro-17-hydroxycorticosterone ('Cortisone') in the form of its acetate, at a dose-level of about 100 mg. per day. The high dosage required for the relief of the symptoms coupled with the fact that rheumatoid arthritics, as far as is known, do not exhibit any of the generally recognised symptoms of adrenal insufficiency, suggested to us that the condition might be associated with an abnormality in the metabolism of cortisone in the affected tissues, rather than with a deficient secretion of this hormone by the adrenal cortex.

Since the large quantities of cortisone necessary for a direct test of this hypothesis were unavailable to us, we considered that it might be profitable to study quantitatively in rheumatoid-arthritic subjects the metabolism of some more readily obtainable steroid closely related structurally to cortisone. We felt that although the discovery of an abnormality in the metabolism of such a steroid in rheumatoid arthritis would not prove the original working hypothesis, it would at least indicate the desirability of attempting a direct experimental investigation as soon as the supply of cortisone improves.

Progesterone was selected for this investigation in preference to the more closely related 11-deoxycorticosterone for two reasons: (1) at the high dosages which have to be employed in such steroid metabolism experiments the sodium-retaining action of the latter might have constituted a serious danger, whereas at these dosages progesterone produces no undesirable physiological or pharmacological effects apart from mild sedation in some instances; and (2) as a result of previous investigations by two of us (Sommerville and Marrian 1950) a considerable amount of information was already available concerning the conversion of administered progesterone into urinary pregnanediol in normal people.

EXPERIMENTAL PROCEDURE

Progesterone dissolved in arachis oil was administered to the subjects by intramuscular injection in two successive daily doses of 60 mg. Twenty-four-hour urine specimens (preserved with toluene) were collected from each subject during a preliminary control period of two ays, during the two days when the hormone was being dministered, and for the following four days. Each pecimen was made up to a volume of 2500 ml. with ater, and pregnanediol determinations in duplicate vere carried out on 500 ml. samples by the method of ommerville, Gough, and Marrian (1948). The total regnanediol excreted as a result of the administration of the progesterone was calculated after correction of the aily apparent pregnanediol excretion for the average control-period "blank."

Experiments were carried out on 9 postmenopausal women and 4 men suffering from rheumatoid arthritis, and on 6 normal postmenopausal women and 4 normal men.* Since some salicylates are known to be excreted in the urine in conjugation with glucuronic acid, the possibility had to be considered that these might in some way influence the excretion of pregnanediol by interfering with the formation of pregnanediol glucuronide. Accordingly salicylate therapy was withheld from all the arthritic subjects for from one to eight weeks before the experiments.

RESULTS

The results indicate quite clearly that rheumatoid arthritics of both sexes excrete in the urine as pregnanediol an abnormally high proportion of intramuscularly administered progesterone. The values given are calculated from the mean of the duplicate determinations. In every case satisfactory agreement between the duplicate determinations was obtained. The percentage of administered progesterone recovered as urinary pregnanediol was as follows :

	Normal	*Rheumatoid arthritic*
Men :	9·3	21·7
	10·0	23·8
	12·2	26·1
	14·7	27·4
Postmenopausal women :	12·1	19·0
	13·7	20·7
	15·2	22·0
	15·6	25·1
	15·6	25·7
	16·0	26·8
		31·0
		35·0
		36·4

Careful assessment of all clinical data revealed no clear-cut correlation between the severity of the disease and the percentage of administered progesterone excreted as urinary pregnanediol.

DISCUSSION

Until quantitative studies on the conversion of administered progesterone into urinary pregnanediol have been carried out in a wide variety of other clinical conditions, the importance of the present observations must remain in some doubt, since the abnormality in progesterone metabolism reported here may be more common than we now suppose. Furthermore, even though this abnormality should prove to be specific to rheumatoid arthritis and related conditions, it may be quite unrelated to the response of these conditions to cortisone therapy. Nevertheless, the discovery of an abnormality in the metabolism of progesterone in a clinical condition which yields to treatment with a closely related steroid hormone is not without interest ; and it now seems clear that our hypothesis that rheumatoid arthritis may be associated with an analogous abnormality in the metabolism of the adrenocortical steroid hormones deserves serious consideration and must be investigated experimentally as soon as circumstances permit.

Further speculations about the possible significance of the present results would be unwise at the moment since little is known about the metabolism of cortisone in the body, while the exact physiological significance of pregnanediol as a metabolite of progesterone is still very obscure.

Although there was no evidence of a correlation between the abnormality of progesterone metabolism and the activity of the disease process as assessed by the criteria available, further work may possibly reveal a relation between this metabolic abnormality and the fundamental pathogenesis of rheumatoid arthritis.

In the hope that others may wish to attempt the confirmation and further extension of our results, we wish to take this opportunity of pointing out that for quantitative studies of the urinary pregnanediol excretion following the administration of progesterone in doses of less than about 100 mg. per day, a method of pregnanediol determination at least as sensitive and accurate as that used in the present work must be employed. The difference in the pregnanediol excretions between normal and arthritic subjects reported here are quite definite, but it is doubtful whether they would have been observed if a less accurate and sensitive quantitative method had been used. In our opinion, older methods such as the original one of Venning (1937, 1938), or newer methods designed primarily for semi-quantitative routine diagnostic work, such as those of Guterman (1944, 1945) and of Sommerville, Marrian, and Kellar (1948), would be entirely unsuitable for quantitative studies on progesterone metabolism.

We wish to express our gratitude to the Medical Research Council for a personal grant to one of us (I. F. S.), and for a grant (to G. F. M.), from which the expenses of this work were largely defrayed. We owe much to the skilful technical assistance of Mr. D. W. Davidson.

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* All but one of the figures for the excretion of pregnanediol by normal postmenopausal women and men following the intramuscular injection of progesterone are taken from a previous paper by two of us (Sommerville and Marrian 1950).

Preliminary Communication

ISOLATION OF A POLYPEPTIDE WITH HIGH ADRENOCORTICOTROPHIC ACTIVITY

We have previously reported[1] that, by ultrafiltration of pituitary-gland extracts under suitable conditions, it is possible to prepare a polypeptide mixture which has high adrenocorticotrophic activity, approximately 1·4 times as active as the homogeneous protein adrenocorticotrophic hormone of Sayers, White, and Long.[2] We have now separated from this mixture by fractional ultrafiltration and ionophoresis a peptide which appears to be homogeneous. Paper partition chromatography in phenol, lutidine, butanol-acetic acid, and propanol-acetic acid reveals only one peptide spot. Ionophoresis at pHs 2·3, 4·0, 6·0, and 8·0 indicates only one peptide component. More rigorous tests of homogeneity must await the isolation of larger amounts of the peptide. The adrenocorticotrophic activity of this material has been compared with that of the Armour standard adrenocorticotrophin preparation no. La-1-a by the adrenal ascorbic-acid depletion method of Sayers, Sayers, and Woodbury.[3] The results are :

Preparation	*Number of animals used*	*Dose (μg.)*	*Ascorbic acid depletion (μg. per 100 mg. adrenal tissue)*
La-1-a	3	0·3	29
	4	0·6	69
	4	1·2	134
Polypeptide	4	0·04	41
	4	0·08	97
	4	0·32	163

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Analysis of these data indicates that the polypeptide is 8·5 times as active as La-1-a, or approximately 10 times as active as the protein hormone of Sayers, White, and Long.

Until the constitution of the active material has been elucidated, we suggest that it be called "adrenocorticotrophic peptide" (A.C.T.P.).

Ultrafiltration at different pH values and paper chromatography of the various peptides isolated from the mixture, both singly and in artificial mixtures, indicate that, in the pH range near neutrality, the active peptide can associate with other components to form a larger molecule. This process appears to be reversible and suggests that A.C.T.P. exists as such in the protein hormone molecule.

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Medical Societies

ROYAL SOCIETY OF MEDICINE AND SOCIETY FOR STUDY OF ADDICTION

Treatment of Alcoholism

ON Jan. 10 Dr. ERIK JACOBSEN (Copenhagen) read a paper on Biochemical Methods in the Treatment of Alcoholism, with special reference to 'Antabuse,' to a joint meeting of the Society for the Study of Addiction and the psychiatry section of the Royal Society of Medicine. Dr. W. J. T. KIMBER, president of the psychiatry section, was in the chair.

Dr. Jacobsen remarked that alcohol, like fire, was a good servant but a bad master. Why should it remain the servant for most yet become the master of a few? Some answered this question in terms of biochemistry, others in terms of psychology. Dr. Jacobsen warned against extreme views and emphasised that biochemical methods must be complementary to psychotherapy.

In the production of alcoholism there were external factors, such as bad social or family conditions and drinking habits. But there were also internal factors; and different workers attached importance to anxiety or Freudian complexes or psychopathic states. Some people could not help continuing to drink when they had taken a certain amount, which Dr. Jacobsen termed the "critical dose." In alcoholics this was small and therefore soon exceeded. Probably even in the individual alcoholic there was no single cause; but in some, external factors predominated, and in others the internal. Once developed, alcoholism was kept alive by a series of vicious circles—it led, for instance, to neuroses, which increased the internal psychological factors, and to a social decline which increased the external factors.

Many general practitioners—and even, Dr. Jacobsen admitted, some specialists—believed that it was sufficient to deprive the person of alcohol. Yet experience showed that this would produce only temporary abstinence; the importance of withholding alcohol should not be underestimated, but it was necessary to control all the factors.

This brought Dr. Jacobsen to the description of tetraethylthiuramdisulphide ('Antabuse').[1] If alcohol was taken after the administration of antabuse, the discomfort was usually so intense as to result in abstinence. In itself antabuse was quite innocuous; there were side-effects, but these disappeared as treatment continued and were not of practical importance. If, however, even small quantities of alcohol were taken, the person became red in the face after about 5–10 minutes and the vasodilatation might spread over the whole of the upper part of the body; the pulse-rate rose; and the patient had palpitations, a feeling of tightness about the neck, possibly nausea and vomiting, and a highly disagreeable feeling described by Dr. Jacobsen as like "a premature and very severe hangover." The effects included a sharp rise in the blood-acetaldehyde content which was responsible for all the effects.

Dr. Jacobsen described the results in 200 cases, mainly outpatients, observed by Dr. O. Martensen-Larsen.[2] The patient was first kept off all alcohol for a few days, so that none should be present in his system when antabuse was given. 0·5–1 g. antabuse was then given daily for 2–3 days, after which a small test dose of alcohol (equivalent to 1 oz. of whisky) was drunk in the presence of the doctor, to bring home to the patient the unpleasant effects. The dose of antabuse was adjusted in relation to the reaction and to the side-effects, and administration was continued for some months according to the needs of the patient. At the same time psychological and social treatment was given. The nature of the addiction was explained to the patient in terms of diabetes, and he was told that, just as diabetics had to avoid sugar, so he had to avoid alcohol; he was given every possible psychotherapeutic help. Group psychotherapy was found useful, and for after-treatment a group on the lines of Alcoholics Anonymous had been formed. Lastly a guardian (wife, friend, or employer) was appointed to watch over the patient and report if anything went wrong.

The 200 cases described by Dr. Jacobsen were unselected; 17 attended for so short a time that proper treatment was impossible, 16 had disappeared, and 3 had died. Of the remaining 164, 112 had been observed for twelve months and 42 for nine months. Of all the patients, 10% were women; and of the total, 90 had previously had some form of treatment. The results showed that 76% of patients under 35 and 44% over 51 were socially recovered. A wife could judge much better whether her husband had recovered than could a doctor who only saw him occasionally; and Dr. Jacobsen drew attention to the importance, for success, of the attitude of the patient and his relatives. The results indicated that the prognosis was best in young persons; and it became progressively less good with increasing age. This might be due partly to difficulty in getting older people to adjust their habits—it was, for instance, difficult to get a man who had spent all his life in public houses drinking with his friends to start collecting stamps.

In itself antabuse was no cure for alcoholism but an adjunct to other measures. In its administration the clandestine method, however attractive it might seem, was contra-indicated for three reasons: (1) the person might have a serious reaction through drinking alcohol when he did not realise that he had had the substance: (2) he would find out that he was being dosed (one man was now seeking a divorce on this ground); and (3) it should not be decided by a layman whether treatment for addiction was desirable. Antabuse should, therefore, only be used with the patient's full consent and coöperation.

Dr. Jacobsen described antabuse as producing "chemical confinement," whereas in the past the most effective way to prevent a man drinking was to lock him up. This "chemical wall" would not continue to stand of itself; and while it stood all other therapeutic steps should be taken.

One psychological result of alcoholism was fear of alcohol intake and its consequences. When a patient found that with antabuse he was unable to take alcohol he was greatly encouraged, but the physician must not be deceived by such early recovery. The patient might find that, although he had overcome the craving for alcohol, he met other difficulties; or he might, through over-confidence, stop treatment. For this reason there

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1. See Hald, J., Jacobsen, E. *Lancet*, 1948, ii, 1001.

2. See Martensen-Larsen, O. *Ibid*, p. 1004.

was a critical period three or four months after treatment had started, and this was why there must be a guardian who could report such a development.

Antabuse could not be continued indefinitely; it was a matter of experience to judge how long it could be used. Therapy, Dr. Jacobsen concluded, must be individual.

Dr. H. J. **Pullar-Strecker**, hon. secretary of the Society for the Study of Addiction, said he was glad that the speaker had recommended simple common-sense psychotherapy which the patient could understand. Dr. Pullar-Strecker thought that for the patient who would do anything to throw off his handicap antabuse might be regarded, not as an adjunct, but as a therapy. Antabuse was a landmark in the treatment of alcoholism. In the same way that electroconvulsant therapy helped psychiatry in general, antabuse would help to dispel the notion that alcoholism was incurable.

Dr. M. A. **Partridge** said that little attention seemed to have been paid to the effect of antabuse on the blood-pressure.

Dr. A. E. A. **Carver** referred to the value of antabuse as an indication of whether a person under treatment had been taking drink surreptitiously.

Dr. R. **Orton** drew attention to toxic symptoms, consisting of diplopia and left facial palsy, and asked for an antidote to aldehyde poisoning. With the introduction of antabuse, patients could no longer pretend that they were trying to overcome their alcoholism when they were not.

Dr. J. A. **Hobson** compared apomorphine and antabuse. Antabuse made it impossible for the alcoholic to drink, because the effects of drinking were so unpleasant, but it did not affect his feeling of the need for alcohol. Apomorphine took away a craving for drink, yet left the person able to drink if he wanted to; and it was completely safe.

Dr. **Jacobsen** replied that in animals the toxicity of antabuse had proved very slight; no chronic ill effects had been observed, but some had been reported by other workers. Whilst acknowledging that there had been two or three deaths following administration of antabuse, Dr. Jacobsen pointed out that something like 20,000 people had been treated with it in Denmark, Sweden, and elsewhere. Several patients with angina pectoris had had antabuse and gone through the alcohol test without ill effect.

In acetaldehyde poisoning. use should be made of oxygen, or better still oxygen with 5% carbon dioxide. American workers had recommended ascorbic acid intravenously; saline might also be given, and hexobarbitone to make the patient sleep.

Reviews of Books

Diabetes and its Treatment

Joseph H. Barach, M.D., F.A.C.P., associate professor, University of Pittsburgh. London: Oxford University Press. 1949. Pp. 326. 50*s.*

Dr. Barach has written a big book, which "offers the general medical man a clinical approach" on diabetes and its treatment. This it certainly does, and very clearly; but one wonders what page the inexperienced practitioner should turn to in a hurry when faced with a new diabetic patient. Many useful diets are prescribed. in separate sections for men, women, and children, on a calorie-requirement basis, the highest for men being 30 cal. per kg. weight—on which, we should think, the Pittsburgh operative diabetic might fade out of working efficiency. Though the book will be of interest mainly to specialists, it is good and by an experienced clinician.

A striking difference is apparent between books on diabetes published in the United States and those published in this country. In the U.S.A. there are some four large works which, comprehensive though they are. give little help to the practitioner in setting about practical treatment, except perhaps by diet. In this country, on the other hand, we have many useful and simple books which cover this ground. In either country, when in doubt, the doctor should always be able to refer cases to a diabetic centre. At present these are hardly sufficiently widespread in the U.S.A., but the American Diabetic Association are keenly interested in the establishment of centres, and Dr. Barach is a leader in such activities. In Britain the new health service may provide the widespread centres necessary to make our 200,000 diabetics healthy working citizens.

Textbook of Histology

Jose F. Nonidez, D.SC., late professor of anatomy, Cornell University, and professor of microscopic anatomy. University of Georgia; William F. Windle, PH.D., SC.D., professor of anatomy, University of Pennsylvania. New York and London: McGraw-Hill. 1949. Pp. 446. 57*s.* 6*d.*

This is a good and indeed enjoyable book written by a man who knew just how he could help the student of histology. It is clear, concise, and up to date; the presentation is simple yet with an accentuation of important fundamentals, so that it will appeal not only to the young student but also to that perpetual student of histology the seasoned morbid anatomist, who can use it to refresh his memory. Dr. Nonidez had been working on this book for some time when, shortly after taking up his new appointment in Georgia. he died. Dr. Windle at once assumed responsibility for completing the project, and in the text which he has prepared he has kept faithfully to the original plan. The work is admirably illustrated with 209 drawings, many of them by Dr. Nonidez himself, and 193 photomicrographs, several of which are outstandingly good: they include up-to-date examples of phase-contrast microscopy as well as no fewer than fourteen from slides prepared by the late Prof. George A. Piersol over fifty years ago—a happy blend of the old and the new. Dr. Windle has produced a fitting memorial to his friend, for he has provided us with a simple textbook which will. as he intended, "elicit the abiding interest of the reader."

The Thyroid Hormones and their Action

G. Mansfeld, M.D., professor of physiology, University of Budapest. Translated by Erwin Pulay, M.D. London: Frederick Muller. 1949. Pp. 157. 24*s.*

For *the first time* a comprehensive account of Mansfeld's work on thyroid physiology is available to the English reader. This work, almost unknown over here, is based on numerous well-controlled experiments. extending over some thirty years. It has evolved on quite different lines from those followed by British and American workers on the thyroid, and the conclusions may seem surprising. Yet the strange views put forward in this book cannot be dismissed as mere speculation; on the contrary. each step in the argument is closely supported by experiments.

The title sufficiently indicates the wide divergences between Mansfeld's conception of thyroid function and that current in this country. To us, there is only one thyroid hormone: to Mansfeld, there are several. There is the hypothetical hormone which he thinks is concerned with the maturation of red cells. Then there are the "thermothyrins" A and B, which antagonise the metabolic effects of thyroxine and are, according to Mansfeld, of prime importance in the normal control of heat regulation. These last two hormones have been isolated and their empirical formula determined. Mansfeld also holds that the colloid has a physiological function quite apart from its thyroxine content. The study of thyroxine itself has by no means been neglected: Mansfeld has investigated its mode of action on cells and the pathways by which it reaches them. Here again his views are heterodox, for he has found evidence which suggests that thyroxine passes from the blood to the central nervous system, whence it reaches the tissues by way of the peripheral nerves.

The greater part of the book describes physiological experiments and the deductions to be drawn from them. The final chapter is on Graves's disease; here the argument keeps less strictly to verifiable facts and will not carry much conviction in this country. The translator's prose has a strong resemblance to English and is usually comprehensible.

Tuberculosis Nursing

JESSIE G. EYRE, senior sister tutor, St. Helier Hospital, Carshalton, Surrey; formerly sister tutor to Chity Sanatorium, Birmingham. London: H. K. Lewis & Co. 1949. Pp. 292. 21*s*.

THIS book will prove valuable to nurses who are caring for cases of pulmonary tuberculosis, especially those in institutions where surgical treatment is done on a large scale. The general set-up is good, and the instructions given are clear and thorough. In writing a book of this kind, the author is at once faced with the problem of how much to leave out and how much to put in. On the whole, a happy compromise seems to have been achieved, the emphasis being laid on hospital nursing. A little more detail on the psychological side of nursing in sanatoria would be helpful. It is perhaps unfortunate that the patch test should be advocated, since most workers have now decided that this is unreliable and have discarded it in favour of the tuberculin-jelly test. The method suggested for the use of B.C.G. is not that recommended by the Ministry of Health for routine use in England. No special instruction is given in the care of a nurse's own health, and disinfection is treated in three different places. A number of nursing procedures common to all nursing could be spared to make room for fuller sections on such important topics. But such omissions will doubtless be remedied in future editions; meanwhile the book can be recommended with confidence to all nurses dealing with tuberculous patients, though the publishers would have been wise to sacrifice some of the volume's sleekness in consideration for the average nurse's pocket.

Studies in Preventive Medicine

HAVEN EMERSON, A.M., M.D., D.S.M., professor emeritus of public-health administration, Columbia University, New York. Battle Creek: W. K. Kellogg Foundation. 1949. Pp. 507. $3.

Dr. Haven Emerson is well known to workers in preventive medicine in this country. In the second decade of the present century he was health commissioner of New York City, and later he was for many years professor of public-health administration in the Columbia University. His seventy-fifth birthday was on Oct. 19, 1949; and the W. K. Kellogg Foundation, of which he has been a trustee for 14 years, celebrated this by publishing 35 papers selected from his writings during his long, strenuous, and varied career. The papers range over a wide field of professional activity, including laboratory studies and contributions to clinical medicine, epidemiology, vital statistics, social medicine, and public-health administration. On all these subjects Dr. Emerson has much to say that is well worth hearing and ruminating on. He shows that though, since the beginning of the century, great advances have been made in our knowledge of diseases, there has been a considerable lag in applying new knowledge to their control. For him, two of the most powerful enemies of the public health, against which Western civilisation has hitherto not launched a really effective attack, are alcohol and venereal diseases. A most interesting paper describes the incidence of tuberculosis in the Emerson family during their 311 years of continuous residence in America, and covers eleven generations in the direct male line. In the first five generations (1638–1776) there was no evidence of tuberculosis; in the next five (1811–1938) there were 5 fatal and 9 non-fatal cases; but no case has yet appeared in the eleventh generation (1933+). Dr. Haven Emerson himself developed pulmonary tuberculosis when he was 36, but recovered under the care of Dr. Trudeau. His illustrious forbear, Ralph Waldo Emerson, contracted tuberculosis while a student at Harvard, but recovered and died at the age of 79 of circulatory disease. The book is interesting from beginning to end. It reveals a wise, strong, and dynamic personality, and is written with a literary charm that was to be expected from a member of a family so distinguished in the world of letters.

Clinical Electroencephalography

ROBERT COHN, M.D., *electroencephalographer and director* of neurological research, U.S. Naval Hospital, Bethesda, Maryland. New York and London: McGraw-Hill. 1949. Pp. 639. 119*s*.

THIS expensive and bulky atlas contains samples of E.E.G. records from nearly 300 patients. The text is limited to two dozen pages of introduction to the clinical interpretation of the E.E.G., and to case-summaries which face the records—a massive accumulation of undigested material. A few of these cases, with some reference to the valuable work done in this subject in the past 15 years, would have attracted and stimulated the intending worker. These hundreds of pages of records cannot be a substitute for personal experience, and will deter any but the most stolid. What is needed today is a textbook covering the physics, physiology, and clinical aspects of electro encephalography, as well as some guiding principles, based on fundamentals, and presented with illustrative examples. These would help in the training of a clinical electro-encephalographer. The subject is already overloaded with uncritical description such as this.

Ictericias y Laboratorio

HECTOR DUCCI CLARO, auxiliary professor of medicine University of Chile, Santiago. Santiago: University o Chile Press. 1949. Pp. 196.

THIS short monograph in Spanish is concerned wit the biochemical investigation of jaundice. After concis accounts of the causes and salient features of the variou types of icterus, the author describes the individua diagnostic tests. All the current flocculation tests ar critically considered and the growing work on the subjec carefully annotated. The tables on pp. 55 and 96 ar particularly valuable and give a good summary of th present position. Dr. Ducci's own contribution consists i the findings of the flocculation tests, for serum citri acid and for serum alkaline phosphatase, in a very larg series of jaundiced patients. His results agree with thos previously published. The bibliography is comprehensive and the book well produced; it will be of little interes to the general reader, but can be recommended for the specialist interested in liver disease and in particular for those working on flocculation tests.

Schildrüse und Basedow

Prof. Dr. Med. WILHELM EICKOFF, M.D., of Rheine, Westphalia. Stuttgart: Thieme. 1949. Pp. 125. D.M. 10·80.

WILD rabbits, when taken captive, pine away and die. Eickoff's clinical and pathological studies of this interesting phenomenon have convinced him that the process is the same as human thyrotoxicosis. If the rabbits are treated with methyl thiouracil from the time of capture, they survive and gain weight. Various ingenious observations on this and other species of wild animal lead to a discussion of the factors governing thyroid function in the natural state. The approach is decidedly original and not unpromising, but the rather scanty facts so far discovered are overburdened with hypothesis.

Handbook of Bacteriology (6th ed. London: Baillière, Tindall, and Cox. 1949. Pp. 547. 20*s*.).—"The most unwilling student," Prof. Joseph W. Bigger writes in the preface to the new edition of his well-known book, "could not regret more than I the increase in the text from 455 to 535 pages." He has worked hard at pruning, compressing, and revising, but new discoveries will keep breaking in. Penicillin and the sulphonamides, mere infants when the last edition appeared in 1939, have sprung up, and are now among the giants of bacteriology, occupying two full chapters. The viruses and rickettsiæ are of course multiplying rapidly. Five chapters on immunity, three on intestinal bacteria, and one on undulant fever have been rewritten; and the revision of the whole book is described as the most thorough in its history. It has always been a favourite, and continues to deserve its honours.

THE LANCET

LONDON: SATURDAY, JAN. 21, 1950

The Brachial Palsy Hazard

DESPITE the old saying that a change is as good as a rest, few patients really relish exchanging one disorder for another. To go into the theatre with uterine fibroids and come out with brachial palsy has lately become quite a common accident. Indeed, one patient in a gynæcological ward who complained of moderate weakness of her right arm was admonished: "You're lucky: look at Mrs. So-and-so—she has to take hold of hers with her left hand before she can move it at all." Though it is easy enough to say that most of these palsies clear up in six months or so, the patient may suffer considerable hardship during that time. Most of the cases reported have been in the right arm, presumably because, from the surgeon's point of view, this is the more convenient arm for the anæsthetist to use for intravenous medication. But a labourer whose right arm is weakened even temporarily may find it difficult to get work. Fine finger movements may take even longer to return than power in the larger muscles. We have heard of one commercial artist whose former firm line is now tremulous, though more than a year has passed since the operation. A teacher of sewing had a comparable experience; and it is easy to see how such a disability could hinder the livelihood of many others—pianists, instrument-makers, joiners, typists, embroiderers, and watchmakers, to name a few. In none of the cases of which we have heard was the patient asked before operation whether he was right-handed or left-handed; yet this simple precaution alone should have made it possible to spare the earning hand. The lesion is not merely troublesome: it is uncomfortable too. In his article on another page Dr. KILOH mentions aching pain in root distribution and tenderness of muscles. This aching, patients report, is brought on by using the arm, and by weather changes. They find they have to favour the bad arm, carrying parcels in the other hand and protecting it from extremes of heat and cold—a constant tiresome reminder of someone else's carelessness.

The cases reported this week by Mr. EWING and by Dr. KILOH show that gynæcological operations are not alone to blame; brachial palsy can follow any operation provided a small group of factors are present. The patient has always, or nearly always, been given a curariform drug, he has often been placed in the Trendelenburg position, and his arms have generally been abducted, extended, and externally rotated. This combination of events, it seems, could hardly have been better designed for putting the brachial plexus on the stretch, and perhaps for compressing it as well between the first rib and the clavicle. In the Trendelenburg position the shoulders are supported by rests, and the weight of the body, thrusting down from above, forcibly depresses the shoulder-girdle against the action of the structures which sling it from the trunk—the brachial plexus among them. In a conscious person, as Mr. EWING shows, the tonic contraction of the trapezius and the rhomboids will protect the nerve-trunks from strain, temporarily at any rate; but in an anæsthetised and curarised patient things are very different. The muscles, agreeably toneless for the surgeon, are lost allies for the patient; they take no strain at all. Nor is the surgeon the only one whose convenience must be studied; since intravenous medication or transfusion may be necessary, the anæsthetist naturally likes to have the patient's veins convenient to his hand. The flaccid arms are therefore usually supported on a board pushed under the rubber mattress on the operating-table; which means they are not only abducted to a right-angle, extended, and externally rotated, but are usually sloping from the shoulders to a horizontal level slightly below that of the rest of the body. In this position of the limb, the head of the humerus is thrown into prominence, and tightens the stretched plexus as a bridge tightens fiddle-strings. In a gall-bladder operation the tension may be increased still further by extending the patient's back over a double wedge. And finally some additional tension may be secured—though the evidence is not conclusive—if the anæsthetist for some good anæsthetic reason turns the patient's head to the opposite side. The lookers-on must also be catered for: they press in between the arm and the body, pushing the supporting board askew, until the right-angle becomes obtuse.

The case for compression is not so clear, but Dr. KILOH thinks there has been at least one unquestionable example where a brachial-plexus lesion after the use of the Trendelenburg position was due to direct pressure from an inadequately padded shoulder-rest. DENNY-BROWN and BRENNER, however, as Mr. EWING notes, have shown the primary cause of damage to a nerve by pressure to be the result of ischæmia due to obliteration of its vessels; and they found it very hard to cause such a disturbance in large nerve-trunks. This may be easier to do, however, in a nerve which is already stretched; and as Dr. KILOH says, idiosyncrasy may come in: "the slope of the shoulders, the size of the first rib, and other individual anatomical peculiarities, all within the limits of normality, may in combination render the brachial plexus vulnerable to pressure or traction."

But the causes of this condition, fascinating as they are, surely deserve less serious attention than the fact that it can be avoided. The extreme Trendelenburg position and complete muscular relaxation certainly make gynæcological surgery easier; they are much favoured in America where brachial-plexus lesions after their use have been described for a long time past. The fact remains that, if the slope is steep, it is difficult to find a harmless way of anchoring the patient. If he is suspended from the knees he is liable to develop thrombosis in the leg vessels, and at least one amputation for gangrene has been necessary. Shoulder-rests carry the risks we have been discussing, and a suggestion that the patient should be suspended from the iliac crest by special holders seems to have appealed as little to surgeons as it probably would to patients if they were asked. In any case few conscious people over the age of 40 care for standing on their heads for even a moment. To hang upside down for an hour or more would doubtless make them feel exceedingly ill, and there is no reason to suppose that because consciousness is absent the body finds the experience more acceptable. Thanks to curariform drugs, the extreme Trendelenburg position is now rarely—possibly never—needed; and even a mild degree of tilting should be maintained for as short a time as possible. Some surgeons take the precaution of waiting till they have opened the peritoneum before allowing the patient to be tilted at all.

"In no circumstances," Mr. EWING says, "must the arm be abducted with the patient in this position." This maxim should be strictly followed. He shows that the claims of the anæsthetist can, with a little ingenuity, be met when the arms are at the sides. Mr. BRYAN WILLIAMS tells us that in his clinic they have had no cases of brachial palsy associated with the Trendelenburg position since they gave up abducting the arm. Now that the causes and methods of prevention are clearly before us, every surgeon should feel his credit engaged to ensure that no further cases develop among his patients. He would himself think the cost of recovery after an operation very high if he paid for it with his dexterity.

The Malignancy of Nodular Goitres

NODULAR goitres are common, even outside the classical endemic areas, and a proportion of them become malignant. How often this change occurs, and the measures to be taken to deal with or forestall it, have been the subject of much debate. The surgical opinion in the United States [1] is that nodular goitres are more frequently malignant than has generally been supposed and consequently should be more freely operated on. The article by BRANSON and HOUSTON,[2] in our columns a few weeks ago, shows that the same view is now held by some British surgeons; indeed, the writers go so far as to recommend the removal of all nodular goitres, irrespective of symptoms or size. The evidence on which this opinion is based deserves careful examination. BRANSON and HOUSTON reviewed 530 cases of nodular goitre which had been under the care of the late Mr. CECIL JOLL in 1931–44. Among these cases there were 33 malignant adenomas and 32 thyroid cancers of other types. Assuming that all the malignant adenomas, and some of the other cancers, arose in a pre-existing goitre, it appears that 6–12% of all their nodular goitres were malignant. In many of these malignancy was not suspected before operation. The nodular goitres were treated by partial thyroidectomy, followed by irradiation, with excellent results. Since the operative mortality was low, BRANSON and HOUSTON conclude that all non-toxic nodular goitres should be surgically removed.

Many surgeons will undoubtedly agree with this argument, but some surgeons and pathologists hold a contrary view. Broadly speaking the critics would raise two objections—they would have doubts about the histological diagnosis of malignancy, and they would contend that the cases were not truly representative of the general run of nodular goitres. On the question of diagnosis, GRAHAM and VAUX might be quoted, since BRANSON and HOUSTON adopted their criteria in arriving at a histological diagnosis. The greatest difficulty lies in distinguishing benign from malignant adenomas. Here BRANSON and HOUSTON relied on GRAHAM'S [3] paper of 1925. In 40% of the cases classed as malignant adenomas the diagnosis was made highly probable by the close relation of the neoplastic cells to vascular endothelium, often with actual invasion of the lumen. In the remaining 60% the diagnosis was based on morphology—that is, on the character and arrangement of the thyroid epithelium—and here the distinction between benign and malignant adenomas is less obvious; indeed, some authorities [4] [5] say that no hard-and-fast line can be drawn. It is noteworthy that VAUX,[5] in reporting on 13 malignant adenomas from the same series as BRANSON and HOUSTON, looked on close apposition of neoplastic cells to the vascular endothelium as the most reliable indication of malignancy; this was present in all her cases. Moreover GRAHAM [6] writing in 1933 about 186 cases previously diagnosed as malignant adenomas, felt compelled to reclassify 108 cases as benign, because they had survived for six or more years without recurrence. All the cases which he reclassified had been diagnosed on morphological grounds alone. It is likely that GRAHAM would regard the fact that all 50 of BRANSON and HOUSTON'S "malignant adenomas" survived for five years or more (after only a partial operation) as evidence that some were wrongly diagnosed in the first instance.

The other objection might come from CRILE.[7] He also has found a high incidence of malignancy among the nodular-goitre patients who have had a thyroidectomy; but he maintains that such figures cannot be applied to nodular goitres as a whole. The nodular goitre which comes to operation has been carefully screened: first by the patient (who seldom seeks advice for a small and static lump), then by the general practitioner, and then by the surgeon. CRILE is impressed by the fact that 4% of the patients admitted to the Cleveland Clinic for non-thyroid disease were found to have nodular goitres; no treatment was advised for these goitres. By an ingenious (though not necessarily reliable) calculation he surmises that operating on everyone who has a nodule in the thyroid would mean doing 6675 thyroidectomies to prevent 1 death from thyroid cancer. Accepting BRANSON and HOUSTON'S figures for operative mortality this policy would involve about 40 operative deaths for every patient saved from cancer. Speculative calculations of this kind should not be taken too literally; but this one shows that the critics of the policy have reasons for their opposition. Before all nodular goitres could be removed there would have to be a mass survey to bring to light all the

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1. Cole, W. H., Majarakis, J. D., Slaughter, D. P. *J. clin. Endocrinol.* 1949, 9, 1007. Cope, O., Dobyns, B. M., Hamlin, E., Hopkirk, J. *Ibid*, p. 1012. Frazell, E. L., Foote, F. W. *Ibid*, p. 1023. Ward, R. *Ibid*, p. 1031.
2. Branson, K. M., Houston, W. *Lancet*, 1949, ii, 979
3. Graham, A. *Ann. Surg.* 1925, 82, 30.
4. Wegelin, C. International Conference on Goitre. Berne, 1927. Dunhill, T. P. *Brit. J. Surg.* 1931, 19, 83.
5. Vaux, D. M. *J. Path. Bact.* 1937, 44, 163.
6. Graham, A. *Arch. Path.* 1933, 15, 741.
7. Crile, G. Practical Aspects of Thyroid Disease. Philadelphia and London, 1949.

eople with such goitres who never seek medical dvice. If Branson and Houston really advocate uch drastic measures they must make out an unassailble case; and they must show that their proposed emedy is less lethal than thyroid cancer itself, which ills about 300 people a year in this country. Until hey have brought forward stronger evidence it might be better to adopt Crile's [7] policy. He holds that the linician should learn to be suspicious of the particular ype of goitre which is most often malignant and oncentrate his efforts on seeing that such cases are ffectively treated.

Polio's Cousins from Coxsackie

It is well recognised in North America that several viruses can produce clinical manifestations like those of poliomyelitis, and that in research work somewhat elaborate laboratory investigations are therefore necessary to verify a clinical diagnosis of poliomyelitis. Now Dr. Gilbert Dalldorf, director of the New York State Laboratories, Albany, and his associates [1] have separated off yet another virus infection which must be considered in the differential diagnosis. This virus was first isolated from patients in the village of Coxsackie in New York State in 1947. In that year workers in various parts of North America reported that mild attacks of what was accepted at the time as non-paralytic poliomyelitis were unduly prevalent in relation to the number of frankly paralysed cases. Sabin [2] in Cincinnati and Rhodes [3] in Toronto were able to recover only comparatively few strains of poliomyelitis virus from these mild illnesses, and in retrospect it seems possible that some of the suspected poliomyelitis cases were in fact infected with the Coxsackie virus. Melnick and his co-workers [4] in Dr. John Paul's department at Yale University, who have played a notable part in the investigation of this new disease, have isolated the virus from cases in Ohio, North Carolina, Texas, Rhode Island, and Connecticut; and Jaworski and West [5] have described the clinical features of some of the cases.

It appears that there are several antigenic types of the Coxsackie virus; so it is more accurately described as the "Coxsackie group of viruses." The main biological character of these viruses is pathogenicity for suckling mice and hamsters, older animals of these species, as well as monkeys and other animals, being insusceptible. These properties are in sharp contrast to those of human poliomyelitis virus of the rodent (Lansing) or monkey pathogenic types. The apparent primary lesion in suckling mice is in the skeletal muscles, where there is extensive involvement of striated fibres, with swelling, hyaline or waxy change, and loss of transverse striation. In some areas the fibres disappear completely. There is a well-marked proliferation of the cells of the sarcolemmal sheath, but no frank inflammatory exudate. Coxsackie viruses have been isolated from the stools and nasopharyngeal secretions of patients with illnesses characterised by "meningeal" irritation and diagnosed as non-paralytic poliomyelitis or aseptic meningitis. They have also been recovered from patients with brief febrile illnesses and can evidently cause a muscular weakness. Laboratory infections have occurred.[4, 6] Antibody develops in convalescence, but titration of antibody level presents technical difficulties. With regard to the association of this new virus with that of poliomyelitis, Melnick [4] mentions the recovery of both agents from pooled fæcal specimens and flies. Very recently, Nelles Silverthorne, A. J. Rhodes, and their associates [7] at the Hospital for Sick Children and the Connaught Medical Research Laboratories in Toronto have isolated both Coxsackie and human poliomyelitis viruses from the separately collected stools of three children, contacts one of another. They also refer to the isolation of Coxsackie viruses from three adults who had been in contact with these children, and from another child in whom the clinical diagnosis was Guillain-Barré-Landry ascending paralysis.

It is evident therefore that infections with the Coxsackie group of viruses are widespread in North America. It remains to be seen whether the reported association of human poliomyelitis virus and Coxsackie virus in individual patients is commonly observed; it is certainly far from universal. The association raises some interesting questions. For example, is it possible that one infection immunises against the other, or that one virus exerts an interfering or blocking effect on the other? The answers may solve several outstanding puzzles in the ætiology, pathogenesis, and epidemiology of "poliomyelitis." Meanwhile there is more justification than ever for insisting that a diagnosis of poliomyelitis, especially the minor (abortive) or non-paralytic (meningeal) varieties, can only be tentative until confirmed by laboratory tests.

How Do Drugs Act?

Chemotherapeutic drugs are valuable because they are more toxic to parasites or pathogenic bacteria than to the tissues of the host: they poison the disease and the patient recovers. Many other substances are relatively harmless to man but poisonous to certain undesired beings such as insects, rats, or weeds; and some time ago the Society for Experimental Biology held a symposium on this large subject of selective toxicity. The proceedings have now been published.[8]

Drugs, it is now realised, act by a very complex process involving a number of stages, the events at each stage depending on those in the previous one. Of the many stages, two in particular have lately been studied. One of these is the action of drugs at the surface of the cell, to which attention was first drawn in the Overton-Meyer theory of narcotic action. With the modern conception of surface membranes composed of elongated molecules orientated in a particular direction, this theory has been elaborated; and it is now widely recognised that one way in which a small amount of a chemical substance can prove toxic is by interfering with the surface structure of the cell. The other process singled out for study is the action of drugs as selective poisons to enzymes. Well-known examples of these are fluoride and cyanide (the latter inactivates cytochrome oxidase); but heavy metals such as mercuric salts and arsenicals act in the same way, combining with essential —SH groups in the tissues. The work of Prof. R. A. PETERS, F.R.S., and his associates has elucidated some of the mechanisms accounting for the extreme toxicity of lewisite and other arsenical poison gases and lacrimators; it has also provided the antidote, dimercaprol (BAL), which forms a stable compound with these poisons and so diverts them from the tissues.

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[1] Dalldorf, G., Sickles, G. M. *Science*, 1948, 108, 61; Dalldorf, G., Sickles, G. M., Plager, H., Gifford, R. *J. exp. Med.* 1949, 89, 567.

[2] Sabin, A. B., Steigman, A. J. *Amer. J. Hyg.* 1949, 49, 176.

[3] Rhodes, A. J., McClelland, L., Donohue, W. L. *Canad. med. Ass. J.* 1949, 60, 359.

[4] Melnick, J. L., Shaw, E. W., Curnen, E. C. *Proc. Soc. exp. Biol., N.Y.* 1949, 71, 344.

[5] Jaworski, A. A., West, E. J. *J. Amer. med. Ass.* 1949, 141, 902.

[6] Curnen, E. C., Shaw, E. W., Melnick, J. L. *Ibid*, p. 894.

[7] *Canad. Publ. Hlth J.* 1950 (in the press).

[8] Symposia of the Society for Experimental Biology. No. 3: Selective Toxicity and Antibiotics. London: Cambridge University Press. 1949. Pp. 372. 35s.

The symposium showed that much has been done to elucidate the mode of action of the two great modern remedies—the sulphonamides and penicillin. In 1940 D. D. WOODS found that sulphanilamide interferes somehow with the utilisation of *p*-aminobenzoic acid. It is now known that an important part in cell metabolism is played by folic acid, which is a complex of glutamic acid, *p*-aminobenzoic acid, and pteridine nuclei; and sulphonamides act against certain bacteria by preventing the synthesis of folic acid from *p*-aminobenzoic acid. Yet these certain bacteria do not include the common sulphonamide-sensitive pathogens; and WOODS is forced to conclude tha inhibition of bacterial growth by sulphonamide cannot be satisfactorily explained solely by thei effect on the synthesis of folic acid. Th problem of how penicillin acts, and why it acts o gram-positive bacteria more than on gram-negativ organisms, is still largely unsolved; but a valuabl contribution is made by E. F. GALE. According t him, gram-positive bacteria are peculiar in being abl to concentrate amino-acids from their environment and this assimilation is bound up with a ribonucleotide complex, which is responsible for the positive gram reaction. He suggests that penicillin exerts a direct effect upon nucleic-acid metabolism within the growing cell, and possibly this impairs the power to assimilate amino-acids.

Annotations

A.C.T.P.

THE field of research opened up by Hench and his colleagues at the Mayo Clinic is being marked out almost day by day. In this issue Dr. and Mrs. Morris report from the London Hospital the isolation from pituitary-gland extracts of a peptide, named by them A.C.T.P., which appears to be homogeneous and has 8·5 times the activity of a standard American preparation of adrenocorticotropic hormone (A.C.T.H.). Whether this finding materially brightens the prospects of synthesising an active agent will depend on the nature of the peptide and the number of amino-acid residues; but the discovery should certainly bring nearer the production of A.C.T.H. of standard potency. As we mentioned on Jan. 7, one or more peptides with A.C.T.H. action have lately been isolated in California by C. H. Li.

On other pages Professor Marrian and his colleagues in Edinburgh report that in rheumatoid arthritics an abnormally high proportion of intramuscularly injected progesterone is excreted in the form of pregnanediol; and a Polish worker, Dr. Landsberg, describes a development in the technique described by Lewin and Wassén,[1] who relieved the manifestations of rheumatoid arthritis by injection of ascorbic acid and deoxycortone acetate. Dr. Landsberg has achieved similar results using other sterones (progesterone and testosterone) in place of deoxycortone.

OUTWORK

'UNWOMANLY' rags have gone out in Great Britain, along with much poverty, most hunger, and a certain amount of dirt. But piece-work—or outwork—goes on, though not on the wretched terms so rightly denounced by Tom Hood. Its effect on the sociological conditions of the workers, especially those who do it in their homes, has lately been studied in St. Pancras by the members of a seminar of the London School of Hygiene and Tropical Medicine. Their report ("Outwork"), which has not been published, is based on work done between January and March, 1949. Registered outworkers in the borough numbered 328 at that time: 185 of them were interviewed by members of the seminar and 124 by members of the staff of the St. Pancras public-health department, while 19 proved to have given up outwork. The department had been troubled over a possible rise in the number of outworkers, the names on the register having increased from 200 in 1945 to 577 in 1947. The findings of the seminar suggest that this was a temporary peak and that the rebuilding of factories after the wa and the improved supply of whole-time workers ha already reduced the amount of work put out.

The ordinary outworker gets on fairly well—or cause little trouble, as the St. Pancras council put it. Bu there are some outworkers who take in work not onl for themselves but for their whole family, and sometime other people. The contracting outworker then become in effect a factory owner, and even—if the industry lend such things as electric sewing machines—a power factor owner. A power factory in an overcrowded, under ventilated, poorly lighted St. Pancras basement, with inadequate sanitation, can cause a good deal of trouble

The seminar suggest that the term outwork should be used generally to cover all forms of work put out by a factory or shop; and that "homework" should be the term applied to work done by people in their own homes They have little but good to say of homework; for, though it is rewarded by relatively low hourly rates of pay, it offers some people—especially the housewife with one small child, the disabled worker, and the elderly—the chance to add to the family income and increase domestic comfort. It can be done at times convenient to the worker; and if it is work requiring special skill, such as embroidery or the handmaking of shoes, it is unsuitable for the mass-production methods of factories. Wearing apparel, including boots and shoes, gave occupation to no less than 208 people on the register; others made boxes, paper bags, handbags, brushes, artificial flowers, Christmas novelties, coat-hangers, electrical fittings, wigs, or umbrellas, or were concerned with soft furnishings, household linen, embroidery, furs, plastics, or buttons. There was no evidence of overcrowding among true homeworkers, and the condition of their homes depended not on whether they did homework but on whether they were any good as housewives. Weekly earnings ranged from 10*s*. to £3 a week, according to the ability of the worker and the time that could be spared for the work. The money was often spent on such amenities as cigarettes, extra clothes, table delicacies, or entertainments. A few people depended entirely on homework for their income, and a larger group would have been badly off without it. Only a few cases of sweated labour were seen. Children took no part in homework in any of the cases visited; and there was no evidence that the health of homeworkers was adversely affected. The seminar conclude that homework fulfils a useful function, both for the employer and the worker. They wisely insist, however, that outwork done in a workshop should be supervised under the Factories ct, 1937, as work done in a factory, and that the osition of the contractor who hands outwork to others equires further scrutiny.

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[1] Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.

TASTE SENSITIVITY TO PHENYL THIOUREA

THE observation that phenyl thiourea tastes bitter o some people but is tasteless to others was first made y Fox[1] in 1932. This odd finding was taken up by eneticists and it soon became apparent that the ability o taste phenyl thiourea is inherited in a simple way; whether a person is a "taster" or "non-taster" depends olely on the constitution of a single gene pair. "Tasters" are homozygous or heterozygous for the dominant allele.

According to numerous independent observers about 25–35% of people of European stock are "non-tasters." This proportion is surprisingly constant, which suggests that there is no particular biological advantage in being either a "taster" or a "non-taster"; and in that case the differential taste-response must be regarded as a biological curiosity of no practical importance. But recent work shows that the phenomenon cannot yet be summarily dismissed as having no significance for medicine. Harris and Kalmus[2] have assembled the known facts about the chemical grouping necessary for the differential taste response and have added much new information of their own. They make the generalisation that all the substances which give the phenyl thiourea type of response contain the same $=N-\underset{|}{C}=S$ group as the goitrogenic (antithyroid) substances. If a person is a taster for phenyl thiourea he is also a taster for thiourea, thiouracil, and a whole range of similar goitrogens. This generalisation might be of purely academic interest were it not for the fact that many of these goitrogenic substances are found in plants, some of which form part of our normal diet. Indeed Astwood[3] has made out a strong case for supposing that the ingestion of this type of substance is of considerable importance in the causation of goitre. If we accept his view, it would be reasonable to expect tasters and non-tasters to react differently to the presence of goitrogenic substances in their diet. Ability or inability to taste these substances might conceivably affect the amount of goitrogenic vegetables consumed; or, more probably, it might be an indication of the way in which these substances are metabolised. If the specialised taste-buds react in two different ways, then other tissues might do so also.

Harris, Kalmus, and Trotter have investigated the taste-reactions of a series of cases of goitre and they lately reported their results in a preliminary communication.[4] They found a normal proportion of non-tasters among cases of toxic diffuse goitre; but among cases of nodular goitre—whether toxic or not—there seemed to be an excess of non-tasters. Unfortunately the level of statistical significance attained was not decisive, so it would be premature to draw conclusions from their work until they have extended it or it has been repeated elsewhere. All that can be said is that the differential taste response may yet turn out to be of medical interest.

Meanwhile, some American work, on different lines, suggests that the physiological mechanism of taste may be more complex than had been supposed. Cohen and Ogdon[5] claim that even "tasters" cannot taste phenyl thiourea when a saturated solution is placed on a previously dried tongue; nor can they taste it when it is dissolved in another person's saliva, whether that person is a "taster" or not. Only when the phenyl thiourea is dissolved in the "taster's" own saliva does the bitter taste become apparent. Cohen and Ogdon conclude that "salivas are probably as different as fingerprints," but the evidence they present scarcely justifies such a sweeping conclusion, for no saliva from any person was used for more than one test on more than one subject. The technique too is open to criticism in that the subjects' tongues were dried by blowing air over them; this would evaporate the water but leave behind the solid constituents of the saliva which would probably redissolve when the phenyl thiourea solution was placed on the tongue. In any case, placing solutions on the tongue is a precarious method of taste-testing, for the results depend entirely on whether the solution reaches the taste-buds on the back of the tongue. In short, these experiments will have to be repeated with a more satisfactory technique before any firm conclusions can be drawn from them.

OLD PEOPLE AT SALFORD

SYMPATHY for old people is nowadays expressed less in elegant sentiments than in good hard work. Salford has done much already for the welfare of its older residents, and plans to do more. At an informal conference,[1] arranged last November by the mayor (Councillor C. R. V. Haynes, J.P.), Sir William Douglas recalled that between 1931 and 1947 those over the age of sixty-five rose from 7·4 to 10·9% of the population of this country; and in the latter year, some 13·7% of the population were of pensionable age. By no means all of these elders depend on public care for their comfort: only about 5% are in hospitals or institutions, and many of the remainder live with their families. But there are many, too, who live alone and need help of various kinds.

Meals-on-wheels are among the best services which these lonely old people can be offered. Miss S. Doherty, domestic help organiser, described the scheme running in Preston. She spoke of a heated metal cupboard in the transport van, of warmed containers to receive the food prepared at the civic restaurant, of the sparkling cleanness of the equipment, the server's fresh white overall, and the white towel in which she carries the hot container to the door; but more important to the old person than the meal (though that is interesting enough) is the chance to talk to someone friendly—a break in the day's monotony, something to look forward to. The home help and the home visitor bring the same kind of pleasure. Miss Bessie Chadwick told of the work done by the 62 home helps employed by the Salford corporation, not all of it paid work. The home helps become attached to the old people they look after. One goes nearly a mile nightly to tuck up her old lady for the night, another sends her child in to run messages on the days she does not go herself, a third left a dance during a storm to sit with her old lady, who was afraid of thunder. The Salford Good Neighbours Association has 29 volunteers, some of them men, who visit old people for a chat, and help them with small jobs. A retired naval man scrubs, sews, darns, and washes; a hairdresser gives a free haircut in the course of an hour's gossip. Miss C. E. Smith, a health visitor, mentioned the need for laundry services for old people; and suggested, too, that public-bath attendants might visit the homes to bathe old people; or perhaps transport might be arranged to take them to the public baths where the attendants could help them to bath themselves. She also mentioned the care of their feet: much of the difficulty which old people experience in getting about comes from foot troubles, and they need regular visits from a chiropodist.

Old people's clubs have proved their worth for many lonely old people. In Salford there are some 3500 old people living alone, and many of them already belong to clubs. The first of these was opened about two years

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1. Fox, A. L., *Proc. U.S. nat. Acad. Sci.* 1932, 18, 115.
2. Harris, H., Kalmus, H. *Nature, Lond.* 1949, 163, 878.
3. Astwood, E. B. *Ann. intern. Med.* 1949, 30, 1087.
4. Harris, H., Kalmus, H., Trotter, W. R. *Lancet*, 1949, ii, 1038.
5. Cohen, J., Ogdon, D. P. *Science*, 1949, 110, 532.

1. Towards the Better Care of the Elderly in their Own Homes. A limited number of copies are available, on request, from Dr. J. L. Burn, medical officer of health, Health Department, 143, Regent Road, Salford, 5, Lancs.

ago; but at the time of the conference there were already 20 in action. At one club with a membership of about 80, the average attendance, on the weekly club night is 60–65. The entertainment is simple but evidently satisfying—" the men play cards and dominoes and the ladies sing and dance," as one speaker put it; and there are concerts, outings, and entertainments, and social afternoons.

For those who are no longer fit to live entirely alone, Salford, like other places, is beginning to open residential homes, taking over big old houses for the purpose. There are now 11 houses open for women, with 78 residents; and similar homes are needed for men. The mixed homes which have proved such a success in many places were not mentioned as a possibility.

The Manchester and Salford Family Service Unit contribute to the symposium a telling little note on the care of the " problem aged." The unit undertakes to pay regular visits and give practical help to such people, many of whom through apathy and despair are " ending their days in loneliness and squalor." The unit workers clean and decorate, repair furniture, disinfect, shop, cook, arrange for washing to be done, find new clothing and bedding, and help with a move to better quarters when this is possible. They promise a complete account of their experience, which will surely be widely read.

PROFESSOR RYLE'S RETIREMENT

Prof. John Ryle's career reflects the changes which medicine as a whole has undergone during the present century. He comes of a family which has achieved distinction in religion and philosophy, and he has consistently deprecated the narrow technical approach to medical problems. The first phase was the normal development of a consulting physician, beginning with the physiological studies on gastric secretion, which have made the name of Ryle familiar to every medical student, and culminating in the lectures on clinical phenomena which were finally published as the *Natural History of Disease.* His contributions to knowledge of the visceral neuroses were especially noteworthy.

His abilities as a clinical research-worker and writer, and his success as a consulting physician, were so great that many were surprised when Ryle left the broad highway of medicine in 1935 to accept the regius chair of physic at Cambridge. It was less of a surprise to those who were familiar with his growing preoccupation with social problems and with the need for a reorientation of medical education and practice. The attempt to start a new clinical school at Cambridge was frustrated by the war. In addition, it seems probable that both at Cambridge and at Oxford the establishment of a university hospital would have required greater expenditure and a sharper break with the past than most people were prepared to support.

During the war he returned to Guy's, which was then depleted of staff and in a heavily bombed area. His experiences deepened his interest in medicine as a community problem, and he gladly accepted the invitation to take charge of the newly founded Institute of Social Medicine in Oxford in 1943. Here he found a congenial field for his talents, and the next six years were extremely fruitful. He hammered out his conceptions of social medicine, as both a service and a scientific discipline, in a number of lectures which were collected and published in 1948 under the title *Changing Disciplines.* Oxford became a centre of pilgrimage for students of social medicine, and Ryle visited India, America, and South Africa to disseminate his ideas. His departure from the chair of social medicine and from Oxford makes a gap that will not easily be filled. Nevertheless, one of his constant aims has been to attract good people into social medicine and he leaves a strong team behind him. His pen is not likely to be idle in his retirement in his home beneath the S
downs, where the trackways, the circles of beech
and the evidences of ancient man have so often br
him " the still, sad music of humanity."

FINDING BEDS IN LIVERPOOL

THE Liverpool Regional Hospital Board re
that on completing its first year's work last Septe
the Liverpool Emergency Bed Bureau had rec
9260 requests for admission. Accommodation was f
in 8923 cases, though in 430 it was not accepted.
remaining 337 (3½%) are reported as " failures,'
35 of the patients were admitted at a later date.
" failures " are detailed at some length, and it is no
able that some of them at least are barely disting
able from chronic waiting-list cases—e.g., chronic h
failure and senility. As might have been expe
about two-thirds of the " failures " occurred in
first three months of the year.

The bureau has admitted to 73 hospitals, including
Liverpool teaching hospitals, and has clearly follo
the spirit of the National Health Service in not allov
management-committee or regional-board boundarie
be any bar to the movement of patients. From
steady increase in the use made of the bureau i
evident that it has earned a high reputation and
be extensively used this winter.

CONSULTANT SERVICES

SIX months before the National Health Service c
into being the regional hospital boards received from
Ministry of Health a long memorandum on the deve
ment of specialist services.[1] This document has been
useful during the past two years, and now, with a
minor alterations, it has been officially issued to
public.[2] Pointing out that the distribution of consulta
has been haphazard and uneven, it rightly says that
regional planning now possible will continue to be
of the most important functions of the boards. " Dis
bution can be improved by the creation of new sala
posts, part or whole time, beginning first in those a
where the need is greatest." The deficiency in numb
however, can be made good only gradually, for " i
imperative to avoid the mistake of expanding consult
staffs by recruiting men and women with inadequ
training and experience." Under the headings of vari
specialties the memorandum discusses the requireme
for a hypothetical average hospital district with
population of about 100,000–120,000. The main probl
of the regional board, it is suggested, will be to integr
the consultant services of the hospital centres with th
of the regional centre—which includes the teach
hospital. It seems best that, apart from plastic surge
neurosurgery, thoracic surgery, and radiotherapy,
services of a complete range of consultants should
available at each hospital centre, and that these co
sultants should be fully responsible for the hospi
treatment of its population.

> " Under such conditions, linkage between the Regio
> and Hospital Centres would be maintained by recognisi
> all the consultants throughout the Region as members
> one team. Members of the staffs of Hospital Centres shou
> be given the opportunity to take temporary duty
> hospitals at the Regional Centre, and some grades
> medical staff in the Regional Centre should similarly ha
> opportunities of doing temporary duty in a Hospi
> Centre."

The memorandum concludes with useful appendic
showing, for each region, the population, the number
hospitals, and the number of beds.

Sir ARCHIBALD GRAY has been appointed to t
General Medical Council as representative of the Unive
sity of London in place of the late Sir Herbert Eason.

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1. R.H.B. (48) 1.
2. National Health Service: the Development of Consulta Services. H.M. Stationery Office. Pp. 39. 9*d*.

Special Articles

AN OUTPATIENTS' CLUB

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M.D. Camb., F.R.C.P.
PHYSICIAN TO THE ROYAL SUSSEX COUNTY HOSPITAL, BRIGHTON

This paper describes an attempt, on a small scale, to solve the problem of the long-term outpatient. Even a partial solution may go some way to solve the still more harassing problem of accommodation for long-stay inpatients. The latter have forced themselves on our attention more objectively since the fusion of all hospitals into a general service. Professional and lay people, accustomed to working under the voluntary-hospital system, have been shocked to discover the great numbers of chronic sick never dealt with under that system, who have now become part of their responsibility. Departments and specialties, which had hoped that extension to other hospitals would mean increased opportunities to treat acute and urgent illness, find instead that many of their beds are occupied by elderly, paralytic, rheumatic, cardiac, or otherwise incapacitated patients. This rather sudden awareness of the facts, and the knowledge that our population is progressively ageing, has led to serious consideration of the care of old people and of the chronic sick, especially from the standpoint of prevention and rehabilitation. As part of this problem, the management of old age and chronic illness in outpatient departments assumes importance.

THE PATIENTS

Firstly, old age. Between normal old people on the one hand, and the incapacitated inmates of chronic blocks on the other, there is a large group of the elderly who attend outpatient departments for lengthy periods. An analysis of 1028 outpatients whom I saw for the first time during 1948–49 gave the following figures:

Age-group	*Number of patients*	*Percentage*
0–15	19	1·8
16–25	61	5·9
26–35	117	11·4
36–45	157	15·3
46–55	233	22·7
56–65	223	21·7
66–75	181	17·6
76–85	36	3·5
86–95	1	0·1
Total	1028	100·0

It will be seen that 21·2% of these new patients were over sixty-five and had reached what is often considered old age; and they would probably need treatment differing in kind and duration from what is applicable to younger people.

Secondly, chronic ill health. There is a group which attends hospital over long periods suffering from chronic incapacitating diseases. Of these, rheumatism is an example. Records were kept of patients who attended a rheumatic clinic under my charge during 1946–48. The total was 440, of whom 58, or 13·2%, attended the clinic—as distinct from the physiotherapy department—for six months or more: an appreciable number had attended for many years.

PHYSIC OR FELLOWSHIP?

A notable—indeed inescapable—feature of these outpatient departments was the constant and amiable chatter among the patients while they were waiting to see the doctor. Indeed, the brief interview in his room often seemed to play only a minor part in the morning's visit. Frank consideration led me to the regretful conclusion that the benefits of treatment were often not detectable by objective methods of diagnosis; but, though the physical condition and the wording of complaints remained unchanged over many years, the patients believed that they derived great benefit from their attendances.

These observations led to the idea that a few of these patients should be allowed to visit hospital without seeing a doctor at all. Through the enthusiasm and all-round ability of the staff of the Latilla physiotherapy department at the Royal Sussex County Hospital, Brighton, a Rheumatic Club was accordingly formed, and this has held regular fortnightly meetings for two years. It does not, in fact, consist of rheumatic patients only; any one with a chronic incapacitating disease can become a member. As it is easier for most patients to make a day-time visit, meetings are held during the working day of the department. To minimise interference with the routine work, a small room is all that is set aside. The number of members has thus had to be restricted to about 15, though many more would be glad to join and there is practically a waiting-list.

Among these chronic invalids the atmosphere of great cheerfulness supports the original conception that a great deal of the benefit they derived from attendance at outpatients was from human fellowship rather than from the ritual medical advice and bottle of physic. They are unanimous that they "look forward to the meetings," which "make a break" and are "jolly good treatment." Some of the members never leave their homes except for their fortnightly visit, which provides the only fresh faces and conversations they have.

I am now convinced that the formation of such "clubs" should be an important part of the work of our health service. In the past quite a number of people have made a considerable proportion of their social contacts by visiting an outpatient department. The qualification has been the prescription form for a bottle of medicine or a course of physiotherapy. To refuse this treatment has been to cut them off from their contacts; but to allow it from kindness of heart has been to perpetuate an unsatisfactory attitude of mind.

Hospitals should accept, as part of their function, the duty to reable and encourage these patients through social activities, without the intervention of orthodox medical therapy. Later this work should no doubt be transferred outside the hospital walls: we hope, for example, to develop connexions with a local old people's club. Hospitals have, however, advantages which make them the most suitable meeting-place to begin with, and, if medical aspects are not allowed to obtrude, the development of healthy independence is not interrupted. It should be remembered that the object of every health service is to make hospitals obsolete.

One of the advantages which the hospital possesses is transport. With W.V.S., hospital service, and ambulance cars at its disposal, invalids can be taken to hospital more easily than to a club elsewhere. Other advantages are the provision of materials and reading matter. The Red Cross welfare officer can offer wool, silks, and materials for embroidery, rugmaking, and the like at cost prices. Through the Red Cross and St. John libraries books are provided and changed at each visit. With these aids the Red Cross and St. John workers attached to the hospital have been able to develop a spirit of independence in members. At first it was found helpful to have entertainments, lectures, and community singing, and these are still welcomed from time to time: but the essential purpose is to let members interest and amuse themselves, and once this is achieved outside interests are not wanted.

Gravely incapacitated patients are given suitable occupational therapy; those who are more active knit, sew, make rugs, or do other handwork, most of which can be sold. Once a year, usually at Christmas, an At Home and exhibition of work is held, and in the summer a tea-party for the club is held at the home of the original organiser. These are now the formal activities. The essential benefit of the work depends however, on its informality. Tea, cakes, and cigarettes are provided, and the meeting is spent in buying materials, examining patterns, comparing jumpers, mats, and suchlike completed in the past fortnight, and changing library books—all among a babble of conversation. It is better to mix the sexes.

At first financial support came from voluntary donations. At another hospital, the house committee has allotted funds to start a similar club. Once the work is under way, the goods can be sold at a profit. The members also spontaneously suggested a subscription, and they now have their own treasurer, who collects a shilling a month from each. This money is used to buy cakes and cigarettes from friendly tradesmen nearby. With some help from hospital supplies, the club is, in effect, self-supporting.

On this groundwork, other services, such as advice from the almoner when money or other difficulties arise, are provided as needed. The principle is, however, extremely simple—to pick from the population of outpatient departments the crippled, lonely, and ageing, and help to keep them mobile, active, and purposeful, to find them friends, and to show them that they are not peculiar isolated cases and that other people who are equally handicapped can do things, be real persons, and find life worth while. Preventive treatment of chronic disease and of the physical and emotional incapacities of old age is a vital necessity if the burden on chronic bed accommodation is to be kept within bounds. Outpatient clubs can do much to ease this burden.

Acknowledgment must be made to those who put this idea into practice: Miss K. Ward, late sister in charge of the Latilla department; her successor, Miss L. B. Martin; Miss Wildey, occupational therapist, who brought to the work the spirit of St. Dunstan's; the British Red Cross and St. John; and Dr. R. W. Windle, for finding space in his busy department.

ELECTION CANDIDATES

THE lists of candidates include the names of the following medical men and women:

LONDON BOROUGHS

Fulham West.—*Edith Summerskill, M.R.C.S. (Lab). W. J. O'Donovan, O.B.E., M.D. Lond. (C).

Holborn and St. Pancras South.—*S. W. Jeger, M.R.C.S. (Lab).

PROVINCES

Barking.—*Somerville Hastings, F.R.C.S. (Lab).
Bath.—Bruce-Cardew, L.M.S.S.A. (Lab).
Batley and Morley.—*A. D. D. Broughton, M.B. Camb. (Lab).
Cheshire, Crewe.—J. R. T. Turner, M.R.C.S. (C).
Cheshire, Northwick.—W. N. Leak, M.D. Camb. (L).
Gloucestershire, West.—W. H. Tandy, F.R.C.S. (L).
Gosport and Fareham.—R. F. B. Bennett, L.M.S.S.A. (C).
Hertfordshire, Barnet.—*Stephen Taylor, M.D. Lond. (Lab).
Kent, Tonbridge.—E. St. J. Lyburn, M.B. Dubl. (Ind).
Luton.—Charles Hill, M.D. Camb. (L and C).
Preston.—*Samuel Segal, M.R.C.S. (Lab).
Stoke-on-Trent, Central.—*Barnet Stross, M.B. Leeds (Lab).
Surrey, Carshalton.—Sydney Sharman, M.B. Glasg. (Lab).
Warrington.—*H. B. Morgan, M.D. Glasg. (Lab).
Willesden, West.—Genevieve Rewcastle, O.B.E., M.B. N.U.I. (C).
Yorkshire, West Riding, Ripon.—*Lieut.-Colonel Malcolm Stoddart-Scott, M.D. Leeds (C).

WALES

Cardiff, South-East.—J. J. Hayward, M.R.C.S. (C).
Cardigan.—G. S. R. Little, M.R.C.S. (C).

SCOTLAND

Glasgow, Kelvingrove.—*Walter Elliot, P.C., M.C., M.B. Glasg. (C).
Lanark, Motherwell.—R. D. McIntyre, M.B. Edin. (Scot Nat).
Orkney and Zetland.—*Sir Basil Neven-Spence, M.D. Edin. (C).

C, Conservative. Ind, Independent. Lab, Labour. L, Liberal. Scot Nat, Scottish Nationalist.

* A candidate who was a member of the last Parliament.

Public Health

BACTERIAL CONTAMINATION OF AIR IN UNDERGROUND TRAINS

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With an appendix

SLIT-SAMPLER FOR LONG-PERIOD SAMPLING OF AIR FOR BACTERIA

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SURVEYS of the bacterial flora of the air in underground railways were carried out by Andrewes (1902) and Forbes (1924) in London, and by Soper (1908) and Buchbinder et al. (1938) in New York. Air-sampling apparatus has been greatly improved in the last few years, and it seemed desirable to include the cars of underground railway trains in a survey that we have been making of the bacterial contamination of the air of occupied places.

METHODS

Samples of air were collected on six double journeys across London during the evening rush-hour: (I) three from Golders Green via Charing Cross to Kennington and back (in two cases the return journey included the line between Golders Green and Edgware, where the trains are above ground); and (II) three from Golders Green via Bank to Morden and back. The car was never crowded on the outward half of route I but was usually full on the first part of the return-journey (minutes 40–60 in fig. 1), after which the passengers left in small numbers at each stop. On route II the car was crowded for the second half of the outward journey (minutes 25–50 in fig. 1), but not on the return.

The car in which the observations were made was of the modern underground-railway type, open in its full length with seats on both sides; it had one pair of single and two pairs of double doors on each side, and all the doors on one side were opened at each station. We used the central car of the train, and this car has a driving cab at one end cut off from the body of the car except for a window about 12 inches high by 6 inches wide. 5 feet from the floor. The sampler, which is described in the appendix, was set up in the cab, and a hood, which fitted tightly over the slits of the sampler, projected into the window; air was drawn through the hood by a small fan, and the sampler took air from this stream (fig. 2). Observers were stationed at each end of the car to keep notes of the number of passengers, time of entering and leaving stations, and the time that windows were opened or closed. All the samples were taken in the same car, which was a "non-smoker." On route I samples were taken in September, November, and December, 1947, and on route II in January, March, and July, 1948.

One of the two slits of the sampler passed 0·33 c. ft. of air per minute (at the working pressure of 12 in. water-gauge), and the particles from this slit impinged on nutrient agar containing 5% horse-serum. The other slit passed 1·3 c. ft. per minute, and the particles from it were collected on a selective medium for streptococci (Williams and Hirch 1949); a *Strep. viridans* count has been proposed as an index of pollution of air from the respiratory tract (Gordon 1902–03, Wells et al. 1941), and we wished to include such an index in our survey. The colonies developing on the serum-agar were counted fter twenty-four hours' incubation at 37°C; the selective lates were examined after forty hours' incubation, nd, after counting, films were made in nigrosin of a andom sample of the colonies and examined microcopically to recognise the streptococci. The streptoccal count reported is therefore based on the total umber of streptococci, regardless of the hæmolysis that hey would produce on a blood-agar medium.

RESULTS

The counts of total viable bacteria for the three runs on each route agreed sufficiently closely to justify our reporting only the average, and the charts (fig. 1) show three-minute moving averages of the counts on each run; moving averages were adopted to smooth out minor fluctuations in the count, which were often accentuated by the irregular movement of the sampler caused by the jolting of the train. Our estimate of the number of passengers present was necessarily an approximation once the car was full; 110 was taken as a maximum.

Two facts are outstanding in the chart. First, the general bacterial count never reached a very high figure —in fact, the highest count obtained in any one-minute period was 170 colonies per c. ft. and the averages over the three runs on each of the two routes were 47 and 32 colonies per c. ft. The streptococcal counts were also extremely low: 0·33 per c. ft. and 0·22 per c. ft. (with a single peak up to 2·9 per c. ft. in one minute). Secondly, the count rose steeply when people entered the car, and tended to settle rapidly even while the car was still full; and a relatively small rise in the number of passengers, to about 20, caused as large a rise in the count as did the entrance of 50–100 *people*. The streptococcal count followed the same general pattern.

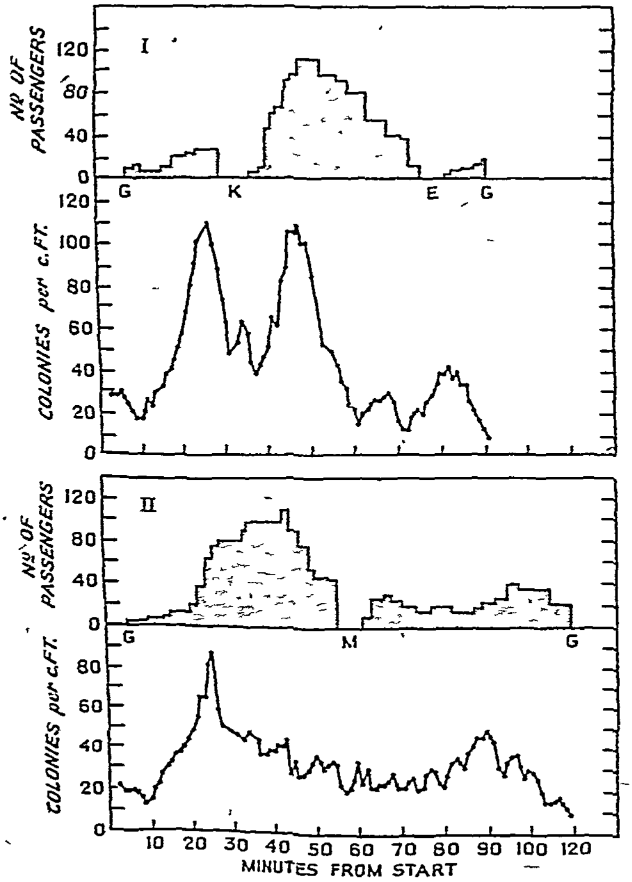

Fig. 1—Three-minute moving averages of colony count on serum-agar plates, and approximate number of passengers in the car: I, Golders Green (G) to Kennington (K) via Charing Cross, and back to Edgware (E), and Golders Green; II, Golders Green (G) to Morden (M) via Bank, and back. In each case the curve represents the mean values from three journeys on the route.

On each journey temperature and humidity readings were taken at about ten-minute intervals on the excess air escaping from the sampler hood. There was no systematic change in the relative humidity, which varied from 39 to 67% on route I and from 31 to 65% on route II. There was, however, a steady rise in temperature during the runs, generally about 12°F, the limits being 51–79°F on route I and 61–82°F on route II.

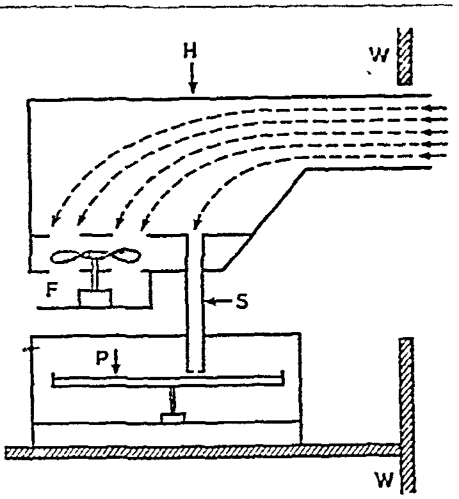

Fig. 2—Diagrammatic section of sampler and hood: W, wall between cab and body of car; H, thin metal hood; F, fan sucking air through hood; S, slit tube of sampler; P, petri dish in sampler.

DISCUSSION

In view of the number of people on these trains during the rush period the counts obtained were surprisingly low compared with those observed in other occupied places. For example, we have observed a mean count *of 80–100 colonies per c. ft. in a large number of observations* in elementary-school classrooms and of 76 per c. ft. in some public offices (unpublished observations.)

It is impossible to make strict comparisons with previous work in underground trains, owing to fundamental differences in sampling and bacteriological technique. Forbes (1924), who incubated his plates for six days at 37°C, obtained an average count of 112 colonies per c. ft. for all the six railways. Andrewes (1902) gave 40 per c. ft. as the mean count for his plates incubated at 37°C. Soper's (1908) observations are not comparable with those considered above, since he only used settling-plates in the cars of the subway. Buchbinder et al. (1938) recorded an average of 0·1 streptococci per c. ft. of air in the New York subway cars, but their method of recognising streptococci differed materially from ours.

Once the passengers have filled the centre of the car, there tends to be relatively little movement for some time, and the rapid drop in count observed may be due to removal of the bacteria by ventilation and settling. coupled with a reduction in their dispersal; we have not found any other explanation for this fall. There does not seem to have been any association between the drop in count and the opening of windows; and since the same fall occurred on both the Charing Cross and the City lines, it seems doubtful if it had any connexion with the arrangement of tunnel-ventilating plants, which supply fresh air at some stations and extract the vitiated air at others. The steep rise in count with the entry of a few passengers might be expected if, as seems likely, most of the bacteria in the air of these trains are liberated from the clothing of the occupants and from the upholstery, since there is more opportunity for movement when the number of people is small. Forbes (1924) made a similar observation. The sampler had, of necessity, to be at one end of the car, and we do not know whether the bacterial count is the same there as in the centre or by the side doors.

It seems clear that there was no massive accumulation of airborne bacteria in these trains, and the rapidity with which the count fell from its peaks suggests that there can be but little risk of any persistent contamination of the air with pathogenic bacteria. The small number of streptococci isolated from the air indicates, too, that there was not on these occasions massive pollution from respiratory sources; and it is true that in underground trains the activities that produce most streptococcal droplet nuclei—sneezing and coughing—are not very common, and there is not even much talking. There must nevertheless still be a risk of transfer of respiratory infection, between passengers standing crowded together, by the more direct routes—by mouth droplets that are too large to remain airborne, and by particles from handkerchiefs (Dumbell et al. 1948). These risks cannot be satisfactorily estimated by examining samples of air withdrawn from the car in the way that we have done.

SUMMARY

A bacteriological examination of the air of underground trains was made during six double runs across London at the evening rush period.

The average count of aerobic bacteria for three journeys from Golders Green to Kennington via Charing Cross was 47 colonies per c. ft. and from Golders Green via Bank to Morden 32 per c. ft.

The highest count in any one-minute period was 170 colonies per c. ft.

The entry of even a few passengers into the car raised the number of bacteria recovered from the air considerably, but thereafter the count of airborne bacteria fell even before many passengers had left.

The mean counts of total (α, β, and non-hæmolytic) streptococci on the two routes were 0·33 and 0·22 per c. ft.

This work could not have been done without considerable assistance from the London Transport Executive, and we are very grateful to Dr. L. G. Norman, Mr. Bradley, and other members of the staff of the railways for their constant help; and to the Executive for permission to publish these results.

Slit Sampler for Long-period Sampling of Air for Bacteria

(DR. O. M. LIDWELL)

This sampler is a development of the slit sampler described by Bourdillon et al. (1941, 1948). Two 6 in. petri dishes are mounted side by side in the airtight box which comprises the body of the sampler. Air is exhausted from this box so that the air to be sampled enters through two tubes passing through the roof of the box. These tubes are closed at their lower ends except for a diametral slit in each. The height of the slits, each 0·5 in. long, can be adjusted so that their lower edges lie 2 mm. above, and parallel to, the agar surfaces of the petri plates, this being the greatest permissible separation for efficient collection of the smallest bacteria-carrying particles. The sampled air impinges on the agar, depositing any bacteria-carrying particles. The slits are so oriented that, if prolonged, the line would pass through the axes of rotation of the petri dishes. The petri plates rotate together about their centres and at the same time move laterally, parallel to the slits, travelling $^{5}/_{8}$ in. for each revolution of the plates. The bacteria-carrying particles are thus deposited along a spiral track with a pitch of $^{5}/_{8}$ in. and $^{1}/_{8}$ in. separation between successive turns. This track has a radius, at its centre, of $2^{1}/_{4}$ in. at the start of a sample, dropping to 1 in. at the end of the two turns which comprise the completed motion. The total length of the track is about 20 in., and about 45% of the surface of a petri dish with an internal diameter of $5^{1}/_{4}$ in. is usefully employed (fig. 3).

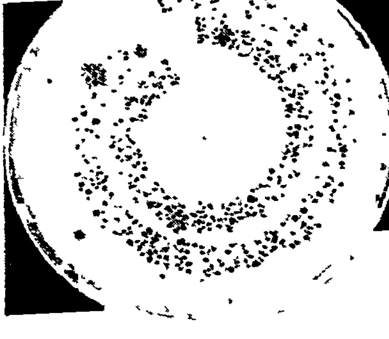

Fig. 3—Serum-agar plate exposed in spiral sampler for 1 hour and incubated for 24 hours at 37°C. Bacterial colonies lie on spiral track 0·5 in. wide. Gap in trace was produced by turning off suction for 3 minutes in middle of sample

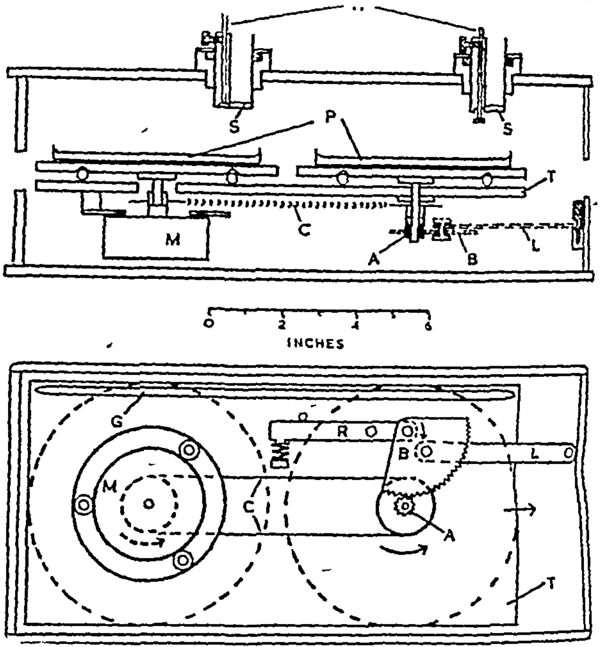

Fig. 4—Diagram of sampler: above, vertical section through middle of base, with lid raised 1 in.; below, underside of trolley, showing link mechanism; A, pinion, 19 teeth No. 38DP; B, sector, 44 teeth; C, chain drive; H, float height indicator for adjusting slit-agar separation; S, slit; L, link; M, synchronous motor; P, 6 in. petri plates; R, release, operated from above, for resetting trolley to starting position; T, trolley running on balls in lateral grooves and guide groove G. Broken lines show detail obscured by overlying parts or out of plane of diagram. Arrows indicate direction of motion during sampling.

With this type of sampler it is possible to obtain a relatively long length of track on a petri dish of convenient size, a feature which has proved very useful in field investigations where a continuous assessment of the aerial contamination over a period is often preferable to an intermittent series of short samples. The incorporation of two plates on to which simultaneous samples can be taken at different rates of air flow is a further advantage when pathogens or indicator organisms are sought with selective media. The mechanical details, including sampling-rates and duration of sample, are susceptible of considerable variation. For the present investigation the sampling slits, cut in a plate $^{1}/_{8}$ in. thick, were $^{30}/_{1000}$ in. and $^{10}/_{1000}$ in. wide, passing 1·3 and 0·33 c. ft. of air a minute at the working pressure of 12 in. of water, while the plates were arranged to rotate once in 30 minutes, giving a total sampling-time of an hour.

Fig. 4 illustrates some aspects of the construction; the details shown relate to later improved models and differ in some respects from those of the sampler used in the investigation described above. Particular points are:

(1) *Driving Power.*—The original model was driven by an alarm-clock movement. This proved too weak for the purpose and has been superseded by a synchronous electric motor (Venner type M2T). When A.C. mains are not available, this can be driven off dry batteries through a 50-cycle vibrator,

sing either a step-up transformer or, preferably, a centre-
ped low-resistance motor coil (500 turns of no. 30 S.W.G
melled copper wire is suitable for use in conjunction with
e 0800 cycle-type batteries).

2) *Slit Tube Bearings.*—So long as the tubes fitted their
porting collars reasonably well, no gasket or sealing was
essary, and leakage of air was negligible, especially if
tubes were lightly greased. Felt washers were incor-
ated to maintain this lubrication.

3) *Lateral Motion.*—A double rack-and-pinion system was
d in the earlier models but proved rather complex and
le to considerable backlash. The much simpler and more
ust link action illustrated does not produce a true spiral
ck, but the deviations are insignificant in practice.

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Up Pirquet, Down Mantoux!

THE now historic tuberculin-testing and B.C.G. vaccina-
on of tuberculin-negative probationer nurses at the
slo City Hospital, Ullevaal, which began in 1926, has
inged on the Pirquet test with old tuberculin and without
drenaline. Dr. J. Heimbeck, the author of this under-
king, who has brought the story of it up to date,[1]
as never been a wild-eyed devotee of the Pirquet test,
ut he has stuck to it because he could find no better.
a his hands it has been quite useful in distinguishing
hose infected from those not infected with the tubercle
acillus, and in indicating the latter as suitable for
.C.G. vaccination. Once positive, the test is always
ositive except occasionally in the old and in some
everely ill people. All the 1247 Pirquet-positive persons
n Oslo whose Pirquet-testing was repeated once or
ftener, were found to be again Pirquet-positive, many
fter an interval of several years. Heimbeck recalls
hat in Denmark Sigrid Holm showed that 30% of
.243 people who were originally Mantoux-positive
ecame Mantoux-negative after a certain time. Heimbeck
rites: "There is therefore only one possible explanation
f all the revertors with the Mantoux test: it is that
n a great number of cases Mantoux gives a false reaction
r one which is interpreted wrongly, and Mantoux is
herefore an unreliable test on which to base B.C.G.
accination." With reproachful surprise Heimbeck
efers to instructions on tuberculin-testing and B.C.G.
vaccination contained in a pamphlet published by the International Tuberculosis Campaign. Here an account is given of the Mantoux and Moro tuberculin tests, whereas nothing is said about the Pirquet test "on which" as Heimbeck remarks, "the whole of B.C.G. vaccination is founded." Heimbeck asks—evidently with little hope of a satisfactory answer—what investigations have been carried out with the Mantoux, the Moro, the adrenaline-Pirquet, or other tests which can show as conclusive results as those he has obtained in his Ullevaal nurses with the Pirquet test using old tuberculin and no adrenaline.

Control of Air Traffic

For the health control of air traffic the five countries of Western Union—Belgium, France, Luxembourg, the Netherlands, and the United Kingdom—are on Feb. 1 to become one single area, which will be known as the "excepted area." The effect of this agreement is as follows:

1. An aircraft beginning its flight anywhere within the excepted area will not normally be subject to health control on arrival anywhere else within the area. This does away with the aircraft declaration of health (by the commander of the aircraft) and with the personal declarations of origin and health by the passengers.
2. An aircraft, and its passengers, which begins its flight outside the area will be subjected to health control within the area only at the place where it first touches down.

The excepted area may be restricted by the ministers of health, to exclude temporarily any of the member countries, or parts of them, in which there is an epidemic.

The new scheme is the result of a system devised by the Public Health Committee of the Brussels Treaty Organisation. In each of the five countries passengers landing from an "infected" area will receive the same kind of "warning" postcard to hand to their doctor if they fall ill shortly after landing.

Births and Fertility in 1944

The Registrar-General's Statistical Review for 1944[1] completes the war-time series of volumes of civil tables. It records a slight rise in the birth and marriage rates as compared with the year 1913 and a continuation of the downward trend in the stillbirth-rate.

Births.—There were 751,478 live births in 1944, representing a rate of 17·7 per 1000 total population. This was an increase of 1·5 per 1000 over the previous year. Illegitimate live births numbered 55,173, compared with 43,709 in the previous year (7·3 and 6·4% of the total live births respectively). There were 21,306 stillbirths, representing a rate of 28 per 1000 live and still births, compared with 21,262 and a rate of 30 per 1000 in the previous year. This improvement has been maintained in later years, the provisional rate in 1948 being 23 per 1000.

Fertility.—43·2% of the legitimate confinements during 1944 were to mothers with no surviving previous children; 29·8% to mothers with one surviving previous child; and 13·4% to mothers with two. There were 9604 confinements which resulted in multiple births, of which 9520 were twin, 80 triplet, and 4 quadruplet maternities. All the quadruplets were liveborn.

Second Quarter of 1949 in Eire

The Registrar-General of Eire[2] reports that in the June quarter of 1949 the birth-rate was 22·2 per 1000 of the estimated population—1·8 less than that in the second quarter of 1948. Illegitimate births amounted to 3·4% of the total births recorded. Deaths were at an annual rate of 13·3 per 1000, which was 0·7 above the rate for the second quarter of the preceding year. The death-rate for all forms of tuberculosis was 1·0 per 1000—pulmonary 0·8 and other forms 0·2. The infant-mortality rate was 50 per 1000 births registered, compared with 46 in the June quarter of 1948.

1948 Death-rate in the U.S.A.

In the U.S.A. the death-rate in 1948 was the lowest ever recorded. Figures published by the Public Health Service's National Office of Vital Statistics show that the crude rate was 9·9 per 1000 population—2% below the rate of 10·1 for 1947 and 1% below the 1946 rate, the previous low record. Deaths from all forms of tuberculosis amounted to 30 per 100,000 of the population, compared with 33·5 in 1947.

London's Health in 1949

Provisional statistics for London in 1949 are given in a preliminary report by Sir Allen Daley, county medical officer of health. The infant-mortality rate (28 per 1000 live births) and the neonatal-mortality rate (16·5 per 1000 live births) were the lowest ever recorded. The over-all death-rate was 11·9 and the birth-rate 16·9 per 1000 population. The maternal-mortality rate was 0·78 per 1000 live and still births: during the year not a single death from puerperal sepsis was registered.

NEONATAL MORTALITY.—In England and Wales during 1948 the rate was 19·72 per 1000 related live births (males 22·20, females 17·08). This is reported in the Registrar-General's return for the week ended Jan. 7.

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[1] *Tidsskr. norske Lægeforen.* Jan. 1, p. 1.

[1] The Registrar-General's Statistical Review of England and Wales, 1944, Tables, Part II, Civil. H.M. Stationery Office. Pp. 92. 2*s.*

[2] Quarterly Return of the Marriages, Births, and Deaths registered during the June Quarter, 1949. Obtainable from the Government Publications Sale Office, 3/4, College Street, Dublin. Pp. 32. 6*d.*

In England Now

A Running Commentary by Peripatetic Correspondents

I HAVE hit on a new method of stating the prognosis of chronic dermatoses, and one which will not depress the patient who gets a sight of his case-notes. It came to me while I was taking the pulse of a fibrillating old crone in a Gloucestershire cottage. To while away the minute I admired some papillomatous remains on her wrist. "Ah," said she, "them's the remains of My Skin Disease. It took nigh on a hunderdweight of ointment to cure tha'. Th' old doctor brought it in fower ounce pots at a time and I counted un." There it was in a nutshell and so simple. Subheadings may be added according to colour or constituents of the ointment we think will be needed. Then when we write "Eczema, arm, 28 lb. pasta zinci co." it will add a new interest to our chronic cases to see whether we can keep to our estimate.

* * *

The Bostonian had left Grand Central Terminal only five minutes before, and I was enjoying the comfort and novelty of modern railroad transport in America, when the sombre voice of the conductor on the loudspeaker disturbed my reverie: "Will everyone please pay attention now. If there is a doctor on this train will he please meet me in the second car. There is a passenger been taken seriously ill."

I was in no doubt what to do; it was true that I was under a full-time contract with Mr. Bevan and I had agreed not to indulge in private practice, but it would surely be expected of me to help in an emergency, so I resolved to leap forward from my comfortable blue upholstered seat and proudly introduce myself: "British Medicine—at your service!" So, swallowing my natural diffidence and the last mouthful of a Hershey almond bar, I proceeded up through the air-conditioned coach, praying that the emergency would not call for any obstetrical skill. My fellow passengers displayed intense interest and smiled at me encouragingly. I could see that they were proud of their fellow passenger. "Hope you find your patient not too bad, doctor," said one of them. A few yards up the same beautiful steel coach another said, "Your patient is right here, doc." and just opposite sat an agitated old lady. Beside her in tears and wringing her hands was her anxious bespectacled daughter. A moment or two later our company had grown to include the conductor, a couple of trainmen, the "ham sandwich, turkey sandwich, milk, peanuts, and ice-cold Coca-cola" vendor, a sick-bay attendant from the American navy, and a priest. Having hinted to the last-named that his presence was therapeutically unwise, I sat down beside my patient and asked her destination. When she replied "Providence" I was for recalling the priest had not the daughter chipped in, "Of course, doctor, we don't need to go to Providence, we can get off at New Haven; don't you think it would be a good thing? We could continue our journey tomorrow when mother is more settled."

I was confused at having momentarily forgotten the existence of Rhode Island and its capital but once more reassured the willing priest that this was, after all, a job for me. "Are you a real doctor?" asked the old lady, as I held her wrist, noting a healthy pulse albeit a tortuous artery. I assured her that not only was I a real doctor but that I had just that morning arrived from England and that she was my first transatlantic patient. "Do you mean to tell me," she added, "that you are one of those Socialised physicians?" "Yes," I said. "Then don't they provide you with a bag?" she asked, with obvious concern. I was about to explain that as my specialty involved the conduct of autopsies I seldom carried equipment around with me, when I noticed a change in my patient evidently brought about by her interest in England. She was no longer agitated, her hyperventilating tendency had subsided, and she no longer complained of the pain which had been "all over" her chest and abdomen.

My spot diagnosis of "anxiety neurosis" was evidently correct, and I knew that if I could eradicate the exciting cause of the attack—the daughter—we should all finish our journey in peace. "Don't patients any longer have to pay their doctors over there?" she asked. "No,
replied, "the service is entirely free," and then, correcti
myself, I explained how it was in fact so expensive th
people were determined to get their money's worth c
of it. "My mother is very interested," said the daught
"for she has paid many doctors bills' in her 87 years of lif

The potential drama had now resolved itself into
informal and amicable debate, in which neighbouri
travellers freely took part, on the merits and disadva
tages of State medicine, when the conductor took
aside and suggested quite rightly the exhibition of
placebo. We retired together to the galley in the adjoini
grill car, and with the aid of the train-crew's first-aid
and a veritable dispensary in the daughter's hold-a
we concocted a sedative which seemed likely to
effective so long as the daughter was kept occupied.
advised continuing the journey to Providence.

Regular bulletins were brought to me in the grill c
where I studied my first American menu with eag
anticipation. The fashionable young sophomore opposi
leant over the remains of a sizzling Welsh rarebit wit
crab salad to exclaim, "I'm right glad your patient i
better, doctor; it sure is a wonnerful profession."
noticed that her attractively set toque remained undi
turbed as she drained her chocolate milk-shake. Tl
train-man came to find me and explained that in purs
ance with regulations they had decided to call in tl
company's disaster squad at New Haven. I realised no
that they no longer had confidence in me because I h
no bag. The chicken pie still tasted good but I felt hu

The railroad team was an impressive turnout; ho
could I compete with two ambulance drivers, three bag
and a stethoscope? The company's doctor rapid
confirmed my diagnosis and brewed a sedative whi
quietened both ladies for the rest of the journey.

On our arrival at Providence I was awakened by t
daughter. "You sure were wonnerful to mother and
want to pay your fee," she said, fumbling with a t
dollar bill in the upper reaches of her hand-bag.
explained that the humble services I had rendered cou
be regarded as an extension of the National Healt
Service Act, 1946. She thanked me cordially, wished n
an enjoyable visit to the States, and remarked that sl
hoped they would never nationalise their doctors
America because they liked to pay for their servic
individually. I did not think that this view had bee
engendered in her by my doctoring, but I resolved t
carry my pyjamas and toothbrush for the rest of m
stay in a doctor's bag.

* * *

My peripatetic friend last week, who encountere
Bessy at Christmas, had a bit of bad luck; but at leas
he can console himself with the thought that he wa
witnessing the effects of a rare bit of good luck on poo
old Bessy. Speaking as an ex-problem-child (wit
none of Bessy's provocation) I congratulate her warmly
adenoids and all, for being able to keep up her spirit
in an atmosphere of powerful dislike. She may not b
much cop, but lord! you should have seen me in my
heyday. At my most obnoxious I was frightened out o
my wits by the vast enmity I provoked. I suppose i
Bessy had had an eye or a leg missing she would have
been better tolerated—and possibly more tolerable.
But the poor girl has nothing to show the world but her
adenoids.

* * *

At a recent meeting of my club—the M.R.C.P. Faileds—the new methods of conducting the examination were generally applauded. In our view the presence of a younger man at the vivas helps to give confidence, and with two examiners a correct answer is unlikely to be misinterpreted. But there were one or two criticisms. This is an expensive club, probably one of the most expensive in London, with an imposing entrance, and it seems a little unfair that the paying members have to go in by the tradesmen's door through a corridor where the 600 or so of us form a scrum that makes the Rugby Cup Final dwindle into insignificance. Can it be too that the distinguished Censors have been so long away from physiology as to forget the causes of frequency? Four stalls per 600 men under stress seems a little thin, and a feeling of urgency is not (repeat NOT) conducive to clear thinking.

Letters to the Editor

MECHANISM AND PURPOSE

SIR,—In your leading article of Jan. 7 you point out ith clarity—I believe for the first time—that avoidance the unnecessary use of hospital beds and the ising of the level and prestige of general practice e complementary aspects of the same problem.

A certain proportion of patients are in hospital because *is only there that their disorders can properly be dealt* ith; this applies to most, though by no means all, rgical patients. But an increasing number of patients e there not for treatment but for investigation. Many these are not acutely ill and do not stand in need of killed nursing care; none the less they occupy expensive eds.

A major part of this investigation demands the ervices of the pathological department of the hospital; ut given a pathological department staffed, equipped, nd constructed so as to make possible the reception of uch patients, much of this work could be done either without the patient's admission to hospital at all or with admission only for the final steps of the investigation nd for treatment.

To this end the establishment of certain general principles is necessary; and the first of these is that the pathological departments of all general regional hospitals hould be freely and directly open to use by general practitioners. This principle has long been accepted by the Association of Clinical Pathologists and has been rigorously put forward by representative pathologists within the British Medical Association; whether it can be *officially described as B.M.A. policy, I am not certain.* It is already the established custom in a very large number of regional hospitals and should become universal.

It should be the right of the general practitioner to send specimens *from his patients for examination to the* pathological department of his regional hospital at any time during working hours and to receive the report as soon as available; it should also be his right to send the patient in the flesh to the pathological department for the opinion of the pathologist and the collection of such specimens as the pathologist may deem appropriate. To allow *patients complete freedom of entry to the* department would obviously entail an intolerable dislocation of the department's work; certain hours each week must therefore be set apart for outpatient clinics at which the patient, bearing a letter from the doctor, can present himself for examination and for the collection of the appropriate specimens, *the* results being reported to the practitioner. Such outpatient sessions have for years been the established custom in the pathoogical departments of many of what are now the regional hospitals; regional boards might well see to it that the custom becomes universal.

The provision of such facilities will do much to bring he general practitioner back into that place in the economy *of medicine* which he cannot occupy so long as he is debarred from direct access to the opinion of the pathologist. But something more is required. To ensure that the general practitioner regains that place from which he is rapidly slipping, as the person responsible for the care of the patient, *it is essential that until and unless* the patient actually passes from his care these rights shall appertain to him and to him alone.

It is therefore essential that the principle be clearly established that until the patient comes into hospital or into the care of a clinic or hospital department, only the general practitioner in charge of the case shall have the right to refer either the patient or specimens from the patient to the regional-hospital pathological laboratory for examination under the terms of the N.H.S., and *that the report of the pathologist shall be made to that* practitioner. I believe that there are few single measures which would be more effective than this in maintaining the general practitioner in his rightful position in relation to the patient.

My remarks are to be taken as referring only to regional hospitals; the primary function of these is the care of the sick and their return to active life as soon as may be; to them research, although altogether desirable, must be in the nature of an epiphenomenon. The *hospitals under the control of boards of governors are in* different case in that they have onerous educational and other duties, and by their nature research is an essential. Concerning them I do not pretend to speak.

But even for the pathological departments of regional hospitals *something more is necessary than the establish*ment of general principles. To undertake this work for the general practitioner they must be suitably constructed or reconstructed, staffed, and equipped. Few of them have waiting or examination room accommodation; if they are to perform this work with competence these must be provided. Many of these regional departments are already doing this work, albeit under difficulties; and as matters now stand, so great has been the expansion of the hospital service in pathology since its reorganisation by Sir Philip Panton during the late war, that it is to be doubted whether there are in England and Wales any major regional hospital departments of pathology incapable of undertaking it.

The Royal Hospital, Wolverhampton. S. C. DYKE.

SIR,—I cannot say how pleased I was to read your leading article of Jan. 7 and how much I agree about the dangers inherent in regional hospital boards controlling practically all the specialist talent.

Whatever the situation may hold for other branches of medicine, and quite apart from questions of economy, in psychiatry in particular any undue emphasis on the hospital side runs counter to all modern psychological methods. Before the introduction of the N.H.S. there were major advances towards early and preventive work with *patients in their own homes; in fact the whole* trend was to get away as far as possible from the mental hospital with its unfortunate associations. This development could not of course apply to the more severe psychotics needing segregation by the very nature of their illness, for whom the specially designed mental hospital was the only retreat. But the "new" psychiatry took a tremendous step *forward when it broke the* bounds of the mental hospital and opened up large fields previously closed and even now only partly explored. One has only to think of progress in the treatment of the neuroses during the last generation and the recent advances in psychosomatic medicine to see where we were heading.

Unfortunately the bias mentioned in your *article bids fair to halt or even to reverse this emancipation of* psychiatry. The psychiatrist is being yoked again to the mental hospital or the mental wards of the old municipal hospital, and the new fields are being starved of talent. No-one would oppose raising the standard of the mental-hospital staff and improving treatment facilities there, but the policy of attempting to make the mental hospital "the focus of treatment" in psychological medicine (to use an expression put to me by one medical superintendent) is, in my opinion, a decidedly retrograde step and certain to end in failure. The wider fields of psychiatry are bound to suffer, for they need a very different emphasis in training from that given to those practising the treatment of well-established mental disorders.

Mental hygiene means far more than attempts to cure certain mental diseases, just as preventive medicine is not just the treatment of physical diseases. In psychiatry, perhaps even more than in other departments of medicine, early and preventive treatment and all that is implied by the notion of mental health, is bound up with the home. Modern teaching is quite clear on the point that as far as possible it is the individual in his or her own home setting that is the most hopeful object of our attentions; I cannot see this objective being seriously approached by the psychiatrist based on the mental hospital.

Leeds. H. EDELSTON.

THE HEALTH OF NURSES IN HOSPITAL

SIR,—In Dr. Court's article of Nov. 12, in the letters that have followed it, and in the editorial comment on Dec. 31, it has been taken for granted that the higher incidence of tuberculosis among nurses as compared with "other professional women of the same age" is due to the greater exposure to infection of the former. This involves the assumption that the two groups are more or less similar in other respects.

During the period covered by Dr. Court's survey, the approximate average working week in six voluntary training hospitals (three Irish, three English) consisted of 64½ hours, varying from 60 to 72. The number of hours worked averaged 11 (10–13) on a full working day, which occurred six days per week in four hospitals and three or four days per week in the other two. The length of the working day in all six hospitals was either 13 or 14 hours. Night duty varied from 10½ to 12 hours, and the length of time on duty, without a night off, was twelve days in three hospitals, four weeks in two, and eight weeks in the other. In all the hospitals nurses off duty remained in, and those on night duty rose early in order to attend lectures, and of course they had to study and prepare for examinations during their free time.

I can think of no other group, of whatever age or sex, whose working hours are as long as these; and considering the strenuous nature of their work, it seems that nurses are among the most grossly overworked members of the community. This is quite sufficient to account for the high incidence of tuberculosis among them, and it is wrong of hospital authorities to force girls in late adolescence and early adult life to work under such conditions. It is doubly wrong, of course, when they are also exposed to infection, particularly in the case of girls who are tuberculin-negative.

The other two groups in which the Prophit survey shows the incidence of tuberculosis to be higher than in controls are in much the same position as nurses. The members of the family of an open case are usually exposed to the same forces, hereditary, economic, and emotional, that contributed to the development of the disease in their relative. Medical students spend a normal working day at lectures and classes, after which the greater part of their work has still to be done. Because they are dependant on their parents at an age when wage-earners have acquired dependants of their own they are likely to be either maladjusted or irresponsible. Other students work under much the same conditions, but their courses are shorter, less arduous, and very much more practical than that in medicine.

In any of the three groups, it is only possible to attribute the high incidence of tuberculosis to increased exposure, if one assumes that infection with tubercle bacilli is the only essential factor in the ætiology of tuberculous disease. This assumption is so unjustifiable that no-one would admit to being guilty of it. Nevertheless, workers in tuberculosis services make it the basis for most of the preventive measures—as must be clear to those who have followed the correspondence in your columns on the control of tuberculosis.

Since long before the tubercle bacillus was discovered it has been well established that tuberculosis is preceded by a "predisposition" or lowering of resistance, the causes of which are not all known. But among the causes are overwork, lack of sleep, poverty, and an all of which can be avoided more easily than can tubercle bacillus. To lose sight of this fact now can lead to an increase of the already far too preva tuberculosis-phobia.

Dublin. SEAMUS O'DAL

DEOXYCORTONE ACETATE AND ASCORBIC A IN RHEUMATOID ARTHRITIS

SIR,—I have applied the method described by Le and Wassén[1] in 9 cases of chronic rheumatoid arthr and have obtained results identical with those descr by these workers.

On the supposition that the therapeutic effect of t method is due to the alteration of deoxycortone int "cortisone-like" substance through the redox act of the ascorbic acid, I have used for the same pu other sterones. The intramuscular injection of b testosterone (25 mg.) and progesterone (2 mg.) follow by 1 g. of ascorbic acid, injected intravenously, ha produced the same therapeutic effect as the method Lewin and Wassén. Total aqueous extract of adre cortex ('Cortine') and of œstrone were less active; dehydrocholic acid proved completely ineffective.

It seems that ascorbic acid may profoundly alter pharmacological action not only of deoxycortone but of other hormones connected with the function of adrenal cortex. This change is not associated decrease in the number of blood-eosinophils—a decr demonstrated by Spies and Stone (Jan. 7) a administration of adrenocorticotropic hormone. three cases of eosinophilia I found no change in eosinophil level during the six hours after injectio 5 mg. of deoxycortone, or 25 mg. of testosterone, 2 mg. of progesterone, each followed by intraven injection of 1 g. of ascorbic acid.

Radogoszcz Municipal Hospital,
Lodz, Poland.
MARCELI LANDSBER

SIR,—The preliminary communication of Lewin Wassén[1] on the treatment of rheumatoid arthritis w deoxycortone acetate and ascorbic acid prompted me try this treatment on outpatients. The further cor spondence, which has varied in opinion from Le V and Loxton's[2] enthusiastic reports to Kellgren' very depressing remarks, has stimulated me to wr and mention the results I have had in the treatment seven cases.

I do not propose, at this stage, to go into any deta and want merely to state that all seven, which we quite unselected and taken as they appeared in m outpatient clinic, have shown improvement to a great or lesser extent. I have been seeing them all regular for periods varying from three months to a year, a no form of therapy has been of any avail until now.

One of the seven, a very acute case which has b getting steadily worse for the past six months, show quite a dramatic improvement. Of the other six, whi were all chronic, one case produced the startling result which Lewin and Wassén report. She had immediate symptomatic relief, and now, after five injections giv in the course of three weeks, is completely symptom free and is walking better than she has done for eight year All her joints are symptomatically and clinically normal where before she had considerable swelling and pai Her last injection gave symptomatic relief for seve days.

The others have been slower in their response an have shown improvement only after 3–5 injections give at short intervals. Of these, a lady of 63 is better tha she has been for over a year. The improvement

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1. Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.
2. Loxton, G. E., Le Vay, D. *Ibid*, p. 1204.
3. Kellgren, J. H. *Ibid*, p. 1108.

e other four has been less dramatic but always quite finite, both symptomatically and clinically.

I think that this form of therapy should be extensively ed on as many patients as possible, and the results refully assessed. The fact that no improvement may obtained after one, two, three, or even four injections ould not discourage one from continuing, since provement may be slow in starting.

It is too early to be unduly cheerful or to make travagant claims, for there has hardly been time yet r side-effects to show themselves; but I would suggest at those who have found no effect from this treatment n their cases should both persevere and check their chnique.

St. Bartholomew's Hospital,
London, E.C.1.

JAMES A. ROBERTSON
Casualty Physician.

SIR,—I have used the method reported by Lewin nd Wassén in four cases of established rheumatoid rthritis. The results, contrary to Dr. Kellgren's xperience, were far from unsatisfactory.

The patients were women, aged 36, 42, 28, and 60, ho had suffered from the disease for 8, 2, 1, and 1 years espectively. They were more or less crippled and com-laining of pain which was at times very severe and or which they had tried without avail all sorts of nalgesics—including morphine in one case.

They all responded within 10–30 minutes to the com-ined administration of 5 mg. of deoxycortone acetate 'Doca') and 1 g. of ascorbic acid injected intramuscu-arly. Pain was nullified in all cases, and mobility at east partly restored. In fact, one patient, bedridden for he last eighteen months, could walk unaided for the first ime after the second injection. The relief lasted 6–8 ours after the first injection and 16–24 hours after the ighth injection (the last so far given). All the patients re very enthusiastic and thankful, being able to perform nost of their household work without pain.

Being cheap and apparently without disadvantages the method is, I suggest, worth a full trial.

Bagdad, Iraq.

FAYSAL NASHAT.

SIR,—This correspondence, from many reliable sources, reveals wide divergence of results and opinion. In my letter of Dec. 17 I suggested a reason for this, and the report from Leeds[1] supported my supposition, in that of the 17 cases, 15 were inpatients among whom there was only one doubtful gain, whereas both the outpatients gave a reasonably positive response. I further indicated that if hormonal deficiency was merely a dominant factor in rheumatoid arthritis the method could not be expected to do more than alleviate the symptoms caused by some form of adrenal deficiency.

Elsewhere I have put forward a proposition that all rheumatic diseases have a common factor, which is probably infective, and that the variations are due to contributory factors which may dominate the picture.[2] Prof. J. W. McNee's[3] account of the most recent American work on 'Cortisone' and the adrenocorticotropic hormone indicates that the improvement obtained in rheumatoid arthritis is not specific for this condition and that these substances are bringing about improvement in other pathological states presumably arising from adrenal deficiency.

In these circumstances, a review of the cases of "rheumatoid arthritis" which have not responded seems to be desirable. A typical rheumatoid arthritis about which no clinician would argue is one where there is a prodromal stage signified by fatigue, chilliness, vague migrating aching and stiffness, mild sweats, vasomotor disturbances, and tachycardia; anorexia and loss of weight soon follow and the diagnosis is made when swelling and pain develop in the joints. The prodromal stage may last only a few days or as long as several months. The blood-sedimentation rate is nearly always much increased and there is some microcytic anæmia. Unfortunately, rheumatoid arthritis reaches the physician when the condition is established and the dominant feature is arthritic involvement, so that these earlier symptoms which might suggest adrenal-cortex dysfunction are overlooked. On the other hand, there are many cases described as rheumatoid arthritis where this prodromal picture is never evident and the first signs are those of a primary attack on one or more joints. These patients do not lose weight; sometimes they even gain weight, particularly where the disorder develops about the menopause. These cases, then, are not likely to benefit from this new form of therapy, and indeed may be made worse by gland overstimulation or replacement of hormone which is already there in sufficient quantities.

I have now treated about thirty cases, some in advanced stages of rheumatoid arthritis and some in the very early stages, and I have sufficient data to confirm the statements made in this letter.

To summarise, I would say that the only cases likely to benefit from this form of treatment are those of rheumatoid arthritis associated with loss of weight, depression, vasomotor disturbances, and loss of locomotive power, which is limited not by pain alone but by an intrinsic muscle wasting—and only when they are in a period of relapse. In treatment account must be taken of the physiological state of the body and of the capacity of the body-tissues to effect stability. To underline this, I would refer to the good effects of controlled doses of thyroid in thyroid deficiency (cretinism) and the ill effects of overdosage; there is a stage when equilibrium is attained and must be respected.

London, W.1.

WILLIAM W. FOX.

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[1] Hartfall, S. J., Harris, R. *Lancet*, 1949, ii, 1202.
[2] *Rheumatism*, 1950, 6, 33.
[3] *Brit. med. J.* Jan. 14, p. 113.

SYMPTOMATIC TREATMENT OF HYSTERIA WITH INTENSIFIED ELECTROCONVULSANT THERAPY

SIR,—The intensified method of electroconvulsant therapy (E.C.T.) described in 1948[1] is being used at this hospital for the symptomatic treatment of hysteria.

It was confirmed that hysterics responded badly to normal methods of E.C.T., but the improved response of depressives to intensified E.C.T. suggested that hysterics might also respond to this method. Intensive E.C.T. has the advantage that the risk of fractures is virtually eliminated; among the 576 cases treated in 1948 no fractures occurred.

Premedication consists of 'Sodium amytal' gr. 3 half an hour before treatment. An initial stimulus of approximately $1^1/_2$ sec. at 150 volts is given; and after a pause of about 3 sec. extra stimuli of 1 sec. duration are administered with approximately $^1/_2$ sec. intervals between each. At the first treatment seven extra stimuli are given. On each of the next three days the number of extra stimuli is increased by one, up to a total of ten; and at this level—an initial stimulus plus ten extra stimuli—treatment is continued daily until the presenting symptoms improve. Exact timing is not essential, but each stimulus must last at least 1 sec. A suitable apparatus had to be developed since it was found that existing types could not give sufficiently long stimuli, or repeat them rapidly enough.

At first the cases of hysteria were treated as outpatients by the technique that had proved successful with depressives.

The patient attends hospital on alternate days at 10.30 A.M. The less severely ill come to hospital on their own; but after treatment all are taken home by car, and there must be relatives at home to look after them. They receive sodium amytal gr. 3 and after removing their outer garments get into bed. Treatment is given at about 11 A.M., and they return home at about 3 P.M. Since the average case requires less than four treatments, the whole course is usually completed in one week.

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[1] Page, L. G. M., Russell, R. J. *Lancet*, 1948, i, 597.

Whilst the depressives responded well, with a recovery-rate of over 90%, the hysterics responded less well and some 38% of these had to be admitted for further treatment. The failure of outpatient treatment was thought to be due sometimes to the effect of mal-suggestion by over-sympathetic relatives between treatments. To overcome this difficulty, hysterics are now treated as inpatients.

It was soon realised that the essentials for successful treatment of hysterics were (*a*) rapid removal of symptoms, followed by (*b*) rapid rehabilitation and return to work. The following technique is now used.

The patient is admitted on a Monday morning and given intensified E.C.T. on the Monday (1 + 7 stimuli), Tuesday (1 + 8), Wednesday (1 + 9), and if necessary on Thursday (1 + 10). Treatment is stopped as soon as symptoms are relieved.

The treatment produces some amnesia; the patient forgets the symptoms, and no further mention is made of them during his stay in hospital. About 2% of the patients develop acute psychotic symptoms whilst undergoing treatment. They may become hallucinated, deluded, or aggressive, and indicate the presence of a previously unsuspected underlying psychosis. The condition clears in a few days with rest and sedatives. On the Thursday and Friday the patient is encouraged to undertake exercise, routine cleaning duties, or work in the hospital grounds. During this stage the assistance of well-trained nurses is invaluable, since they can persuade patients that they are now able to do normal things and that any minor aches and pains will soon pass off.

The patient is discharged on the Saturday with strict instructions to return to normal work at the beginning of the next week. If patients are kept longer in hospital they react unfavourably to contact with other patients, tending to assimilate new-found symptoms; and the prognosis then becomes poor.

Experience with intensified E.C.T. in depressives and hysterics is summarised in the following figures:

	No. of cases	*Average no. of treatments*	*Satisfactory response (%)*
Outpatients			
Depressives:			
Female	63	.. 2·9 ..	91·3
Male	39	.. 3·1 ..	91·1
Hysterics:			
Female	17	.. 3·3 ..	64·7
Male	8	.. 4·0 ..	62·5
Inpatients			
Depressives:			
Female	114	.. 3·9 ..	90·3
Male	76	.. 3·7 ..	92·8
Hysterics:			
Female	22	.. 3·0 ..	90 +
Male	13	.. 3·4 ..	90 +

Cases treated as inpatients have included examples of conversion, fixation, and anxiety hysteria, The following three cases are typical of the group.

CASE A.—A farm labourer, aged 48, with a good work record and no previous history of psychoneurosis. In November, 1948, he had a bilateral herniotomy which took a normal course, but during convalescence he developed a drawing sensation and pain in the scrotum and down the inside of each leg. The pain was worse when he sat down, and was only relieved by lying in a warm bath. He had been unable to work for seven months, but responded to intensive E.C.T. and returned to work in one week.

CASE B.—A police constable, aged 28, of good intelligence and personality. He had been troubled with headaches for six months and no organic cause could be found. The precipitating factor was a syphilophobia, which had not responded to repeated reassurance. He responded to two days of intensive E.C.T. and returned to duty in five days.

CASE C.—A general labourer, aged 52. Of low intelligence and hysterical personality, he had been unemployed for over two years. He suffered with vague abdominal pains, which had been incorrectly attributed to diverticulitis. Ultimately he was sent to a training centre for disabled persons to learn light leather-work. After one month he was admitted to a general hospital for further abdominal investigations, which proved negative. Whilst in hospital his condition deteriorated rapidly and he was unable to walk or lift his arms to feed himself. The whole condition cleared with three days intensive E.C.T. and he returned to the training centre in week.

All the hysterics treated by this technique ha responded satisfactorily and have been discharged fro hospital. As only 65 cases have been treated so fa it is impossible to give an accurate recovery-rate, but would appear that a rate higher than the 90% four in depressives can be expected.

A precise follow-up of all the cases has not been possibl but the relapse-rate has been less than 10% over a peri of six months following treatment. The cases that hav relapsed have been those of severe hysteria in patien with inadequate personalities who have shown numerou hysterical phenomena for many years.

My thanks are due to my colleagues and the nursing sta for their assistance; and to the Reeves Electrical Co Baldock, Herts, for their coöperation in producing a suitab E.C.T. apparatus.

Three Counties Hospital,
Arlesey, Beds.

R. J. RUSSELL.

THE FIRST MEDICAL EXAMINATION

SIR,—May I take up some points made about m article[1] by Mr. Hentschel in his letter of Dec. 17?

I did not say that I thought the purpose of the fi M.B. examination was to select appropriate students fo medical career. I was concerned not with purpo but with observable effect; I pointed out that t examination *does* select, and with this Mr. Hentsch seems to agree.

Mr. Hentschel attributes the high failure-rate in t external first M.B. examination to the inadequate traini of the candidates, especially in schools; and in suppo of this he draws attention to the much higher pass-ra (60%) in the internal examination (the pass-rate i external first M.B. in July, 1948, was 13% and for high school certificate [H.S.C.], giving exemption from fi M.B., 30%). Might it not be that what constitutes "adequate standard" is differently interpreted different examiners? I do not think that the teachi in many London schools compares so very unfavourab with that in the colleges and medical schools as M Hentschel thinks. It is surely the experience of mo university teachers that many boys and girls receive a excellent background of science at school. Many schoo still have experienced teachers and good facilities fo practical work; as far as time is concerned, only on session is assigned to internal first M.B., but two or thre years to H.S.C. It would be interesting to know how the failure-rate in the London examinations compare with that in other areas.

The discrepancy between the pass-rates in the interna and external examinations is disquieting, not only because it may do injustice to individual candidate but for a further reason. At University College we find that the applicants for admission to the intermediate class, which gives exemption from first M.B., tend to have weaker school records than those who apply for admission to the second M.B. class, having got, or hoping to get, first M.B. exemption externally. This is presumably because of the system by which scholarships are awarded; the brighter pupils try to get exemption from first M.B. at the same time as they attempt to get scholarships on H.S.C. and other examinations which necessitate two or three years' work in the sixth form. If this is the case in other medical schools, the lower pass-rate in the external examinations tends to deprive the medical schools of some of the brighter pupils, while the higher internal pass-rate ensures safety for a larger proportion of potentially weaker students.

The problem is, to decide wisely what is for medical students an adequate knowledge of the basic sciences.

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[1] *Lancet*, 1949, ii, 529.

may quote from my article: "This is not a plea the lowering of standards, it is a plea for the more reching consideration of the nature of the standards": l here I strongly support the views expressed by . Ounsted and Mr. Schardt in their letter of Jan. 7.

Department of Anatomy,
niversity College, London.
M. L. JOHNSON.

CONTROL OF TUBERCULOSIS

ɪʀ,—It is with some hesitation that I join in this cinating controversy, for I am in the embarrassing ition of being able to see both sides, having been a st-clinic physician immediately before I became ysician-superintendent of a sanatorium. However, re appear to me to be important issues involved. r example, the increasing use of active treatment, and ecially streptomycin, outside chest hospitals and atoria to my mind makes increased liaison between rkers in such institutions and chest-clinic physicians urgent necessity.

For the sake of brevity, I will make the following gmatic statements. (1) Like peace, the treatment of uberculous patient is indivisible, beginning on diagnosis d ending only when his name leaves the register. It consists of many different facets, domiciliary, nilial, psychological, institutional, rehabilitating, &c.) Though the form of approach changes, the object of r attentions—the patient—remains the same person ether he is at home or in a sanatorium.

All this would seem to indicate that one physician ould supervise all treatment throughout the patient's reer, perhaps the tuberculosis officer or perhaps the natorium physician. In the past this has been possible ere the institution is small, and it is now attempted by me tuberculosis officers who have general hospital ds at their service and make use of them as pseudo-natoria. But I believe that the work of a good chest inic is quite enough for one man and that its interests e different from, if as valuable as, those of the sana-rium physician, and that the work of the up-to-date natorium is as intricate and all-absorbing. Also I ink it is true that nothing can replace a stay at such sanatorium during the patient's career, not only for e intensive and skilful treatment that can be carried it, but also for its educative value.

But the two spheres cannot be wilfully divorced. any sanatorium physicians believe that the only course hich is ethically correct is to keep and treat each atient till he is almost healed or definitely unhealable. et many patients can finish off their treatment safely t home after a reduced period in the sanatorium, and us be replaced more quickly by others. (It is important at we who work in sanatoria should understand the agedy of the long waiting-list in terms of living dividuals.)

Again, whilst a patient waits to enter the institution, here is often a natural and overpowering urge in the berculosis officer to institute active treatment, and at resent this is done without any relation to the course hich therapy may take in the special hospital. Once here, success will often depend on underlying psycho-gical factors, which are almost certain to be influenced y what is going on in the patient's home.

Tuberculosis must be tackled by a team and this team ust consist of sanatorium physician, thoracic surgeon, elfare workers, and—not least—the chest-clinic hysician. I believe that the last of these should be as elcome in the sanatorium, and his advice as important here, as conversely should be the sanatorium physician n the dispensary (where either will get the time for this s a different question!). (Unlike Dr. A. P. Ford, I hold hat the doctor immediately overseeing the patient nust, however, have the last word in his management.) ncidentally, there would be much to be gained by research being undertaken by the team as a whole, for there are vast, almost unmapped fields in the dispensary files.

One or two practical suggestions. Each sanatorium gets its patients from a definite area; the chest clinics in that area should provide the outpatient physicians to the sanatorium team. It would be worth while, I believe, for assistant-physician posts at chest clinics not to be permanently filled but occupied in rotation by less senior medical officers from parent sanatoria. And, finally, there should be regular consultations (staff meetings or on rounds) between the two forms of specialist, to discuss specific cases.

The correspondence has discussed many problems in the difficult field of tuberculosis control. My letter must be regarded as an addendum to that of Mashiter and others (Dec. 10), and as a plea for coöperation on a broad front.

King George V Sanatorium, Godalming.
J. V. HURFORD.

PLACEMENT MEDICAL EXAMINATIONS

SIR,—Dr. Todd's observations (Dec. 31) on the principle of medical examination for civilian jobs are refreshing, and will have served a useful purpose if they make medical officers who habitually carry out this type of work pause to examine their basic concepts. These observations may, however, give to others a mistaken impression of the way in which pre-employment examination operates in industries where it is normal practice.

In industry, in my experience, the doctor is never the sole arbiter of a man's fitness for a particular job. For example, during 1949 I examined 2337 applicants for employment in a large factory. Of these, 14 were rejected on account of some disability which the examination disclosed; 21 others were not engaged after the medical examination, for other (non-medical) reasons. During the same period, 2181 applicants were rejected by the factory employment bureau as unsuitable, and were therefore not submitted for medical examination. In other words, out of a total of 4518 applicants about 48% were pronounced unsuitable by non-medical personnel, and 0·3% by the doctor. Thus even if it were conceded that for a doctor to forbid a man to undertake a job on account of disability is an infringement of the liberty of the subject, the extent to which it has happened here is negligible.

But let us consider further this question of the liberty of the subject. The industrial medical officer who examines a candidate for a job in a factory has, or should have, an exact knowledge of what that job entails, in regard both to toxic and other hazards and demands on physical capacity. The candidate, on to whom Dr. Todd would put the onus of deciding his own fitness for the job, does not possess this knowledge: moreover, he is usually being driven by economic necessity to seek the job, so that to depict him as a free agent who may voluntarily decide to endanger his own health by undertaking it against medical advice is sheer nonsense. Admittedly a man's eagerness for employment is a factor which should weigh with the medical officer in deciding whether to accept him, and I agree with Dr. Todd on the necessity for flexibility in medical standards—the personality of the individual and the nature of the work must both be considered in every case; but ultimately the decision must be the doctor's, and should not be shirked by him.

Our laws—in my view, rightly—interfere with the right of a man to choose to take his own life, or to destroy himself more slowly with morphine, cocaine, or heroin. Similarly, by our factory legislation we have taken away the "rights" of children to work underground in the mines, or to work in cotton-mills for eighteen hours a day. We have rejected the view that the employer need do nothing to improve unhealthy working conditions because the worker is free to refuse the job. The worst social abuses of the Industrial Revolution were justified by this fiction. In fact, of course, the worker's freedom was an illusion. The awakening of public opinion and the rise of the trade-union movement forced legislation to remove these and similar fictitious "rights of the individual," substituting for them some very solid benefits.

Thus, although Dr. Todd wisely qualifies the supposed right of the individual to accept a job which will endanger his health, the general acceptance of the principle he advocates would put back the clock a hundred years. I cannot believe this to be his intention.

Port Sunlight, Cheshire. F. H. TYRER.

SIR,—We have read with considerable misgiving Dr. Todd's article, in which he states: "We may therefore conclude that there is no real place for a medical examination as a part of the selection of adults for jobs." He writes of injustice towards employees and infringements of their liberties as results of pre-employment examination. We consider that these remarks are incorrect and misleading.

No experienced industrial medical officer doubts the desirability and value of pre-employment medical examination. The duties of, and ethical rules for, industrial medical officers drawn up and published by the British Medical Association support this contention. The incidence of illness, the loss of working hours, and the risks to other employees—to say nothing of loss of efficiency due to faulty job allocation, which is more liable to occur where there is no pre-employment medical examination—are alone sufficient to justify such a procedure.

Would Dr. Todd suggest, as he certainly implies, that there should be no inquiry and investigation into such conditions as pyorrhœa, septic tonsils, chronic aural discharge, previous intestinal disturbance, or pyogenic conditions of the hands of persons whom it is proposed to employ in the preparation and handling of food?

It has been estimated within recent years that for every day lost to industry by industrial disputes 270 days are lost by illness; and surely nothing that would reduce this figure should be neglected. No industrial medical officer is able, or wishes, to *forbid* any prospective employee taking a job. His function is purely advisory to executive management and is analogous to the function of a medical officer in the Services towards the commanding officer.

It is our experience that employees or prospective employees are grateful for kindly and sympathetic advice concerning the work for which they are best suited and the types of occupation which they should avoid. For example, a man with monocular vision working as a crane-driver would constitute a considerable potential danger to his workmates, whereas he would be in no way handicapped working as a fitter. The worker himself may be safeguarded as a result of the examination—for example, if he has hyperpiesia and is prevented from lifting heavy weights continuously and over long periods.

Dr. Todd's statements are absolutely contradicted by the experience of large numbers of industrial medical officers over many years. To dispense with pre-employment examination in industry and with the industrial medical officer in his rôle as a member of the team performing job allocation would be retrograde.

R. A. GORDON SMITH
Medical Officer, Carreras Limited.

R. FRANK GUYMER
Late Chief Medical Officer,
J. Sainsbury Ltd.

INFLUENZA COSMO

SIR,—I believe—open to correction an
sufficiently humbly—that I am about to d
this letter, a hitherto undifferentiated but qu
clinical entity. For several years now, in spi
agely good health considering advancing ag
suffered, perhaps twice in eighteen months
twice in a year, from what apparently be
"common cold." It is not a severe cold. It
interfere with appetite, physical vigour, or th
a cigarette. It is apyrexial. It seldom require
of more than two pocket-handkerchiefs in tw
hours. But it is a cold. People notice it. It a
voice by modifying nasal resonance, and after th
it disappears. "Thank God," I used to say,
over." But I was wrong, and now I don't say it
a day of relief and relative bien-être, the secon
invariably begins. Several times a day, a trache
tation provokes a spasmodic and not very pro
cough. But worse than that, a feeling of general
sets in. Cigarettes taste quite differently. A
lessens. Flatus travels north instead of south. A
or so after luncheon, an hour or so after tea,
hour or so after dinner, there is a rise of temp
to about 100, 101, or 102°F. This has general
appeared before the next meal-time and before g
bed. But however light the meal, or even if it ha
entirely foregone, this is the behaviour of the te
ture, accompanied by introspection of a dismal ty
a strong tendency to profane or even obscene lan
Sometimes I have reluctantly spent a day in be
makes no difference. All this goes on for not less
seven and sometimes eight or nine or ten dra
melancholy days, when the attack is over.

During the first "cold in the head" period, I
often tried lavage with various substances, allege
their sponsors to do good. But in vain. Nothing mo
or alters the pattern or duration of the complaint.
people in my house, or my neighbours, may "cat
cold" at the same time. The first stage of theirs
be longer and much more nasally uncomfortable.
they do not have a second stage. Theirs are one-vol
colds. Mine are two-volume somethings. Now, wha
the explanation? Does the agent or virus of volume
having been carried into the alimentary canal, perh
by involuntarily swallowed mucus, produce volume tw
Or is volume two due to some other agent, norma
innocuous but roused into activity by agent one? I
not a bacteriologist. I am far from libraries and learn
societies. I don't possess a microscope. I don't kno
But here, at any rate, is an exact picture of what h
regularly happened to at least one person—and possib
to many thousands more—for several years. Perhaps
may provoke a fruitful idea in the mind of somebo
poring over the problem of the "common cold," the
various types of "influenza," and the amorphous mas
of complaints, sometimes labelled one, sometimes the
other, and sometimes "chill," "catarrh," "feveris
chill," or "pyrexial catarrh," according to the certifying
doctor's whim, his erudition, or the time at his
disposal.

But by now, I hope, the deeper significance of this
letter has begun to dawn. For it was out of a similar
chaos, known as continuous fever—and with no aid from
bacteriology—that typhoid and typhus were ultimately
disentangled. By whom? *By patient and exact clinical
diarists.* And may it not be true that this chaos also—
so huge in its aggregate of discomfort and sick absence—
really consists of several disorders just, in their way, as
distinct? And that being so, is any real progress likely
to be made until they have received, in respect of exact
histories, very much more clinical attention than has
yet been bestowed upon them? It may be argued that
the majority of sufferers seldom come under medical

e and that; when they do, it is only too easy for a doctor lightly to dismiss them with one or other e above scraps of terminology. But there are, in islands, in the shape of these very doctors, at least 0 trained observers, who must themselves be sional victims. Surely these are enough for an uate beginning. But why call this particular entity enza Cosmo ? Well, I have my private reasons ; and, e present state of our knowledge, why not ?

ston Royal, Wilts. H. H. **Bashford.**

STERILISATION OF POLYTHENE TUBING

r,—Dr. Galley's letter of Jan. 7, in connexion with note published on Dec. 24, is fair comment on the ility of fine 'Polythene' catheters after sterilisation boiling. I am aware of the mishap he reports, and hin the last three months have seen four cases where tubing has broken at the skin margin—one in the ral canal and the other three in the lumbar region. three of our cases, the break occurred after the tubing l been in position for 12 hours, and in the other er 48 hours. In many dozens of cases, however, we ve had no trouble with this technique in prolonged gical operations of 2–4 hours' duration. There is real risk of breakage in prolonged cases, and until bing of more resilient material is available, its use ould be restricted to gravely ill patients in whom ntinuous extradural block offers the only reasonable pe of survival—e.g., the eclamptic woman in whom the od-pressure cannot be controlled by more conservative asures.

Should the catheter break, the results are of no great nsequence. In three of our cases a small incision der a local anæsthetic was made within 12 hours of cture and the piece easily found and withdrawn. the fourth case, no attempt was made to recover the theter for three weeks. It could not be found, and it s reassuring to note that experimental findings were nfirmed in that there was no evidence of tissue reaction.

Nuffield Department of Anæsthetics,
University of Oxford. R. **Bryce-Smith.**

PEMPHIGUS VULGARIS TREATED WITH AUREOMYCIN

Sir,—Dr. Bettley's account last week of a successful ial of 'Aureomycin' in a case of pemphigus vulgaris, ompts me to record my own experience of this eatment in a case under my care.

He was a well-preserved man, aged 89, who was admitted Addenbrooke's Hospital, Cambridge, on Dec. 6, 1949, ith the typical clinical picture of severe pemphigus vulgaris two weeks' standing. He had numerous blisters on the ms and legs, and circinate patches of dusky erythema on e trunk. The eruption began on the feet.

The progress of the eruption was rapid, and uninfluenced sulphapyridine ; the bullæ increased daily in number and size, reaching 4 cm. in diameter. He remained apyrexial d in fair general condition until Dec. 20 when erosions peared on the palate ; his general condition was obviously teriorating, his appetite began to fail, and almost the hole skin surface was involved—blistering, ulcerated, or ythematous.

I started aureomycin on this day with 250 mg. 6-hourly y mouth, and increased it to 500 mg. 6-hourly next day, ntinuing it at this level without toxic effects. After 48 hours e patient's general condition improved, and the few fresh listers were small. On the third day no fresh blisters ppeared, for the first time since his admission. He felt etter and could move in bed without much pain ; the lcerations were drying and the erythematous plaques fading.

This striking improvement lasted six days, during which the ealing areas of skin began to pigment. But on Dec. 25 esh small blisters appeared on his abdomen and legs. They radually increased in size and extent, his general condition eteriorated, and he died on Jan. 7. The aureomycin had een discontinued a week previously, since it was no longer roducing any response.

Pemphigus vulgaris is characterised by remissions and relapses, but the improvement in the patient's condition and the cessation of blistering during the administration of aureomycin parallel Dr. Bettley's observations. A similar case has been reported by Philip,[1] whose patient also died after an initial improvement in the skin on the third day.

Many dermatologists have already started using aureomycin for pemphigus vulgaris, and assessment of results at this stage is likely to be premature, especially since the condition is notoriously capricious in its response to a variety of agents. But the hope engendered by these three cases warrants at least further trial of the drug early in the course of a disease which usually proves fatal.

Addenbrooke's Hospital, Cambridge. C. H. **Whittle.**

TUBERCULOUS ABSCESS AT SITE OF PENICILLIN INJECTIONS

Sir,—I would like to reinforce the plea by Dr. Douglas, on Jan. 14, for better syringe sterilisation and user technique. I feel sure that contamination of the injection material by dust-laden air or failure in aseptic technique is the cause of the accidents, as I have stated before.[2] I know from experience that (1) exclusion of ward dust from solutions, and (2) conscientious and good aseptic technique will prevent these unpleasant consequences of exogenous infection. Training in bacteriology for all nurses is also indicated.

St. Margaret's Hospital, Epping, Essex. **Frank Marsh.**

EPILEPSY AND ORGANIC DISEASE

Sir,—I am grateful to Dr. Dalton (Jan. 14, p. 94) for his reference to my address on epilepsy to the Manchester Medical Society (*Lancet*, 1949, ii, 994) ; and he is right in saying that I drew attention to organic disease as a cause of epilepsy, especially in later life. His partial quotation of my figures is, however, somewhat misleading. It is true that of 25 deaths in patients who had their first fit after the age of forty, the cause of death in 10 was a cerebral tumour. But the 25 deaths occurred in 100 patients with the same age of onset of epilepsy, and the remaining 75 showed, when re-examined not less than three years later, no sign of cerebral tumour. In this series, therefore, of people over forty developing epilepsy, only 10% were subsequently proved to have a tumour. This does not diminish the importance of bearing this possibility in mind and of re-examining periodically all cases of epilepsy.

Newcastle upon Tyne. F. J. **Nattrass.**

HEAT CRAMPS

Sir,—I am most gratified that, in his letter of Nov. 19, Dr. Marsh, who has had wide practical experience in the field, expressed interest in my article of Nov. 5.

I agree with Dr. Marsh that the development and relief of cramp may involve more than simple osmotic factors. In the first draft of my article I did go so far as to suggest that the speed with which cramps were relieved by the injection of strong sodium-chloride solution was greater than might be expected with a simple osmotic mechanism; a certain natural caution, however, and the feeling that possibly a biologically minded physical chemist might make the attempt to calculate the actual time required for an osmotic transfer and show me wrong, caused me to withdraw this remark—I think in proof. But I did go so far, in my paper as printed, as to suggest that sodium chloride, by which I meant either the whole salt or one of its ions, might possibly have a specific function. The best evidence against a simple osmotic theory of heat cramp is provided by those tests in which osmotically everything was in favour of cramp developing, but in which it did not do so; it is here, I think, that the influence of the adrenal cortex may be seen, either direct or secondary to its effect on permeability as shown by recent work at Cambridge.

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[1] Philip, A. J. *Urol. cutan. Rev.* 1949, 53, 417.
[2] *Lancet*, 1946, ii, 508 ; *Ibid*, 1949, i, 800.

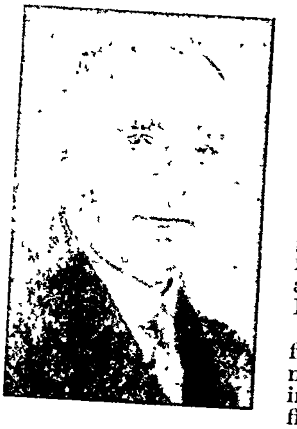
Heat Research Laboratory,
Oshodi, near Lagos, Nigeria.
W. S. S. LADELL.

Obituary

ALEXANDER GEORGE GIBSON

M.A., D.M. OXFD, B.SC. LOND., F.R.C.P.

Dr. A. G. Gibson, consulting physician to the Radcliffe Infirmary, died at his home in Oxford on Jan. 11 at the age of 74. Inevitably, but unfortunately, the general physician who is also actively engaged in pathology is passing from our midst, and students of today are poorer for the lack of men of Gibson's type.



Born at Hull, the son of William Gibson, he was educated at University College, Aberystwyth, and at Christ Church, Oxford. In 1895 he took his B.SC. Lond. and after completing his medical studies at St. Thomas's Hospital he took his B.M. in 1901, proceeding to his D.M. four years later. From a house-appointment at St. Thomas's he returned to Oxford, where at first he held a similar post at the Radcliffe. Later he became university demonstrator in pathology, and afterwards Nuffield reader in morbid anatomy. For a time he was also in general practice in the city, but as his consultant work grew he had to give this up. He was elected F.R.C.P. in 1913 and he was appointed full physician at the Radcliffe in 1919.

Before the days of the Nuffield benefaction, the Oxford medical school was small and intimate; the Radcliffe Infirmary, with its five or six residents, was still a county hospital and not yet a great university medical centre. The army huts in the forecourt were a visible reminder of unwonted activity during the 1914–18 war. This was the setting against which Gibson spent the most productive years of his life as physician, pathologist, and Litchfield lecturer in medicine, surrounded by good colleagues who had worked with Osler and who revered his memory.

"Medical graduates who were at Oxford between the wars" (writes one of them) "remember 'the Gibber' with gratitude and affection, for he found time to share their interests and difficulties, despite his busy consulting practice and his manifold hospital and university duties. Short but well-knit and dignified, he carried himself well; he was clean-shaven, with a firm mouth, an aquiline nose, a lively voice, and a ready smile. Punctually at 20 to 9 he was in the laboratory examining the overnight cultures. 'I told you so,' he would say, emerging from the incubator and shaking off the magnifying glass so that it hung around his neck, 'it *is* a streptococcus. Now see if you can decolorise this one,' and he would give a challenging chuckle. And so another day of interest would begin for Gibson and those fortunate enough to be associated with him. A few minutes later he would be in the post-mortem room which adjoined the laboratory, deftly removing the organs and examining them in the best of north lights. 'You recall the man in the top left-hand bed in Rowney?' he would say; 'well this poor woman has what I believe to be precisely the same lesion.' He would then trace the natural history of the disease and fit it into the patient's story, enlarging perhaps, without however any note of pessimism, on our present futile attempts to treat the condition. The specimen would then be carefully placed in preservative for a future occasion. By now confirmatory tests would be ready to read in the laboratory and the first batch of reports waiting for signature, for Gibson believed that a laboratory service to be
give information promptly. And so by 10
be ready to join the house-physician and
for that top left-hand bed in Rowney,
once again the physical signs which we coul
the lesion we had just seen. Sister's prom
and the arrival of the dinner trolley would
interesting round; and so we would depar
the laboratory and the students to a lectu
noons would be devoted to consultation, b
return to the laboratory in the late afterno
tively review in the space of half an hour th
of the day's work.

"This was Gibson's way of teaching—fro
mortem room to the wards and then to the
for the real value of clinical pathology,
to provide confirmatory evidence. In his
Physician's Art, he wrote: 'there is a dan
skilled aid is available, that the doctor ma
departmental. Sometimes it is just those pa
body that are left to a colleague to examine
afford the clue to the ailment. The aim must
to see the patient's disease as a whole.'

"But he was not to be found only in the
Infirmary. At the Dunn School of Pathology
him as a demonstrator in morbid anatomy,
lectured to us on tropical medicine and helmi
Indeed in the medical school of those days he
many rôles, and so far as the fourth-year stu
concerned it is no exaggeration to say that he
moving spirit in the school. In the summer te
can forget the bicycle rides in the chill morning
the early sun sparkling on the university buil
we hurried into the Dunn School a few minute
7 for the famous tutorial on pickled meats.
the warmth of the museum we would be welc
our genial teacher, already in his white coat;
after an hour of absorbing interest, in which
encouraged to handle the specimens, would w
our thoughts to turn to coffee in college, with
eggs and bacon. If, as occasionally happened, aft
early morning virtue, a reaction set in, he wou
givingly wish us a good game and wave to us as
off for the North Oxford course.

"On Sunday mornings former students would
times return for the privilege of going round wit
and they would be asked to tea in the afternoo
would hope for fresh anecdotes about Osler. How
he was to hear of their experiences in the Londo
pitals and of the questions they had encountered i
examinations. Many a time the round would be
on the staircase outside the ward while he listened
amusement to a hypothetical case-history prod
by a searching examiner. When the B.M.A. me
Oxford in the summer of 1936 Gibson was presi
of the section of medicine, and at the luncheon pa
over which he presided he never failed to invite
juniors to meet the leading physicians of the day.
nothing gave him greater pleasure than to have toge
under his hospitable roof men of all ages."

Gibson was an able historian, and in 1926 he
The History of the Radcliffe Infirmary. *The Physic*
Art, published in 1933, was elaborated around
Locke's fragment *De arte medica*; not only is the
book delightfully written but it mirrors faithfully
gentle personality and kindly disposition of its auth
His Bradshaw lecture in 1928 dealt with pyeloneph
but his main interests were in cardiology and in dis
of the spleen. With the late W. T. Collier in
he produced a useful book on *Methods of Clin*
Diagnosis.

Gibson tried to adapt himself to the altering con
tions brought about by the mushroom-like growth
the clinical departments in the late 'thirties, but
realised that the days of the specialist had come.
continued however to act as a physician, finding fr
interest and renewed happiness when Oxford beca
an undergraduate school during the war years.
enjoyed, too, his visits to Merton College, where he ha
been elected a fellow. In 1942 his wife, to whom
was devoted, died, and soon afterwards it was no
that he was ageing fast. But his good humour a
enthusiasm were still a delight to his friends: on summ

noons in the garden after tea he would discourse :homas Willis to a new generation of students. ucing one book after another for their enjoyment. illness, which lasted several years, interrupted his ural life at a time when his friends hoped he would leisure to write.

:. Gibson leaves a daughter and two sons.

ASSADOUR ARAM ALTOUNYAN

M.D.

HE Armenians, a gifted race, have lost their most nguished representative, and the Near East the man , introduced modern surgery and medicine. His justified the legends which his name gathered; his of work and living had the simplicity and a little he cunning which is endearing to Eastern people.

orn on March 21, 1854, he was an orphan at the age bout six, and it was said of him that he diagnosed the se of his father's death (pneumonia). At any rate n an early age he set his face against the superstitious, tom-ridden ways of thought of his place and time. pported in the bare essentials by his uncle, he had to n the scientific books he needed by doing labourer's rk and by driving donkeys—those toil-bearing creatures so much loved, though he himself was a great horse- n who with regret gave up riding after the age of iety.

American missionaries, recognising his talent, put him ough the medical school of Aintab, a provincial lege in the Turkish Empire. His postgraduate educa- n was taken in the U.S.A., in Germany under Koch, d in Vienna. He rejoined the Aintab College, working h Dr. Sheppard, and married Miss Riddall, the Irish tron there. Then began years of itinerant medicine, ng from village to village, his wife assisting him, ing first in any locality only such operations as would tainly be successful, since this modern surgery was ked on with greater horror and dread than the rbarous conventional treatment of those days. Once was accepted as a surgeon (and to do any effective rk in a primitive community, as those with such perience well know, supersitious opposition has first be overcome) he faced the really difficult surgical tasks. ith a great name in the hinterland already established, settled in Aleppo. Here, because of his Western ideas, was "the last resort"—that maker or breaker of putations. For instance the beautiful daughter of a sha, exiled from the Sultan's court, was declared by e physicians to be dying of tuberculosis; Altounyan ated her for her typhoid fever and she recovered. at was not miraculous work, but it eased the mind the pasha and that of Dr. Altounyan. The Turkish vernment henceforth would receive no health report om Aleppo that was not countersigned by him.

His first X-ray plant, the first in the Near East, was occasion of Oriental comedy. The Turkish medical icials, jealous of his fame and ignorant of the use of e apparatus, desired its possession to enhance their putation; the provincial governor accordingly ordered m to send it to Bagdad. A collection of wires, old ils, and a burnt-out tube were neatly packed and spatched, while the effective apparatus continued to used sub rosa. Some months later when the Turkish tional leader, Jamal Pasha (later to be commander- -chief) broke his leg, Altounyan X-rayed it and told mal the whole story. Jamal enjoyed the joke and the nefit, and prevented further interference with the ork.

Open and fearless in his relation to the Turkish thorities, Altounyan was trusted by them and he was le during the terrible massacres at the end of the st world war to save many of his co-religionists. His ughter smuggled Armenian children into Aleppo past e Turkish guards and fed them on Turkish army rations cured from Jamal Pasha. Kemal Ataturk, then mmanding an army, was one of his patients, and ade the matron's office his headquarters for a time. ltounyan went after the first world war to Paris to present his people at the Peace Conference.

His hospital, built in 1911, was an enterprising place. hen the therapeutic effects of radium were discovered. obtained a "bomb" of it: his was one of the first hospitals where a donor was at hand for every operation that involved shock or loss of blood; and so it went on through the decades and through the wide range of discoveries and developments of laboratory technique. His capacity to work was to the lazy Oriental incredible, as was his endurance to the Westerner; at ninety-one he performed a jejunectomy on his wife because (during the war) there was no-one else who would do the job, though his colleagues obliged by looking on. He saw patients to the day before he died. His last scientific communication,[1] made to the International Society of Surgery when it met in London in 1947, was characteristic of his careful work.

But what made him great among his people and his patients was his simplicity and care for detail; his ease in work and in his social relations sprang from his great ability combined with his humbleness in the presence of complexity. He did not start by assuming that he knew, only that he had still much to learn. Socially he never imposed on his guests; he received them just for the persons they really were.

His house in Aleppo was the gathering-place of travellers (T. E. Lawrence said of one of his carpets that "it alone was worth the sack of Aleppo"). His hospitality was Oriental without display, and Western without formality. East and West seldom meet unless there comes a man great enough to combine them. To this add the refinements of scientific thought and the directness and strength of the peasant, and it will be clear why today Armenians mourn; and we who live with different troubles must stretch our imagination before we are able to understand and acknowledge his kind of greatness.

The memorial service was in Armenian, Arabic, and English—three of the six languages with which he worked. He leaves a widow by his second marriage, a daughter, a son (Lieut.-Colonel E. H. R. Altounyan, M.C., O.B.E., F.R.C.S.), who carries on the tradition, six grandchildren (one a medical student), and four great-grandchildren. JOHN RICKMAN.

HERBERT ERNEST BATTEN

F.R.C.S.

Mr. Herbert Batten, consulting orthopædic surgeon to Charing Cross Hospital, died at his home in London on Jan. 8.

Born in 1877, the son of the late Henry Batten of Ilminster, Somerset, he was educated at Ilminster Grammar School and the University of Bristol. In 1891 he qualified as a pharmacist, but he was already anxious to become a doctor and after a few years he entered St. Mary's Hospital medical school. In 1904 he took the Conjoint qualification and after holding house-appointments at St. Mary's he decided to specialise in surgery. After several years as surgical registrar at the Wigan Royal Infirmary he returned to London to study for the F.R.C.S., which he obtained in 1914. At the West End Hospital for Nervous Diseases, where he held the post of resident medical officer under Laming Evans, his interest in orthopædic surgery was stimulated, and later he became resident surgical officer at the Royal National Orthopædic Hospital. After the 1914–18 war, during which he served in the R.A.M.C. with the rank of major as a surgeon specialist, he settled in orthopædic consulting practice. In 1919 he was appointed orthopædic surgeon to the Freemasons' Hospital (later the Royal Masonic Hospital), and the following year he joined the staff of Charing Cross Hospital. He was also on the staffs of the Royal Sea-Bathing Hospital at Margate and the St. Marylebone and Western General Dispensary.

D. T. writes: "Herbert Batten was a kind and friendly man; he was utterly incapable of any harsh action: he was always helpful, sound in advice, and justly critical. Nothing gave him more pleasure than to feel that he had helped one of his late house-surgeons or registrars in their professional climb; only those close to him would realise this, for he was by no means demonstrative but rather reserved. Indeed, he was a modest man: this accounts for his lack of writing, for he held strong views that papers should contain a real contribution; yet he practised many original methods which would have been

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[1] See *Lancet*, 1948, i, 112.

y a modification to deal with the smaller voltages d. The instrument, which is priced at £36, is well id easy to operate, and the dial readings are clearly A device is incorporated which permits calibration instrument by introducing a standard increase of ty of 6 decibels.

PENICILLIN OUTPUT

emarkable and continuing rise in the production of n is shown in the following approximate monthly r Great Britain and the United States.

Month	*Output per month (million mega units)*	
	U.K.	*U.S.A.*
uary, 1946	0·1	
, 1947	0·25	3
, 1948	0·5	6
, 1949	1	10
ember, 1949	2	11

all quantity is produced in Canada, and a still smaller on the Continent.

HE SPIRIT OF THE CHELSEA HOSPITALS

E is no particular reason why belonging to the nation rob our hospitals of the sense that they belong just h, and far more closely, to their own neighbourhood ditions. This is an old experience in national life, and ich time may teach us to apply internationally. As ferent Saxon kingdoms united to make England they lose their sense of local patriotism—on the contrary, ept it quite violently, and merely extended their beyond it to a wider concept. The hospitals can much without losing or diminishing their own local es. A sense of this truth has been responsible for the of the *Chelsea Hospitals Quarterly*, published in the ' that it would surely be a good thing if the old feeling rsonal interest in a hospital, a feeling that it was a local tion of which people were proud—and fond—could be ed under the new conditions of the National Health ."

material in this first issue goes far to foster this purpose, re is not a dull or badly written line to be found in it. iew of twenty-five years' progress in St. Stephen's al is followed by short notes on the dangers of castor printed), on a new nursery cadet scheme in the Fulham ensington hospitals, and on the physiotherapy department St. Stephen's. Miss Vera Brittain contributes a useful on What Nursing Taught Me. A section on staff es, a correspondence column, some more notes on l records, hospital history, the nurse's view and the 's view, and another quoted article on the influence ur in hospital, make up a lively little journal.

roversial, too: while praising the Fulham and Kensinglet scheme the editor urges the greater use of cadets lly aged 15–16—in the wards. Examples are not wanterious tuberculosis infection, sometimes ending fatally, lescents of this age-group allowed to work in wards, n general wards. They should not be exposed to any isk unless they are watched closely for signs of early on and unless other special precautions are taken otect them. The Fulham and Kensington Hospital ement Committee have this risk well in mind; and if elsea Group Hospital Management Committee decide pt a similar scheme they will doubtless feel equal .

RECRUITMENT OF NURSES

women are entering nursing today than ever before, demand still outruns the supply. The *Ministry of Gazette* for December, 1949, notes wastage and the on of the health services as the chief reasons for the ied need. Conditions of work are improving—fast hospitals, slowly in others. The 96-hour fortnight, ple, advocated by the Government for many years, he best part of this century by various committees g conditions, is not yet universal in our hospitals, ecause increases in staff are more readily used for new wards and departments than for alleviating the he existing nursing staff. However, the situation is steadily easier, and the Ministry of Labour and l Service has had its share in increasing recruitment. tional Advisory Council on the recruitment of nurses dwives meets regularly, the Minister presiding, and this uides the policy of the nursing services branch at the y headquarters, which in turn supervises and directs 33 nursing appointments offices in different parts of the country. These offices foster recruitment in their areas, advise new entrants and trained staff on careers, and place those looking for employment.

To interest women and men in nursing the Ministry publishes advertisements presenting the case for nursing as a profession and providing coupons which those who want more information can send to the London nursing appointments office. During the year ending Sept. 30, 1949, no less than 20,282 coupons or letters were received, about a third of them from people under 18. About a fifth were from people inquiring about employment or training; and 1689 of the applicants were actually placed in employment or training. The yield, though small in relation to the inquiries made, has meant quite a substantial addition to the country's nursing force. The mobile nursing exhibitions, described in our columns [1] in 1946, when the first vans took the road, have toured Great Britain and Northern Ireland and attracted attention and inquiries wherever they went. During the year reviewed, at least 26,400 young people and 14,000 adults saw these exhibitions—which show pictorially the stages in the life of a student nurse and the careers open to qualified nurses. The effect cannot be assessed but is believed to be good. Leaflets on general and special nursing, and on midwifery, have been widely distributed, posters have been displayed in likely places, and films have been used whenever possible. The nursing appointments offices send speakers to senior girls in schools, women's organisations, youth clubs, rotary clubs, and the like. (Incidentally, the offices give advice and information not only to nurses but to radiographers, physiotherapists, occupational therapists, and medical laboratory technicians.) They have also done much to recruit part-time nurses, who have eased the difficulties of many hospitals, especially those for the chronic sick and the mentally disabled. Between June, 1947, and June, 1949, the part-time staff employed in our hospitals rose from 12,000 to 26,000. The offices have also helped actively in schemes for bringing foreign nurses to England. In the year ending Sept. 30, 1949, the offices filled 15,400 vacancies in the hospitals—3000 with trained nurses and midwives, 6300 with students, and 6100 with unqualified staff not in training; 2100 of these were part-time and 13,300 full-time workers. The numbers of student nurses and midwives in training throughout the country have risen from 43,300 in 1943 to 57,800 in 1949, and a growing number of training schools have a full complement of nurses.

The staffing of hospitals generally must have improved, for during the year ending June 30, 1949, the numbers of nurses and midwives employed rose by about 15,000, and the number of occupied beds by 10,000. There are still 30,000 vacancies on the books of the appointments offices, however—a reminder that it is not enough to recruit nurses; we must keep them.

GRANTS FOR STUDY IN THE UNITED STATES

THE United States government announces that under the Smith Mundt Act a limited number of dollar grants are available to university teaching staff or those of equivalent academic status in other institutions and to senior research-workers who wish to visit the United States for the purpose of study, research, or lecturing. Applicants must be affiliated with an American institution of higher learning, and, if in the research group, must spend at least three months in the United States, and visiting lecturers at American universities at least six months or one semester. All applicants must be citizens of the United Kingdom. Successful candidates will also be awarded a Fulbright travel grant (see *Lancet*, 1949, ii, 1207) to cover the return fare from their home in the United Kingdom to the first point of destination in the United States. The maximum Smith Mundt grant is $2000 per annum, plus the cost of internal travel within the United States (when not covered by the Fulbright grant), plus a $10 per diem allowance during this travel. So that as many people as possible may be helped, the grants will usually be awarded to supplement inadequate dollar funds obtained from some other source. The grants will operate within the period of one year from June 1, 1950. Applications may be made by candidates who have not yet concluded the above institutional affiliation. Application forms, to be returned before Feb. 18, may be had from the United States Educational Commission in the United Kingdom, 55, Upper Brook Street, London, W.1.

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[1] *Lancet*, 1946, ii, 777.

University of London

On Jan. 6 the following degrees were awarded :

M.D. Branch I (medicine).—A. W. Anderson, H. J. G. Bloom, J. P. Bound, J. P. Bradshaw, F. S. W. Brimblecombe, C. J. M. Clark,* R. A. Craig, Dewi Davies, A. P. Fletcher, R. M. Hardisty, J. M. Hill, A. F. Huston, R. J. Isaac, A. D. M. Jackson, H. E. M. Kay, E. C. B. S. Keat, L. G. Kiloh, Anthony Knudsen, Michael Leivers, B. S. Lush, Ananda Nimalasuria, W. S. Peart, Eric Sanders, D. G. Sheffield, V. H. Springett,† I. McD. G. Stewart, Cecily M. Tinker, D. A. H. Trythall, J. S. Watson, P. L. Watts, J. C. P. Weber, Elizabeth Williamson.

M.D. Branch II (pathology).—G. T. Allen, W. E. D. Evans, Erich Geiringer, E. J. Harries, Emmanuel Levy, Ernst Neumark, J. A. Nissim,† Sidney Shaw, J. C. Sherris, Peter Story.

M.D. Branch III (psychological medicine).—E. J. Anthony,† R. A. Blair.

M.D. Branch IV (midwifery and diseases of women).—C. J. Champ, C. T. F. Ealand.

M.D. Branch V (hygiene).—Harry Binysh, Wickramaratchyge Ajitha Karunaratne, J. C. McDonald.

* Mark of distinction. † University medal.

Prof. J. M. Mackintosh has been appointed Heath Clark lecturer for 1951. He will deliver five lectures on Trends in Public Health in the 20th Century.

University of St. Andrews

At recent examinations the following were successful :

M.D.—Janet E. Long.

M.Ch.—J. A. Shephard.

M.B., Ch.B.—Christella A. Adamson, N. J. Allan, L. W. Betournay, R. F. Boucher, Helen H. H. Dickie, G. L. Ferguson, John Harrington, Marion C. Kerr, Helen F. McLagan, H. J. Penkala.

University of Bristol

The dissertations of G. S. Andrews and Frances B. Robinson have been approved for the degree of M.D.

Royal College of Surgeons of England

At a meeting of the council on Jan. 12, with Sir Cecil Wakeley, the president, in the chair, Sir Max Page was appointed Hunterian orator for 1951, Mr. William Doolin Thomas Vicary lecturer for 1950, and Prof. P. D. Wilson Robert Jones lecturer for 1950. Mr. R. M. Handfield-Jones was re-elected to the court of examiners and Prof. V. W. Dix and Mr. H. J. B. Atkins were elected as members of the court. Mr. D. N. Matthews was admitted as a member of the surgical section of the board of examiners in dental surgery.

It was decided that in future the annual meeting of fellows and members would be held on the day preceding the second Thursday in December and that on the same day there should be one of the statutory lectures, the monthly dinner, a "view day" in the various departments of the college, and the annual show of recent additions to the museum.

The following diplomas were granted jointly with the Royal College of Physicians :

D.I.H.—Mohamed Mohamed Abdel-Latif, D. K. Cowan, Alan David, A. W. Gardner, R. F. Guymer, E. A. W. Marien, J. M. Muir, G. H. G. Southwell-Sander.

D.M.R-D.—Joseph Ainsworth, Hussain Syed Ali, Ahmed Harold Ansári, E. B. Bradbury, T. D. Brick, J. B. Chetwynd, W. R. Cole, Stanley Davis, W. H. Dempster, J. R. Dow, Dineschandra Dowera, E. P. G. H. du Boulay, Prasanta Kamal Dutt, E. R. Edmunds, J. T. Furnival, D. M. Gregg, C. I. Griffiths, H. J. Hagger, G. K. E. Inman, N. R. Jefferson, J. V. Kent, A. H. McCallum, Ambat Narayanan Kutti Menon, Gordon Osborne, Mohammad Ramzan, K. G. Reynolds, P. W. E. Sheldon, B. S. H. Storr, John Sutcliffe, D. K. M. Toye, Keshawrao Shankerrao Warang, Krystyna Wowkonowicz.

D.M.R-T.—W. R. Argument, R. J. Dickson, Ambalal Mohanlal [illegible] Kinsella, William Kulke, Marcus [illegible] Walton.

[illegible] al Ela, Nasiruddin Ahmad, A. J. E. [illegible] Raman Das Gupta, W. R. Denny, [illegible] an, W. G. L. Hood, D. G. Jones, J. I. Kelly, P. J. O. McCullen, [illegible] Madan, Wilayt Ali Malik, H. M. Parsons, C. H. [illegible] Ryan, Dharam Vir Sethi, Stanislas Silberm [illegible] erenda, J. D. Trethowan.

D.P.M.—L. D. Gardner, Aaron Gillis, Delfan Lewis, W. V. Livingston, I. H. Martin, H. F. Osmond, Leslie Sohn.

D.T.M. & H.—W. E. Barnes, Amiya Kumar Basu, D. E. Boye-Johnson, C. F. Egan, S. C. Ferguson, M. M. Lewis, Champaklal Pranlal Nanavati, D. W. Quantrill, Hardeo Narain Singh.

Medical War Relief Fund

Last year 27 awards were made, 19 as gifts and 8 as loans. In all £3500 was distributed, £3000 less than for the previous year. Help was given to doctors who had difficulty in re-establishing themselves after demobilisation, and to widows, usually in the form of grants for the education of children. A substantial balance remains in the fund, and the committee thinks it unnecessary, for the time being at least, to seek further contributions. Dr. E. A. Gregg has been elected its chairman in succession to Dr. H. Guy Dain.

Royal Faculty of Physicians and Surgeons of

At a meeting of the faculty on Jan. 9 with Dr. W. grass, the president, in the chair, Ramanlal Amrit was admitted a fellow of faculty *qua* surgeon.

Kent Pædiatric Society

A meeting of this society will be held at the Co Approved School, Godstone, Surrey, on Feb. 1, at 2.

Oxford Regional Hospital Board

Dr. A. Q. Wells is resigning from the chairman membership of the board so that he may have m for his research work at the University of Oxford.

London County Medical Society

The following officers have been elected: presider Matheson ; vice-president, Dr. L. T. Hilliard ; hon. Dr. C. H. Comerford ; hon. secretary, Mr. J. Gabe, St. Hospital, Greenwich, S.E.10.

Royal Australasian College of Surgeons

Grayton Brown, H. H. Eddey, R. S. Lawson MacMahon, and K. W. Starr, who are Hallett prize and fellows of the college, have endowed a prize va 5 guineas for the primary examination for fellowshi college, to be known as the Gordon-Taylor prize.

Medical Section of the Library Association

The following officers have been appointed fo chairman, Mr. W. R. Le Fanu (Royal College of of England) ; honorary secretary-treasurer, Mr. W. (Wellcome Historical Medical Library) ; honorary manager, Mr. F. N. L. Poynter (Wellcome Historica Library) ; other members of the committee, Mr. C. C. (London School of Hygiene and Tropical Medicine), Hopkins (British Dental Association), Mr. A. E. S. (Bristol University Medical Library), and Mr. (Royal Society of Medicine).

Chadwick Lectures

On Tuesday, Feb. 14, at 26, Portland Place, Lond Dr. C. Banning, chief medical officer of public he Gravenhage, Holland, will speak on Coördination the Public-health Service and Private Enterprise in On Tuesday, March 14, at Westminster Hospital School, Horseferry Road, S.W.1, Dr. C. A. Bou speak on the Maintenance of Health by the Prev Accidents in the Home. Both lectures will take 2.30 P.M. Further particulars may be had from the of the Chadwick Trust, 204, Abbey House, Wes S.W.1.

Science To-Day is now appearing in a ne This journal, which is published weekly, is obtaina 35*s.* per annum, from Weekly Science Newslett 104, Clifton Hill, London, N.W.8.

Medical research in the Colonial Service has been in an official booklet entitled a Note on Some of the Studies Undertaken by Members of the Colonial Service during the period 1930–47, with a Bib (H.M. Stationery Office. Pp. 47. 1*s.*).

Appointments

BARLEY, D. A., M.B. Lond., F.R.C.S., D.L.O. : consultant and throat surgeon in the Plymouth clinical area.

FINKLEMAN, BENEDICT, M.D., M.SC. Manc., D.P.M. : medic tendent, Rainhill Hospital.

KENNARD, H. W. H., B.A., M.B. Camb. : consultant p Salisbury group of hospitals.

LAWSON, MARY, M.B. Belf., D.P.H. : asst. M.O., school m child-welfare departments, Rochdale.

MCPHERSON, A. G., M.CHIR. Camb., F.R.C.S. : consulta in Bristol clinical area.

NAISH, J. M., M.A., M.D. Camb., M.R.C.P. : consultant ph Bristol clinical area.

NUSSBAUM, ILSE, Staatsexamen Berlin, D.P.M. : consul resident psychiatrist (whole-time), Rainhill Hospital.

RAWLINSON, M. P. G., M.A. Camb., M.R.C.S., D.P.H. : M.O. health district, Alberta, Canada.

SWERDLOW, MARK, M.B., B.SC. Manc., D.A. : consultant a hospitals predominantly in St. Helens and Warringto

Hospital for Sick Children, Great Ormond Street, London

BASSETT, H. F. M., M.B. Lond. : house-surgeon.

FISHER, O. D., M.B., M.R.C.P., D.C.H. : medical reg. pathologist (senior registrar grade).

JACKSON, A. D. M., M.B. Lond., M.R.C.P., D.C.H. : house

JOLLY, H. R., M.A., M.B. Camb., M.R.C.P., D.C.H. : medica and pathologist (senior registrar grade).

LANGHAM, J. M., M.B. N.Z., F.R.C.S. : house-surgeon.

LEVEAUX, V. M., M.D. Lond., M.R.C.P. : house-physicia

TREATMENT OF LEPROSY WITH DIAMINO-DIPHENYL SULPHONE BY MOUTH

JOHN LOWE
M.D. Birm., M.R.C.P.
IRECTOR, LEPROSY RESEARCH UNIT, NIGERIAN LEPROSY SERVICE, UZUAKOLI, NIGERIA

Diamino-diphenyl sulphone (D.A.D.P.S.) was the first ulphone synthesised (Fromm and Wittmann 1908), but s pharmacology and therapeutic effects were not tudied until 1937, when Buttle et al. found that t possessed remarkable properties. In streptococcal nfections in mice, doses of 0·4 mg. were as effective s doses of sulphanilamide a hundred times greater; nd doses of 0·04 mg. were only slightly less effective than ·4 mg. In protection tests, 2 mg. gave better results than 50 mg. of sulphanilamide. Its acute toxicity was however ten to twenty times greater than that of sulphanilamide.

Also in mice, Bauer and Rosenthal (1938) reported similar findings. Buttle et al. (1937) also studied the effects of D.A.D.P.S. in rabbits and in monkeys. In rabbits the results were less striking than in mice, but still very good. In monkeys, the antibacterial activity of the blood after a dose of 1 g. of D.A.D.P.S. was about the same as after 4 g. of sulphanilamide, and the effect was more lasting. Further work in other animals followed, and D.A.D.P.S. later became established as a powerful antibacterial agent in veterinary medicine (McEwen et al. 1941, Francis 1947).

In man, Buttle et al. (1937) found that after a single dose of 300 mg. the blood had definite antibacterial properties, but no detailed studies were reported. Subsequently (Buttle, personal communication) a therapeutic trial was made in human beings with acute infections; doses of the order of 1–2 g. a day were given, but, because of the rapid production of methæmoglobinæmia and other toxic effects, the treatment was soon abandoned. The only other information available to me on the toxicity of D.A.D.P.S. in man is a statement made by Long and Bliss in 1939 and quoted by Feldman et al. (1944) that D.A.D.P.S. was considered too toxic for use in man.

There seem to have been no attempts to determine the therapeutic blood-level needed in man or the dosage necessary to produce that level. The little work that was done in man was with doses fixed arbitrarily at a level now believed to have been far too high.

When Rist et al. (1940) demonstrated the action of sulphones in experimental tuberculosis in animals, D.A.D.P.S., 'Promin,' and 'Diasone' were used in the extensive animal experiments which followed; D.A.D.P.S. showed up well, producing some results comparable to those of other sulphones in higher doses. In this work Feldman and his collaborators were prominent. Feldman (1946), in summarising the work, made no statement regarding the relative efficacy of the different sulphones. It is worthy of note that Smith et al. (1942) found that in vitro D.A.D.P.S. was ten times as active as promin.

In the trials of sulphones in human tuberculosis, because of its reputed toxicity to man no attempt seems to have been made to use D.A.D.P.S., possibly the most potent sulphone. The results of sulphone treatment in human tuberculosis have been disappointing.

THE SULPHONES IN LEPROSY

This work, started in the United States in 1941 and continued since, has been well summarised by Faget (1947) and by Sharp and Payne (1948). Workers in the United States have reported that the results of sulphone treatment in leprosy are much superior to those of any previous form of treatment, though it has limitations. Workers in other countries are now reporting similarly. Some British and other workers have been rather critical of the new treatment, but the opinion has steadily gained ground that a great step forward in leprosy treatment has been made.

Practically all this work has been done with the relatively expensive and complex proprietary sulphones, promin, diasone, and lately 'Sulphetrone.' Until recently no attempt was made, once more because of its reputed toxicity, to use the simpler and cheaper D.A.D.P.S. Cochrane (1949) reports an attempt to use D.A.D.P.S. in leprosy, giving twice-weekly injections of 1·25 g., but he has found that toxic effects are too common and too serious to make this treatment widely applicable, though the results were good.

Some of the criticisms made of sulphone treatment in leprosy have been shown to have little foundation. Thus the statements that it is not tolerated by many patients, and that it is of value only in the severe "lepromatous" cases, have been proved wrong (Lowe and Smith 1949). But there are two criticisms which still carry weight—that in severe lepromatous cases the treatment takes such a very long time (four years or even more), and that the treatment is too costly for wide use in poor tropical countries.

The first criticism—the length of the treatment—carries little weight because of the still greater length of hydnocarpus-oil treatment in such cases, and there is also the severe discomfort of the many injections and the uncertainty of the response.

The second criticism—high cost—is the really potent one. A treatment which costs for drugs alone £10–15 a year per patient and may last five years is completely inapplicable on a large scale in the mostly poor tropical and subtropical countries where leprosy prevails. Moreover, it is among the poorer sections of the population that leprosy is most common. Sulphone treatment on its present basis can never be more than a treatment for the privileged few; the vast majority of those needing the treatment must go without it.

The expense of sulphone treatment could be usefully reduced if a much more efficient and rapidly acting sulphone could be found, or if the sulphones could be made much more cheaply. A sulphone which would be both cheaper and more effective would be of enormous value. This is why some leprosy workers are turning their attention to D.A.D.P.S., a non-proprietary drug which can be made cheaply. The question which this paper attempts to answer is: can it be used in treating human leprosy with safety and with good therapeutic effect?

MODE OF ACTION OF SULPHONES

The sulphones now in common use in leprosy—promin, diasone, and sulphetrone—are derivatives of D.A.D.P.S. Their mode of action seems to be similar to that of the sulphonamides. The question arises whether the more complex sulphones exert their antibacterial action in the form in which they are given or only when they are broken down to D.A.D.P.S. in the body. If the latter view is correct, where does this breakdown to D.A.D.P.S. mainly occur—in the gut before absorption, when the drug is given by mouth; or in the body fluids or cells after absorption from the gut or, in the case of injection, from the tissues?

Johnson (1940) studied the fate of promin after oral administration and after injection. He found that, after injection, nearly all could soon be recovered in the urine as free promin in the form in which it was injected, but that after oral administration only 30% appeared in the urine and some of it had undergone conjugation. These findings suggest (*a*) that promin undergoes a change to D.A.D.P.S. in the gut before or during absorption, (*b*) that much promin given by mouth is not absorbed at all, and (*c*) that after injection very little chemical change occurs and the production of D.A.D.P.S. after injection must be very small.

Hinshaw and Feldman (1941) found that while promin could be given intravenously in doses up to 15 g. with little or no toxic effect, a dose of 1–3 g. by mouth often produced cyanosis and other toxic effects.

Because of these findings, the intravenous injection of promin became a standard method of sulphone therapy. It seems possible, however, that intravenous injection, though much reducing toxicity, reduced therapeutic activity still more.

The administration of diasone has been mainly by mouth. Given in this way, doses of more than 2 g. a day are often toxic, as with promin. Observations made here (Smith 1949) indicate that after the oral administration of diasone, D.A.D.P.S. can be isolated from the urine, but most of the drug is excreted as diasone. It is not clear whether the breakdown to D.A.D.P.S. occurs in the gut, or in the body after absorption.

Regarding sulphetrone more information is available. Brownlee (1948) stated that when sulphetrone is given by mouth, 50% or more is absorbed; practically all the drug present in the body is present as sulphetrone, and it is rapidly excreted as such, mainly in the urine. The absence of acetylation and other forms of conjugation was held to imply that sulphetrone is not hydrolysed to D.A.D.P.S. On Brownlee's data the undoubted therapeutic activity of sulphetrone in leprosy must be attributed to the action of sulphetrone itself. Findings made here (Smith 1949) have not supported Brownlee's findings in some respects. The absorption from the gut is much lower than the 50% reported by Brownlee. While most of the sulphone excreted in the urine is in the form of sulphetrone, a small fraction is in the form of D.A.D.P.S. Even before these findings were published, Brownlee (personal communication) wrote: "It appears most likely to us that it is the rate of degradation (to D.A.D.P.S.) that is important; that is to say, that the lack of toxicity of sulphetrone could quite well be consistent with a slow hydrolysis to D.A.D.P.S." In a later personal communication Brownlee stated:

> "I have looked carefully into this matter again and can say that if sulphetrone is degraded to D.A.D.P.S. it must be degraded less than 10%.
>
> "Those who have studied systematic series of sulphones, such as Smith at Bethesda, have concluded that the amino group or groups must be free or potentially free to have antibacterial activity. Now sulphetrone is antibacterial in the test-tube and is chemotherapeutic in man. If these views are correct, then the micro-organism itself must degrade sulphetrone, after it passes through the cell wall, to D.A.D.P.S. We have tried to prove this point experimentally but have failed."

Thus, even according to Brownlee, who appeared to be the chief exponent of the opposite view, complex sulphones possibly or probably act by being hydrolysed to D.A.D.P.S., though, with some of the complex sulphones, the amount of this hydrolysis is very small.

This discussion brings us to the following important practical points. It is well-established by the experience of many workers that complex sulphones, given in doses producing a blood-concentration of the order of 5 mg. per 100 ml.—and often much less than this—are therapeutically active in leprosy. Most of this blood content is not degraded to D.A.D.P.S. and is therefore possibly or probably inactive. We must conclude that the minimum therapeutic blood-level of D.A.D.P.S. itself in leprosy is perhaps 1 mg. per 100 ml., or even less.

The question to be investigated is whether it is possible in man to produce blood-levels of D.A.D.P.S. of this order without toxic effects. The experiment outlined below was planned to answer this question.

PRELIMINARY TRIAL OF D.A.D.P.S. BY MOUTH

From October to December, 1948, nine patients with leprosy were given D.A.D.P.S. daily by mouth in small and slowly increasing doses, with careful clinical and laboratory examinations for signs of toxicity, and the blood-levels attained on different doses were estimated. The daily administration was continued for 9 weeks. The daily dose was given all at one time. The results are summarised below.

Period	*Daily dose (mg.)*	*Resultant blood-level (mg. per 100 ml.)*	*Toxic effects*
Weeks 1 and 2	100	<0·5	None
,, 3 and 4	200	0·5–0·8	None
,, 5 and 6	300	0·8–1·4	None
,, 7 and 8	400	1·0–1·8	Some increase in hæmolysis
Week 9	500	1·5–2·2	More hæmolysis Experiment stopped

These results were striking. The first dose of 100 mg. gave a definite blood reaction for sulphone, *though* the blood-level attained was hardly measurable. Further doses soon produced a measurable blood-level; and when the dose rose to 300 mg. a day the blood-level averaged slightly more than the 1 mg. per 100 ml. which, on the grounds outlined above, is probably a therapeutic level. Moreover, with administration once daily the blood-level remained constant throughout the day. The later stages of the experiment showed that we had a considerable margin of safety; the slight signs of toxicity at the highest dosage soon subsided when the drug was stopped.

The findings showed that with 300 mg. of D.A.D.P.S. a day the blood-level was comparable to that attained with doses of diasone or sulphetrone five to ten times greater. An explanation of this was sought, and pharmacological studies of the three sulphones were carried out here (Smith 1949). Balance experiments to study the absorption and excretion of sulphetrone, diasone, and D.A.D.P.S. at different dosages, each maintained for two weeks, gave the following results at all the dosages tested.

When sulphetrone was given by mouth over 80% of it was passed in the fæces and was thus apparently unabsorbed, while less than 20% appeared in the urine. The figures for diasone were much better, about 50% being passed in the fæces and about 50% in the urine. For D.A.D.P.S., however, the figures were much better still, less than 5% being passed in the fæces and over 85% in the urine. Thus the absorption of D.A.D.P.S. from the gut after oral administration is excellent, and this fact partly explains the blood-levels attained on such small doses. But of equal if not greater importance is the slow elimination of D.A.D.P.S., mainly by the kidneys. Whereas after ordinary therapeutic doses, when long treatment is stopped, sulphetrone blood-levels are not measurable after 3–4 days, and diasone blood-levels are not measurable after 6–7 days, blood-levels of D.A.D.P.S. are still measurable after 14 days, and traces are found for much longer periods.

Thus the low dosage of D.A.D.P.S. necessary to maintain what is theoretically a therapeutic blood-level in leprosy is explained by the almost complete absorption from the gut and the slow elimination by the kidneys. These facts also probably explain the toxic effects reported by Buttle et al. (1937) on doses of 1–2 g. The blood-level attained on this dosage in a few days must have been very high.

TRIAL OF D.A.D.P.S. IN HUMAN LEPROSY

Immediately after the preliminary experiment in the nine patients recorded above, a therapeutic trial on a considerable scale was instituted in December, 1948. Fifty patients with leprosy, mostly of the severe lepromatous type, were selected. Exactly the same régime was followed as in the preliminary experiment; the osage was 100 mg. a day for two weeks, 200 mg. a day or two weeks, and the standard dose of 300 mg. a day rom the fifth week onwards. To begin with, frequent æmoglobin and blood-sulphone estimations, Schlesinger ests, liver-function tests, and other checks for possible oxicity were in force. As the experiment progressed, he toxic effects were found to be minimal, and later ll routine tests of this nature were abandoned as nnecessary.

The number of patients treated with D.A.D.P.S. was lowly increased to nearly ninety. Treatment has now November, 1949) been almost continuous for nearly a ear (except for one small break of 2 weeks because of taffing difficulties). The general condition of the atients is excellent, and almost all show higher hæmoglobin values than when treatment was started. (All eceive 0·7 g. of ferrous sulphate in a mixture freshly prepared every day.) In not one single case have we seen he toxic effects—nausea, vomiting, hepatic pain, and aundice—reported by Cochrane (1949) after twice-weekly njections of 1·25 g. The experiment has thus amply proved the safety of oral administration of D.A.D.P.S. by the method here outlined, but, as noted before, the mportance of slow induction of the treatment cannot be over-stated. The considerable safety margin is shown by the fact that, in a small number of selected patients, the daily dose has since been slowly increased to 400 and 500 mg. a day and maintained at that level for months without toxic effects.

Results in Lepromatous Cases

The lepromatous cases treated with D.A.D.P.S. for 6 months or more now (November, 1949) number exactly fifty. This group was a very varied and representative one, including a considerable number of very severe nodular cases, some with complications such as leprous affections of the eye and of the respiratory passages; other cases, though lepromatous, were milder, with localised or diffuse lepromatous infiltration of skin and mucous membranes, with few or no complications.

The results on the whole have been the same as those recorded for sulphone treatment in general—slow but sure subsidence of activity of the leprous lesions, gradual shrinkage of leprous nodules and infiltrations, healing of lepromatous ulcers in skin and mucous membranes, and improvement in the patients' vigour and sense of well-being. This clinical response to D.A.D.P.S. has certainly been no slower and has possibly or even probably been quicker than the response seen in patients treated with sulphetrone or diasone, though it is too early to make dogmatic statements on this point.

Further, a diminution in the number of bacilli in the lesions, as shown in "slit smear" preparations made by standard methods, is already apparent in many of our cases. This is at least as great as the diminution we have seen in similar cases treated for a similar period with sulphetrone or diasone. Three cases have become bacteriologically negative. The results in our fifty lepromatous cases treated for 6–12 months, with an average duration of treatment of just over 9 months, are as follows: definite clinical improvement in 36 cases (72%); definite bacteriological improvement in 31 cases (62%); and no cases showing clinical or bacteriological deterioration. Febrile reactions (erythema nodosum) occurred in 15 cases (30%). The changes in bacteriological status were as follows:

Bacteriological status

Before treatment			*After treatment*		
Status		*No. of patients*	*Status*		*No. of patients*
4 +	..	16	4 +	..	7
3 +	..	10	3 +	..	9
2 +	..	19 (1 now neg.)	2 +	..	17
1 +	..	5 (2 now neg.)	1 +	..	14
Neg.	..	0	Neg.	..	3

The bacteriological status is determined as follows. *A number of microscopic slide "smears" are made from various sites in the body, examined and graded. 4 + indicates a preparation teeming with bacilli, thousands to a microscopic field. 1 + represents a smear in which bacilli are few and not easy to find. 3 + and 2 + are intermediate grades between 1 + and 4 +. In each patient the average figure recorded in several smear preparations from different parts of the body is taken to indicate the status of the patient.*

In assessing results clinical improvement is recorded only if it is very definite, and bacteriological improvement only if the reduction in bacilli is sufficient to down-grade the findings (e.g., from 4 + to 3 +). Such a down-grading probably indicates on the average a reduction in the number of bacilli found in smears to about a tenth of the previous number. Thus the estimates of improvement are very conservative.

The period of treatment of these patients is admittedly short; at least 2 years' treatment will be needed in such lepromatous cases before a reasonably accurate assessment can be made. The data so far do not justify a definite claim that D.A.D.P.S. is more rapidly effective than other sulphones in lepromatous cases, though the general impressions of the staff and patients suggest that this is so.

Results in "Tuberculoid" Cases

Until recently it was stated that this milder and often self-limiting, though frequently crippling and disfiguring, form of leprosy did not respond to sulphone treatment. The first published report indicating that it would respond was that of De Souza Lima (1948), though his statements on the subject are cautious and a little vague.

D.A.D.P.S. TREATMENT OF LEPROSY: "TUBERCULOID" CASES

Case no.	No. and diameter (inches) of skin lesions	Inflammation of skin lesion	Thickening, tenderness, and pain in nerves	Weeks before first visible response to treatment	Weeks before complete subsidence of skin activity	Total weeks of treatment to date	Persistence of nerve lesions
	Major Tuberculoid						
1	8 (1–2)	+++	+++	3	20	40	Tenderness gone; thickening less
2	12 (2–6)	+++	++	4	20	36	Nil
3	About 50 (1–2)	+++	—	3	12	36	Nil
4	About 20 (1–12) ..	+++	+	4	24	36	Some thickening; slight tenderness
5	About 24 (3–4)	+++	++	4	24	36	Some thickening; no tenderness
6	12 (3–6)	+++	+	3	24	24	" " " "
7	About 20 (½–3)	+++	+++	2	24	24	Ulnar neuritis still present
8	Over 50 (3–6) ..	+++	+	2	12	28	Some thickening; no tenderness
9	About 50 (½–3)	+++	+	4	16	20	Nil
10	About 10 (½–2) ..	+++	+++	2	20	20	Thickening less; no tenderness
11	Over 50 (1–3)	+++	++	4	still incomplete	16	" " " "
	Intermediate Tuberculoid						
12	Several hundred (small)	++	+	3	12	36	Nil
13	Innumerable (small) ..	++	+++	3	24	32	Thickening and tenderness almost gone
	Minor Tuberculoid						
14	Several hundred (small)	+	—	3	12	36	Nil
15	3 (½–3)	+	—	3	24	24	Nil

Elsewhere (Lowe and Smith 1949) we have recorded the rapid and even dramatic response of leprous lesions of this type to sulphone treatment; focal changes in the skin patches are seen within a few weeks, and activity usually subsides completely within 6 months, though the inflammation of nerve-trunks takes longer to subside. (A fuller report is being prepared.)

The accompanying table summarises the results in fifteen such cases treated with D.A.D.P.S. It will be noted that a response was seen in the lesions within a month, and sometimes within a fortnight, of treatment being started, when the dose was still 200 mg. or even 100 mg. a day. There are here definite indications that D.A.D.P.S. acts more quickly than other sulphones. Moreover, activity, inflammation, and thickening of the patches in the skin have tended to subside completely in a shorter time than with other sulphones. In one case, in which treatment was stopped after 6 weeks because of sulphone dermatitis, the subsidence of activity of the lesions has been continuous and is now complete. It is obvious that quite a short period of treatment is enough to arrest the skin lesions.

In some of these patients treatment has been given for only a few months, but its effect on the thickening and inflammation of the nerves is already apparent in most cases. In only three cases are nerves still abnormally tender; many still show nerves that are hard, thick, and fibrotic, but in others the nerve thickening is much less than it was. In none has the neuritis been aggravated by sulphone treatment—a surprising thing considering how often painful "reactions" in nerves arise in lepromatous cases under treatment.

Thus the results of D.A.D.P.S. treatment in "tuberculoid" leprosy have been highly satisfactory—at least as good as and probably better than the striking results seen with other sulphones used here.

PRACTICAL ASPECTS OF D.A.D.P.S. TREATMENT

Difficulties

The difficulties encountered in establishing and maintaining D.A.D.P.S. treatment are not serious; they are of the same kind as are experienced with more complex sulphones, though probably milder.

The incidence of *febrile reactions* (erythema nodosum) in lepromatous cases has been 30%; this is almost exactly the same incidence as with sulphetrone, and the severity and duration of these manifestations has been no greater than with sulphetrone. We suspend sulphone treatment until the condition has subsided.

Anæmia has been no more, and probably less, common or severe than with sulphetrone; a possible factor here is that sulphetrone forms an insoluble compound with iron in the gut (Brownlee 1948) and may thus prevent iron absorption. When D.A.D.P.S., with its much smaller dose, is used this factor may be absent or less active.

Leprous *neuritis* and leprous *eye inflammation* may be precipitated by D.A.D.P.S. in lepromatous cases, just as by the other sulphones, but they are no more common or severe. Once again we suspend treatment until acute symptoms have subsided.

A drug *dermatitis*, which may progress to exfoliation, may occur with D.A.D.P.S., as with other sulphones, between the 3rd and 5th weeks of treatment. Among nearly ninety patients treated with D.A.D.P.S. we have had three such cases; two however occurred among six patients in whom, as an experiment, the dose has been increased at twice the usual rate. Only one case of dermatitis has been seen in over eighty cases treated under our normal régime. The dermatitis subsides on the cessation of treatment and the oral administration of anti-histamine drugs; we have used 'Anthisan.' In these cases sulphone treatment must be withheld for at least 2 months, and often it can be resumed only after the patient has been desensitised with repeated small and increasing doses; these are best given by injection, working up from 2 mg. or even lower levels if necessary. In sensitised patients dermatitis may appear within few hours of administration, so daily injections ar recommended for desensitisation.

Intercurrent *bacterial infections* during sulphone therap are not common, but when they do occur they are unlikel to respond to sulphonamides. This is probably becaus the ranges of activity of sulphones and of sulphonamide overlap widely; organisms resistant to sulphones ar likely to be sulphonamide-resistant. For this reaso penicillin plays an important part in the treatment o intercurrent disease in sulphone-treated patients. Her the commonest conditions requiring penicillin therap are pneumonia and "tropical" myositis. In patient under sulphone therapy the ordinary septic complication of leprosy rarely arise, presumably because of the wid range of activity of the sulphones.

Cost

The price of 100 mg. tablets of D.A.D.P.S. is 14*s.* a thousand. *A patient treated by the method* here outlined will require on the average a thousand tablets year, so the cost will be 14*s.* a year for drugs. The cos of treating one patient with diasone or sulphetrone i at present £10–15 a year. Thus the use of D.A.D.P.S. ha reduced the cost of sulphone treatment to about twentieth of the previous figure.

In Nigeria, treatment with hydnocarpus oil is now n cheaper than with D.A.D.P.S., and in addition to the o there is the big expense in syringes, needles, sterilisatio and staff to give the injections. Moreover, the results a greatly inferior.

Financial considerations now prevent the wide u of the complex proprietary sulphones, but with D.A.D.P. it should be possible to treat all the thousands of cas of active leprosy in the Nigerian leprosy institutions. other countries the same factors will operate in varyi degrees.

Possible Modifications

Our present régime is based on a standard dose 300 mg. given once a day. The question arises wheth daily doses are necessary. A small group of cases being treated with twice-weekly doses given by mout the régime being: 1st week, 100 mg. doses; 2nd wee 200 mg. doses; and so on to 500 mg. doses in the 5t week, this dose being then maintained. The blood-level range from 2 mg. per 100 ml. soon after the dose t 0·3 mg. just before the next dose. Toxic effects are no serious, and clinical improvement is beginning to appea Injections seem quite unnecessary for twice-weekl treatment. Such a régime would be suitable for ou patients, and would reduce the cost of treatment to 7 a year.

A further question is whether, on daily administratio a dose of 300 mg. a day is necessary or advisable. Th will be investigated later. We already know that, i tuberculoid cases, daily doses of 100 mg. are therapeuti ally active, but in these patients bacilli are very few an natural resistance is high. It would therefore be wron to argue that 100 mg. a day is sufficient for heavi infective lepromatous cases with no natural resistanc Nevertheless, there are indications that improvement not proportional to the size of the dose. Our patients o 400 and 500 mg. a day are not so far showing an apprec ably more rapid improvement than those on lower doses but the period of treatment is too short for a soun judgment. The best standard dose may turn out to b less than our present 300 mg.; and if so the cost treatment will be still further reduced.

Requisites

The main and in fact the only real necessity f D.A.D.P.S. treatment is the supervision of a soun clinician who knows his leprosy. Proper clinical exam nation before and during treatment, and the regulatio f treatment according to the findings, are all that is eally needed. During the first few weeks of treatment a veekly examination is advisable; later, an examination ortnightly, monthly, or even less frequently may suffice rovided the patient can refer to the physician at once f need arises. A few beds for temporary admissions luring "reactions" are very useful.

The giving of the proper doses must be adequately upervised. Primitive people often think that they annot have too much of a good thing. A big dose of D.A.D.P.S., particularly in the early phases of treatment, may be dangerous. Moreover, a patient may be tempted to keep and sell some of his tablets instead of swallowing them.

Laboratory facilities can be very simple. To judge the results of treatment accurately, microscopical examination of "smears" is of course necessary. Hæmoglobin estimations are useful, but the good physician will detect anæmia clinically. The Schlesinger test for urobilin in the urine is useful in cases of suspected toxicity, for the test with Ehrlich's reagent does not work when sulphones are present in the urine. The results must be interpreted with care, for disordered liver function and a positive Schlesinger test are common in "normal" Africans. Blood-sulphone estimations are unnecessary as a routine measure, though they can easily be done with the Lovibond comparator and they add to the value and interest of the work from the physician's standpoint.

DISCUSSION

The introduction of the sulphone treatment by workers in the U.S.A. began a revolution in the treatment of leprosy, whose magnitude is only now becoming apparent and is little realised in the United Kingdom, where publications have been few and opinion has been divided; for while Muir (1947, 1948) and Davey (1948) have written enthusiastically of the treatment, Cochrane (1947), Rogers (1948), and THE LANCET (1948) have been more critical. Cochrane, in later publications in specialist journals (1948, 1949), has shown increasing interest in and enthusiasm for sulphone treatment, his latest report being on 54 treated lepromatous cases, all of which have improved, some markedly, ten of them becoming bacteriologically free of infection.

The number of sulphone-treated cases reported on by British workers has been small, usually less than fifty, and the period of treatment has usually been only a few months, though the 54 cases reported by Cochrane (1949) have been treated for 2½ years. Here at Uzuakoli, Nigeria, the number of cases treated (first by Davey and later by Lowe) has been over 350, and the period of treatment has been up to nearly 4 years; the evidence of the great value of the treatment has been overwhelming (Lowe and Smith 1949).

In 20 years' experience of treatment with hydnocarpus oil and its derivatives, with a growing appreciation of the frequently self-limiting nature of leprosy, I gradually became more and more sceptical of the specific value of this treatment. It often produces clinical improvement in the milder cases, particularly tuberculoid cases, and it accelerates the strong tendency to spontaneous arrest. In mild lepromatous cases it sometimes produces apparent arrest of the disease, but its action is very uncertain, and relapse is common. In lepromatous cases in general, particularly the severer ones, the ability of hydnocarpus oil to modify the course of the disease is often very limited. Years of painful treatment often accomplished little. The argument advanced by some that hydnocarpus treatment is of value because it prevents the tuberculoid cases from becoming lepromatous is negatived by the finding that even without treatment this change is very rare.

The change in outlook produced by sulphone treatment is one of the most striking achievements of modern medicine. The full action of sulphone treatment in severe cases is very slow but amazingly certain. The physician can now feel absolute confidence that an active case of leprosy, no matter how severe, will respond to sulphone treatment; that the disease will cease to progress from the time when the treatment is begun; and that the lesions already present will slowly subside and the infection gradually die out.

The use of D.A.D.P.S. has certainly overcome the difficulty of the cost of sulphone treatment. Whether its use will reduce the duration of treatment remains to be seen. It has at any rate made sulphone treatment possible for a vast number of patients in tropical countries, whereas previous forms of sulphone treatment could not be more than the privilege of the few.

The question arises whether the findings here recorded may not have an important bearing on the sulphone treatment of tuberculosis. So far, in human beings, this has been rather disappointing. Only the complex sulphones have been used. Since D.A.D.P.S. appears to be the most active of the sulphones and can be safely used in man, it may be of value in human tuberculosis. Its value in experimental tuberculosis has already been demonstrated, but its reputed toxicity has prevented its use in the human disease. A few preliminary observations made here have shown that D.A.D.P.S. is well tolerated by patients with tuberculosis of the lungs, and a proper trial is well worthy of consideration.

SUMMARY AND CONCLUSIONS

The special properties of D.A.D.P.S. are outlined. In vitro and in animals its antibacterial power is possibly the greatest of any of the sulphones.

The accepted idea that D.A.D.P.S. is too toxic for use in human beings is examined and found to be erroneous.

A régime of oral administration of small doses, rising very slowly from 100 mg. a day to the standard 300 mg. a day in 5 weeks, is recommended, treatment being continuous. This régime does not produce toxic effects of any consequence, and it will maintain a blood-level of about 1 mg. per 100 ml., which on theoretical grounds should be a therapeutic level in leprosy.

The almost complete absorption from the gut and slow elimination by the kidney explain the relatively high blood-levels attained with such small doses, and also explain the toxic effects reported with the much higher doses used by others.

In the avoidance of toxic effects, very slow induction of D.A.D.P.S. treatment is of paramount importance.

A therapeutic trial of this treatment in 88 patients with leprosy for periods up to a year is described.

Of the fifty lepromatous cases treated for more than 6 months, none show deterioration; 72% show clinical improvement; 62% show bacteriological improvement; and three have become bacteriologically negative. These results compare very favourably with those seen here with complex proprietary sulphones. There are indications that D.A.D.P.S. is acting more rapidly than these other sulphones.

In fifteen "tuberculoid" cases treated for 4–10 months the response has been apparent within a month, and sometimes within a fortnight or less, with complete subsidence of activity of the skin lesions within 6 months; the nerve involvement however takes longer to subside. The results, though similar to, appear to be more rapid than those seen with other sulphones in similar cases.

The cost of D.A.D.P.S. for the treatment for one patient for a year on this basis is 14s. The cost of treatment with the complex proprietary sulphones is about twenty times as much.

A régime for twice-weekly administration of D.A.D.P.S. by mouth suitable for outpatients is outlined, the cost being 7s. a year per patient. Injections seem to be unnecessary.

It is suggested that the more complex sulphones act by being hydrolysed to D.A.D.P.S. in the body. They are incompletely absorbed from the gut and incompletely hydrolysed to D.A.D.P.S.; they thus provide an unnecessarily elaborate and expensive method of securing the action of D.A.D.P.S. in the body. Administration by injection, by preventing hydrolysis in the gut, may even reduce their therapeutic activity.

The administration of D.A.D.P.S. itself by mouth is safe, simple, and very cheap. It seems to be the most rational form of sulphone treatment.

Reconsideration of the sulphone treatment of human tuberculosis may be advisable in the light of the findings recorded here. Preliminary observations show that D.A.D.P.S. treatment as here outlined is well tolerated by patients with tuberculosis of the lungs.

The observations reported formed part of the work of the Leprosy Research Unit working first under the British Empire Leprosy Relief Association and now under the Nigerian Government..

My thanks are due to Dr. G. B. Walker, Director of Medical Services, Nigeria, and Dr. R. Bland, Senior Leprosy Officer, for their encouragement and for permission to publish this paper; to Dr. T. F. Davey, superintendent of the Uzuakoli Leper Settlement, for his willing help in arranging for the work; to Mr. M. Smith, B.SC., until recently of this unit, for the chemical work here reported and for supervising the work during my absence on leave; to Imperial Chemical (Pharmaceuticals) Ltd. for free supplies of tablets of D.A.D.P.S.; to Mr. John Francis, M.R.C.V.S., for a copy of his unpublished memorandum on sulphones, which has proved most useful in writing this paper; to Mr. G. Brownlee, PH.D., of the Wellcome Physiological Research Laboratories, for information, suggestions, and criticism; and to my African staff, particularly Mr. Okezie, technical assistant in the laboratory service, for valuable assistance.

Above all, my thanks are due to Dr. E. Muir, C.M.G., for the original suggestion that I should experiment with D.A.D.P.S., and to my African patients whose splendid coöperation enabled me to carry out his suggestion.

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"... It is easy for hospital people to think in terms of the hospital as an institution, for public health people to think in terms of their highly standardized program, for physicians to think as entrepreneurs. It is harder for any of these three groups to think freely about what people need and how it can be made available to them ... is it possible that the accepted reasons for taking a sick person from his home and putting him in a hospital bed should be reexamined, and that if the hospital beds we have were used more judiciously we should not need so many more of them?"—*Annual report of the Commonwealth Fund*, 1949.

OBSERVATIONS ON CHLORAMPHE

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It has been shown that chloramphenicol (' mycetin ') exhibits antibiotic activity against *H. p* in a concentration of about 0·2 µg. per ml. in te experiments (Smith et al. 1948). Using the pap method on Bordet-Gengou medium, a 1 mm. z inhibition at a concentration of 0·25 µg. per m demonstrated against *H. pertussis* in this labora with the same method *H. parapertussis* gave a z 1·5 mm. at 2 µg. per ml.

However, a laboratory antibiotic effect cannot al be translated into terms of clinical usefulness, w depends not on the changes that can be demonstr on a medium but on whether the drug can cure a dis flourishing in the body. Consequently when an epide of whooping-cough presented itself during the sp and early summer of 1949, the opportunity was t to bring the disease and the antibiotic together an follow the outcome. There is no need to emph the importance of examining any drug which m exert a favourable influence in pertussis and lesse attendant train of misery.

It was not intended to report on the effect of chlor phenicol in this disease until a reasonable numbe cases had been collected. Experience has shown t conclusions drawn from trials in a small series in infective illnesses of childhood are often errone partly because of the protean nature of these disea However, during the investigation some factual inf mation concerning chloramphenicol was gathered wh seemed likely to affect the future use of the drug a should therefore be recorded. Since the experime arose logically in the course of the work on whoopi cough it was difficult to split the clinical from t experimental findings without blurring the origins the latter and it seemed simpler therefore to repo the whole.

SELECTION OF CASES

The diagnostic criteria for accepting a case as a contr or for treatment were as follows:

(1) The isolation of *H. pertussis* from a postnasal swab using Lacey's modified medium and technique.

(2) The production of a paroxysmal cough during th examination period. (Swabbing the nose usually precipitate a paroxysm.)

(3) A normal erythrocyte-sedimentation rate (E.S.R.).

(4) An absolute lymphocytosis.

As the disease progresses it becomes increasingly difficult to isolate the organism, so some cases were accepted which met only the second, third, and fourth conditions.

In evaluating the effect of chloramphenicol in pertussi there is only one question to answer: What happens to the cough? Therefore the results were based on serial cough-counts made over twenty-four hours by the mother—usually from 2 P.M. on one day to 2 P.M. on the next. These were written on slips of paper to be presented when the patient was next seen. The mothers were not asked to differentiate between the types of paroxysms, but to note the total number of coughing attacks, irrespective of whether they were major, minor, or minimal. As far as possible, leading questions were avoided, and it was hoped that information on qualitative changes might be gleaned from spontaneous remarks made by the observers. The controls were given milk-sugar capsules which closely resembled those of chloramphenicol, and the number and spacing of the capsules were the same for treated and controls.

For the purpose of reporting the results, the series has been split into two groups—(A) cases which from the history might reasonably be placed in the first two weeks of the disease; and (B) those which on the same grounds could be placed in the third or fourth week. No case in the fifth or later week was included, because of the obvious difficulty of differentiating between a natural cure and a chemotherapeutic one late in the disease. There must be some overlapping of the groups, but in graphing the results this has been disregarded for the sake of clarity.

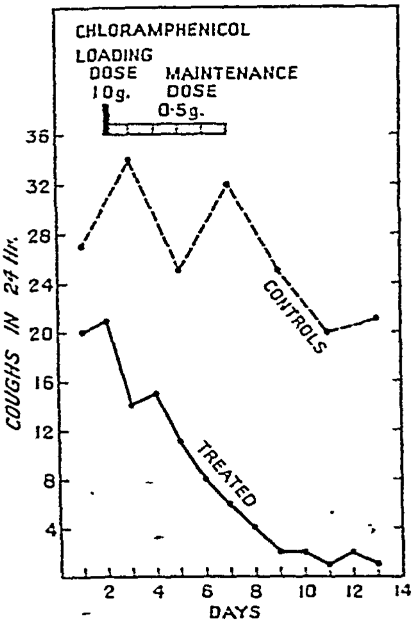

Fig. 1—Mean daily cough-counts in group A (first two weeks). Here and elsewhere the initial (loading) dose is shown in black and the maintenance dosage (g. per day) as a stippled oblong.

DOSAGE

No information regarding the optimum dosage was obtainable, so the early stages of the trial were used in an attempt to determine this. As a starting-point the dosage for typhoid fever was accepted—50–60 mg. per kg. of body-weight for loading, followed by 0·25 g. three-hourly for maintenance. Experience suggested that the loading dose was too small and the maintenance dose too fixed. The dosage finally decided on was as follows:

Up to the age of 1 year: 100 mg. per kg. followed by 60 mg. three-hourly.

From 1 to 3 years: 100 mg. per kg. followed by 125 mg. three-hourly.

Over 3 years: 100 mg. per kg. followed by 250 mg. three-hourly.

RESULTS

The following two cases are examples of group A (first two weeks) and group B (third or fourth week).

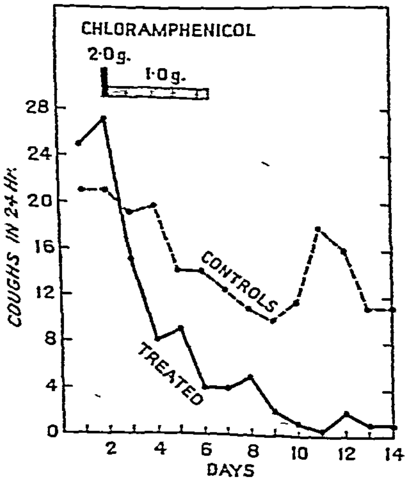

Fig. 2—Mean daily cough-counts in group B (third or fourth week).

Case 1.—Girl, aged $3^1/_2$ months, weight 5·5 kg. Cough started on Oct. 1, 1949. When first seen on Oct. 5 her cough was spasmodic in type, but there was no whooping or vomiting. She was having 4–5 spasms a day. White-cell count 9375 per c.mm. (polymorphs 38%, lymphocytes 60%, monocytes 1%, eosinophils 1%, basophils 0). E.S.R. 3 mm. in 1 hour (Crista). From the nasal swab taken on that day *H. pertussis* was isolated after two days incubation.

Oct. 6.—9 coughs in counting period. Still no major paroxysms.

Oct. 7.—Chloramphenicol 0·6 g. given as loading dose, followed by 60 mg. three-hourly.

Oct. 8.—6 coughs in counting period. Continue at 60 mg. three-hourly.

Oct. 9.—3 coughs in counting period. The coughs started to loosen "as if she had bronchitis." Continue maintenance dosage.

Oct. 10.—1 cough in counting period. White-cell count 13,750 per c.mm. (polymorphs 56%, lymphocytes 42%, monocytes 0, eosinophils 2%, basophils 0).

Oct. 11.—Chloramphenicol stopped.

Oct. 13.—3 loose minor coughs a day. Baby eating and sleeping well.

Oct. 16.—Nil to report. Told to return if there was any suggestion of a relapse.

The chloramphenicol was given to this baby in the form of a loose powder washed down with milk.

Case 2.—Girl, aged 6 years, weight 28 kg. Started dry hacking cough about Sept. 5, 1949. When first seen, on Sept. 19, she was vomiting and whooping in the paroxysms. Appetite poor, not irritable. White-cell count 12,800 per c.mm. (polymorphs 39%, lymphocytes 50%, monocytes 4%, eosinophils 7%, basophils 0). E.S.R. 5 mm. in 1 hour (Wintrobe). From nasal swab taken on that day *H. pertussis* was isolated after two days' incubation.

Sept. 20.—25 paroxysms in counting period.

Sept. 21.—Chloramphenicol 2·8 g. given as loading dose, followed by 250 mg. three-hourly.

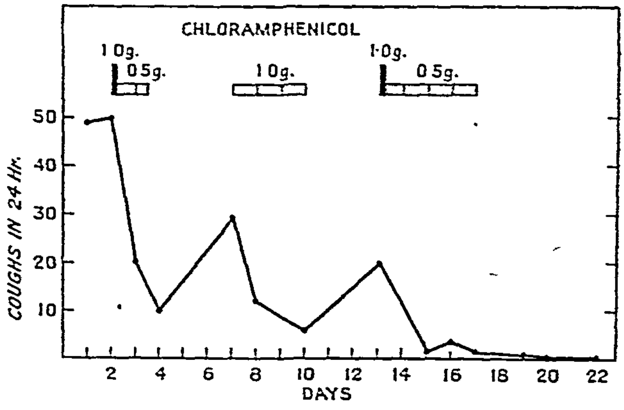

Fig. 3—Effects of insufficient dosage illustrated by three courses in child aged 8 months, weighing 10 kg., starting at fourteenth day of disease.

Sept. 22.—22 loose coughs, "like bronchitis." Vomiting and whooping has stopped. Continue treatment.

Sept. 23.—5 coughs with 4 vomits in counting period. Continue treatment. White cell-count 14,800 c.mm. (polymorphs 53%, lymphocytes 40%, monocytes 1%, eosinophils 6%, basophils 0).

Sept. 24.—7 coughs with 2 whoops in counting period; no vomiting. Completed four days' treatment. Chloramphenicol stopped.

Sept. 25.—Only coughs now when excited. White-cell count 18,700 per c.mm. (polymorphs 56%, lymphocytes 42%, monocytes 2%, eosinophils 0, basophils 0).

Sept. 27.—Nil to report.

Oct. 3.—Nil to report.

This patient had a sterile upper respiratory tract for seven days after the first day of treatment.

Effect of Chloramphenicol on Cough

Fig. 1 shows the daily cough-counts of 7 treated children and 9 controls, all in group A (first two weeks of disease). The ages of the controls were: 9 mos., 2 yr., 3 yr., 3 yr., 4 yr., 5 yr., 5 yr., $5^1/_2$ yr., and 6 yr.

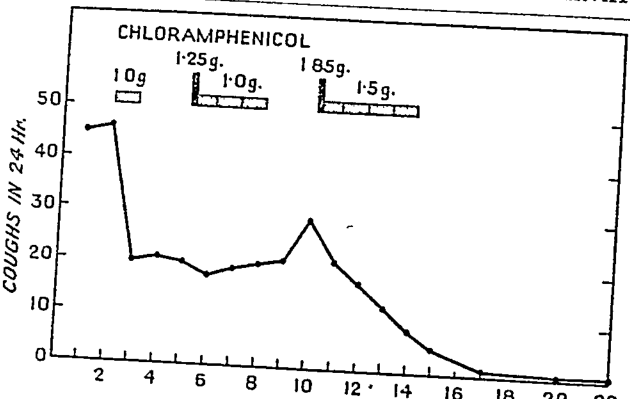

Fig. 4—Effects of insufficient dosage, illustrated by three courses in child aged 6½ years, weighing 18 kg., starting at seventh day of disease.

The ages of the treated children were: 7 mos., 8 mos., 9 mos., 4 yr., 5¾ yr., 6 yr., and 6½ yr.

Fig. 2 shows the daily cough-counts of 7 treated children and 8 controls, all in group B (third or fourth week). The ages of the controls were: 2 yr., 3 yr., 3 yr., 4 yr., 5 yr., 5 yr., 5½ yr., and 6 yr. The ages of the treated children were: 7 mos., 8 mos., 9 mos., 4 yr., 5¾ yr., 6 yr., and 6½ yr.

The qualitative changes in the coughs are reported by the mothers as follows. During the first twenty-four hours there is a reduction in the length of the paroxysms, usually with the abolition of either whooping or vomiting. After about seventy-two hours the hard hacking cough changes to a soft exudative one, described by some mothers as a "wet bronchitis." It is then claimed that the total cough-count drops to 3–5 per day.

Effect of Suboptimal Dosage

Fig. 3 demonstrates the effects of inadequate dosage on the cough-counts. In the first course the dosage was correct but the maintenance was too short. In the second no loading dose was given, and treatment was ineffectual in spite of a doubled maintenance dosage. In the third the dosage was correct.

Fig. 4 is another demonstration of inadequate dosage. In the first course no loading dose was given. In the second the loading dose was insufficient and the maintenance dosage too low. In the third the dosage was correct.

In several cases peculiar relapses were seen. These occurred after the correct loading and maintenance dosage had been given but the maintenance dosage had been continued for only three days. The paroxysms appeared to come under control, and the relief lasted for about four days, but then a recrudescence of the illness was reported in which the paroxysms approached the pretreatment level in both quality and quantity. This state lasted for three to five days, after which period, though no more chloramphenicol was given, the coughing rapidly lessened to the level attained at the end of treatment.

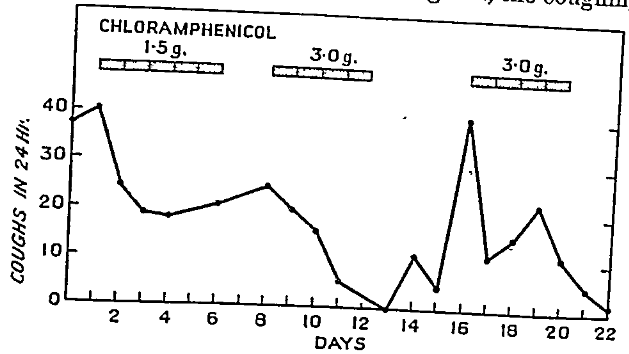

Fig. 5—Effect of rectal administration in child aged 1½ years weighing 10 kg., starting at fourteenth day of disease.

Plasma-levels

Chloramphenicol levels, estimated at varying times during treatment, ranged from about 48 μg. per ml. about three hours after a loading dose to 8–16 μg. per ml. during maintenance dosage. The levels were measured by diluting plasma with glucose-phenol-red broth at 1 : 2, 1 : 3, 1 : 4, 1 : 6, 1 : 8, 1 : 12, 1 : 16, 1 : 24, &c. The diluted plasma was inoculated with a *Shigella sonnei* having a known sensitivity of 2 μg. per ml. The end-point was taken at the first tube which did not sh fermentation. It must be emphasised that the end-poi accepted was that of the bacteriocidal value. Througho this work, bacteriostasis as a means of measureme has not been used. More recently, however, t chemical method of estimating chloramphenicol (Glazk 1949) has been in use and has given more accurat results.

Administration: Rectal Dosage

The administration of chloramphenicol by mouth t children aged 1–3 years presents a problem. At thi age children refuse to swallow capsules and it is futile to attempt to introduce the drug in powder form. Chloramphenicol has the most intensely bitter taste that ever offended a palate. It cannot be disguised in any of the vehicles hitherto used to deceive the taste buds. Babies will accept the powder diluted in a little milk or sugar water, presumably because they have not yet gained discrimination. Older children will coöperate but for the "in-betweens" treatment by mouth is ofte impossible. Obviously if chloramphenicol is essenti for the control of a grave infection it will have to b given by stomach-tube until some other method administration has been devised.

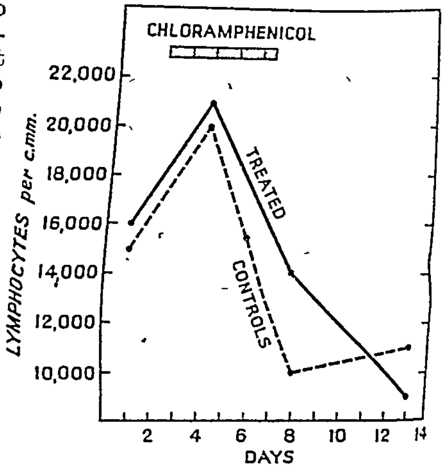

Fig. 6—Mean absolute lymphocyte-counts in group A.

Rectal administration was tried in 5 cases. Th chloramphenicol was given in two forms—(1) i cocoa-butter suppositories, each containing 1 g. o chloramphenicol; and (2) in gelatin capsules containing the required dosage, pierced with a needle in half a dozen places and then inserted into the rectum. The cocoa-butter suppositories were a failure. In 2 cases 18–24 g. of chloramphenicol in this form was given over a period of three days, with no appreciable effect on the disease. Fig. 5 shows the cough-counts in a patient receiving chloramphenicol by rectum in pierced capsules. The oral dosage required in this case would have been 1 g. for loading and then 1 g. daily in divided doses for five days. It has been suggested that to achieve comparable results with rectal administration the dosage must be 25% higher than the oral dosage. On that basis this patient should have been given about 1·25 g. for loading and then 1·25 g. daily for five days—i.e., a total of 7·5 g. It will be seen that in fact a total of 33 g. of the antibiotic was given per rectum in fourteen and a half days with disappointing results.

Effect on Lymphocytosis

Serial blood-counts were done in the treated children and controls to determine whether the lymphocytosis which nearly always accompanies whooping-cough could be influenced by chloramphenicol. In Fig. 6 the mean absolute lymphocyte-counts in 7 treated children and in 9 controls in group A (first two weeks) are compared. The hatched areas represent the approximate days of treatment. In fig. 7 there is a similar comparison between treated and controls in group B (third or fourth week). From these comparisons it appears that chloramphenicol does not affect the lymphocytosis of pertussis.

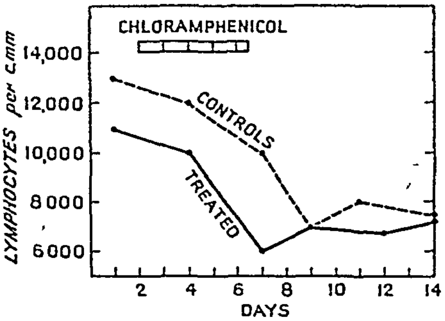

Fig. 7—Mean absolute lymphocyte-counts in group B.

Untoward Reactions

So far, 29 children have been treated for whooping-cough with varying doses of chloramphenicol in this inquiry. One child developed a reaction which seems worth describing in detail.

Case 3.—Girl, aged 5 years, weight 24 kg. First seen on Sept. 1, 1949. History of cough starting on Aug. 27, attacks worst at night. 13–14 coughs in twenty-four hours. No whooping or vomiting.

Sept. 2.—White-cell count 13,820 per c.mm. (polymorphs 41%, lymphocytes 48%, monocytes 1%, eosinophils 8%, basophils 2%). E.S.R. 8 mm. in 1st hour (Wintrobe).

Sept. 5.—*H. pertussis* isolated. Cough-count still 13–14 a day. Child irritable. No change in appetite.

Sept. 7.—27 coughs in counting period. Now whooping and vomiting.

Sept. 8.—32 coughs with whooping and vomiting. Chloramphenicol 2·4 g. statim, to be followed by 250 mg. four-hourly. At 4 P.M., the patient took the loading dose prescribed. By 5 P.M., her arms, chest, and face were covered with giant urticarial weals. Shortly afterwards she had an intense attack of asthma which led to cyanosis. By 8.30 P.M. she was beginning to improve, and when she was seen at 9.30 P.M. the attack was over. The chloramphenicol was stopped.

Sept. 11.—7 coughs in counting period. White-cell count 23,700 per c.mm. (polymorphs 31%, lymphocytes 65%, monocytes 1%, eosinophils 3%, basophils 0). *H. pertussis* not isolated. Patch test for sensitivity to chloramphenicol negative.

Sept. 14.—8 loose mucoid coughs in counting period. No night paroxysms.

Sept. 17.—7 short coughs in counting period.

Occasionally in the series the cough-count fell dramatically, as in case 3, after a single dose of chloramphenicol, but this is exceptional. The main point of interest in case 3 was the allergic reaction. It later transpired that this patient's mother had eczema as a child and now has periodical attacks of summer asthma, but as far as could be ascertained this was the patient's first attack of asthma or urticaria. Considering the time relationship, it seemed reasonable to conclude that the dose of chloramphenicol was the cause of the allergic reaction, though it was unlikely that the child could have been sensitive to the chloramphenicol molecule itself before this illness, since she could not possibly have had previous access to the antibiotic. The alternative explanation was that an antigen to which the patient was sensitive had been released by the action of the drug, the most probable antigen being bacterial protoplasm. This implied that bacterial death and lysis could be produced within an hour by a single massive dose of chloramphenicol. To investigate this point the following series of experiments was undertaken.

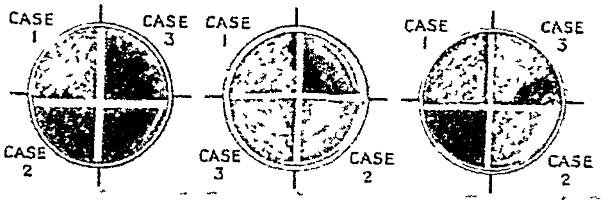

Fig. 9—Growths at twenty-four, forty-eight, and seventy-two hours in 3 of the 4 cases included in Fig. 8.

EXPERIMENTS ON ANTIBACTERIAL ACTION OF CHLORAMPHENICOL

Sterilisation of Upper Respiratory Tract

Four hospital patients, who were not suffering from whooping-cough (3 were convalescent from acute rheumatism and 1 had nephritis) and had not been given penicillin, sulphonamides, or streptomycin, were chosen. A postnasal swab from each was taken, as a control, and was plated on blood-agar. A dose of chloramphenicol at 100 mg. per kg. body-weight was then given to each patient and the postnasal space was swabbed at hourly intervals for six hours and at twenty-four, forty-eight, and seventy-two hours, the swabs being cultured on the same medium as the controls.

Fig. 8 shows the effect of chloramphenicol on the bacterial flora of the upper respiratory tract each hour for six hours; fig. 9 at twenty-four hours (case 4 was unexpectedly discharged and could not be followed properly), at forty-eight hours, and at seventy-two hours. The cultures show that massive bacterial death has taken place within an hour of

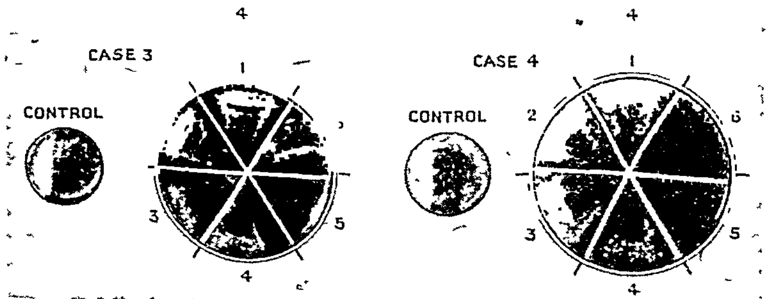

Fig. 8—Growths on blood-agar plates from postnasal swabs taken before chloramphenicol ("control") and hourly for six hours after single dose of 100 mg. per kg. body-weight. These patients were not suffering from whooping-cough.

a single dose, and that at least seventy-two hours is required for the flora to return to normal.

The organism in case 1, which seemed to revive at the fifth hour, disappear at the sixth, and reappear in pure culture at twenty-four hours, was a non-hæmolytic, coagulase-negative, *Staph. aureus*. At the fifth hour it was more gram-negative than gram-positive and the staining had to be controlled with a stock *Staph. aureus* to make sure that the appearance was not due to over-decolorisation. At twenty-four hours it was predominantly gram-positive. The chloramphenicol sensitivity of this staphylococcus was 10 µg. per ml., its penicillin sensitivity was about 0·1 unit per ml.

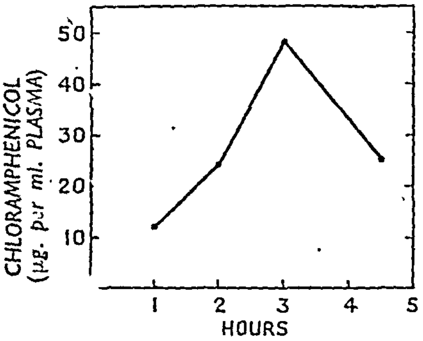

Fig. 10—Mean blood-levels of 4 cases included in fig. 8.

Fig. 10 shows the blood-chloramphenicol levels (average of the 4 cases) at hourly periods during the first four hours of the experiment.

Fig. 11 represents an extension of this work on the effect of chloramphenicol on the flora of the upper respiratory tract.

The patient (weight 10 kg.) was suffering from whooping-cough. A is a blood-agar plate culture of a postnasal swab taken on Sept. 15, before treatment. Between 4 P.M. on Sept. 16 and 8 P.M. on Sept. 17 he was given 1·5 g. of chloramphenicol by mouth, and treatment was then stopped. On Sept. 20 another postnasal swab was taken and plated; B shows the result.

The sterility of the upper respiratory tract appears to be maintained for a considerable time after the cessation of treatment in some cases. Fig. 12 illustrates this observation.

Two sisters, both with whooping-cough, participated in this experiment. One of them was given 5·875 g. of chloramphenicol in four days, while the other was given milk-sugar capsules of an equivalent dosage as a control. Five days after their last dose the postnasal space of each was swabbed and cultured. The growth on the left side of the plate is from the control; that on the right side of the plate is from the treated patient. It can be seen that the normal flora has not yet returned.

That complete sterility does not always occur is illustrated in fig. 13.

This patient was under treatment for a fractured humerus and had not been given any of the other antibiotics. His weight was 25 kg. He was given 2·5 g. of chloramphenicol as a loading dose, followed by a maintenance of 125 mg. three-hourly while awake. The course lasted four days. The cultures show the change in throat flora over a period of six days. All other organisms except a *Staph. aureus* were eliminated. This organism persisted in a diminishing concentration until treatment was stopped. Its chloramphenicol sensitivity was titrated at 12 µg. per ml. Its penicillin sensitivity was less than 0·1 unit per ml.

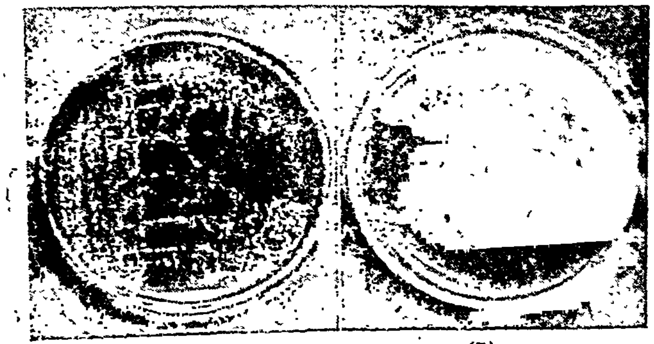

Fig. 11—Growths on blood-agar from postnasal swabs taken (A) before chloramphenicol, and (B) three days after course of 1·5 g. Patient with whooping-cough.

In following the course of this complete sterilisation of the upper respiratory tract, it has occasionally been found that a pure culture of *Strep. hæmolyticus* or *Staph. aureus* heralds the return of the organisms to the throat. These in turn have been outgrown by the α-hæmolytic streptococci and diphtheroids, the last to appear being *N. catarrhalis*.

Rectal Administration

By using serial postnasal cultures to estimate the efficacy of rectal chloramphenicol, the findings in the treatment of whooping-cough by this route have been confirmed.

A dose of 5 g. was given over a period of thirty-six hou to a child weighing 14 kg. Fifty-two hours after the en of this course, a swab grew 70 colonies of *Staph. aureus* an a scattered growth of *Strep. viridans* and *Strep. pneumonic* *N. catarrhalis* and the diphtheroids were absent. At hundred and ten hours, the *Staph. aureus* count had dropped t 21 colonies, but the α-hæmolytic streptococci had definitel increased. At a hundred and thirty-four hours there was profuse growth of all the ordinary comensals except *N. catarrhalis*.

Weakness of Accommodation

After a loading dose of 100 mg. per kg. body-weight, a transient ophthalmoplegia has been noted in children old enough to discuss their sensations. On reading, the print gradually blurs until the book has to be put down. After the eyes have been rested by using distant vision only, near vision becomes normal, but again after a few minutes' reading it reverts to the blurred state. This effect on near vision lasts about four hours. As far as can be ascertained, it coincides with chloramphenicol blood-levels of about 50 µg. per ml. and over. It has never been met while a patient is on maintenance dosage.

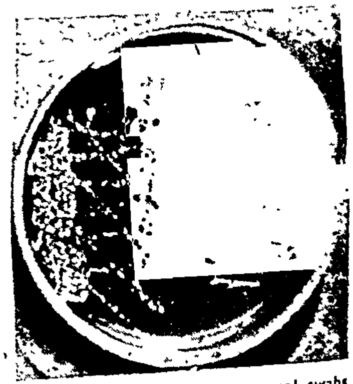

Fig. 12—Growths from postnasal swabs taken from two sisters five days after one (on left) had received a course of milk sugar, and the other (on right) a course of chloramphenicol.

Bilateral internal ophthalmoplegia is usually considered an indication of a central rather than a peripheral lesion. However, the waxing and waning of the condition with muscular use and rest suggested that it was peripheral, and that in some way the antibiotic was interfering with the metabolism of the ciliary muscle. It seemed essential therefore to find out whether this was a muscular metabolic change and whether the skeletal muscles were similarly affected. The following experiments were therefore undertaken.

Experiment 1.—A man, aged 50 years and weighing 80 kg., held a 14 lb. weight in the palm of his hand at arm's length and the period during which he could maintain this position—from the time of the outstretch until he dropped his arm—was timed with a stopwatch.

Before chloramphenicol the times were: 1st trial, 40 sec. (a rest for 5 minutes was then taken); 2nd trial, 37 sec. (rest as before); 3rd trial, 38·5 sec. Mean of trials, 38·5 sec.

A dose of 80 mg. of chloramphenicol per kg. body-weight was then given and three hours later, when the blood-

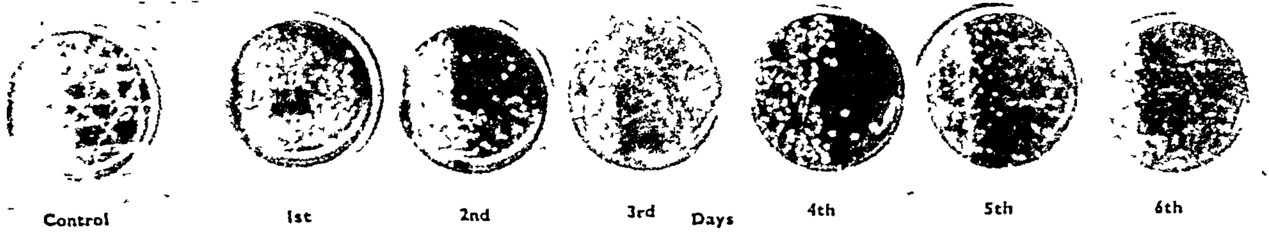

Fig. 13—Growths from throat swabs taken before chloramphenicol ("control") and then daily from start of four-day course.

loramphenicol level * was 48 µg. per ml., the test was peated.

After chloramphenicol the times were: 1st trial, 39·2 sec. est as before); 2nd trial, 23 sec. (rest as before); 3rd trial, 2·5 sec. Mean of trials, 28·2 sec.

The difference between the means is 10·3 sec.

Before chloramphenicol the man's near point for distinct inocular vision was 11$^3/_4$ in. and the diameter of his upils was 4·5 mm. While he was under the influence of hloramphenicol his near point was 13 in. and his pupil iameter 5·5 mm.

He described his subjective symptoms as: (1) dry mouth nd metallic taste; (2) extreme fatigue; (3) slight blurring f vision after reading for a few minutes; and (4) mental lepression.

Experiment 2.—The weight-holding test was repeated in a man aged 23 years and weighing 60 kg.

Before chloramphenicol the times were: 1st trial, 72 sec. (rest as in expt. 1); 2nd trial, 60 sec. (rest as before); 3rd trial, 58 sec. Mean of trials, 63 sec.

A dose of 100 mg. chloramphenicol per kg. body-weight was then given, and three and a half hours later, when the blood-chloramphenicol level * was 44 µg. per ml., the test was repeated.

After chloramphenicol the times were: 1st trial, 88 sec. (rest as before); 2nd trial, 34 sec. (rest as before); 3rd trial, 28 sec. Mean of trials 50 sec.

The difference between the means is 13 sec.

Before chloramphenicol the man's near point for distinct binocular vision was 3$^1/_2$ in., his pupil diameter was 5 5 mm., and Scheiner's test for his right eye was 7–8 in., and for his left eye 9$^1/_2$ in.

While he was under the influence of chloramphenicol his near point was 5$^1/_2$ in., his pupil diameter 5 5 mm., and Scheiner's test for his right eye was 9$^1/_2$–13 in., and for his left eye 10–12 in.

His subjective symptoms were: (1) dry mouth and metallic taste; (2) "fuzzy" close vision; and (3) a condition which he described as "postalcoholic convalescence."

Drug Resistance

As yet, acquired resistance by *H. pertussis* to chloramphenicol has not been encountered in this clinical trial. Attempts have been made in the laboratory to produce chloramphenicol-resistant strains of both *H. pertussis* and *H. parapertussis* by culturing on Bordet-Gengou media containing 0·1 µg. and 0·18 µg. of chloramphenicol per ml. After two twelve-day periods of exposure, titration of the organisms after final subculture showed that the original sensitivity had not altered. Further, *H. pertussis* does not seem to show the wide variation in strain sensitivity that is seen with the *Staph. aureus* group, the sensitivity of which may range from 2 to 12 µg. per ml.

It seemed advisable to make sure that the concentration of organisms in the inoculum played no part in the presumed strain variations in the staphylococcal group.

Two strains of *Staph. aureus* were chosen which had previously titrated at 8 and 12 µg. per ml. They were incubated overnight in peptone water, and then dilutions from these cultures were made in sterile normal saline to give concentrations of 1 millionth, 1/10 millionth, 1/20 millionth, 1/40 millionth, 1/80 millionth, 1/160 millionth, 1/320 millionth, and 1/640 millionth of the original. Viable plate-counts of the final dilution showed that the primary cultures contained respectively 2500 million and 1900 million organisms per ml.

One drop from a 50-dropper pipette from each of the dilutions was added to Khan tubes holding 2 ml. of glucose-phenol-red broth containing 6 µg. of chloramphenicol per ml. After four days' incubation the tubes were read. Fermentation had occurred in all tubes up to the 1/80 millionth dilution. After this point irregularity appeared, but consideration showed that successful inoculation of the broth from the final dilutions was a matter of chance.

It seems then that strain variations in sensitivity to chloramphenicol is a cell characteristic and is not dependent on the concentration of organisms present.

Action of Bacteria on Chloramphenicol

A final series of experiments were planned to inquire into the fate of chloramphenicol after interaction with bacteria.

The *Staph. aureus* with a sensitivity of 12 µg. per ml. was chosen for use. Nutrient broth containing 8 µg. of chloramphenicol per ml. was inoculated with this strain and incubated for five days, by which time growth was florid. The broth was divided into two parts after Seitz filtration. The chloramphenicol content in one part was estimated by chemical means. Serial determination showed that 8 µg. per ml. was present—the same amount that had been introduced into the broth originally.

This suggested that there had been no quantitative change in the chloramphenicol after reaction with the staphylococcus. (It should be mentioned that the chemical estimation does not distinguish between the active and inactive forms of the antibiotic.)

The remainder of the filtered broth was now used in the following manner:

Two rows of six Khan tubes (test and control), each holding 0·5 ml. of glucose-phenol-red broth, had been prepared. The test and control sets contained fresh chloramphenicol in concentrations of 0·4, 1·2, 2 0, 2·8, 3·6, and 4·4 µg. per ml., and to each of the test tubes a 0 5 ml. portion of the filtrate, equivalent to 4 µg. of chloramphenicol, was added. To each control tube was added 0 5 ml. of plain glucose-phenol-red broth. The tubes for the test now contained theoretical concentrations of 4·4, 5·2, 6·0, 6·8, 7·6, and 8·4 µg. of chloramphenicol, and those for the control 0·2, 0·6, 1·0, 1·4, 1·8 and 2·2 µg. per ml.

Both test and control tubes were inoculated with a standard loopful of a culture of *Sh. sonnei* with a known chloramphenicol sensitivity of 2 µg. per ml., and they were incubated for forty-eight hours. The end point was taken at the first tube showing no fermentation.

There was no difference between test and controls, the end point in both sets being 2·2 µg. per ml.

The same experimental method has been used in an attempt to isolate a chloramphenicolase (or chloromycetinase), but so far without success, though it seems that the reaction between organisms and chloramphenicol leads to inactivation of the antibiotic.

The conclusions to be drawn from these last two experiments might be summed up as follows. Chloramphenicol becomes inactivated when its antibiotic powers are exerted, and the process of inactivation does not involve the molecule as a whole but only part of it.

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* The chloramphenicol levels in these two experiments are for whole blood estimated chemically and should not be confused with the preceding plasma-levels estimated bacteriologically. The two methods are not comparable.

DISCUSSION

It is not proposed to attempt an assessment of chloramphenicol in whooping-cough—for three very good reasons. First, the series is too small. Secondly, the objectivity of the observers is open to question. And thirdly, the widespread use of a pertussis vaccine may modify the disease in an incalculable manner. However, the trial has suggested that the correct dosage of chloramphenicol for any particular disease may be extremely critical, for in whooping-cough there is no apparent relationship between the in-vitro sensitivity of *H. pertussis* and the amount required to eradicate the same organisms in the body. This in turn may be related to observations made by Glazko et al. (1950)—that the highest concentrations of chloramphenicol are found in the kidney and liver, with progressively smaller amounts in the lungs, spleen, heart muscle, and brain.

Possibly more important than the effect of chloramphenicol on whooping-cough is the extraordinary indiscriminate bacterial holocaust it produces in the upper respiratory tract, the unusualness being enhanced by the speed with which it works and with the length of time that sterility is maintained. The future uses of this antibiotic in respiratory infections seem almost limitless, if the observations made on the upper respiratory tract can be extended to include the whole tract. This property will enable the chest surgeon to work in a field as sterile as any purist could desire, and this sterility can be maintained for as long as is required.

Attention must be drawn to the intense allergic reaction which occurred in one patient during these trials. It is important to bear in mind the possibility of precipitating unwelcome crises in those patients who have a direct bacterial background to their sensitive state, particularly if the doses of chloramphenicol given are large enough to cause the death en masse of their bacterial flora. Whether allergic patients of this type can be temporarily freed of their disability by the judicious use of chloramphenicol is open to trial. The question of massive bacterial death raises a further point for consideration: in the treatment of any condition with large doses of the antibiotic, the release of considerable amounts of protoplasm derived from the dead organisms may possibly produce a "toxic" state, so that the patient seems to be made worse instead of better.

Chloramphenicol has two disadvantages—its bitter taste and its relative insolubility—but its advantages over other antibiotics are enormous. It can be boiled without altering its potency; it is effective by mouth; accurate chemical estimation of its concentration is possible; a "chloramphenicolase" has yet to be demonstrated; and bacteria do not acquire resistance to the drug. Lastly, it is completely indiscriminate in the type of organism it kills. This indiscriminate action suggests that it may interfere with a metabolic system so fundamental that it is shared by most unicellular organisms. It was with this concept in mind that particular attention was given to the muscular changes induced by large doses of the drug. From the two cases investigated, it would appear that muscular fatigue does ensue, but there is no evidence to show how this is brought about.

Possibly the muscular changes are unrelated to the cause of bacterial death. However, bacterial and muscle metabolism have one factor more or less in common—their method of converting sugar to energy. Considering the problem from a unitarian standpoint, and invoking what help the muscle-fatigue experiments give, the crux does not seem to lie in the release of energy but in its restoration. The focal point of the latter is the pyruvic acid $\rightleftharpoons H_2$ coenzyme $\rightleftharpoons$ lactic acid relationship; and Smith and Worrel (1949), who have investigated the action of chloramphenicol on dehydrogenase from a bacteriological standpoint, can find no evidence of inactivation. The possibility of a "blocking" of lactic-acid combustion was therefore entertained and some preliminary experiments undertaken. However, until more information is available, further speculation is unwarranted.

Before large doses of chloramphenicol are advocated without reserve, two factors should perhaps be more closely studied. First, it is possible that the muscle-fatigue syndrome may extend to the myocardium. In the healthy young heart this may not matter, provided that undue exercise is not taken; but in the elderly, the toxic, and those suffering from heart-disease the interference with myocardial metabolism might be serious. Secondly, it is possible that the striking sterility induced in the upper respiratory tract by large doses of chloramphenicol may also occur in the gut. In infants this may seriously interfere with the synthesis of vitamin K, leading to a drop in hepatic prothrombin and the onset of a purpura.

A great deal more research is required before the place of this drug in the scale of antibiotics can be fully established.

SUMMARY

A clinical trial of chloramphenicol in whooping-cough has been made in two groups of children—(A) in the first two weeks of the disease, and (B) in the third or fourth week. In both groups alternate cases were given chloramphenicol or a placebo.

The cases were too few for definite conclusions to be drawn, but satisfactory oral dosage schedules were worked out. Owing to the persistent bitter taste of chloramphenicol, administration by mouth to children aged 1–3 years presents serious difficulty. Rectal administration was tried, with suppositories and with pierced gelatin capsules, but proved ineffective. Where chloramphenicol treatment is thought to be essential for children of this age, the drug may be given by stomach-tube.

One child developed an urticarial reaction after a single dose of chloramphenicol. Since she could not have had access to the drug before, it is supposed that her sensitivity was due to massive bacterial death.

Among the treated children given massive dosage, those who were old enough to notice visual symptoms developed a peculiar internal ophthalmoplegia characterised by rapid fatigue of accommodation on reading, with recovery after a short rest. This was thought to be a peripheral effect. Experiments in adults confirmed the existence of this side-action, and weight-holding tests showed that chloramphenicol hastens the onset of fatigue in skeletal muscles.

Serial postnasal swabs showed that chloramphenicol completely sterilises the mucous surfaces of the upper respiratory tract. The sterility lasts for 2–3 days after the last dose, but it can be maintained indefinitely by continuing administration. This property may prove of great value in surgery, especially if the sterilisation is found to extend into the lungs.

I am greatly indebted to Mr. J. A. Rouse, senior technician, Belgrave Hospital for Children, for his continuous help; to Mr. H. Daverson for the photographs; to Dr. B. W. Lacey for information regarding the cultural vagaries of *H. pertussis*; to Dr. J. Stanley White, of Messrs. Parke, Davis & Co., for access to unpublished information; to Dr. W. H. Bradley, of the Ministry of Health, for his support and interest; and to Mr. R. P. Crick for the ophthalmological examinations.

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EFFECT OF DEOXYCORTONE AND ASCORBIC ACID ON FORMALDEHYDE-INDUCED ARTHRITIS IN NORMAL AND ADRENALECTOMISED RATS

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AFTER the observation of Lewin and Wassén (1949), hat a single intramuscular dose of 5 mg. of deoxycortone cetate, followed in a few minutes by 0·5–1·0 g. of ascorbic cid intravenously, produces symptomatic improvement n patients with chronic rheumatoid arthritis, it was of nterest to inquire whether similar effects might be bserved in animals, and particularly in adrenalectomised nimals.

EXPERIMENTAL TECHNIQUE

The animals used in these experiments were adult male albino rats of inbred Wistar stock maintained under uniform conditions of diet and management for many years. The experimental arthritis (Selye 1949) was produced by the injection of formaldehyde. Since much of the interest of these observations centres round those made in adrenalectomised animals a description of the methods which ensure the absence of endogenous adrenal hormones is desirable.

Male rats weighing 100–110 g. are anæsthetised with 0·08 ml./kg. of a 2·5% solution of bromethol in saline, injected ntraperitoneally. Anæsthesia is developed within 5 minutes and is sufficiently deep for surgical section in 10 minutes; recovery is incomplete for several hours and is smooth and free from excitement. The animals operated on, and indeed all the animals in these experiments, were housed at 24° ± 2°C. To offset overnight starvation a few drops of sugar solution were usually given.

The methods essential for complete adrenalectomy are discussed in detail by Schultzer (1935, 1936). Essentially, the kidney is exteriorised through an incision and the adrenal displayed. The pellicle of the gland is grasped with two finely pointed curved forceps without touching the gland itself, and is crushed and torn; the gland is then freed by a single upward pull. When now pulled caudally the adrenal gland, with about half of the attached kidney capsule, is freed in one movement. Any fragment of the upper part of the capsule is carefully removed. The right adrenal demands more care.

Of 684 male rats operated on in this way in these and other experiments 43 (6%) did not survive the operation, and 23 (3·5%) *did not die.* In all but 3 of the latter group remnants of cortical tissue were found at necropsy. Suspicious fragments were cut across and immersed in a dilute solution of silver nitrate. Sections which blackened within a minute were assumed to contain cortical tissue (Szent-Györgyi 1928). The mean survival time of the untreated adrenalectomised rats is 15·4 days ± S.D. 3·9 on a diet containing 7·9 mg./g. of sodium and 5·3 mg./g. of potassium.

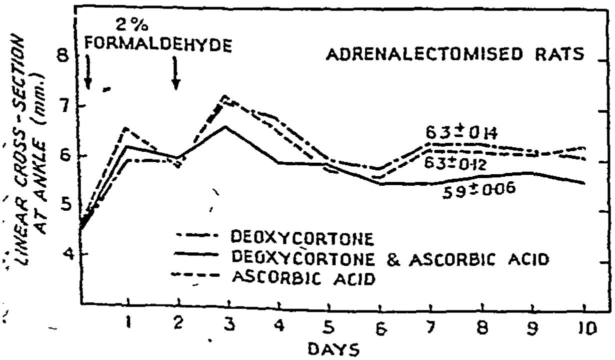

Fig. 1—Formalin-induced arthritis in adrenalectomised rats. Groups of 6 rats given deoxycortone 1 mg.; deoxycortone 1 mg. with ascorbic acid 20 mg.; and ascorbic acid 20 mg. Ordinates are measurements of the amount of the inflammatory process just below the ankle. The protection given by combined therapy is statistically greater than that given by the other two.

EXPERIMENTS WITH ADRENALECTOMISED RATS

Twenty male adrenalectomised rats were untreated for four days to promote exhaustion of the endogenous adrenal hormones. Additional sodium chloride, 1 part in 100, was added to their drinking-water to prolong their survival time. At this stage, all were injected in both hind feet, just beneath the plantar aponeurosis, with *0·1 ml. of 2% formaldehyde.* They were then divided into three groups each of 6 animals and treated differently. The first had 1 mg. of deoxycortone subcutaneously daily, the second 20 mg. of ascorbic acid intraperitoneally daily, and the third 1 mg. of deoxycortone subcutaneously daily with 20 mg. of ascorbic acid intraperitoneally at the same time. On the third day (the seventh after adrenalectomy) all the rats had a second injection of formaldehyde exactly as before.

The first effect of the formaldehyde is to produce an acute reaction which subsides in about two days; if formaldehyde is again injected there is a further acute reaction which subsides in two or three days. About five or six days after the first hyperæmic and œdematous response a chronic reaction begins, slower in onset and now distributed round the ankle-joint.

These effects are similar to those described by Selye (1949). Day-to-day changes in the inflammatory processes were recorded for each group by measuring the linear cross-section, immediately below the ankle, between the central aspect of the plantar aponeurosis and the extensor hallucis dorsis with a pair of engineer's screw callipers. The mean measurement, to the nearest half millimetre, of both feet in each group of 6 rats is shown for a period of ten days (fig. 1). The mean values for all the observations, with their standard errors derived from the group means, are also given. A simple analysis of the means and their respective standard errors makes it possible to estimate the significance. In the expression

$$t = \frac{M_1 - M_2}{\sqrt{s_1^2 + s_2^2}},$$

a comparison of the measurements in the rats receiving ascorbic acid with those in the rats receiving deoxycortone plus ascorbic acid yields a value of 2·6 for t. Entering the distribution of t at 19 degrees of freedom, 2·6 corresponds to the probability of this difference being obtained by chance once in fifty times. In the same way, the probability that the difference observed between the means for the deoxycortone group and for the deoxycortone plus ascorbic acid group is also real is expressed by a figure for t of 2·7, which corresponds to a probability of 1 in 75 that this difference might arise by chance.

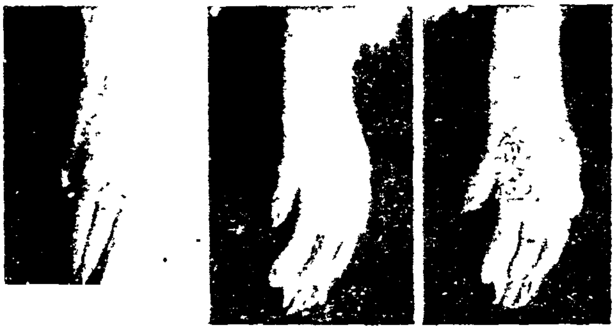

Fig. 2—Formalin-induced arthritis in adrenalectomised rats, on the tenth day (cf. fig. 1). *Reading left to right, deoxycortone 1 mg.* with ascorbic acid 20 mg.; deoxycortone 1 mg. alone; ascorbic acid 20 mg. alone. The group given combined therapy shows significantly less inflammatory change than the other two. (Here and in fig. 3 the means for each group, and their standard errors, are shown on the curves.)

Fig. 1 gives little indication of the observed degrees of difference seen between the groups, particularly, towards the end of the experiment. The differences are obvious to the eye and are reproduced in fig. 2.

EXPERIMENTS WITH NORMAL RATS

Three groups, each of 6 adult male rats, were treated with (*a*) ascorbic acid 20 mg., (*b*) deoxycortone 1 mg., and (*c*) deoxycortone 1 mg. plus ascorbic acid 20 mg. On the first and third day of therapy all the animals received an injection of 0·1 ml. of 2% formaldehyde just beneath the plantar aponeurosis of each hind foot. Measurements were made, as in the adrenalectomised group, and are reproduced in fig. 3, together with the group means and their standard errors.

A comparison between the means and their standard errors for the group treated with ascorbic acid and that given deoxycortone and ascorbic acid yields a t of 2. For 19 degrees of freedom this corresponds to a probability of 1 in 20 that the observation was due to chance. A similar comparison between the deoxycortone group and that treated with deoxycortone and ascorbic acid gives the figure of 4 for t, which corresponds to a probability of 1 in 1000 that the observed difference arose by chance.

The differences between these groups were obvious during the experiment, and in the case of groups (*b*) and (*c*) they were gross. They are illustrated in fig. 4.

DISCUSSION

The observation of Lewin and Wassén (1949), that a 5 mg. intramuscular dose of deoxycortone, followed by 0·5–1·0 g. of ascorbic acid intravenously, relieves the symptoms of chronic polyarthritis, is of great significance. The practical value of this treatment has been widely confirmed (e.g., Le Vay and Loxton 1949, Fox 1949), but in the fields of biochemistry and endocrinology the observation may have even more far-reaching effects.

The stimulus for this work derived from the demonstration by Hench et al. (1949) that 100 mg. doses of a chemically defined sterol, 'Cortisone,' produced dramatically beneficial effects in chronic rheumatoid arthritis. In this connexion it is of great importance that purified adrenocorticotropic hormone (A.C.T.H.) is also effective in rheumatoid arthritis (Hench et al. 1949). It is known that one effect of A.C.T.H. is to reduce the amount of ascorbic acid in the adrenal cortex, and indeed the method has been used for the quantitative estimation of A.C.T.H. (Sayers et al. 1948).

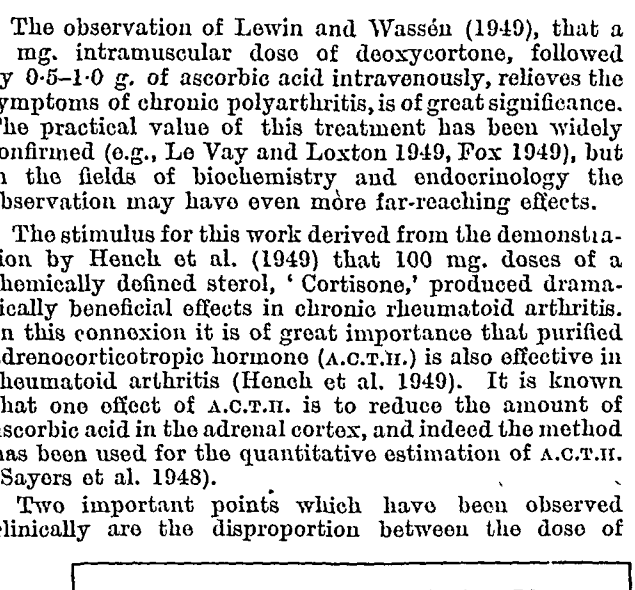

Fig. 3—Formalin-induced arthritis in normal rats. Groups of 6 rats given deoxycortone 1 mg.; deoxycortone 1 mg. with ascorbic acid 20 mg.; and ascorbic acid 20 mg. Most protection is given by combined therapy. Some protection is given by ascorbic acid alone. The inflammatory processes are aggravated by the injection of deoxycortone alone; this appears to be in contrast to the adrenalectomised group (fig. 1).

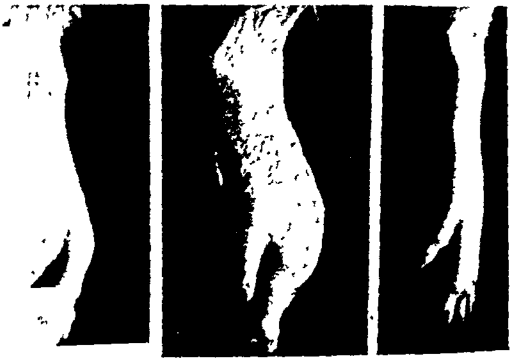

Fig. 4—Formalin-induced arthritis in normal rats, on the tenth day (cf. fig. 3). Reading left to right, deoxycortone 1 mg. with ascorbic acid 20 mg.; deoxycortone 1 mg. alone; and ascorbic acid 20 mg. alone. The group given combined therapy shows most protection, that given ascorbic acid alone some protection, while that given deoxycortone alone shows aggravation of the inflammatory process.

Two important points which have been observed clinically are the disproportion between the dose of deoxycortone (5 mg. or less) and the dose of cortisone (100 mg.) and the fact that the ascorbic acid must be given parenterally. The discrepancy between the dose of deoxycortone and of cortisone may also be true for the rat. Selye (1949) used 5 mg. of cortisone in adrenalectomised animals to obtain similar protection to that seen in the present experiments in adrenalectomised animals wit 1 mg. of deoxycortone plus ascorbic acid. It seem probable that a dose of 1 mg. of deoxycortone wit ascorbic acid is unnecessarily large, particularly in th normal animal, but in the adrenalectomised anim such a dose is essential for complete survival. Under ou experimental conditions we have established a quantitative titration curve for survival of adrenalectomise rats in the range of 0·25–2·5 mg. of deoxycortone p 100 g. rat. In this range doses of 2·0–2·5 mg. sho chronic toxic effects. A dose of 1 mg., on the other han gives almost complete protection against the effects o adrenalectomy for many weeks without toxic effects.

In the tests on adrenalectomised rats reported her the protection given against formaldehyde-induced arthritis in the group receiving deoxycortone combined with parenteral ascorbic acid is statistically significantly greater than that afforded by either ascorbic acid or deoxycortone alone. Moreover, the effect of combined therapy is similar in normal and in adrenalectomised animals. In the adrenalectomised group the effects seen in the deoxycortone group and in the ascorbic acid group are almost identical and do not differ statistically.

In normal rats the protective action of combined therapy is significantly greater than that of deoxycorto alone and probably greater than that of ascorbic ac alone. The considerable protection afforded by ascor acid is not unexpected and probably reflects the influe of ascorbic acid on endogenous adrenal hormones. Wh however, the normal rats treated with deoxycortone on one hand and with ascorbic acid on the other are co pared, the difference is highly significant, ascorbic showing a greater protective action. At 19 degrees freedom t=3, giving a probability of 200 to 1 agai the observation being due to chance.

Observations made during the administration o deoxycortone to formaldehyde-treated normal ra suggested that the sterol was exacerbating the inflamma tory process. The course of the curve in fig. 3 from th fifth day onwards suggests a similar conclusion. Th aggravating effect of deoxycortone is also described b Selye (1949) in normal animals. He als o seems to hav observed a slight aggravation of symp toms by deox cortone in adrenalectomised animals (see fig. 3 in Se 1949), but we have not observed this (compare fi and 3), and if it exists it appears to be mu ich milder th the aggravating effect in normal rats.

he points which have emerged from this work may tated as follows:

The therapeutic effect of cortisone on chronic rheumatoid arthritis in *man* (Hench et al. 1949) and its protective action against formaldehyde-induced arthritis in normal and adrenalectomised rats (Selye 1949) seem to have been reproduced by a combination of deoxycortone and ascorbic acid, both in man (Lewin and Wassén 1949) and in rats. Further, 5 mg. of deoxycortone with ascorbic acid appears to have approximately the same effect as 100 mg. of cortisone alone.

Ascorbic acid gives some protection against formaldehyde-induced arthritis in normal rats but not in adrenalectomised rats.

Deoxycortone alone aggravates the experimental arthritis in normal rats but not (or only very slightly) in adrenalectomised rats.

eoxycortone plus ascorbic acid, in the absence of ogenous adrenal hormones, seems to be an effective stitute for the naturally occurring anti-arthritic ol hormone. Since neither deoxycortone nor ascorbic l alone is effective in the adrenalectomised animal h substance must be essential to the biochemical nges involved. The possibilities are either that both xycortone and ascorbic acid, perhaps with other stances in addition, are components of an essential yme system, or that deoxycortone must first be nged chemically (reduced) by ascorbic acid before s effective.

he facts that ascorbic acid is present in the normal enal cortex but appears to be released therefrom by administration of A.C.T.H., and that it gives some tection against formaldehyde-induced arthritis when en parenterally to the normal animal, strongly suggest t ascorbic acid takes part in the biochemical reaction which the natural anti-arthritic sterol is involved.*

fact that ascorbic acid given by mouth, though l absorbed, is ineffective (Lewin and Wassén 1949) icates that the redox system may be implicated.

he aggravating effect of deoxycortone on inflammation an intriguing observation. Does this mean that ltered deoxycortone, though unsuitable as an antihritic sterol, may nevertheless compete with the ural sterol hormone as a building unit and thus cause npetitive inhibition, in the same way that sulphanilide is thought to compete with *p*-aminobenzoic acid ?

e apparent discrepancy between positive effects seen man with 5 mg. doses of deoxycortone combined th ascorbic acid, and the negative effects reported th 10 mg. doses of deoxycortone in combined therapy pies et al. 1949), may be explained by the aggravating ect of excess deoxycortone. It will be interesting to rn of the effect of combining ascorbic acid with tisone.

SUMMARY

aily parenteral doses of deoxycortone 1 mg., with orbic acid 20 mg., protect normal and adrenalectomised s against formaldehyde-induced arthritis.

n normal rats, but not in adrenalectomised rats, orbic acid 20 mg. parenterally offers some slight tection.

eoxycortone 1 mg. daily, parenterally, exacerbates formaldehyde-induced arthritis in normal rats, only to a very slight extent, or not at all, in enalectomised rats.

he significance of these experimental observations is cussed in the light of the current clinical developments.

References at foot of next column.

REMOVAL OF FORCEPS FROM THE ABDOMINAL CAVITY

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SHANGHAI

The leaving of hæmostatic forceps in the abdominal cavity at operation cannot be a very common accident, though undoubtedly more cases arise than are recorded. Most surgical textbooks ignore the subject, though Crossen and Crossen (1940, 1948) have written at length on it. Books on surgical errors, such as those of Thorek (1932) and of Burrows (1925), discuss the matter, and from time to time cases are recorded in the journals. Perhaps two of the best articles are those by Clifford White (1923) and by Greenhill (1933).

To the general public and to many doctors the accident seems inexcusable, but it has happened in even the best hands. The husband of the patient whose record is described here was horrified when he found what had happened to his wife, and remarked: "I have often heard stories about surgeons leaving things inside patients, but I always thought they were jokes."

CASE-RECORD

A married woman, aged 42, presented herself with a ready-made diagnosis of a hæmostatic forceps inside the abdomen.

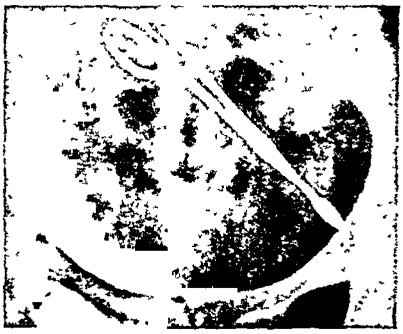

Fig. 1—Radiogram showing hæmostat in pelvis

Early in 1947 she had become pregnant, and in February of that year was operated on for a ruptured ectopic gestation. She recovered well from the operation and had no symptoms until October, 1948, when she began to have rather severe abdominal pain and from time to time noticed blood in the stools. She consulted different doctors without much benefit until one of them suggested an X-ray examination, which revealed a hæmostat in the pelvis (fig. 1). She was advised that the hæmostat should be removed.

Physical examination showed a healthy woman. There was a well-healed transverse scar in the lower abdomen. The hæmostat could not be felt by either abdominal or vaginal examination, though pressure in the lower abdomen evoked some pain. The blood-count, urine, and stool were normal; and chest-screening showed no abnormality in the lungs and heart. The history of blood in the stools suggested some erosion or penetration of the intestine, so a few days before operation on Dec. 13, the patient was admitted to hospital and given full doses of succinyl sulphathiazole.

Operation.—Under ether anæsthesia given through an Oxford vaporiser a median subumbilical incision was made. Numerous omental adhesions were separated, and it was found that the earlier operation had been on the right tube; the left tube was present but was distorted. The uterus was

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dditional evidence pointing to the distribution of ascorbic acid in the tissues as an important factor in the causation of arthritis was provided by the convincing studies of Rinehart et al. (1938) in human *rheumatoid* arthritis. They found that the fasting blood-concentration of ascorbic acid was uniformly and severely reduced in patients with rheumatoid arthritis. Further, the administration of large doses of ascorbic acid produced, at best, a delayed increase in the plasma ascorbic-acid levels, and in some cases no response, even though the urinary excretion rate was high.

normal. To the right of the uterus and extending up into the right iliac fossa was a dense mass of adhesions among coils of small intestine, and through these adhesions could be felt the foreign body. It was deeply placed, and a tedious and blood-stained dissection was necessary before it could be seen.

It is difficult to describe exactly how this lay, but one handle was completely inside a loop of small intestine, while the other handle, part of which was missing owing to erosion, was buried in the mesentery. The shaft and tips of the forceps were partly in and partly outside the gut, the tips having traversed a loop of small gut and become adherent to the middle part of the left uterine tube.

To get the forceps out, the intestine was opened over the intact handle. A piece of tape was then passed through the handle and gentle traction applied to the tape. Cautiously the jagged ends of the other handle were extracted from the mesentery and drawn out through the hole in the intestine. The rest of the forceps (fig. 2) was then easily extracted. One large hole in the intestine, about 2 in. long, and two smaller holes were repaired. In repairing the large hole, it looked as though the intestine had been greatly narrowed. Resection of the affected loop was plainly desirable; but the loop could not be freed or brought into the wound without the probability of inflicting further damage, for the adhesions around it were very firm and dense. Some of the spectators suggested short-circuiting, but in view of the unavoidable contamination it was thought unwise to extend activities to other parts of the peritoneal cavity, and so short-circuiting was left for another operation, if required. A cigarette drain was inserted down to the right iliac fossa and brought through a stab wound, and the main incision closed. A transfusion of 500 ml. of blood was given.

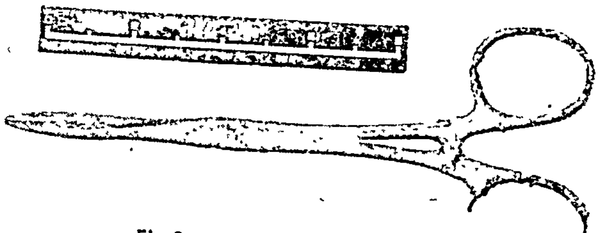

Fig. 2—Hæmostat after removal.

Progress.—For a few days we were anxious about the patient, but she did remarkably well. The drain was removed on the 4th day and the patient got out of bed. Though troubled with flatulence, she soon began to pass gas herself and within a week had a normal stool; and no fæcal fistula developed. Liberal use was made of streptomycin and penicillin in the postoperative period, and these medicines and the preoperative succinyl sulphathiazole may have been a factor in her speedy and smooth recovery.

When seen two months after the operation the patient was perfectly well, with no symptoms whatever.

DISCUSSION

The precautions taken in operating-theatres to prevent such accidents as that described here are not foolproof, and the responsibility for leaving something inside the abdomen rests with the surgeon. If after operation there is the slightest reason to think that an instrument may have been left in the abdomen, an X-ray examination should be taken; and the foreign body should be removed without delay. Clifford White records 13 instances where operation for removal of a foreign body was undertaken within a matter of hours or days, and all the patients recovered. When operation is delayed, however, the mortality is considerable, for two reasons: (1) owing to dense protective adhesions, the operation may be very difficult; and (2) the foreign body may have eroded or penetrated the intestine.

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X-RAY CINEMATOGRAPH IN CONGENITAL HEART-DISI

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M.D.

FROM THE RÖNTGEN- UND LICHTINSTITUT JANK

ANGIOCARDIOGRAPHY by rapid serial radio being increasingly used as cardiac surgery dev this technique is often sufficient for diagnostic but it cannot give a continuous picture of the the heart and is likely to miss some of the i details of this process.

As early as 1931, when there was still no indic human angiocardiography, X-ray cinematograp the injection of radio-opaque substances was be at Bonn to demonstrate the atria, ventricl great vessels in animals. More recently this metl been adopted in the diagnosis of human heart and we have abandoned serial radiography.[1]

METHOD

Before the radio-opaque substance is injecte patient is submitted to a careful clinical exam and is tested for iodine idiosyncrasy. The ne surgical interference must also be established. P exposure of the skin to X rays should, as far as p be avoided. For the X-ray cinematography its patient should have an empty stomach and sho placed lying on his back. Usually an anæsthe unnecessary, but if the patient is restless, hy hydrobromide can be given subcutaneously.

The radio-opaque substances used are 70% 'Iod (Cilag) and 80% 'Per-Abrodil M' (Bayer). Durin taking of the film 30–60 ml. (according to the pati size and age) of one of these substances is inj through a special wide cannula into the exposed m cubital vein, the injection taking 1–2 seconds. effects, such as cardiac arrest lasting a few sec coughing, vomiting, headache, a slight fall in bl pressure, and moderate cyanosis, are generally qui abolished by giving oxygen.

APPARATUS

The X-ray cinematograph had to be adapted angiocardiography. The shock-proof X-ray tube (RÖ Oil-Rotalix, made by Messrs. C. H. F. Müller), wh has a high capacity and a focus of 1·2 mm., is arran above the lead-protected table which contains fluorescent screen, with its fluorescent side downwar The image of the fluorescent screen, against wh lies a fine-line grid, is reflected to the cine-camera a silver-surfaced mirror. The camera is fitted with lens with an aperture of 1 : 0·85 (Leitz or Zeiss). T camera was constructed for me (Askania-R.-Kame Janker) in such a way that the open sector of the rota shutter is enlarged at the expense of the obscuri sector, and the film is exposed through 270° out of ea revolution of the shutter. The highly sensitive 35 m 'Fluorapid-Film' (Agfa) is used.

The camera is mounted on a rail so that it can be moved forwards or backwards, and with appropriate adjustment of the lens the screen can be recorded in various sizes—e.g., 35 × 35, 30 × 30, or 24 × 24 cm.

Before and during the taking of the film the screen can be watched from the control room through a hooded slit-like window of lead glass. By a similar arrangement it is possible to make observations of the cardiac catheter for diagnostic purposes—e.g., for taking samples of blood from the various cavities of the heart for measurement of oxygen saturation.

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[1] Janker, R. Die Röntgenkinematographie. Stuttgart and Berl Kohlhammer 1939.

The X-ray apparatus now in use is the condenser del made by Messrs. C. H. F. Müller, with a capacity to 90 kV of direct current. The data are 90 kV and mA at a focus-film distance of 65 cm. Since the whole ocess does not last longer than 6–8 seconds, there are objections to the use of X rays of such intensity. The in is exposed to a dose of about 50 r. By means of a rther attachment (constructed by Mr. Kleimann of essrs. Müller's staff) the tube is only in action while e rotary shutter is open, and in this way the X-ray osage reaching the skin is reduced by a further 25%.

The number of frames which can be exposed per cond depends on the patient's size and build, stout atients requiring a longer exposure than thin ones. sually 18 but occasionally 24 frames a second are xposed. It is hoped to increase this number by raising ne voltage. At present much the same effect is achieved y incorporating a specially constructed copying apparaus, by means of which each frame exposed is copied up to wenty times ; thus the whole process is "stretched out" n projection, which is a great help in diagnosis.

Further improvements may be expected from the introluction of stereoscopic films, which are now still in the xperimental stage.[2]

APPLICATIONS AND RESULTS

Up to now we have used this method in the investigaion of congenital cardiac defects, to decide on the dvisability of surgery in such conditions as Fallot's etralogy, Eisenmenger's syndrome, truncus arteriosus ommunis, pulmonary stenosis, tricuspid atresia, &c. It has enabled us to confirm the diagnosis and the need for operation—in some difficult cases diagnosis has only been possible by this means—and it has enabled the urgeon to map out his landmarks, to decide on which ide he should operate, and to choose the vessels to be used for anastomoses.

Apart from its importance in diagnosis, this method, unlike all others used in examining the heart, enables us to study the minute details of the blood-flow through the heart and great vessels, thus providing important physiological information regarding the function of the deformed heart.

The accompanying figure is an enlarged still from an angiocardiographic film of a girl, aged 9 years, who had Fallot's tetralogy, with congenital cyanosis, clubbing of the fingers, and considerably reduced functional efficiency. The deficit of arterial oxygenation was 30%. Angiocardiography reveals that the aorta and the pulmonary artery fill practically at the same time. The pulmonary stenosis can be seen proximal to the valve. The pulmonary artery is dilated beyond the stenosis. The right ventricle is enlarged to the left. On the left side a vessel suitable for anastomosis can be seen.

Enlarged still from an X-ray cineradiographic record of a case of Fallot's tetralogy.

In this case angiocardiography confirmed the diagnosis and the indication for operation and showed Prof. Derra, the surgeon, on which side to operate, thus playing an important part in the success of the operation.

Details of the apparatus will be published in *Fortschritte auf dem Gebiet der Röntgenstrahlen*. The technique has been developed in collaboration with Prof. Grosse-Brockhoff and Dr. Schaede, of the Medical Clinic of the University of Bonn, and Prof. Derra, director, Surgical Clinic, Medical School of Düsseldorf.

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[2] 2. Janker, R. *Fortschr. Röntgenstr.* 1949, 71, 2.

Preliminary Communications

HÆMOPHILUS INFLUENZÆ MENINGITIS

A POSSIBLE ECOLOGICAL FACTOR

In the course of a larger study of a series of cases of *Hæmophilus influenzæ* meningitis, an attempt was made to find common factors bearing on the epidemiology and ætiology of the disease.

Findings

Negative.—(1) No patient had contact at any time with any other patient, nor had the families of the patients any acquaintance or contact with one another. (2) In no case had any member of a patient's household any known illness during the three weeks preceding the onset of that patient's disease. (3) No clinical evidence was found of a potentiating viral infection preceding the infection by *H. influenzæ*. (4) The children were not drawn from any particular area, income group, race, or religion.

Positive.—(1) The patients themselves were healthy children of normal development before the onset of the disease. (2) The age-distribution was from 3 months to $3^{1}/_{2}$ years : this is the usual age-distribution of the disease (Smythe 1948, Dubos 1948). (3) The families of the children were strikingly large, and every patient had two or more elder living siblings aged less than 12 years.

Facts from the Literature

Dubos (1948) discussed the variation of the quantitative bactericidal power of the blood of healthy Americans against the smooth meningeal strain of the Pitman type B organism, at different ages. The titre was high in infancy and fell abruptly to zero at 3 months. From 3 months the level remained low until 3 years, when a steady rise began. The curve flattened at the age of 8 and from the age of 10 was sustained at a maximum into adult life. Children who developed meningitis were drawn almost exclusively from the age-group with the lowest bactericidal power. Children aged 3–12 have submaximal bactericidal titres.

Good et al. (1943) found a high carrier-rate among the siblings of children with hæmophilus meningitis.

The hospital incidence of the disease has risen recently in Norway (Grelland 1946), in Denmark (Engbaek 1948), and in England (Braid and Meyer 1949, Ounsted 1949). The English birth-rate has shown an increase in the same period.

The disease is never reported as occurring in epidemic form.

Statistical Examination of the Present Series

Problems.—It is necessary to show that the number of elder siblings aged less than 12 years in the hæmophilus group differed significantly from that of the general hospital population of the same mean age. Further it has to be shown that hæmophilus infection differed in this way from other infections, and in particular from other meningeal infections, in children of the same age-distribution.

Methods.—Two control series were evolved. One consisted of a hundred consecutive admissions to the children's wards of the Radcliffe Infirmary aged 3 months to 4 years, and the other of fifty-two consecutive cases of meningococcal meningitis of similar age-distribution and admitted to the same ward. The control groups were then set against the hæmophilus group and against one another, and statistical tests were applied to the absolute figures.

Results.—Detailed examination of the control groups suggested that they were biologically valid controls.

It is clear from the percentile figures (see figure) (*a*) that the meningococcal group and the over-all hospital population follow an almost identical pattern, and (*b*) that the hæmophilus group follows an entirely distinct pattern.

Since the numbers in the hæmophilus group were small it was necessary to test the absolute figures. For example:

Group	No. with two or more elder sibs	No. with less than two elder sibs
(*a*) 100 controls ..	26	74
(*b*) 13 *H. influenzæ* cases	13	0

When the χ-square test is applied to these figures a value of $\chi_1^2 > 22$ is obtained—a "highly significant" result.

The absolute figures of the meningococcal and control groups have been compared over the first four sibling groups:

No. of siblings	0	1	2	3 and over
52 meningococcal cases ..	27	13	8	4
100 control cases.. ..	47	27	16	10

Application of the χ-square test gives a value of $\chi_3^2 = 0{\cdot}429$, showing that the close parallelism of the percentile figures (see figure) is statistically valid.

Conclusions

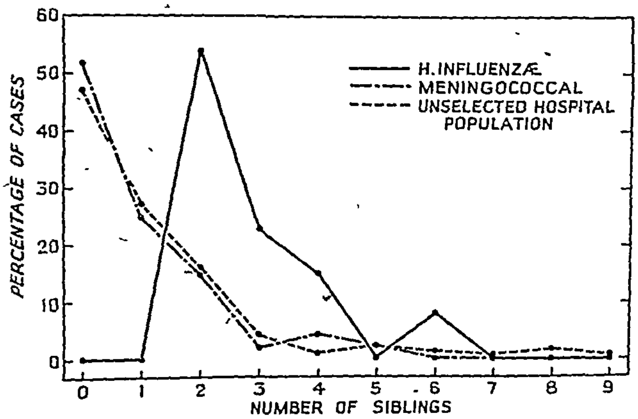
Children admitted to hospital with meningitis due to *H. influenzæ* have contact with two or more elder siblings aged less than 12 years.

Children with meningococcal meningitis have a sibling pattern identical with that of the general hospital population of the same mean age.

The distinctive pattern in the hæmophilus group is not, therefore, due to any peculiar liability in the younger children of large families to meningeal infection per se.

Ad-hoc Hypothesis

On the tenuous basis of these facts a hypothesis was formed. It seems possible that the *H. influenzæ* organism requires one or two bacterial passages thro partially immune contacts, before a strain is evol that can pass the meningeal barrier. The problem under further study.



I wish to thank Dr. V. Smallpeice for encouragement permission to publish.

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ARTERIOVENOUS ANASTOMOSES IN THE STOMACH WALL

ANATOMICAL evidence for the presence of arterioven anastomoses in the wall of the human stomach is n accumulating. De Busscher[1] described complex arte venous anastomoses of the glomus type, and Barlo has demonstrated by microdissection the presence simple direct arteriovenous channels in the submuc connective-tissue of the stomach. That such anastom may be present was deduced by Barclay and Bentl from their investigation of the gastric blood-vessels means of micro-arteriography.

In view of this evidence an attempt was made demonstrate physiologically the existence of arte venous shunts as *functioning* entities. Human stoma removed at operation have been perfused at a tempe ture of 37°C in a moist atmosphere, within a few minu of operation. They remain viable for many hours tested by the response of the vessels to drugs. Perfus at a pressure of 120 mm. Hg, is made by means o cannula in the right gastro-epiploic artery, the o flow being collected from a cannula in the right gas epiploic vein; the cut ends of all other vessels are clam or tied.

When microscopic glass spheres of known diame are introduced into the perfusate entering the arte cannula, the outflow from the gastro-epiploic vein found to contain these spheres in considerable numbe The mean diameter of the spheres injected is 16 (S.D. 52) and the mean size of the spheres found in outflow is not appreciably different. It can be conclu therefore that arteriovenous anastomoses exist in stomach wall capable of passing glass spheres of at le 160 µ diameter.

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2. Barlow, T. E. *J. Anat.* (in the press).
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"... There is no one good word to describe what medi ought now to become. Those who believe doctors should wiser than they are now deny the exclusive claim of older medicine to the name *scientific*: they believe medic should become more scientific, in the sense of admitting d now commonly left out of consideration. Medical progress use the word *preventive* when they think of what medi could do before pathology develops; *constructive* when t set 'positive health' as their goal; *comprehensive* when t ask doctors to deal with people whole instead of in pa *social* when they feel the pressure of the human environm on the individual and want the doctor to be at least aw of it. All these concepts are facets of good medicine. *Annual report of the Commonwealth Fund*, 1949.

Medical Societies

BRITISH TUBERCULOSIS ASSOCIATION

Debate on Infection

THE British Tuberculosis Association met on Jan. 20, der the chairmanship of Prof. F. R. G. HEAF, the esident, to debate the proposition That Infection, hough Necessary, is Not the Major Factor in the revalence of Tuberculosis. In the end no vote was ken.

Dr. H. J. USTVEDT (Denmark) said that whilst no-one ould deny that without tubercle bacilli there would be o tuberculosis, this was a dangerous slogan, since it oncentrated attention too much upon the infecting rganism and left the "constitutional factors" out of the icture.

What evidence there was did not support the ssumption that differences in the virulence of the organism greatly influenced the prognosis of primary tuberculosis. It was strange how deeply rooted was the concept of "massive infection." Belief in the decisive importance of the infecting dose seemed to derive mainly from misinterpretation of experiments on animals, where the bacilli were injected, and of the striking frequency of tuberculous disease in contacts. Even Rich, however, admitted that the number of air-borne bacilli which could lodge at any one site in the lung could hardly be regarded as massive. In Dr. Ustvedt's opinion, the importance of the infecting dose under natural conditions was minimal.

Superinfection—a new infection where the primary was still living, though possibly latent—might take place in the pre-allergic phase after primary infection, in the allergic phase, or in the postallergic phase, where the sensitivity to tuberculin had waned but some form of allergy remained. There was indirect evidence that superinfection could hardly be of major importance. There was also little reason to doubt that tubercle bacilli inhaled into the alveoli of people already infected with tuberculosis, and allergic, might invade the lung tissue; and it seemed highly probable that superinfection might stimulate the tuberculin sensitivity of the skin.

As to whether superinfection influenced the course of tuberculosis the pathological evidence was inconclusive. The frequency of the disease in contacts could not be used as an argument for the importance of superinfection, for a series of factors were involved. In this regard the large amount of material regarding marital tuberculosis was also valueless. Dr. Ustvedt agreed with A. L. Jacobs's comment on the Prophit survey that the important social and environmental disadvantages in group A (nurses) were quite adequate to explain the relatively small excess morbidity. Whilst superinfection might occasionally produce tuberculosis in B.C.G.-vaccinated individuals who were still regarded as tuberculin-positive, it must be remembered that generally the course of the disease in vaccinated subjects seemed to be rather benign. However, under ordinary conditions tuberculous disease in tuberculin-positive individuals, occurring after the period of primary infection, must be assumed to depend either on exacerbation of old foci or on dissemination.

Dr. Ustvedt then turned to the question of the higher tuberculosis morbidity among medical-student invertors than among other student invertors. As to whether this difference was real or was due to factors inherent in material or methods, the technique of testing might be important. In the international tuberculosis campaign the final dose for the Mantoux test had been lowered from 100 toxic units (T.U.)—corresponding to 1 mg. of old tuberculin (O.T.)—to 10 T.U., because of frequent reactions to Mantoux 100 T.U. which were assumed to be non-specific. The question whether medical students, who were exposed to much more tuberculous infection than their comrades in other faculties, really showed a higher morbidity could not be regarded as settled.

Summing up, Dr. Ustvedt said that there was little support for the assumption that infection in itself was of major importance in tuberculosis, apart from being a necessary condition. Possibly under special circumstances the infecting dose or the virulence of the organism, or superinfection, might have a rôle, but statistically this had not been proved. The tuberculosis destiny of an individual must be determined predominantly by hereditary factors, age of infection, and non-specific resistance, depending upon nutrition and other environmental factors and immunity.

Dr. L. E. HOUGHTON did not doubt that differences in racial constitution caused well-marked variations in the reaction to the tubercle bacillus. The Prophit survey drew attention to variations in opportunity for infection in certain groups of nurses, but no such observation could explain the increased incidence among the Irish and Welsh nurses. There existed also hereditary transmissible differences in the degree of native resistance.

Apart from infancy, the age of greatest hazard for females was 15–30 years. In Britain the male peak seemed to be steadily shifting to the right and was now between 40 and 50 years, the over-all incidence being greater than among females. The differences in morbidity and mortality rates among children of different ages were also interesting. It would be hard to explain these phenomena almost entirely by opportunity for infection.

Undernourishment was recognised as a factor which promoted abnormal sensitivity to the bacillus, though which food factor might be responsible for the fluctuation in resistance was not established. Physical overstrain did not appear to be a factor in the ætiology, though it affected active lesions. In some cases anxiety might be one of the most potent precipitating factors of tuberculosis; and if there was any truth in the historical association of genius with tuberculosis, this was probably the explanation.

The dramatic effect of streptomycin and other antibiotics and drugs seemed to emphasise the overriding importance of the infection factor. But, of course, "without tubercle bacilli, no tuberculosis." Furthermore, streptomycin might well have profound effects other than the elimination of tubercle bacilli. It was certainly true that resolution of tuberculous lesions sometimes continued long after streptomycin injections ceased, and that clinical improvement might continue even though complete streptomycin resistance had been established. It was the behaviour of the tissues in contact with the tubercle bacilli which determined the fate of the patient.

Dr. PETER EDWARDS, opening for the opposition, said that a happier and more cheerful crowd than his patients it would be difficult to find. He believed that Dr. Houghton had mixed up a cause of tuberculosis and the attitude of patients who had got the disease. The Prophit survey showed a greater incidence of tuberculosis among nurses in hospitals with tuberculosis wards; and it was known that sanatorium nurses had a low incidence where there was proper education and technique.

On contact infection, Dr. Edwards pointed out that the small number of tuberculous people produced one-third of the total incidence in the whole population. He thought that it could be concluded that infection and the repeated dose were important. At Liverpool in 1860, when 13·7% of deaths from tuberculosis took place in hospital, the mortality in the population was 44 per 1000. In 1946, when deaths in hospital were 57%, the mortality was 0·9 per 1000. This indicated that mortality dropped with segregation. The same had been found in the U.S.A. In a sanatorium a man with human tuberculosis who had shared a cubicle with a man suffering from bovine tuberculosis who was of the “ uneducatable ” type, left the sanatorium with the human disease plus the bovine ; and Dr. Edwards could only think that this was due to infection. Infection seemed the chief factor and all preventive methods ought to be directed against it. He believed that education in hygiene was most important ; and cases should be found, isolated, and treated.

Dr. **Alice Stewart**, the second speaker against the motion, referred to her investigations in the boot-and-shoe industry, where the incidence of tuberculosis was found to be two or three times higher in the larger factories than in the smaller ; they were driven to the conclusion that a proportion of cases had arisen at work, by infection. Another investigation had shown that the incidence of tuberculous cases in houses next door to houses with a case of tuberculosis was 16% in excess of what would normally be expected.

Investigation in a workroom where four young women were discovered, by mass radiography, to be suffering from pulmonary tuberculosis, revealed that there had been previous cases, and ultimately that a man working in the room had been shown post mortem to have been suffering from tuberculosis. His wife died of tuberculosis in 1924, but he was not examined at that time. In 1942 his daughter died of the disease, but again it was not detected in him. There was very suggestive evidence that this man was responsible for causing the disease in people who might otherwise never have had it. From long-term studies of groups sufficiently well defined there was also evidence that grouping people together at work was liable to increase the incidence. After describing in detail the variations in the tuberculosis death-rate from 1881 to 1931 in three trades, which all had a strong family tradition—the printing trade, the shoe-making trade, and fishing—Dr. Stewart concluded that with any infectious disease the larger the exposed population became, the more resistant would people become. This would explain many so-called genetic factors. “ Highly resistant as we are, it is still not safe to leave people to be exposed to this infection.”

Dr. **G. Canetti**, of the Pasteur Institute, Paris, maintained that superinfection was of primary importance in the pathogenesis of tuberculosis. Foci of superinfection were not rare ; they appeared usually in the upper part of the lung and were small, though they passed through the same changes as primary foci. They were met with more frequently in older subjects, and were seen long after the primary foci had been cured. If tuberculosis arose five or six years after the primary infection, he believed that it was due to superinfection.

Dr. **A. L. Jacobs** answered the question : “Why are a large number of people infected with tuberculosis but only a small number develop the disease ? ” by saying that such factors as age and environment were more important than the static factor—the infection. The fact that superinfection foci existed was no more significant than the fact that primary foci existed ; the constant factor was the same in both.

Over-all figures from an Italian survey of 59,000 people working in hospitals for the tuberculous showed that the average morbidity amongst administrative and office workers was 4·9 per 1000, among medical and nursing staff 8·7 per 1000, and among nuns working in institutions 18 per 1000. Why should the incidence among nuns carrying out nursing duties be so m higher ? Surely the considerable differences in th of life of the nuns from that of the other nurs something to do with it ?

Dr. **Halliday Sutherland** said that he had livened up a meeting by declaring : “ When discovered the tubercle bacillus, he put the clock b And there was a great deal of truth in it. Before doctors had been asking themselves : “ What is change which occurs in the humors of the body enables tubercles to grow ? ”—which was the que they were asking today. The incidence of tubercu fell most steeply between 1860 and 1882, because that period there was a great improvement in so conditions, which improved the resistance of people.

Dr. **Clark Penman** thought that Dr. Sutherla was very keen on putting the clock back. *But by lea* ing the clock where it was they had a form of atta which had been very successful in Minnesota a Saskatchewan.

Dr. **J. S. Westwater** had not expected the motic to be taken so seriously. When he had heard D Houghton suggest that anxiety was an important facto he wondered whether the increase in the disease Scotland during and since the war was because t people there were more anxious than in England. The when he heard Dr. Houghton associate genius wit tuberculosis, he thought he had the answer.

Dr. **Marc Daniels** remarked that there were tw major factors—infection and resistance. The motio presupposed there was *only one*, so he urged member to abstain from voting.

Dealing with superinfection, Dr. Daniels recalled that the Prophit survey had shown a primary-infection rate of 26% in the controls, 54% in group B nurses, and 80% in group A nurses (those in hospitals with many tuberculous patients). The degree of tuberculin sensitivity in tuberculin-positive nurses rose rapidly in the first year of nursing, and more so in group A than in group B. This was interpreted in the survey as evidence that superinfection took place. The survey further found that the annual morbidity-rate per 1000 was 7·0 in group B nurses and 11·3 in group A—that is, it was 63% more in A than B—and group A were more frequently infected than group B. Dr. Jacobs had stated that the difference between A and B was very small, being only 0·4%, by which root of calculation the rise in tuberculosis mortality in Warsaw during the war from 150 per 100,000 to 500 per 100,000 was a paltry affair—a mere 0·35%.

Differences in resistance might be responsible some of the difference in morbidity, but the rest w probably due to increased infection. If there was large a difference in constitutional resistance as Jaco suggested, one would expect the disease to be mo severe in group A than in group B ; in fact there was difference in severity.

Most believed that the bacilli responsible for tube culosis in adults might come from a recent primar focus, from exacerbation of an old focus, or from a added infection from outside. What proportion o cases were due to one or the other, was not known. They should let it rest there in a spirit of healthy agnosticism until further evidence was forthcoming.

Dr. **Reti** (Israel) pointed out that very little had been said about the bacillus itself, and its host, from the biochemical angle. It had been found that a complicated enzyme system was necessary to build up the tubercle lipoids, and one must bear in mind the functioning of this enzyme system and the counter-action of the host to neutralise it.

LIVERPOOL MEDICAL INSTITUTION

Ulcerative Colitis

At a meeting on Jan. 5, with Prof. Charles Wells, the esident, in the chair, ulcerative colitis was discussed.

Dr. S. W. Patterson said that after excluding the ll-defined causes of ulcerative colitis, such as amœbic d bacillary dysentery (which occurred not only in opical climates but also in this country, especially in fants and elderly patients in institutions), tuberculous ceration of the bowel, and syphilitic proctitis, there mained a characteristic syndrome which formed a sease-entity. The cause of this was still unknown. ypically the course was relapsing, with gradually creasing diarrhœa, the motions containing blood and ucus. This group of patients often responded to rest nd simple dietetic measures and commonly the disease as self-limiting. In the treatment diet was important, he object being to support the patient and yet not rritate the bowel; sufficient vitamins should be supplied, nd for the diarrhœa antispasmodics and sedatives; bsorbents, such as kaolin and bismuth, and rarely opium might be given. The sulpha drugs were best dministered in retention enemas—gr. 45 in 6 oz. of water—two or three times in the twenty-four hours. Anæmia and dehydration should be countered by blood-transfusion, supplemented with iron by mouth and liver extract by injection. Lavage of the colon with antiseptics and douches had been largely abandoned. These patients often showed immature personality, childishness, fussiness, and anxiety; and mild encouraging psychotherapy was needed.

Two types of greater severity were common: (1) the fulminating, especially in young patients with poor resistance; and (2) the chronic, which resisted treatment and had long severe recurrences characterised by wasting, fever, dehydration, anæmia, and tachycardia, with extension of ulceration from the sigmoid to the whole colon and often to the terminal ileum. Inflammation round the rectum, with abscess and fissure, and skin lesions ranging from acne to gangrenous dermatitis were common. In these severe cases ileostomy was the operation of choice; and after improvement, through resting the colon, colectomy was indicated. The object must be to control the symptoms, to arrest the inflammatory lesion, and to prevent invalidism. Even after three or four years of desperate illness, patients recovered and the remission might be permanent.

Mr. R. B. Welbourn said that there was no known cure for ulcerative colitis, but that surgery could save life, increase the expectation of life, and make life more tolerable. The aim of treatment was physiological rest for the colon, and this could be achieved by terminal ileostomy. When performed on patients in extremis, this carried an operative mortality of at least 50%; but many of those who survived were restored to health. Ileostomy should be adopted as an elective procedure in any patient who did not respond to a fair trial of medical treatment; and the operative mortality was then less than 10%. It had been shown statistically that this procedure gave much better immediate and long-term results than medical treatment. The testimony of patients who had an ileostomy was that it was much preferable to the distressing symptoms of ulcerative colitis. A "spout" type of ileostomy, covered with skin, was preferable to the usual "flush" type, because it delivered the fæces directly into a bag and prevented soiling and excoriation of the abdominal wall; and patients found it more manageable. If the disease remained active, colectomy might be necessary; and this was becoming commoner as a routine procedure to prevent complications such as severe hæmorrhage or malignancy, which might still arise after ileostomy. The operative mortality was low. Most patients who had an ileostomy were destined to keep it for life, because attempts at restoring a functioning anus usually resulted in a relapse, even after subtotal colectomy and ileorectal anastomosis. It was too early to say whether total colectomy and excision of the rectum, followed by an ileal "pull-through," would give any better results.

Dr. A. R. D. Adams remarked that bacillary dysenteric and amœbic dysenteric infections, though particularly prevalent in the tropics, were also common in Britain. Amœbic dysenteric infection contracted in the tropics commonly caused acute dysentery; when it was contracted in temperate climates acute symptoms were comparatively rare. But the incidence of acute cases even in the indigenous population was greater than was generally supposed, for when these cases did arise the diagnosis was missed and they were treated as chronic ulcerative colitis; one patient at present in hospital had been dealt with in this way for twenty-six years. The importance of examining the stools microscopically in all cases of chronic colitis could not be overemphasised, and amœbic dysenteric infection should always be excluded by this means before idiopathic ulcerative colitis was diagnosed. The treatment of acute amœbic dysentery by emetine injections was well known, but it was less well known that to sterilise the infection a variety of drugs must be administered in concert for some weeks.

As a sequel to severe dysentery, chronic ulceration of the bowel, due to recurring breakdown of scar tissue, was not uncommon. This persisted after the primary infection had disappeared, and differed little from idiopathic ulcerative colitis. Owing to better diagnosis and specific treatment of acute dysentery, post-dysenteric colitis was much less prevalent after the second than after the first world war.

The treatment of chronic ulcerative colitis was unsatisfactory, the best results being obtained by palliative measures. Most acute cases resolved spontaneously, though under stress they might always relapse. In acute cases with severe anæmia, blood-transfusion and liver injections were of great value; enemata of astringent solutions such as silver nitrate or tannic acid, or of eusol or acriflavine, had not proved beneficial, and in many cases were harmful. The sulphonamide drugs and penicillin were rarely helpful, and these again sometimes seemed to have a deleterious effect. The short-circuiting operations, such as ileostomy, appendicostomy, cæcostomy, and colostomy, had on the whole proved most unsatisfactory; and it was doubtful whether these were justifiable since acute colitis might continue below the opening, with the discharge of pus, mucus, and blood from the anus. The objections to these operations were: a considerable operative mortality, the psychological effect, and the probability of a permanent opening without material betterment of the patient's condition. Where total colectomy was done, there had been some entirely satisfactory results; and in carefully selected cases this operation might afford radical cure.

Dr. R. Winston Evans pointed out that the ileum was probably involved more often than was generally realised. The association of malignancy and ulcerative colitis was more frequent than could be expected from chance alone. Carcinoma usually developed in the younger patients, and the most common sites were the cæcum and the rectum.

". . . It is a fantastic anomaly that routine service of a domestic kind should have devolved upon trained nurses or even nurses *in training*. It would be equally wrong for day-to-day catering, purchasing, accountancy and general management to be undertaken by a medical man."—Dr. John Yule, *Public Health*, January, 1950, p. 55.

Reviews of Books

Further Rare Diseases and Debatable Subjects

Editor: F. PARKES WEBER, F.R.C.P. London: Staples Press. 1949. Pp. 236. 25*s.*

BECAUSE of his immense fund of knowledge and his experience of rare diseases, Dr. Parkes Weber has long been one of the best-known personalities in the medical world; and his enthusiasm and boyish delight in the unusual give an interest and a zest to his writings. A man who has already been a fellow of the Royal College of Physicians for over fifty years deserves special congratulations on this second and even fresher volume on rare diseases and debatable subjects, which he has produced with slight help from a few other authors. The subjects have a wide range, and though there is perhaps some bias towards the nervous system, the skin, and rheumatism, almost all varieties of disease are touched in one way or another. Indeed the diversity of his interests is astonishing. A few brief almost philosophical notes are there, and many groups of inborn developmental peculiarities are described. As in all Dr. Parkes Weber's writings, exact chapter and verse is given for every quoted opinion; but innumerable theories and ideas are scattered through the book. Interesting, stimulating, and (as the author says in his preface) instructive, the study of single cases can sometimes be as valuable as the study of large series. This volume, which is beautifully produced and illustrated, reflects high credit on its author and his collaborators.

Practical Anatomy

(2nd ed.) W. E. LE GROS CLARK, D.SC., F.R.S., F.R.C.S., professor of anatomy in the University of Oxford. London: Edward Arnold. 1949. Pp. 493. 30*s.*

OPPRESSED by the weight of topographical detail which his students of anatomy were expected to memorise, Prof. Le Gros Clark set out in 1946 to lighten their load by publishing a short dissecting manual. We commented [1] then on the need for an effort such as this, and wondered whether Prof. Le Gros Clark had gone far enough in following out his own views. The second edition (with its improved pictures, now numbering 268) will convince most readers that he has pruned as far as he can if every medical student is to dissect the entire body for himself. Some reformers of the anatomical curriculum, even more zealous in eliminating topographical detail than Prof. Le Gros Clark, may contend that most of the details even in this short book will soon be forgotten (and not subsequently missed) by that large body of medical students who enter general practice. But it will be a great pity if our future doctors do not dissect the whole body: the details may be forgotten, but the process leaves an intangible familiarity with the body's structure, and a respect for it which nothing less could cultivate. What a relief this splendid little book would have been to those who had to plough through the interminable prosiness of some former directions to would-be dissectors!

Female Sex Endocrinology

CHARLES H. BIRNBERG, M.D., associate obstetrician and chief of the female sex endocrinology laboratory, Jewish Hospital of Brooklyn. Philadelphia and London: J. B. Lippincott. 1949. Pp. 134. 35*s*

THE subject matter in this little book is useful and there are some excellent illustrations; the author knows his subject, has some original ideas, and has commendably condensed what he has to say. He covers the salient points about the commoner endocrine problems in the female, including those associated with adolescence, menstruation and its aberrations, the menopause, sterility, habitual abortion, and such oddments as mastalgia and hirsutism. In general his descriptions of the various conditions, if brief, are accurate, though there is one curious mis-statement where he describes the ovulatory mucus as "a thick, tenacious glairy plug . . . difficult to remove" and goes on to say that "as the cycle continues . . . the plug becomes thinner." His suggestions for treatment are mostly orthodox and clear. He rightly favours the cyclic and balanced use of the two ovarian hormones for such diverse conditions as amenorrhœa, dysmenorrhœa, menorrhagia, genital hypoplasia, and the induction of ovulation. The value of this type of therapy is perhaps not yet widely enough appreciated. The book rather falls down in the chapters on sterility and abortion: indeed the sketchy and inaccurate remarks about sterility in the male might with advantage have been omitted.

Human Relations in Modern Industry

R. F. TREDGOLD, M.A., M.D., D.P.M., regional psychiatrist, South Eastern Metropolitan Hospital Board; formerly Boots lecturer in industrial health, Roffey Park Rehabilitation Centre. London: Duckworth. 1949. Pp. 19 8*s.* 6*d.*

The Psychologist in Industry

M. E. STEINER, research psychologist, personnel division, General Electric Company, Bridgeport, Connecticut. Oxford: Blackwell Scientific Publications. 1949. Pp. 107. 9*s.* 6*d.*

IF Dr. Tredgold, quite properly in a book addressed to laymen, over-simplifies the integration of human relationships, Mr. Steiner regards men and society as existing merely to be measured. Both books are well worth reading; but the contrast in the British and the American approach to industrial relations is brought into sharp relief. Assuming that the well-being of men is paramount, Dr. Tredgold, through explanations of normal and abnormal psychological processes, proceeds to demonstrate the need to treat men as men, and, more important still, *how* to treat men as men. Elton Mayo's great contribution to the understanding of industrial morale, made by studying normal people, is emphasised; and in the closing chapters the British experiment in preventive reablement of the mentally ill at Roffey Park is described. The humanistic views are frank and refreshing, and set a goal both for those who manage industry and for those who manage hospitals.

Mr. Steiner's book contains useful accounts of the many psychometric procedures employed in estimating intelligence and aptitude. He is best when describing the Rorschach and similar tests; but whether the battery of tests to which an industrial worker may be subjected have real value in industry is not clearly stated. The importance of the psychometric approach to human relationships lies in the attempt to measure abilities even if (in contrast to Dr. Tredgold's humanistic integration) this results in a purely technical approach. Paradoxically, the greatest danger to the future industrial worker may be the numerous and complex tests designed to ensure his correct placement: efficiency becomes the measure of health. For those interested in psychometric procedures, the book will prove a useful summary; but Mr. Steiner damages his own case by advocating counselling (perilously close to therapy) by non-medically qualified psychologists.

Fundamental Considerations in Anesthesia

CHARLES L. BURSTEIN, M.D., chief, department of anesthesiology, Hospital for Special Surgery; attending consultant in anesthesia, Veterans Administration Hospital, Bronx, N.Y. New York and London: Macmillan. 1949. Pp. 153. 30*s.*

NOWADAYS onlookers find it difficult to follow the reasoning behind the complex mixtures of drugs administered during anæsthesia, and to explain some of the phenomena encountered. Dr. Burstein's little book attempts to explain why things happen. He introduces, as he must, a certain amount of physiology and pharmacology, both important subjects for any real understanding of anæsthesia. Much of the book is devoted to a discussion of the effect, on the autonomic nervous system, and in particular on the respiration and circulation, of a combination of anæsthetic drugs and surgical trauma. Laryngeal spasm, and the effect of stimuli and of drugs on the cœliac plexus and on the carotid sinus, are considered in detail. The text is well illustrated with helpful diagrams and tracings from the author's own experimental work. His style is a little stilted, but he demonstrates in a telling and learned manner that if anæsthetists are to be something more than knob-turners they must have a basic knowledge of physiology and pharmacology.

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1. *Lancet*, 1946, ii, 308.

THE LANCET

LONDON: SATURDAY, JAN. 28, 1950

Sulphones in Leprosy and Tuberculosis

Leprosy is not a rapidly fatal disease, and even in such countries as India it is of less biological mportance than tuberculosis. Nevertheless it has always provoked horror, and, largely because it lasts so long, it causes an immense amount of suffering. The British Commonwealth contains a large proportion of all cases of leprosy, and we should therefore be especially concerned to improve the treatment of this ntractable infection.

It is nearly a century since Mouat[1] in 1854 gave the first English description of the use of chaulmoogra oil; and this oil can perhaps be regarded as the first example of a remedy with a direct antibacterial action, since intravenous injection of its derivatives is followed by disintegration of leprosy bacilli.[2] Quite possibly chaulmoogra will retain a place in association with other agents[3]; but it is fair to say that interest has now shifted to synthetic drugs and particularly to the derivatives of 4 : 4′ diamino-diphenyl sulphone, which Buttle et al.[4] introduced into therapeutics in 1937 under the name of diaminosulphone. These derivatives, such as ‘Promin,’ ‘Diasone’ and ‘Sulphetrone,’ are less toxic, and have therefore been considered better therapeutic agents than the parent substance; but the advantage of using them has been challenged.[5] If, as is now suggested, their activity is due to the diaminosulphone which they liberate in the body, the question arises whether the same effect cannot be obtained by giving this drug itself instead of its derivatives. Cannot the objection to its high toxicity be met by merely reducing its dose? Admittedly it has been found 15 times as toxic to mice as sulphanilamide, but it was also 30 times as active against streptococci—i.e., it had a therapeutic index twice as high.[6] In bovines it is actually less toxic than sulphanilamide—a fact which has led to its use in the treatment of mastitis in cattle. A recent investigation of its antibacterial and pharmacological properties[7] has, we understand, been followed by experimental studies[8] showing that in mice, to produce the same effects as diaminosulphone against streptococcal infection, 5–6 times as much promin and diasone, and nearly 100 times as much sulphetrone, had to be added to the diet. It is now, indeed, widely accepted that both the activity, and most of the toxicity, of the solubilised derivatives of diaminosulphone depend on the extent to which they break down into the parent drug. Incorporated in the diet at a concentration of 0·1 or 0·025%, the latter has proved slightly more effective against rat-leprosy than streptomycin.[8]

On the clinical side Cochrane and colleagues[9] have accumulated evidence indicating that diaminosulphone, in a 25% suspension of arachis oil injected subcutaneously, is the most potent agent available against leprosy. Toxic reactions were observed in some patients, but the drug seems to have been tolerated in doses not exceeding 1–1·5 g. weekly. Molesworth and Narayanaswami[10] have likewise obtained favourable results, using smaller doses of the suspension, without any serious toxic effects. In Nigeria, Smith[11] has shown that the drug is well absorbed in man, 83% of the daily oral intake being recoverable from the urine; and, as excretion is slow, a single daily dose of 300 mg. gives blood-levels of at least 1·0 mg. per 100 ml. Recording fresh observations in our present issue, Dr. Lowe recommends oral administration of small doses, rising in five weeks from 100 mg. to the standard 300 mg. daily. This régime, he says, has given excellent results in lepromatous and tuberculoid leprosy, and the small doses of diaminosulphone have proved to be at least as effective as much larger doses of the complex sulphones. Similar success has been reported by Floch and Destombes[12] using no more than 200 mg. a day. All this is important particularly because diaminosulphone is so much cheaper than its derivatives: the amount that is needed for Lowe's modified régime of twice-weekly oral doses for out-patients costs only 7*s.* per patient a year—a sum which could well be found even for moneyless native patients numbering millions. With a remedy so inexpensive and apparently so effective, leprosy may be the first of the great infectious diseases to be brought under control largely by chemotherapy.

Dr. Lowe suggests that the use of diaminosulphone in the treatment of human tuberculosis should now be re-examined. Though Pfeutze and Pyle[13] conclude that its derivatives, promin and diasone, have some action in certain forms of tuberculosis, it seems unlikely that we can expect much from the use of any of these drugs alone. On the other hand, they may have the same action as *p*-aminosalicylic acid in preventing the development of streptomycin resistance[14]—and in much smaller doses. Various workers have claimed that in experimental tuberculosis the results are better when *p*-aminosalicylic acid or one of the sulphones is given with streptomycin than when streptomycin is given alone. Moeschlin and Schreiner[15] provide fairly convincing evidence to support this opinion, and so do Rist and Cottet,[16] who describe clinical tests carried out with Brissaud and Cousin in cases of tuberculous meningitis, where the effects of streptomycin were compared with those of streptomycin plus the sulphone given both intrathecally and by mouth. The advantage of the combined treatment seemed to lie not in the rapidity of cure but in the reduction of deaths during the 4th–6th month, most of which are associated with the appearance of resistant bacilli. The investigators noted that children under six years of age tolerated diaminodiphenyl sulphone in doses of 4 mg. daily per kg. body-weight, or even 5 mg., whereas older children tolerated no more than 3 mg. It remains to be seen whether, in small doses, the drug will be as useful as *p*-aminosalicylic acid as an adjuvant to streptomycin.

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[1] Mouat, F. J. *Indian Ann. med. Sci.* 1854, 1, 646; partly republished in *Int. J. Leprosy*, 1935, 3, 723.
[2] See Rogers, L. *Indian J. med. Res.* 1917, 5, 277.
[3] Rogers, L. *Lancet*, 1948, i, 515.
[4] Buttle, G. A. H., Stephenson, D., Smith, S., Dewing, T., Foster, G. E. *Ibid*, 1937, i, 1331.
[5] Feldman, W. H., Hinshaw, H. C., Moses, H. E. *Amer. J. med. Sci.* 1944, 207, 290.
[6] Bauer, H., Rosenthal, S. M. *Publ. Hlth Rep., Wash.* 1938, 53, 40.
[7] Francis, J. *J. comp. Path.* 1949, 59, 226.
[8] Francis, J. (to be published).
[9] Cochrane, R. G., Ramanujam, K., Paul, H., Russell, D. *Leprosy Rev.* 1949, 20, 4.
[10] Molesworth, B. D., Narayanaswami (to be published).
[11] Smith, M. I. *Leprosy Rev.* 1949, 20, 78.
[12] Floch, H., Destombes, P. *Bull. Soc. Path. exot.* 1949, 42, 434.
[13] Pfeutze, K. H., Pyle, M. M. *Proc. Mayo Clin.* 1949, 24, 213.
[14] See *Lancet*, 1949, ii, 1237.
[15] Moeschlin, S. von, Schreiner, W. *Schweiz. med. Wschr.* 1949, 79, 117.
[16] Rist, N., Cottet, J. *Pr. méd.* 1949, 57, 713.

Leucotomy for Pain

SINCE Prof. WALTER FREEMAN[1] began to extend the field of prefrontal leucotomy to the treatment of intractable pain in non-psychotic patients, the operation has probably been performed for this purpose by many surgeons all over the world. But as it is generally regarded as a last resort after other therapeutic procedures (psychotherapy, nerve block, nerve section, drug and sleep therapy, shock therapy, sympathectomy, chordotomy, &c.) have failed, the number of cases treated by one neurosurgeon must naturally be small; hence the scarcity of reports on representative series. The indications for the operation, and the effects to be expected from it, have been clarified by the American papers published in the last two years, but these have also revealed some unsolved problems in regard to the mechanism of the results and their theoretical implications.

The operation can undoubtedly relieve the pain of incurable cancer. OTENASEK,[2] at Johns Hopkins, for example, describes its use in 11 patients requiring heavy doses of analgesics and narcotics, and, except for one whose death was attributable to the leucotomy, all of them were freed from pain and suffering until the time of the report or until they died from cancer. At the Lahey Clinic in Boston, where this treatment was started in 1946,[3] DYNES and POPPEN[4] have now reported on their results in 18 patients. Half of these had malignant metastases and the remainder various other severely painful conditions, such as neuralgias or tabetic crises. All had received large amounts of morphine and other analgesics, and many were addicts. Several had undergone other operative procedures such as rhizotomy or chordotomy without improvement. The results of leucotomy were "good" in 11 cases and "fair" in 4; in 3 cases the result was "poor," but 2 of these patients were cured of their narcotic addiction. On the whole, the response was best in the cancer cases. At both Johns Hopkins and the Lahey Clinic the operation performed was a bilateral leucotomy. To avoid undesirable personality changes, SCARFF[5] operated on one hemisphere only in 33 patients. Again those with neoplasms formed the majority, but he also included patients with phantom-limb pain and arthritis. Though he performed a very thorough severance of white fibres under direct visual control, his results—good in 22 cases, fair in 6, and poor in 5—seem less favourable, and the relief of pain less definite, than with the bilateral operation. There was no evidence that an ipsilateral leucotomy was more effective if the pain was localised to one side of the body or that the results were any better if the dominant hemisphere was operated on. In assessing the results malignant cases the duration of observation operation is important. Good results lastin two years are among those cited, but in mar best cases the follow-up period is only a few Even so, in several patients immediate relief followed by a return of symptoms, paralle relapse of mental symptoms observed i psychotic patients after leucotomy.

The patient's subjective reaction to the op is not always as expected. Some feel com relieved and never complain of pain after the tion; but it is more common to find that the p will admit when questioned that the pain has per though they no longer make any spontaneous plaint. Their demeanour and behaviour gi indication that they are suffering. Moreover desire for drugs and the addiction to analg invariably cease, even in the apparently less favou cases; anxiety disappears, and, in the malignant the fear of impending death is replaced by c ful equanimity. These psychological effects a special interest in view of CHAPMAN'S[6] parado observation that when the pain threshold of patients is determined by quantitative methods are found to be oversensitive to painful stimu the skin after the operation. The most plau explanation of the action of leucotomy is still th abolishes suffering rather than pain, removing emotional component and distressing significa The important question whether "primary" d addiction, not due to or ascribed to bodily p should be treated by leucotomy can hardly answered in general terms. Everything depends the original personality of the addict, his stabil his social and occupational adaptation, and the mo support he can expect from his family. The tenden for the patient after the operation to become l self-critical, with weakened will-power and se restraint and a reduced sense of responsibility, w deter the psychiatrist from recommending leucotom in most of these cases.

One had hoped and still may hope that research into the effects of leucotomy in non-psychotic subject may teach us something about the influence of frontal lobe damage on personality, which is often difficult to discern in the mentally disturbed. Even the simple question of whether the beneficial results can be obtained without sacrificing personality assets is not answered by the present observations. SCARFF'S unilateral-leucotomy patients underwent psychometric tests and their intellectual abilities were found to be unchanged, but many workers have made the same claim for the bilateral operation. His estimate of personality change can hardly be regarded as reliable in view of the short period of postoperative observation. The two reports on bilateral leucotomy give one the impression that the relief of pain depends on alterations in the emotional aspects of personality. DYNES and POPPEN classify their cases as either "retarded" or "euphoric" after operation—obviously an oversimplification of a complex and fluctuating clinical change. It is reasonable to assume that personality changes are quantitatively related to the extent of frontal-lobe isolation, but we still o not know how great this must be to abolish intract- ble pain without sacrificing assets of personality. n cases of malignant disease this may be of little onsequence, but it must limit the application of he operation in patients whose pain is not caused by terminal illness.

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[1] Freeman, W., Watts, J. W. *Lancet*, 1946, i, 953.
[2] Otenasek, F. J. *Bull. Johns Hopk. Hosp.* 1948, 83, 229.
[3] Poppen, J. L. *Lahey Clin. Bull.* 1946, 4, 205.
[4] Dynes, J. B., Poppen, J. L. *J. Amer. med. Ass.* 1949, 150, 14.
[5] Scarff, J. E. *Surg. Gynec. Obstet.* 1949, 89, 385.
[6] Chapman, W. P. *J. Amer. med. Ass.* 1949, 140, 18.

Cortisone, A.C.T.H., and Deoxycortone

Hench's dramatic report on 'Cortisone' in rheumatoid arthritis has opened an entirely new field of work, and results are being obtained which could not have been foretold. Their importance, as we have already suggested, lies more in their potentialities than in any method of treatment so far devised: Spies and Stone[1] rightly describe the adrenocorticotropic hormone (A.C.T.H.) as a tool of research. As McNee[2] indicates, long-continued therapy with cortisone or A.C.T.H. carries serious risks; and it is necessary to point out that a plentiful supply of these compounds would not mean the "cure" of rheumatoid arthritis in general. The range of conditions found susceptible to treatment is steadily increasing: Elkinton and his colleagues[3] have confirmed the previous results with A.C.T.H. in rheumatoid arthritis and rheumatic fever and have obtained remissions in disseminated lupus erythematosus, dermatomyositis, and status asthmaticus: Baehr[4] has likewise noted remission in lupus erythematosus, and Pearson, Eliel, and Talbot[5] describe diminution in the size of the spleen and lymph-glands in chronic lymphatic leukæmia, lymphosarcoma, and Hodgkin's disease, and a remission in five cases of acute leukæmia. But Elkinton had to discontinue treatment of one rheumatoid patient because of the development of Cushing's syndrome—a complication also referred to by Baehr—and on cessation of treatment the acute rheumatoid symptoms returned in their original intensity. Another patient showed the symptoms of alkalosis and low potassium associated with hypercorticaladrenalism, and another apparently became refractory to the drug.

The action of the compounds seems to be a general one on the connective tissues of the body, and Ragan[6] says that in patients under treatment with A.C.T.H. there is inhibition of growth of granulation tissue in open wounds and delay of healing in incised wounds: he suggests that cortisone and A.C.T.H. may act by decreasing reactivity of connective tissue to trauma of unknown origin. The fact that the disorders benefited are not associated with the usual symptoms of adrenal insufficiency led Marrian and his colleagues[7] to wonder whether they might be due to an abnormal metabolism of cortisone, rather than to a primarily insufficient supply; they therefore studied the metabolism of a related hormone, progesterone, in rheumatoid patients and found that a much higher proportion than normal was excreted as pregnanediol. This is definite evidence of some abnormality of steroid metabolism, but Marrian wisely takes a very cautious view of its meaning, and does not claim that it has necessarily any bearing on the effect of cortisone. Fitch, Warter, and Seifter[8] now report good results in mild or acute rheumatoid arthritis with "artistone" (21-acetoxypregnenolone) derived from plant sources (steroidal saprogenin). Seifter's ingenious experimental method of testing anti-arthritic properties, developed from the work of Selye and of Ragan and Meyer, has revealed eight other sterol compounds considered promising.

On the chemical side progress is being made apace. Li[9] has shown that comparatively simple polypeptides with adrenocorticotropic activity can be prepared by partial hydrolysis of the ordinary protein A.C.T.H., and in our last issue Dr. and Mrs. C. J. O. R. Morris reported the isolation of a polypeptide (A.C.T.P.) which has, weight for weight, ten times the activity of A.C.T.H. The Nuffield Foundation grants to Cambridge for investigations on A.C.T.H., and to Oxford for study of the synthesis of cortisone and related compounds, should aid further advance.

Arising out of the work on cortisone came the claim by Lewin and Wassén[10] that signs and symptoms in rheumatoid arthritis are removed or reduced by the use of deoxycortone and ascorbic acid in association with one another. Attempts to repeat this observation have led to numerous provisional reports in our columns, some confirming and others denying the the effect. On Nov. 26 we said it was difficult to reconcile it with Selye's work on formalin arthritis in rats: but the paper by Dr. Brownlee, which we publish this week, goes a long way towards bringing the two sets of findings together. Brownlee found that daily doses of deoxycortone with ascorbic acid protected both normal and adrenalectomised rats against formalin arthritis; but, whereas ascorbic acid alone offers some slight protection to normal rats, deoxycortone exacerbates the condition. In adrenalectomised animals ascorbic acid alone has no effect and deoxycortone a much smaller one. At the moment the interpretation of this must be somewhat speculative.

Control of Drugs

In 1948 the total production of soporific drugs in the U.S.A. amounted to 336 tons—the equivalent of about 24 therapeutic doses for each person in the country. The World Health Organisation's expert committee on habit-forming drugs was told this when it met in Geneva this month to consider which drugs should be included by the United Nations in the international conventions which provide for control. Control of synthetic drugs falls within the scope of the 1948 Paris protocol, which came into force on Dec. 1 last year; and one of the new synthetic substances on which the committee heard evidence was a potent analgesic, known as 'Keto-Bemidone,' which has been found particularly liable to produce addiction. This drug belongs to the pethidine group, several members of which the committee had already recommended for control. The committee reiterated its concern over the increased consumption of diamorphine in several countries. In Finland consumption per million inhabitants rose from 6·98 kg. in 1936 to 17·67 kg. in 1947; but it fell slightly to 16·68 kg. in 1948, and the Finnish government estimates that this year it will be 5 kg. In Italy the figure increased from 3·4 kg. in 1936 to 5 kg. in 1947, but fell slightly to 4·26 kg. in 1948.

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1. Spies, T. D., Stone, R. E. *Lancet*, Jan. 7, p. 11.
2. McNee, J. W. *Brit. med. J.* Jan. 14, p. 113.
3. Elkinton, J. R., Hunt, A. D., Godfrey L., McCrory, W. W., Rogerson, A. G., Stokes, J. *J. Amer. med. Ass.* 1949, 141, 1273.
4. Baehr, G. Symposium held at New York Academy of Medicine, Jan. 13, 1950.
5. Pearson, O. H., Eliel, L. P., Talbot, T. R. *Ibid.*
6. Ragan, C. *Ibid.*
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8. See *New York Times*, suppl. Jan. 22.
9. Li, C. H., quoted by Sir R. Robinson. *Nature, Lond.* 1949, 164, 1029.
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Annotations

SOME ACTIONS OF CHLORAMPHENICOL

With our small supplies of the new antibiotics, 'Aureomycin' and chloramphenicol, it has not been possible in this country to obtain first-hand evidence of their usefulness except in a very limited number of infections. Their activity against systemic infections with gram-negative bacteria has been demonstrated in the clinical response of typhoid fever to chloramphenicol, and the response of brucellosis to both drugs; so there was good reason for testing them against *Hæmophilus pertussis*, which is sensitive in vitro to very low concentrations of aureomycin or chloramphenicol.

In experimental infections with *H. pertussis*, aureomycin has proved effective in mice inoculated intracerebrally,[1] and chloromycetin in mice infected intranasally (so far unpublished), but very few clinical trials have been reported. Bell and his colleagues [1] have had encouraging results with aureomycin in 20 children with whooping-cough, more particularly in cases which were treated early. Payne and his co-workers [2] have given chloramphenicol in 50 severe cases in children aged 0–9 years, and found that fever, when present, disappeared on the second day of treatment and that paroxysms of coughing decreased from the third day and usually disappeared by the sixth day, leaving only a "light cough" for a few more days. They obtained good results with rectal and intravenous as well as oral administration of the drug. In this issue Dr. Gray reports good results with chloramphenicol among out-patient children whose progress was assessed from cough-counts (the number of paroxysms of coughing per 24 hours) made by the mothers. The cases were divided at the start of treatment into early or late, according to whether they were in the first or second fortnight of the infection, and alternate patients received chloramphenicol or similar capsules of milk-sugar by mouth. In both groups the treated children showed a rapid reduction in the cough-counts within 4–8 days; whooping and vomiting quickly disappeared, and the harsh hacking cough was replaced by a soft exudative cough more like that of bronchitis. In the controls, the cough-charts show, the recovery was decidedly slower. Any new claim for cure of a disease which has had so many "cures" must be received with caution, but the results with chloramphenicol certainly justify large-scale controlled trials under hospital supervision, and the Medical Research Council, through its antibiotics (non-tuberculous infections) committee, is understood to be already organising such trials in centres throughout the country. The difficulties to be overcome, besides those inherent in any controlled therapeutic trial, include the early recognition of the infection by the practitioner, the persuasion of doctor and parent that hospital treatment is often best for a young child with pertussis, and sufficient supplies of isolation accommodation and trained nurses. Gray also discussed the difficulty of giving children aged 1–3 years an intensely bitter drug like chloramphenicol by mouth. Rectal administration he found to be ineffective, and his only answer at the moment seems to be a stomach-tube; rather than agree to this, many mothers would manage somehow to get powders or capsules down, disguised in jam or syrup, or, as Payne and his colleagues found successful, in honey or orange juice. These American workers also treated 6 cases with rectal suppositories, and 5 cases with intravenous injections of a solution in propylene glycol, and these 11 children were all free of symptoms in five days or less. Gray's dosage for children, established during the trial, was 100 mg. per kg. of bo weight as a loading dose, followed by three-ho maintenance doses of 60 mg. up to the age of 1 y 125 mg. at 1–3 years, and 250 mg. after this age. (of his patients had a short allergic reaction to her f dose, presumably because she was sensitive to so *bacterial* product. Perhaps the main interest in Gra paper lies in the experiments that arose out of his clin trial. He found that the older children under treatm developed a curious weakness of accommodatio print rapidly became blurred when they were readi and vision would recover temporarily after a sh rest. By weight-holding tests Gray showed that ad show a similar weakness of skeletal muscles, as well as accommodation.

What may turn out to be an observation of f reaching significance is that chloramphenicol kills all the bacterial flora of the upper respiratory muco membrane. Gray's serial nasal swabs showed th massive bacterial death, usually amounting to complet sterilisation, occurs within an hour of a single dos The sterility continues for 3–5 days after the end of course of the drug, and it can probably be maintain for as long as is desired by continuing or repeating course. This finding obviously calls for further inqui How far does the sterilisation extend down the respirat tract? And is there any similar effect on the intesti *flora*?

X-RAY CINEMATOGRAPHY

Good angiocardiography has become essential in diagnosis of cardiac lesions, especially in *congen* heart-disease. There are three different ways of obta ing pictures of a radio-opaque substance as it pas through the great vessels and the chambers of the hea These are: (1) ciné-camera photography of a fluo scopic screen, (2) serial radiography using a rap changing device, and (3) roll-film radiography. T method which so far seems to have gained most popular in this country is that employing the rapid chang of cassettes. This has obvious disadvantages: heavy and bulky containers are difficult to feed rapi past the patient; they use an expensive amount film; and the noise is quite alarming. Results fr roll-film photography have lately been described Campbell and Hills,[1] who took serial pictures at o second intervals by a technique [2] adapted from that u in mass radiography. This technique has the merit being relatively inexpensive. Roll-film radiography moreover, a little neater and faster than serial rad graphy; but, judging by the standard at the Bar Hospital, St. Louis, it is no less noisy. In this investi tion adult patients are rarely given an anæsthe so anything that may diminish the ordeal for them welcome.

Cinematography may well prove to be the method choice if sufficient speeds can be obtained; and in t issue Professor Janker, of Bonn, describes how he l succeeded in perfecting a technique for use in ma Professor Janker may be regarded as a pioneer X-ray cinematography; as long ago as 1932 he publis accounts of this type of work in animals.[3] In this coun Prof. K. J. Franklin [4] utilised the technique for a stu of blood-flow in the great veins, and as a result so beautiful cardiovascular studies have emanated from t Nuffield Institute for Medical Research at Oxford.[5]

When a ciné film is projected, the minimum spe which avoids visual flicker is 16 frames per secon the rate of photography should be not less than t or it is not true cinematography. Professor Janke hod employs 18, and occasionally 24, frames per nd with a skin exposure of about 50 röntgen in a iod of 6–8 seconds. Subsequently, each photograph opied up to twenty times, and thus when the film iewed the whole process is slowed down and can be died more closely. Professor Janker uses as a trast medium 70% or 80% organic iodide of which -60 ml. is injected into an arm vein in 1–2 seconds ; this part of the method is much the same as when settes or roll film are used. The illustration accom-nying Professor Janker's article gives some idea of the cellent definition obtained with X-ray cinematography d also of the information which such pictures can er to the physician in diagnosis and to the surgeon in anning an operation. Indeed, this is the only tech-que which allows one to see the blood, or rather a dio-opaque substance, actually flowing through the art.

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[1] Bell, J. G., Patteman, M., Olson, E. J. *Publ. Hlth Rep., Wash.* 1949, 64, 589.

[2] Payne, E. H., Levy, M., Zamora, G. M., Vilarroel, M. S., Canelas, E. Z. *J. Amer. med. Ass.* 1949, 141, 1298.

[1] Campbell, M., Hills, [illegible], 12, 65.

[2] Hills, T. H. *Brit. J* [illegible]

[3] Janker, R. *Dtsch.* [illegible]; *Dtsch. Z. Ch* [illegible] 1933, 240, 52; Di [illegible] Stuttgart, 19

[4] Franklin, K. J., Janker, R. *J. Physiol.* 1934, 81, 134.

[5] Franklin, K. J. Cardiovascular Studies. Oxford, 1948.

APPROVED SCHOOLS

AMONG possible economies being considered in these ard times is a saving on approved schools. The Select ommittee on Estimates have therefore been trying to ecide whether such schools are doing their job.[1] There re 162 approved schools in England and Wales, 124 of hem run by voluntary bodies ; and in Scotland there are 25 schools, all but 1 of them voluntary. There are advantages in both types, the committee think: voluntary societies have a long and good tradition, many of them have a religious background, and their staffs believe that voluntary bodies encourage initiative in headmasters; on the other hand, such schools may be out of the general current of public life, whereas local-government schools are not. The record of success is moderately good. In England and Wales 66% of successes are claimed among the boys and 80% among the girls ; in Scotland the figures are rather better—76·3% for boys and 93·6% for girls. The committee were well satisfied, on the whole, with the conditions in the five schools which they visited ; but they describe one unsuitable and gloomy place where the children were poorly dressed, the atmosphere oppressive, and the gymnasium closed to them in their spare time, the only recreation-rooms being the classrooms. They recommend that conditions here should be remedied with the least possible delay.

Approved schools are expensive ; the weekly cost for senior boys ranges from £3 17*s*. 8*d*. to £9 12*s*. 7*d*. ; for girls it ranges from £3 0*s*. 3*d*. to £6 16*s*. 9*d*. This is doubtless partly due to the need for a relatively high ratio of staff to children. Approved schools are open all the year round, and as the children's leisure, like their school hours, is a learning time, the number of teachers cannot be reduced if results are to be maintained and improved. On the other hand the number of children being admitted has declined year by year since the end of the war—for what reasons we are not told in this report—and it seems that some of the senior girls' schools are to be closed. The committee advise that the possibility of closing more schools should be kept under review.

They suggest no major change in the present dual management of school, by voluntary and statutory bodies, but they think that efficiency would be greater if local government was represented on all voluntary management boards. They also think that foster-care might be used more widely as an alternative to approved-school training. Classifying schools, in which children are studied before being sent to the most appropriate approved schools, have proved very successful. These only cover the needs of half the country at present, and the committee favour the provision of more classifying schools, believing that by their use the time some children spend in an approved school might be reduced. They hold that facilities for practical training should be introduced where they do not already exist, and should be related as closely as possible to outside apprenticeship and vocational requirements. Altogether it looks as though we cannot save much here : the money spent on approved schools is in the main well spent.

POST-WAR RESEARCH

IN the years following the end of the war the activities of the Medical Research Council fell broadly into three phases : contraction, reorientation, and expansion. The council's report on these years[1] opens with a brief epitaph on its short-term investigations during the war[2] :

> "It may be said here, in retrospect, that when the fundamental knowledge available was already substantial, investigations of this type generally led to satisfactory solutions of immediate value ; but that when fundamental knowledge was inadequate, as in the case of wound shock, for example, the additional information gained under wartime conditions did not generally provide a basis for complete control, although the results often gave useful practical help of a limited kind. This is a lesson of great significance in planning for the future."

Among the war-time committees which have been disbanded are those concerned with war wounds, clinical trials and synthesis of penicillin, brain injuries, traumatic shock, malaria, typhus, therapeutic requirements, and military personnel research. Though the brain-injuries committee no longer functions, the cognate committee on nerve injuries remains in being, as also do the food-rationing (special diets) advisory committee and the Royal Naval personnel research committee ; but the largest war-time activity carried over into peace is the operation, on behalf of the Ministry of Health, of the Public Health Laboratory Service.

For research-workers the personal reorientation to peace-time conditions was not easy.

> "In other cases, especially among the leaders, the change to be faced was even greater, because those who were controlling and directing other men engaged on wartime problems had little time to engage personally in research. These men have had to re-adapt their lives, and, after working in gregarious conditions while helping others in the practical solution of war problems, have had to settle down again to the laboratory bench with entirely different problems to study."

The council itself has been faced with shortages of accommodation, of equipment, and also of trained men. This last shortage is attributed to the long gap in recruitment, and to a lesser extent to war casualties ; and "added to this is the competition of other expanding medical and scientific services for the limited man-power available." Among the main preoccupations of the council, occupational health and nuclear physics have taken an increasingly prominent place ; and new research units have been set up as follows : a pneumoconiosis unit at Cardiff, an industrial-medicine unit at Birmingham, blood-products, blood-group, and blood-transfusion units in London, a dental unit in London, a clinical chemotherapeutic unit at Glasgow, a clinical endocrinological unit at Edinburgh, an electromedical unit at Stoke Mandeville, a building unit in London, a toxicology unit at Porton, a biophysics unit in London, a radiobiological unit at Harwell, a vision unit in London, a unit on the molecular structure of biological systems at Cambridge, a social-medicine unit in London, and a unit on climate and working efficiency at Oxford.

The cost of instituting these units and of expanding the council's other establishments, including the National

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[1] Approved Schools. Eighteenth Report from the Select Committee on Estimates : Session 1948–49. H.M. Stationery Office. Pp. 128. 4*s*.

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Annotations

SOME ACTIONS OF CHLORAMPHENICOL

WITH our small supplies of the new antibiotics, 'Aureomycin' and chloramphenicol, it has not been possible in this country to obtain first-hand evidence of their usefulness except in a very limited number of infections. Their activity against systemic infections with gram-negative bacteria has been demonstrated in the clinical response of typhoid fever to chloramphenicol, and the response of brucellosis to both drugs; so there was good reason for testing them against *Hæmophilus pertussis*, which is sensitive in vitro to very low concentrations of aureomycin or chloramphenicol.

In experimental infections with *H. pertussis*, aureomycin has proved effective in mice inoculated intracerebrally,[1] and chloromycetin in mice infected intranasally (so far unpublished), but very few clinical trials have been reported. Bell and his colleagues [1] have had encouraging results with aureomycin in 20 children with whooping-cough, more particularly in cases which were treated early. Payne and his co-workers [2] have given chloramphenicol in 50 severe cases in children aged 0–9 years, and found that fever, when present, disappeared on the second day of treatment and that paroxysms of coughing decreased from the third day and usually disappeared by the sixth day, leaving only a "light cough" for a few more days. They obtained good results with rectal and intravenous as well as oral administration of the drug. In this issue Dr. Gray reports good results with chloramphenicol among out-patient children whose progress was assessed from cough-counts (the number of paroxysms of coughing per 24 hours) made by the mothers. The cases were divided at the start of treatment into early or late, according to whether they were in the first or second fortnight of the infection, and alternate patients received chloramphenicol or similar capsules of milk-sugar by mouth. In both groups the treated children showed a rapid reduction in the cough-counts within 4–8 days; whooping and vomiting quickly disappeared, and the harsh hacking cough was replaced by a soft exudative cough more like that of bronchitis. In the controls, the cough-charts show, the recovery was decidedly slower. Any new claim for cure of a disease which has had so many "cures" must be received with caution, but the results with chloramphenicol certainly justify large-scale controlled trials under hospital supervision, and the Medical Research Council, through its antibiotics (non-tuberculous infections) committee, is understood to be already organising such trials in centres throughout the country. The difficulties to be overcome, besides those inherent in any controlled therapeutic trial, include the early recognition of the infection by the practitioner, the persuasion of doctor and parent that hospital treatment is often best for a young child with pertussis, and sufficient supplies of isolation accommodation and trained nurses. Gray also discussed the difficulty of giving children aged 1–3 years an intensely bitter drug like chloramphenicol by mouth. Rectal administration he found to be ineffective, and his only answer at the moment seems to be a stomach-tube; rather than agree to this, many mothers would manage somehow to get powders or capsules down, disguised in jam or syrup, or, as Payne and his colleagues found successful, in honey or orange juice. These American workers also treated 6 cases with rectal suppositories, and 5 cases with intravenous injections of a solution in propylene glycol, and these 11 children were all free of symptoms in five days or less. Gray's dosage for children, established during the trial, was 100 mg. per kg. of bo weight as a loading dose, followed by three-hou maintenance doses of 60 mg. up to the age of 1 ye 125 mg. at 1–3 years, and 250 mg. after this age. O of his patients had a short allergic reaction to her fi dose, presumably because she was sensitive to so bacterial product. Perhaps the main interest in Gray paper lies in the experiments that arose out of his cli trial. He found that the older children under treatme developed a curious weakness of accommodatio print rapidly became blurred when they were readin and vision would recover temporarily after a sho rest. By weight-holding tests Gray showed that adult show a similar weakness of skeletal muscles, as well as accommodation.

What may turn out to be an observation of far reaching significance is that chloramphenicol kills o all the bacterial flora of the upper respiratory mucou membrane. Gray's serial nasal swabs showed that massive bacterial death, usually amounting to complete sterilisation, occurs within an hour of a single dose The sterility continues for 3–5 days after the end of course of the drug, and it can probably be maintaine for as long as is desired by continuing or repeating th course. This finding obviously calls for further inquir How far does the sterilisation extend down the respirato tract ? And is there any similar effect on the intestin flora ?

X-RAY CINEMATOGRAPHY

GOOD angiocardiography has become essential in t diagnosis of cardiac lesions, especially in congenit heart-disease. There are three different ways of obtai ing pictures of a radio-opaque substance as it pass through the great vessels and the chambers of the hea These are: (1) ciné-camera photography of a fluor scopic screen, (2) serial radiography using a rapi changing device, and (3) roll-film radiography. T method which so far seems to have gained most populari in this country is that employing the rapid changi of cassettes. This has obvious disadvantages: t heavy and bulky containers are difficult to feed rapid past the patient; they use an expensive amount film; and the noise is quite alarming. Results fro roll-film photography have lately been described l Campbell and Hills,[1] who took serial pictures at on second intervals by a technique [2] adapted from that use in mass radiography. This technique has the merit o being relatively inexpensive. Roll-film radiography i moreover, a little neater and faster than serial radi graphy; but, judging by the standard at the Barn Hospital, St. Louis, it is no less noisy. In this investig tion adult patients are rarely given an anæstheti so anything that may diminish the ordeal for them welcome.

Cinematography may well prove to be the method choice if sufficient speeds can be obtained; and in th issue Professor Janker, of Bonn, describes how he h succeeded in perfecting a technique for use in ma Professor Janker may be regarded as a pioneer X-ray cinematography; as long ago as 1932 he publish accounts of this type of work in animals.[3] In this count Prof. K. J. Franklin [4] utilised the technique for a stu of blood-flow in the great veins, and as a result so beautiful cardiovascular studies have emanated from th Nuffield Institute for Medical Research at Oxford.[5]

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1. Campbell, M., Hills, T. H. *Brit. Heart J.* 1950, 12, 65.
2. Hills, T. H. *Brit. J. Radiol.* 1948, 21
3. Janker, R. ; *Dtsch. Z. Chi* Stuttgart, 19 1933, 240, *J. Physiol.* 1934, 81, 134.
4. Franklin, K.
5. Franklin, K. J. Cardiovascular Studies. Oxford, 1948.

ıod employs 18, and occasionally 24, frames per ıd with a skin exposure of about 50 röntgen in a ɔd of 6–8 seconds. Subsequently, each photograph ɔpied up to twenty times, and thus when the film ewed the whole process is slowed down and can be ied more closely. Professor Janker uses as a rast medium 70% or 80% organic iodide of which 30 ml. is injected into an arm vein in 1–2 seconds; his part of the method is much the same as when ettes or roll film are used. The illustration accompying Professor Janker's article gives some idea of the ellent definition obtained with X-ray cinematography also of the information which such pictures can r to the physician in diagnosis and to the surgeon in nning an operation. Indeed, this is the only techue which allows one to see the blood, or rather a io-opaque substance, actually flowing through the rt.

APPROVED SCHOOLS

AMONG possible economies being considered in these d times is a saving on approved schools. The Select mmittee on Estimates have therefore been trying to ide whether such schools are doing their job.[1] There 162 approved schools in England and Wales, 124 of m run by voluntary bodies; and in Scotland there are schools, all but 1 of them voluntary. There are vantages in both types, the committee think: luntary societies have a long and good tradition, ny of them have a religious background, and their ffs believe that voluntary bodies encourage initiative headmasters; on the other hand, such schools may be t of the general current of public life, whereas localvernment schools are not. The record of success is derately good. In England and Wales 66% of ccesses are claimed among the boys and 80% among the ls; in Scotland the figures are rather better—76·3% r boys and 93·6% for girls. The committee were ell satisfied, on the whole, with the conditions in the e schools which they visited; but they describe one suitable and gloomy place where the children were orly dressed, the atmosphere oppressive, and the mnasium closed to them in their spare time, the ly recreation-rooms being the classrooms. They commend that conditions here should be remedied ith the least possible delay.

Approved schools are expensive; the weekly cost for nior boys ranges from £3 17*s.* 8*d.* to £9 12*s.* 7*d.*; for irls it ranges from £3 0*s.* 3*d.* to £6 16*s.* 9*d.* This is oubtless partly due to the need for a relatively high tio of staff to children. Approved schools are open all e year round, and as the children's leisure, like their hool hours, is a learning time, the number of teachers nnot be reduced if results are to be maintained and proved. On the other hand the number of children eing admitted has declined year by year since the end f the war—for what reasons we are not told in this report -and it seems that some of the senior girls' schools are be closed. The committee advise that the possibility f closing more schools should be kept under review.

They suggest no major change in the present dual anagement of school, by voluntary and statutory odies; but they think that efficiency would be greater local government was represented on all voluntary anagement boards. They also think that fosterare might be used more widely as an alternative to pproved-school training. Classifying schools, in which hildren are studied before being sent to the most ppropriate approved schools, have proved very uccessful. These only cover the needs of half the ountry at present, and the committee favour the rovision of more classifying schools, believing that by their use the time some children spend in an approved school might be reduced. They hold that facilities for practical training should be introduced where they do not already exist, and should be related as closely as possible to outside apprenticeship and vocational requirements. Altogether it looks as though we cannot save much here: the money spent on approved schools is in the main well spent.

POST-WAR RESEARCH

IN the years following the end of the war the activities of the Medical Research Council fell broadly into three phases: contraction, reorientation, and expansion. The council's report on these years[1] opens with a brief epitaph on its short-term investigations during the war[2]:

> "It may be said here, in retrospect, that when the fundamental knowledge available was already substantial, investigations of this type generally led to satisfactory solutions of immediate value; but that when fundamental knowledge was inadequate, as in the case of wound shock, for example, the additional information gained under wartime conditions did not generally provide a basis for complete control, although the results often gave useful practical help of a limited kind. This is a lesson of great significance in planning for the future."

Among the war-time committees which have been disbanded are those concerned with war wounds, clinical trials and synthesis of penicillin, brain injuries, traumatic shock, malaria, typhus, therapeutic requirements, and military personnel research. Though the brain-injuries committee no longer functions, the cognate committee on nerve injuries remains in being, as also do the food-rationing (special diets) advisory committee and the Royal Naval personnel research committee; but the largest war-time activity carried over into peace is the operation, on behalf of the Ministry of Health, of the Public Health Laboratory Service.

For research-workers the personal reorientation to peace-time conditions was not easy.

> "In other cases, especially among the leaders, the change to be faced was even greater, because those who were controlling and directing other men engaged on wartime problems had little time to engage personally in research. These men have had to re-adapt their lives, and, after working in gregarious conditions while helping others in the practical solution of war problems, have had to settle down again to the laboratory bench with entirely different problems to study."

The council itself has been faced with shortages of accommodation, of equipment, and also of trained men. This last shortage is attributed to the long gap in recruitment, and to a lesser extent to war casualties; and "added to this is the competition of other expanding medical and scientific services for the limited man-power available." Among the main preoccupations of the council, occupational health and nuclear physics have taken an increasingly prominent place; and new research units have been set up as follows: a pneumoconiosis unit at Cardiff, an industrial-medicine unit at Birmingham, blood-products, blood-group, and blood-transfusion units in London, a dental unit in London, a clinical chemotherapeutic unit at Glasgow, a clinical endocrinological unit at Edinburgh, an electromedical unit at Stoke Mandeville, a building unit in London, a toxicology unit at Porton, a biophysics unit in London, a radiobiological unit at Harwell, a vision unit in London, a unit on the molecular structure of biological systems at Cambridge, a social-medicine unit in London, and a unit on climate and working efficiency at Oxford.

The cost of instituting these units and of expanding the council's other establishments, including the National

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BLE VI—USE OF SOCIAL ORGANISATIONS AFTER LEAVING

Group	Activities maintained	Activities given up	New activities joined after leaving
itution (50) ..	11 (22%)	0	10 (20%)
ool (51) ..	27 (53%)	14 (25%)	0

nual of directions has been followed, but we have parted from his scoring instructions in that we have t credited those test items which the child, because of ecial restraint or lack of opportunity, fails to perform. ll himself points out that if people in some institutional vironments are credited with such scores their total ore will be materially affected. As the object of this rvey is to compare the effects of an institutional vironment with those of a normal environment, it emed desirable to us to present a score which was free om this bias.

The social quotients were 92·9 for 50 institution chilren and 106·5 for 52 school-children. When we compared dividual items of the social maturity tests, we deduced hat the institution child is less in touch with the outside vorld than the school-child, whether by newspaper, adio, or group life; he does not get so far from home nd is more dependent on others to plan for him.

Some estimate of the degree to which institution life estricts opportunities for self-maturation can be assessed by crediting the scores of the institution child for those items which he was unable to perform "because of special restraint or lack of opportunity, but which he formerly did perform successfully when no restraints were imposed, or where the opportunity was present, or which he would perform habitually, or could quickly learn to perform if such limitations to behaviour were removed." (These are Doll's N.O. and F scores). When these items are credited the institution child's social quotient rises 4·8 points to 97·7. Thus of the difference of 13·6% between the institution quotients and the control quotients, 4·8% can be attributed to lack of opportunity.

Two examples show the extremes of general social capacity found among these children.

CASE 9.—The institution child with the lowest S.Q. (70) was an illegitimate boy of 16 who had been born in an institution, discharged with his mother to live with the maternal grandparents, and readmitted aged 2 in a state of malnutrition; he was transferred to a children's home when aged 5. He had no contacts with his family and the staff found him of wild and uncertain temper; he was regarded as "dotty" (mentally defective). Actually he had a mental age of 10·2 at the age of 16, an I.Q. of 75, and scored 34 in the matrices test (grade IV); so he was not educationally subnormal. He was educationally retarded, with a reading age of $7^1/_2$ and an arithmetic age of 7·8. He was clumsy, uncouth, his school books were appallingly dirty. Placed in a farm training school, he made no friends, had no hobbies, gave no special trouble. He had written one letter only to the matron of his old institution, could only read very simple material, played no skilled games, had no say in choosing his clothes, belonged to no group of his own age, took no interest in current events or newspapers, had never travelled any distance by himself, not even to a nearby town, had 2s. a week pocket-money but no other means. He could not look after his own health without direction. His social age was 11·2 years. The psychologist's impression at the follow-up interview was that "he might give trouble."

CASE 10.—In contrast, the institution child of the highest social capacity was an illegitimate girl, also born in an institution, and brought up in a foster home until she was 11; she had spent the last 4 years in an institution. She had frequent contact with her mother, then her only known relation, and though she had no close friends was popular with her schoolmates and in the Guides. She was a girl of superior intelligence (I.Q.129) but lost her chance for a scholarship because her foster-mother developed eccentric behaviour, and the child was transferred to an institution at the time she should have sat for her examination. At school she had been an asset in the social life, and was vice-captain when she left. In the institution the matron describes her as "the only really intelligent girl I have got, . . . trustworthy, a pleasant personality." She left the institution to live with an elderly aunt and her unmarried daughter. She wanted to be a nurse but her first employment was that of a clerk in the local Co-operative Society. She thinks of it as a dead-end job, wants to get a secretarial post, and means to attend night school and to learn shorthand and typing. Her friends were mainly from her cousin's circle, a good deal older than herself. Her mother had died in the interval between the first examination and the follow-up visit and this girl had dealt competently and efficiently with the necessary correspondence.

DISCUSSION

The outstanding feature in the social history of these institution children is the high proportion (75%) of children who are not technically orphans. More than a third (37%) of these non-orphans, however, had parents who were certified as mental defectives or of unsound mind, and nearly half (47%) had parents or sibs who were in mental hospitals or mental-deficiency colonies. None of the control group of children had insane or defective parents, and only 6 (12%) had defective sibs.

Besides the difference in domestic environment between the two groups, there is also a difference to be presumed in constitutional endowment. In our institution sample, hereditary factors are probably of considerable importance in adaptation. For example, 37% had relatives for whom evidence was available of antisocial acts. None of the control group had such relatives.

To illustrate the effect of these constitutional factors the social quotients of two groups of children have been compared. A small group of illegitimate children were excluded because there was insufficient information about one or other parent. A group of 28 children whose parents had been admitted to mental hospitals or mental-deficiency colonies, or were guilty of bigamy, desertion, or indecent assault on the children, were compared with a group of 63 children, either in institutions or brought up in their own homes, whose parents had not been admitted to mental hospitals or defective colonies and had not been recorded as guilty of antisocial conduct. The average social quotient of the first group was 91·6, and of the second 105·0. The difference of 13·6% is exactly the same as that between the average social capacity of the institution children and the school controls. That is to say, the same degree of social retardation is to be observed whether the children are grouped according to environmental circumstances (home or institution) or to constitutional factors (unsatisfactory or satisfactory parentage). Such a finding certainly weakens the case of those who argue that any social retardation is attributable exclusively to environmental influences.

In America, the concept of the "institution child" as a clinical type has been developed and elaborated. Lowrey (1940) in a study of personality distortion and early institutional care, claims that only those children admitted to institutions before the age of 2 developed a syndrome of personality distortion; this was characterised by unsocial behaviour, hostile aggression, inability to give or receive affection, inability to understand or accept limitations, and considerable insecurity in adapting to environment. Can this theory of the dangers of institutional life beginning before the age of 2 years be confirmed? Comparison of the social quotients of children admitted before and after the age of 2 years does not seem to show this age to be critical; the quotient was 93·1 for 16 children admitted under 2, and 92·8 for 34 children admitted over this age.

Goldfarb (1943) has studied the effects of institutional life in more detail, but the average I.Q. of his institution group was only 72·39 (Wechsler Bellevue) compared with 95·37 for his control group. The reported social failure of these American institution children could equally well be attributed to dull intelligence. As already the institution; 4 children had made no choice and 1 girl wept when this question was put to her. Of the girls, 6 had decided on children's nursing, 5 on hospital nursing, 4 on domestic service, and 1 on laundry work; 1 girl hoped to be a physical-training instructress, and 1 to be an actress. Many of the boys wanted to work on a farm (8); 2 specified poultry-farming, 2 dairy-farming. Engineering in some form was also popular (8), the boys specifying electrical engineering, radio-mechanic, and garage work in 6 instances. More individual choices were draughtsman, plumber, butler, and comedian.

In the school group, 3 children made no choice. Among the girls the most popular choice was factory hand (11), office clerk (6), sempstress (5), waitress (2), and shop-hand, telephonist, hairdresser, teacher (1 each). No girl chose domestic service or nursing. Among the schoolboys the choices were factory hand (4), engineer (3), vanboy (3), building trade (2), carpenter (2), and 1 each of tailor, draughtsman, painter, toolmaker, labourer, clerk, and Services. No boy in the control group was interested in farm work.

OCCUPATION

It is not to be expected that there should be a 100% correspondence between the job actually secured and the vocational choice. In the institution group 40% and in the school group 58% had this good fortune.

Even in the short time—at the most a year—since the children had left school, between the first interview and the follow-up visit, 22% of the institution group and 36% of the controls had changed their jobs. Seven (14%) of the institution children failed to adjust themselves to working conditions and returned to the institution (see table III). None of the control group failed in this way.

TABLE III—OCCUPATION DETAILS OF CHILDREN WHO RETURNED TO INSTITUTION

Child	Institution	Job chosen	Job taken	I.Q.	Time at work (months)
1	A	None	Nurse-housemaid	75	3
2	B	Children's nurse	Private service	71	11
3	C	Farm hand	Farm	84	10
4	C	Farm hand	Garden boy	65	9
5	C	Dairy hand	Garden boy	86	8
6	D	Cook	Farm trainee	72	12
7	H	Farm hand	Upholsterer	80	5

The 7 unsuccessful children came from five different homes; only one had chosen the type of job found for him. Their average intelligence was dull (I.Q.76), and their average period in work was 8 months. The following examples illustrate the type of failure:

CASE 1.—A girl who, when boarded out, was foolish with boys and inclined to drop things and smash crockery. Regarded in the home as "daft," irresponsible, inefficient, a slacker, unreliable. Did not get on with children in her first place in domestic service. Subsequently this very dull unstable girl made a successful adaptation in domestic service.

CASE 3.—This boy was described as wilfully disobedient at school, and hasty and hot-tempered. In lodgings he knocked down the landlady. He was in trouble in his second job for clumsiness; described as an "uncertain fellow."

In both groups several children said they looked forward to further promotion or to acquiring further skills; 17 (34%) institution children with an average I.Q. of 98·7, and 12 (23%) school-children with an average I.Q. of 109·9, had this ambition.

FRIENDS

It is particularly important that the institution child—who has usually been deprived of one or both parents, or comes from a disorganised family—should have the capacity and opportunity to develop personal relationships, not only with an adult, but also with children of his own age. In this survey, children were asked at the interview about their friendships, whether withi institution group or the school community, or outs Results are shown in table IV. The following is example of the friendless institution child.

CASE 8.—Both parents were mentally defective, the fa being under supervision, and the mother, known to N.S.P.C as a "bad mother," having been admitted to a defective institution when this girl was 5. The child has b in same girls' home for 9 years; the staff find her dull a retiring. She has been brought up with an older and tw younger sisters in the same institution, has visited her gra parents and been to visit her father for a weekend. Th psychologist found her of dull intelligence (I.Q.77); she wa unresponsive and unwilling to talk or to commit hersel School was "not much" liked.

TABLE IV—FRIENDSHIPS INSIDE OR OUTSIDE COMMUNIT

Group	With friends in institution	With friends at school	With friends outside	With no friend
Institution (51) ..	35 (69%)	21 (41%)	3 (6%)	3 (6%)
School (45) ..	—	36 (80%)	10 (22%)	1 (2%)

SOCIAL ACTIVITIES

Opportunities for organised social activities—f example, attendance at youth clubs, or organisations su as Scouts, Army cadets, Guides—were compared. Of t 51 institution children, 11 (22%) took part in su activities, as against 37 (79%) of 47 school controls.

Since most of the institution children made th friends within their own community, it is of interest find out how these friendships fare once the childr have left the institution. Table V gives our findin One of the friendless institution children (case 8) h already been described as of dull intelligence. Anoth 7 children were also dull, their I.Q.s ranging from 65 83, with an average of 74. Of the 8 children of avera intelligence, 2 had returned to relations and we obviously in the process of working out their position the family circle; 3 more children were placed in isolat foster-homes. Two boys are left who were well plac as far as social contacts were concerned, but who characters made personal relationships difficult.

We also compared the use made, by the two groups, organised social activities after the children had le school or institution. Results are shown in table VI.

CONTACTS WITH THE OPPOSITE SEX

Among adolescents contacts with the opposite se begin to be significant. Of 19 institution girls 2 (10% and of 27 schoolgirls 13 (48%), had boy friends or spe some of their leisure time with boys. The average I. of the girls in the institution group was 98, and of tho in the school group 99. The numbers of boys wh showed interest in girls were 4 (13%) out of 31 in th institution group (average I.Q. 87), and 5 (20%) out o 25 in the school group (average I.Q. 96). It was note that of the institution boys interested in girls, 3 we of dull intelligence.

TABLE V—FRIENDSHIPS AFTER LEAVING COMMUNITY

Group	Old friends retained	New friends made	No friends
Institution (51) ..	22 (44%)	15 (30%)	16 (32%)
School (52) ..	41 (80%)	20 (39%)	6 (12%)

GENERAL SOCIAL CAPACITY

The two groups were also assessed by Doll's (194 Vineland social maturity test. One of us has publish elsewhere his experience in the use of this test with series of several hundred children (Bodman 1946). Doll ctors a reasonable opportunity to consult and meet eir colleagues and to refresh mind and body."

he report comments on the very small number of lications to practise in the Highlands, attributing mainly to the lack of houses. Moreover, "the mittee have noted with concern that in several ances where no other suitable house was available the ring or deceased doctor's residence has been bought an intermediary before the vacancy has been filled." se transactions have been within the law.

SIZE OF LISTS

The committee do not accept the permitted maximum 4000 patients "as any proper indication of the number o can be adequately served with justice to both patient l doctor."

> "The Committee would stress that a reduction to a ower figure should be regarded as a step which must be aken (*a*) if a satisfactory standard of service is to be rovided by practitioners to the general public, and (*b*) if he medical profession is to be allowed a reasonable amount f leisure in the conduct of their lives."

The report notes a tendency by local bodies to disperse all practices when they fall vacant, or to transfer patients in these practices to doctors already on the dical list. This course, it seems, has been defended preferable to advertising a vacancy unlikely to attract ny applicants.

> "While this view may at times have certain advantages, he Committee hold that this method of disposing of prac- ices other than those of very small numbers should not e regarded as normal or desirable. They viewed with oncern the action of an Executive Council in dispersing without any allocation the patients in two practices where he combined total was over 4000."

cordingly the committee have recommended that by ulation executive councils should be denied authority disperse a practice or to transfer patients to another ctor when this seems inadvisable to the committee.

UNDERDOCTORED AREAS

The committee express the view that in the following eas the need for additional doctors appears to be ablished:

ecutive council, counties	*Area*
yll and Bute	Southend district of Kintyre
gus	Forfar
r	Dalry; Kilmarnock and Hurlford; Tarbolton, Coylton, and Drongan
mbarton	Alexandria and Renton; Dumbarton
e	Buckhaven, Methil, Leven, and East Wemyss; Cowdenbeath and Lochgelly; Dunfermline, Rosyth, Inverkeithing, and Charleston
nark	Airdrie; Bellshill
thians and Peebles	Bathgate; Musselburgh; Newtongrange and Gorebridge; Tranent
nfrew	Greenock; Johnstone; Paisley; Port Glasgow; Renfrew
rling and Clackmannan	Denny, Dunipace, and Bonnybridge; Falkirk; Grangemouth; Polmont

In the following areas, the committee believe, "addi- nal doctors would appear to be desirable":

ecutive council, counties	*Area*
r	Ardrossan, Saltcoats, and Stevenston; Kilbirnie and Glengarnock
ithness	Wick
mfries	Annan; Ecclefechan and Eaglesfield; Kirkconnel, Sanquhar, and Wanlockhead
mbarton	Clydebank
e	Kirkcaldy and Dysart
nark	Coatbridge; Hamilton; Harthill; Larkhall; Motherwell; Shotts
thians and Peebles	Bo'ness; West Calder and Addiewell; Whitburn
ss and Cromarty	Dingwall
xburgh, Berwick, and Selkirk	Galashiels
rling and Clackmannan	Alloa; Cowie, Plean, and Bannockburn; Lennoxtown
tland	Lerwick and Bressay
ty of Dundee	The area generally

The committee conclude: (1) that in general, with e exception of some districts in the Highlands, rural parts are not inadequately supplied with doctors; and (2) that some industrial parts are under-doctored. On the ground that circumstances are constantly changing, the committee are opposed to declaring any area "closed."

ELECTION CANDIDATES

In addition to those named in our last issue (p. 128) the following medical men and women are standing as parliamentary candidates.

Aberdare.—Alexander Wilson, M.A. Camb., L.M.S.S.A. (Communist).
Kingston-upon-Thames.—Nora Johns, M.B. Lond. (Lab).
London and Westminster.—J. A. Gorsky, L.M.S.S.A. (L).
Motherwell.—A. D. Robertson, M.B. Edin. (C and L).

Disabilities

44. PROLAPSED INTERVERTEBRAL DISC

I HAVE now learnt that a bad attack of sciatica may take six months or more to get well. When one of my general-practitioner friends told me this last summer I hardly believed him; and the specialists skilfully avoided giving a prognosis. Six months gives one ample time to ruminate and reflect on the many theories of causation.

Having a long back, with an extra lumbar vertebra, I always found the rugger scrum rather trying; and so are a few hours at the operating-table. My first real attack of lumbago was at the age of 25. It started during a game of squash whilst taking a difficult backhand shot: there was a feeling of something snapping in the back followed immediately by pain. A few days later I went off to winter sports with some misgiving, but the pain disappeared after the first fall. During the next fifteen to twenty years attacks of lumbago recurred—usually quite suddenly after some trivial movement, such as bending down to open a drawer or leaning over to open a car door. Once it started while I was playing a golf shot out of a bunker; but sometimes it came on several days after exercise. The pain usually subsided after a few days in bed; but there was also a chronic backache, making it difficult to bend over a bed or over a golf putt. It was impossible to do any weeding in the garden, and operating-tables had to be specially high. There was also occasional pain in the buttock, brought on by sitting for more than an hour or so.

Many treatments were tried. Manipulation, with or without anæsthesia, gave little relief. Physiotherapy in various forms—infra-red rays to the back, the "hot squat" of diathermy, or short-wave diathermy, each followed by massage—was comforting, but did not cure. (Nevertheless, I remain grateful to the many charming damsels who sweated in vain on my account.) Injections of procaine into tender nodules in the back or buttock also had little effect. Once my doctor produced a dart of pain down my leg by introducing the needle into one of these nodules. When I asked what he proposed to do next, he answered "blow it up, and break it up." He advanced with the largest syringe I have seen and "blew it up"; afterwards he applied a miniature road-drill and "broke it up." It took a week or two for the hole in the skin to heal.

The climax came when, a few days after a long weekend at golf, I rose from bed in the small hours of the morning and was quite unable to get back. I tried a frontal assault, and a rear attack, and then tried to crawl in on hands and knees—but all to no avail. My kind wife placed a mattress on the floor, and there I remained for several days till the ambulance-men arrived. The only way I could get to my feet was by making the spine rigid and being pulled up "in one piece." This was at the height of the disc season, and when the surgeon asked me to choose between several weeks in bed, followed by several months with plaster-of-paris, and an operation, I unhesitatingly chose the latter.

noted, an attempt was made in our study to match the intelligence levels in the two groups.

CONCLUSIONS

1. The children brought up in institutions were less mature socially than those in the control group, as measured by the Vineland social maturity test.

2. This relative lack of maturity is shown in fewer contacts with the community and the outside world, whether by organised social activities, the radio or press. Less advantage is taken of the opportunity to explore the neighbourhood or to travel any distance from home. Less initiative is shown in taking responsibility or in making practical plans for the future.

3. A little more than a third of the difference in maturity can be attributed to lack of opportunity and the restrictions associated with institutional life.

4. Of the institution children 30% had no contact with any relatives.

5. Less than 6% of institution children had no friends while in the institution, but over 30% were friendless after leaving the institution.

6. Before leaving, less than a quarter of institution children belonged to some kind of youth organisation compared with more than half the school group; but after leaving another 20% of the institution group joined organised social activities, while more than a quarter of the control group abandoned youth organisations.

7. Nearly 5 times as many girls in the control group, compared with the institution girls, showed an interest in boys. There was not such a marked difference among the boys: 1 institution boy in 8, and 1 schoolboy in 5, showed an interest in girls.

8. Only 40% of institution children were successful in obtaining the occupation of their choice, compared with nearly 60% of the controls.

9. Only 22% of institution children had changed their jobs, compared with over 35% of the control group.

10. Rather more than 1 in 7 institution children failed in their first job. Except for 1 boy they were all of dull, if not very dull, intelligence.

11. A greater proportion (over a third) of institution children expressed themselves as looking forward to further promotion or acquiring further skill; less than a quarter of the controls showed this ambition, which seemed to be associated with at least average intelligence.

12. A very striking discrepancy appears in the family histories of the two groups of children. Among the institution children 18% had relatives in mental hospitals, another 18% had relatives in mental-deficiency institutions, and 37% had relatives guilty of antisocial behaviour. Among the control group there were no relatives suffering from mental illness or guilty of antisocial behaviour: 11·5% of the control group had mentally defective sibs, and nearly a quarter had neurotic relatives.

13. The very high proportion of institution children with relatives of proved defect, disease, or instability of mind (72·4%) suggests that inherited constitutional factors contribute to their relative social immaturity.

14. When all the children—whether from institutions or schools—are regrouped according to the mental stability or otherwise of their parents, it is found that the differences in social maturity are exactly the same as when they are grouped according to the environment in which they have been raised. This finding suggests that constitutional factors are at least as important as environmental factors in social maturation.

We wish to thank the National Association of Mental Health, whose provisional council sponsored this investigation; and the Nuffield Provincial Hospitals Trust, who made the survey financially possible. We are also grateful to many public-assistance committees and the executive committees of various voluntary organisations for permission to examine children in their institutions, and to matrons and of homes and institutions for their coöperation. We indebted also to the Chief Education Officer of the C Bristol for providing us with facilities for the examinat a control group.

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SCOTTISH MEDICAL PRACTICES COMMITTEE

First Report

WHEREAS England and Wales have an average of 730 people to the square mile, Scotland has only 170; and round the coast 160 different islands are inhabited. The difficulties of providing for a scattered and sometimes isolated population are reflected in the first report of the Scottish Medical Practices Committee which was issued last week.

MEMBERS

Since the inception of the National Health Service on July 5, 1948, 504 applications for inclusion in the medical lists of executive councils have been received. Of these applications, 148 were to establish new practices or to practise in partnership with a doctor already on a medical list; 243 were to extend an established practice into the area of an adjoining executive council; 38 were from doctors selected to fill advertised vacancies; and 75 were for limited purposes only—e.g., to serve staff of institutions.

The number providing general medical services rose from 2339 in July, 1948, to 2416 at the beginning of last December. These 2416 have undertaken to provide services as follows: (1) general medical and maternity medical services, 2006; (2) general medical services only, 315; and (3) maternity medical services only, 3. The remaining 92 are on medical lists for limited purposes.

ADMISSION TO LISTS

The report expresses concern at the length of the interval between the occurrence of a practice vacancy and the time when the final decision about filling it becomes effective, especially in cases where an appeal has been taken to the Secretary of State.

> "They [the committee] have been concerned at the inevitable hardship occasioned to their nominee, who is debarred from making any arrangements of a permanent nature until the Secretary of State has given his decision and are advised that patients tend to make other arrangements for medical care during the interim period, with the result that the practice transferable to the successor has decreased in numbers and has presumably become less attractive than when advertised."

The committee understand, however, that the present procedure may be modified.

DISTRIBUTION OF PRACTITIONERS

In surveying reports from executive councils, the committee have been impressed by the extent to which the country is served by doctors working in single-practice districts.

> ". . . this is inevitable in certain island communities, but on the mainland, and particularly in the northern counties, many practice areas are limited and confined by geographical factors—mountains or sea inlets—and the doctor in a district may be isolated from his fellows within the same Executive Council area . . . they feel that some arrangement might and should be made in order to alleviate hardships imposed by isolated conditions and to afford

In England Now

Running Commentary by Peripatetic Correspondents

NCE I have often wondered whether *I Want to be octor,* I went to Alexandra Palace to see Michael ry getting ready his television feature of that title. vas disconcerting to meet Hippocrates coming out dressing-room and Laennec going in, not to mention it appeared to be "real" medical students smoking es and wearing sports coats with patches on the ows. The studio was packed with props and scenery, l seemed in even greater confusion than usual; the naging of so much in so small a space made under-ndable the slight background noise in some of the dio shots. The scenes packed into studio A included dean's office and a very plausible imitation of the irs at the Royal College of Surgeons, complete with rtraits, bust. and banner—only they ended in nothing-ss at the first turn. Up in the producer's gallery—e "bridge" from which operations are directed—e heard mysterious incantations like "pan camera 1," nix two," "over boom." The producer-author, who mes of a medical family, took great pains to ensure curacy. A medical authority was consulted on the storical section, a car was sent to collect some real rses' uniforms, and even a humble suggestion from yself was adopted.

Nothing went wrong on the night. But I would have ked to see the face of the dissecting-room attendant hen he was asked to produce for the film sequence 1 gangrenous leg."

* * *

Some of the more lurid purveyors of what passes for ews seem to take pleasure in repeatedly telling their eaders how miserably fed we all are and how we subsist n the charity of food parcels from our more fortunate rethren overseas. It is, therefore, with great pleasure hat I record that we received the other day a heart-ending request from relatives of my wife in New Zealand o send them a food parcel. They wanted tinned fish of any kind, because they couldn't get any in New Zealand. Only too pleased to oblige, my wife managed to get several tins of herrings. She wrapped them up firmly and took the parcel down to the post office. Here she had to make a declaration of the contents, and being an honest soul she said the parcel contained herrings. Then she got a rude shock. "No unrationed foods can be sent out of the country unless accompanied by an equivalent weight of rationed foods," she was told. The parcel weighed several pounds, so this was manifestly impossible, and she sadly brought it home. I took over then and went to a different post office, where I perjured my soul but got the parcel sent off. I only hope it is not opened by the Customs at the other end. I couldn't bear to think of the herrings going 12,000 miles and then being refused admission because they hadn't brought their rations with them.

* * *

Little did we think, as we opened the innocent-looking package on that fateful January morning, that within a month one of the three of us would be a changed man, another would be on the edge of insanity, and the third would have to make a terrible decision. . . .

I am talking about the Rorschach test. We had watched its progress across Europe from Switzerland, cursed while it was held up in the London docks, and seized it eagerly when it arrived at the hospital. We thought we would practise on each other. Jamie was the first victim. He is an intellectual rather than an emotional bloke and has the naïve belief that his own actions are governed by intelligence. He had vague memories about the test but (I am convinced) secretly checked up on it before he did it. Being determined to show intellectual responses he overdid them, and turned out to be a sort of natural ENIAC, a calculating machine with no soul. This shook him. For a day or two he pondered. Then he delivered himself of the dictum: "If the test says I'm abnormal then the test's wrong"; and he has held to this point in spite of the derisive laughter of his colleagues. But now he goes about being emotional just to show that he's human after all.

George, on the other hand. is—or was—a bluff ex-Naval type whose favourite remark was "Don't worry, chaps." He evidently worked out from first principles that chiaroscuro responses showed an artistic temperament, and as he has always wanted to be artistic he got lots of them. It turned out that he had an inner conflict instead. Then he began to wonder if his responses were spontaneous after all. At first it was: "Look at me, chaps, have I got an inner conflict?" He tried vainly to discover what the conflict was, in spite of our assurances that it would be much too deep and Freudian to be unearthed by simple methods. Now he is becoming more and more solitary and introspective, and soon we shall have to take him up to the Insulin Clinic.

As for me—what am I to do? Should I pretend that I am so familiar with the Rorschach that it is pointless for me to do it? Or shall I work out a perfect personality and then produce the right answers? In either case, would they believe me?

One thing is certain: I dare not take it home. Ever since my wife did better than I did on Raven's Matrices, domestic discipline (based on the unquestionable superiority of my opinion) has gone all to pieces. After the Rorschach she would probably leave me.

* * *

Patients' newspapers provide an interesting study during the morning ward round. Before July 5, 1948, the most popular seemed to be the *Mirror*, with the *Mail*, *Express*, and *Graphic* a little behind and the *News Chronicle* and *Herald* less prominent. Very occasionally one would see the *Telegraph*. I once went round a hospital of 200 beds near midnight looking for the *Times*—ours had disappeared from the residents' room —but could not find a single copy even in the private wards. But lately things have changed. The *Mirror* still retains its popularity, but now one finds the *Telegraph* being read quite frequently, and last month two patients in the female side were taking the *Times*. Strange as it may seem, I have yet to see the *Daily Worker* in the wards; if you want that you must come into our mess, where one of the residents takes it daily.

* * *

Yesterday I experienced a new and subtle pleasure. Driving up the steep hill outside our village I passed, and passed at speed, a large expensive car with B.M.A. on its index plate. My car is old and decrepit but I have painted up the index plate so that G.M.C. shows clearly. I waved my hand as I passed and sounded a victory peal on my horn, but I fear the symbolic nature of my exploit was lost on the occupants of B.M.A.

I like having G.M.C. on my car, even though my colleagues suggest it savours of advertising: I prefer it to D.U.D., anyway. I recently saw a lot of D.U.D.s in Oxford and thought how irritating it must be to Lord Nuffield.

I am told—and I do hope it is true—that there is in Worcestershire a venereologist with a car numbered N.A.B. 606.

* * *

Chicken-skin, delicate, white,
  Painted by Carlo Vanloo,
Loves in a riot of light,
  Roses and vaporous blue.

All honour to the eighteenth-century craftsmen who, by fashioning from chicken skin such a thing of beauty and daintiness as the Pompadour's fan, inspired Austin Dobson's lines. Now we must honour no less the scientific craftsmen (*Publ. Hlth Rep., Wash.* 1949, 64, 1287) who have fashioned from chicken skin a device for feeding lice on blood and germs.

* * *

There is always an element of chance in examinations. but a friend of mine must hold the record for luck. For a "long case" in his clinical surgical examination for the Conjoint final he had a patient with syringomyelia. Three months later he took the medical part of the Conjoint final and had the same patient again. A year later he decided to complete his M.B. Lond., and, believe it or not, in clinical surgery the same case of syringomyelia was his "problem." He is to attempt the M.R.C.P. shortly and has great hopes of meeting his friend for a fourth time.

The operation, so far as I was concerned, was trivial. When it was over I was amazed that I hardly felt the incision (so different from an abdominal operation) and could lie on my back with no discomfort. There was, it is true, some pain in the calf of the unaffected leg which kept me awake at night; this was rather like toothache, and was attributed to traction on nerve-roots at the operation. But the main trouble and discomfort was from the bowels. Any acute illness, or just adopting the horizontal position, upsets the regular daily action. As there had been no action for a few days before the operation, and none for a few days afterwards, the first resembled a miniature delivery, and the pain of the resulting fissure and anal hæmatoma was far worse than any pain produced by the operation. We doctors are inclined to leave bowel regulation to the nursing staff. Believe me, from the patient's viewpoint this is a matter deserving the full attention of the physician-in-charge.

The acute lumbago was immediately relieved by the operation, and strangely enough the chronic backache also disappeared. (I have heard that often the backache is most difficult to cure.) I naturally felt rather weak after a month in bed, but was able to resume surgical work after another month, and started golf two months later. Putting was no longer painful, and the golf improved—so much so that several cups appeared on the mantelpiece.

This happy state of life continued for a couple of years; and then, during intensive training for the defence of the championship, all the symptoms recurred. Another acute attack! The lumbago once more yielded to rest in bed, and gradually disappeared. When I thought the back was well I was foolishly persuaded to enter the parents' race at the school sports, which was in the nature of a treasure hunt. While running over some rough ground I slipped in a pot-hole; and at that instant pain shot down the leg for the first time. Presumably a further prolapse. My advisers at first thought this sciatic pain might be due to rupture of an adhesion and that it would respond to a short period of bed rest. This, however, did not happen, and after a while it became clear that it was to be a severe attack. A further period of bed rest followed.

In the acute phase extension of the spine is painful, and I found it quite impossible to lie flat in bed. Lying on either side was also painful, and the only comfortable position was sitting up with the knees flexed, with a rigid back-rest supporting the pillows. One gradually gets accustomed to sleeping in this position. I got much comfort from a 'Dunlopillo' cushion placed under the thighs; but I took care to see that it did not press at the back of the knee and so obstruct the calf veins.

Flexion of the spine was also to be avoided. The tiniest forward movement was painful, and eating, washing, and shaving were quite difficult. Nor could I sit for long with the knees straight; I prayed to be quickly relieved of the bed-table, so as to bend the knees again. Bed-making was quite an ordeal. First you have to sit forward while the bed-rest is removed; then lie back while the bottom half is made; then sit forward whilst the top half is made; then turn from one side to the other while the sheet is smoothed out; then sit forward again while the bed-rest and pillows are adjusted; and finally sink back to rest. What a relief! The bedpan is also a menace. To balance on it is a feat in itself, and the pain is so excruciating that all desire to be relieved quickly passes. I was soon allowed to use a commode; and steps were taken to secure an easy action; for straining is also very painful. To move gently out of bed and use a commode seems to me much less disturbing than to use the bedpan. Absolute rest for the spine seems impossible in bed without a plaster spica; but with the help of a pulley over the bed, one can manage to move about while keeping the fairly still.

Apart from pain on movement and on coughing sneezing, there were surges of spontaneous pain. It odd that the pain got worse during sleep and could extremely severe on waking. This is probably du relaxation of muscle spasm; they say the spine actua lengthens during sleep. Pain on waking persisted several months, when other symptoms had larg disappeared; and for many weeks it was impossible sleep in any position other than the half-sitting. Ly down in bed, even with several pillows, was painf and so was lying on either side. Lateral flexion of spine is said by some to be free; but in my case it st produces pain now several months after the attack. other words, the only comfortable position is with t spine kept rigid in the degree of flexion or extensi permitted by the ailment. The pain was at tim very severe, but it was almost always relieved by ta codein. co.

After four weeks' bed rest a plaster jacket was applie At this stage no attempt was made to overcome t kyphosis; the lumbar curve returned of its own acco during the succeeding weeks. Apart from rather seve discomfort around the ribs for the first twenty-four hou the plaster jacket was no great encumbrance; but plaster made no immediate difference to the pain. T periods of freedom were probably longer, but if plaster got into the wrong position the pain was actua worse; it was essential to sit on a rubber cushion, that the bottom edge was clear of pressure.

The plaster was rather hot, but when I got back work it did not stop me operating; of course in sum heat it might have been unbearable. The plaster very skilfully applied; in fact it was so snug that, a five or six weeks, rectal bleeding started and œde and petechial hæmorrhages developed around ankles. Because of these symptoms, which apparen are an uncommon complication, the plaster was repla by a belt which I wore for several months.

Slowly the pain in the thigh diminished, then pain in the calf, and finally that in the foot. It wa long time before I was free of pain on waking, and was a month or two before the bed-rest could be dispen with or I could sleep on my side. Pain on coughing sneezing varied from day to day, and it was less pain to cough with the knees flexed. In contrast, hyperexte sion of the head, as in drinking, or rotation of the nec as when tightening a tie, would produce immediate pa in the leg. Sitting with legs outstretched—the equival of straight-leg raising—was possible only for sh periods. Thus to be left too long with the bed-ta was an ordeal, and a bath was equally trying. Washi my own back was impossible; and it was a nuisance to be able to put on my own socks and shoes, or to my toenails—which can never be done so well by any else, except a trained chiropodist. Even now, picki something off the floor is possible only by bending knees or kneeling on the floor, and is better left to othe Sitting in a low chair, as in the driving seat of a c requires extensive hip flexion which in turn flexes the lov lumbar spine and sacrum and produces pain; so I ha to be content with back-seat driving. Unless the car large, getting in and out is also difficult. For mont the calf muscles were tender, and painful cramp cou easily be brought on by stretching them.

It is not always easy to explain how each and eve pain is produced, but it becomes quite clear how imp tant is the spine in most bodily movements. A b cannot immobilise the last few lumbar vertebræ co pletely, but it limits the movement of the spine as whole and thereby acts as a reminder and a check activity. It is also a great comfort and should be ke handy to relieve any threatened attack.

n they are present alone—i.e., when they have been hed.

he "curdling" effect is due not so much to an ration of the blood as to a change in the myanesin, if red cells are present the pigment released by ir breakdown may to some extent be adsorbed.

t is fallacious to argue, as Dr. Davison is inclined to that because he has injected myanesin without effect, it is safe. One *can* inject air into a vein without toward effects. Is air therefore safe? We too have ected myanesin without apparent harm, but neverthe- s we still feel that there is a potential danger and that care should be observed.

We were interested in Dr. Berger's comments. Having d no experience of myanesin given by the oral or ramuscular routes, we do not feel able to give an inion on these methods. However, it is obvious that e intravenous method has dangers which seriously nit the usefulness of the drug, as Dr. Berger has nfirmed.

Dr. Berger's view that the concentration in the blood the effective factor in causing the hæmolysis appears be correct. When we stated that our impression was at serious hæmolysis was more likely to occur with rger doses of myanesin, we based this on a standard ilution of the drug (10%), given at a standard rate ml. in 6 sec.), the only variable being the total amount dministered.

Essex County Hospital,
Colchester.

D. R. T. CLENDON
JOHN B. PENFOLD.

THE FIRST MEDICAL EXAMINATION

SIR,—I have one point that I would like to make in nswer to Dr. Johnson's letter of Jan. 21. There is o doubt that the same standard is maintained for the xternal and internal examinations for London first .B. The equating of the standards for the two examiations is ensured by the fact that the same external xaminers, who are teachers of other universities, act or both examinations; and it is one of their duties to ee that the standard of the papers and of the marking s equivalent. Furthermore, some internal students whose colleges do not hold special college examinations ake the same papers as the externals and are examined y the same examiners; yet the pass percentage of these andidates is always markedly higher than that of the xternals.

London, W.1.

C. C. HENTSCHEL.

PRIMARY UMBILICAL SEPSIS IN THE ADULT

SIR,—The article of Jan. 7 by Mr. Greig and Mr. Shucksmith prompts me to record the following case.

On May 22, 1949, a man, aged 45, was admitted to hospital complaining of soreness and discharge from the umbilicus of seven days' duration. On the previous day he had developed nausea, attacks of shivering, and severe pain in the epigastrium and on the right side of the abdomen. Six months previously he had been treated for chronic bronchitis.

On admission, the patient looked ill; his temperature was 100·2°F, and pulse-rate 85 per min. Examination revealed a slight purulent discharge from the umbilicus, which admitted a probe to a depth of 3 cm. There was tenderness and guarding in the epigastrium and to the right of the umbilicus. An ill-defined mass, dull to percussion, was palpated extending from the subcostal margin to the umbilicus. The patient was not jaundiced. Only the right testicle was present in the scrotum.

The white blood-cell count was 16,000 per c.mm. (polymorphs 84%); urinary diastatic index 29 units. Straight X-ray examination: abdomen, nothing abnormal; chest, old fibrosis at the right apex.

In view of the uncertain diagnosis, laparotomy was performed, on May 24. On opening the abdomen through a right paraumbilical paramedian incision the liver was seen to be smooth, and enlarged to the level of the umbilicus. There was no free fluid in the peritoneal cavity. The anterior abdominal wall in the vicinity of the umbilicus, the falciform ligament, and the ligamentum teres were acutely inflamed and œdematous. The greater omentum had become adherent to these structures and showed some fibrinous exudate. The other abdominal viscera were normal. The left testis could not be demonstrated. A piece of omentum was taken for biopsy and the abdomen was closed.

From the biopsy specimen the omentum was reported to be œdematous and congested with well-marked signs of acute-on-chronic inflammation.

Convalescence was uneventful. When seen recently, the patient looked fit and well. The liver had diminished in size but was still palpable below the subcostal margin.

Further investigation showed that the plasma-proteins, the serum alkaline-phosphatase, the thymol-turbidity and flocculation tests, and the serum-bilirubin were normal.

It would seem that in this case the inflammatory process originated in the umbilicus and spread along the ligamentum teres. Despite the gross enlargement of the liver, no interference with hepatic function was demonstrated by the usual tests.

St. James' Hospital, London, S.W.12.

J. BURKE.

FILARIA AND LOEFFLER'S SYNDROME

SIR,—Transient pulmonary infiltrations have been noted by many workers throughout the world. Loeffler[1] described such changes which were demonstrable by X rays and were accompanied by eosinophilia. This association was also described by Weingarten,[2] who called it tropical eosinophilia. Loeffler believed the condition was an allergic pulmonary reaction to various antigens. Soysa and Jayawardena[3] found mites in the sputum of 11 out of 30 cases of this syndrome, and Van der Sar[4] found pulmonary acariasis in his 2 cases.

I have observed filariasis associated with Loeffler's syndrome in at least 4 cases. In all of them microfilariæ were found in the peripheral blood, radiography showed that the lungs were affected, and blood-counts showed leucocytosis and eosinophilia. In 3 of them there were asthmatic attacks, and in 3 cases eosinophils were found in the sputum. Fever is a fairly common accompaniment of filariasis; it does not respond to sulphonamides or to penicillin, which fact suggests that it is not due to secondary bacterial infection.

CASE 1.—In June, 1946, a man aged 23, who lived in a filarious district, had a rigor followed by intermittent fever, for which he was admitted to hospital, where no malaria parasites were found in his blood. He had well-marked eosinophilia. His fever did not respond to quinine, and he left hospital after eight days. As soon as he left hospital his temperature came down and remained normal until December, 1946. He then started complaining of heaviness in his right leg, and in a week typical elephantiasis of his right leg developed, which was successfully operated on in September, 1947.

I saw him first in December, 1947, when he was complaining of asthma and fever. He had eosinophilia (eosinophils 60%), and his sputum contained many eosinophils. Actively motile microfilariæ were found in his peripheral blood. Radiograms of his chest over three weeks showed fleeting pneumonic infiltrations, most marked near the lung roots.

CASE 2.—A girl, aged 13, became ill in February, 1947, with cough, expectoration, and wheezing. She was admitted in May, 1948, for the third time to King George's Hospital, Lucknow, where active microfilariæ were found in her peripheral blood. She had scattered rhonchi throughout her lungs. Her sputum contained eosinophils, and her white-cell count was 12,000 per c.mm. with eosinophils 60%. Radiography of the lungs showed soft shadows, which cleared in three weeks.

CASE 3.—A boy, aged 6 years, was brought to King George's Hospital, Lucknow, in May, 1947, with a history of wheezing since the previous October. He had a slight cough with mucoid sputum, most of which he swallowed. Apart from rhonchi in the lungs, he appeared healthy. His white-cell

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1. Loeffler, W. *Beitr. Klin. Tuberk.* 1932, 79, 338.
2. Weingarten, R. J. *Lancet*, 1943, i, 103.
3. Soysa, E., Jayawardena, M. D. S. *Brit. med. J.* 1945, i, 1.
4. Van der Sar, A. *Amer. Rev. Tuberc.* 1946, 53, 440.

Letters to the Editor

FERTILITY AND FAMILY PLANNING

SIR,—Your annotation of Jan. 14 quotes the recent report on fertility[1] as stating that 40% of women seeking advice for *sterility have no treatment ordered.*

In my own clinic I find that a large number of patients do not come from medical practitioners at all; they come from other sources including various welfare centres, and as a result of articles which have appeared in such papers as *Picture Post, Home Chat,* and *Housewife.* The women have written to the Editor, who has referred them to such bodies as the Marriage Guidance Council and the Family Planning Association, which in turn refer them to the nearest subfertility clinic. All these women give the same story of having sought advice and been told that nothing could be done, when in fact a great deal could have been done for them. For example, a case of sterility lasting ten years was treated with a variety of hormones but had never had a vaginal examination by her doctor; and she had seven fibroids. In another case the wife had been subjected to many operative procedures: in fact, her husband had azoöspermia.

This report provides evidence that we should give wider publicity to the existence of sterility clinics—through the medical press to doctors, and through the medium of the B.B.C. and popular feature articles to the general public. The popular magazine on health which the British Medical Association is to publish might well take up this issue.

M.O., SUBFERTILITY CLINIC.

ACUTE DIVERTICULITIS OF THE CÆCUM

SIR,—I read Mr. Shaw's article last week with great interest. I was reminded of a case with which I had to deal last July, and which illustrates some of the dangers that Mr. Shaw brings to notice.

A man, aged 64, was admitted to the Clayton Hospital, Wakefield, under the care of Mr. Lawson Light, with a history that three days previously he had noticed the onset of mild colicky pain in the epigastrium, which later had become more severe and which, after about twenty-four hours, had become localised to the right iliac fossa. There had been no vomiting; bowel actions had been normal; and there was no previous history of intestinal disorder.

On examination he was found to be a healthy man, with slight fever and a furred tongue. There was tenderness and guarding in the right iliac fossa. On rectal examination nothing abnormal was found. The history suggested a straightforward acute appendicitis and preoperatively this diagnosis was confidently made.

The peritoneal cavity was opened through a McBurney incision and a normal appendix found. There was, however, a small mass, about the size of a walnut, on the posterolateral wall of the cæcum, at its junction with the ascending colon. This mass was hard on palpation and the surrounding cæcum was œdematous. The omentum had migrated to the mass and was partially enveloping it. Several enlarged mesenteric lymph-nodes were to be felt. The remaining portions of large bowel were normal. The liver was normal and there was no peritoneal effusion. It was decided that the condition was early carcinoma of the cæcum. The McBurney incision was converted into a Rutherford Morison one and a right hemicolectomy performed. The immediate postoperative period was most satisfactory and the patient got up on the second day.

The pathologist reported that sections taken from the mass in the wall of the cæcum showed only an inflammatory reaction, there being no evidence of malignancy. There were no other diverticulæ in the resected portion of gut.

The patient's convalescence proceeded well until the seventh day, when he died within fifteen minutes from a massive pulmonary embolism, which was confirmed at autopsy, when examination of the remaining portion of large gut showed no abnormality.

I should like to make one comment on a poin by Mr. Shaw. He suggests that the correct tr for this condition is diverticulectomy; and he de how he clamped the base of the diverticulum as i an appendicectomy, ligating the stump and then bur it. In the case I have described, such a proc would have been quite impossible and it would been necessary to remove a portion of the cæcal wal

Clayton Hospital,
Wakefield.

P. H. TASK
Surgical Regis

INFLUENZA IN AN ISOLATED COMMUNI

SIR,—I trust that I shall not be accused of an e or unscientific approach if I say that I was shock some of the social and humanitarian implications o article by Dr. Isaacs and others in your issue of Jan

In the first place, it is recorded that the labo on Ocean Island are accommodated in huts measu 16 ft. by 8 ft. with 4 men to a hut. This is bad enc —in Britain the Housing Act of 1936 requires 70 sq for one person—but later there is mention of wo and children. One wonders whether they had to s with their men-folk some 32 sq. ft. of floor space.

Next we learn that 800 Chinese travelled for weeks in bad "conditions of overcrowding" to the island. On arrival they were admitted to quara for 24 hours—a period the rationale of which is dif to understand. Finally they were "examined" b island medical officer—all 803 of them in 24 h That allows 1 min. 48 sec. per "examination" i M.O. worked continuously through the day and nig

For many years it has been suspected that co with Chinese labour was followed by influenza outb among the Ellice Islanders. Dr. Isaacs and his laborators confirm this and report 5 deaths in 19 a community of just less than 300. Yet, thoug means of prevention are obvious, they sugges experiment in immunisation another year. Is li cheap? And will the Ellice Islanders—if the experi is carried out—be warned what is in store for th Would anyone be prepared to make a similar experi with, for example, leprosy in Britain?

Burley-in-Wharfedale, near Leeds.

ASHLEY A. ROB

HÆMOLYTIC EFFECTS OF MYANESIN

SIR,—Dr. Armstrong Davison, in your Dec. 10 i seems to find the word "overwhelming" for the evid that 'Myanesin' produces intravascular hæmo incorrect, and apparently wishes to substitute the "strong." He is not supported by Dr. Berger i letter of Jan. 14. Dr. Davison then proceeds to dem his own contention of strong evidence by trying to that myanesin does not produce hæmolysis at all, that the brown coloration we obtained was du breakdown products of the myanesin.

We agree with Dr. Davison that spectroscopic evid is important, but so far as we remember this exan *tion has only been carried* out by one person,[1] then with negative results. Before accepting it we sh like to see it confirmed. This is the only experim evidence against hæmolysis.

On the other hand we have shown that hæmo occurs with "curdling" in vitro,[2] and if Dr. Da cares to mix a little myanesin and blood, and wat under the microscope, he can see with his own eyes red cells breaking up. Since this is a very rapid pr we see no reason why it should not also occur in vein. At the same time we should like to point that no brown pigment is produced when plasm serum is mixed with myanesin. It appears only red cells are present, and it will appear with t

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[1] Family Limitation and its Influence on Human Fertility During the Past Fifty Years. H.M. Stationery Office, 1949.

[1] Mallinson, F. B. *Proc. R. Soc. Med.* 1948, 41, 493.

[2] Ogilvie, T. A., Penfold, J. B., Clendon, D. R. T. *Lancet,* i, 947.

THE SMALLER HOSPITAL

r,—May I endorse very strongly the plea for the ition of small hospitals in crowded areas, which was forward by you towards the end of last year ?[1]

write as a social worker for many years in an area h depended greatly on the Waterloo Hospital for nen and Children. The smallness of the hospital was efinite asset; a few yards from the entrance the ous mother would be at the door of the clinic.

. Thomas's and Guy's are justly beloved and are erred by many; but the range of large buildings, the passages, the numerous clinics, even the unending ession of hurrying students, nurses, and porters can ly stupify an anxious woman and frighten a nervous d.

do not hesitate to affirm that hundreds of women in thwark and North Lambeth have lost a feeling of urity through the closing of the Waterloo, and that fears of many nervous children will be increased in ir new hospital by the absence of immediate personal ognition and of the almost homely atmosphere which y knew at the Waterloo.

ondon, W.1. HELEN BARLOW.

INFLUENCE OF HEART-RATE ON CARDIAC OUTPUT

SIR,—From his letter of Jan. 14, it appears that ofessor McMichael knows enough about me to allege at "I lack experience of modern laboratory work." erhaps he has overlooked my criticism[2] of the modern" laboratory work on cardiac output and also the Haldane method of blood-gas analysis.

About the failure of the ferricyanide method, the late r Joseph Barcroft was in full agreement with me when discussed this question with him in 1923 at the International Congress of Physiology. Subsequently, so far I know, Sir Joseph published no investigation based n this method. I worked out a new and, I believe, perior method for blood-gas analysis based on entirely w principles.[3] Does Professor McMichael really think at it is a special achievement of modern technique use a "water-immersed gas-analysis apparatus"? his was in use about a hundred years ago by Bunsen-eppert, and it was used by me with the Haldane pparatus forty years ago. I think that he must have en referring to some really novel device which he left nmentioned.

Regarding my criticism of the determination of xygen consumption by the spirometric method, the nipping apparatus is the most elaborate and most opular; yet even with this device the errors due to uncer-ain temperature distribution, and therefore uncertain ater-vapour tension, together with observational istakes, produce an error in the result of up to ±10%.

Professor McMichael reproaches me for my "imagin-g" that the "cardiac catheter is a coiled spring" because him it is "flexible and imposes no mechanical obstacle" the contraction of the heart. If he placed a catheter his mouth, he would know better what disturbance of nction may result in an even more sensitive cavity ach as an auricle or ventricle of the heart.

Taking a further point from Professor McMichael's etter, I will admit for a moment that modern investiga-ion has corrected my figure (1909) for average cardiac utput from 4 litres to 5 litres per minute; though n fact I did discuss "the possible range in health and isease" at that time. However, I fail to see what this as to do with the reported variation of the minute-olume between 2 and 12 litres for different individuals nder similar experimental conditions.[4] It seems to me that such large variations are a severe condemnation of the experimental method.

Lastly, I must contest the paragraph in which Professor McMichael refers to Mackenzie and Thomas Lewis as if their school of thought had been confined to this country. Their teaching was known and respected all over the world; and so was their observation "that the reduction of ventricular rate by digitalis in auricular fibrillation was of major importance in the production of clinical improvement." I am convinced that in establishing this empirical result these able cardiologists did not confuse two such elementary ideas as the power of the heart and the performance of the heart, as Professor McMichael and his school have done.

London, W.1. J. PLESCH.

SIR,—Despite Professor McMichael's reply to Dr. Plesch's criticisms of the article by Kelly and Bayliss, it seems to me that some factual information is lacking. Kelly and Bayliss, though they report many of their actual observations of the heart-rate and of the venous pressure, give only their deductions on the cardiac output in the form of calculations from the Fick formula.

Those interested would like details of the changes in the denominator and numerator of the equation. Does the oxygen consumption go up, and if so, by an amount which can be recorded comfortably on a spirometer? While the Douglas and Courtice modification of the Haldane blood-gas analysis apparatus is excellent for determination of blood gases with a normal amount of dissolved oxygen, surely this method would not show all of the *sevenfold increase* in dissolved oxygen which will be present during the examination if the spirometer contains 100% oxygen.

If it is deduced that the pulmonary blood-flow is increased only because of diminished arteriovenous difference, then is this because the mixed venous oxygen saturation has increased; or does the arterial saturation also increase, but to a smaller extent?

These facts, and a note on the experimental errors which the authors found with apparatus used in their laboratories, would allow readers to form a serious judgment of the results.

Department of Physiology,
St. Mary's Hospital Medical School,
London, W.2.

K. W. CROSS.

FRACTURES AND DISLOCATIONS IN GENERAL PRACTICE

SIR,—We are grateful for your review (Dec. 24) of the 2nd edition of this book, but we feel we must comment on the inaccuracies contained in the last sentence.

This states that "there is no mention of the invaluable Capener nail for trochanteric fractures" (of the femur) and continues, "the ritual of reduction and plaster is still advised for vertebral fractures." In the third paragraph of p. 192 of the book it is stated that a special type of nail and plate may be required in the treatment of pertrochanteric fractures of the femur. It is true that the Capener nail is not specifically recommended, but this nail is only one of many similar patterns and we do not agree that it is "invaluable." It is true also that "the ritual of plaster is still advised for vertebral fractures." Your review implies that this method of treatment should not have been advised. Recent work by Nicoll, and the experience of us all, has shown that good results can be obtained in some of these fractures without the use of a plaster-jacket; nevertheless in the majority of cases, under the most usual circumstances, the "ritual" of reduction and plaster is still the accepted treatment and this method has not been abandoned by surgeons of experience and sound judgment.

London, W.1.

W. D. COLTART
J. P. HOSFORD.

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1. *Lancet*, 1949, ii, 902.
2. Plesch, J. Blood Pressure and its Disorders. London, 1947.
3. Plesch, J. *Biochem. Z.* 1935, 276, 198.
4. Kelly, H. G., Bayliss, R. I. S. *Lancet*, 1949, ii, 1071.

count was 18,300 per c.mm. (eosinophils 40%). There were no eosinophils in the sputum, and no tubercle bacilli were found in the sputum or on gastric lavage. Actively motile microfilariæ were found in his peripheral blood. No abnormality was found on radiography of the lungs. The Wassermann reaction was positive, but a Kahn test was negative.

This case is interesting in view of Neumann's statement[5] that microfilariæ are usually not found before the seventh year after infection, and the claim of Dickson et al.[6] to have found microfilariæ in 1·6% of 244 children under the age of 5 years.

Case 4.—A man, aged 25, was admitted to the Railway Hospital, Jubbulpore, on Sept. 5, 1948, with a history of two months' chyluria, three weeks' asthmatic attacks, and a week's irregular febrile episodes. There were scattered rhonchi and a few crepitations in his lungs. His white-cell count was 10,000 per c.mm. (eosinophils 70%). Actively motile microfilariæ were so numerous in his peripheral blood and so constantly present that slides made at any time of the day or night were full of them. The sputum contained eosinophils but no acid-fast bacilli. Radioscopy showed diffuse mottling of the lung parenchyma. The patient was treated with 'Neostibosan.' The asthma and the radioscopic appearances cleared.

My thanks are due to Dr. B. B. Bhatia, dean of the University of Lucknow, for permission to publish cases 2 and 3; Dr. S. N. Lahiri, chief medical officer of the Great Indian Peninsula Railway, for permission to publish case 4; and Dr. L. J. Hiwale, pathologist, Railway Hospital, Jubbulpore, for help in laboratory work.

Medical Department,
Great Indian Peninsula Railway,
Nagpur.
S. L. MALHOTRA.

CEREBRAL PALSY

Sir,—We were interested by Professor Illingworth's letter,[7] with much of which we agree. We touched on most of the points he raises and would have dealt with them more fully had we not desired to make our article[8] short enough to arouse interest.

We realise, of course, that the differentiation between cerebral palsy and mental retardation is difficult, and we stated that in these cases diagnosis is not easy. Professor Illingworth states that it is incorrect to say that retarded infants smile early. We agree: what we said was that they smile easily. Regarding the sitting position, manipulative behaviour, dribbling, sucking, and so on, we tried to make it clear that the mentally retarded child may show deficiencies here, but that in the cerebral-palsied child the difficulty is due to a damaged motor system, whereas in a mentally retarded child the disability is due to generally retarded development. A major object of our article was to direct attention to the fact that even in slight cases the disorder is one of the whole motor system rather than a defect of the limbs. In over four hundred cases seen in the past two years there has been not one of monoplegia.

With reference to the letter from Dr. Asher and Miss Schonell,[9] we were emphasising that cerebral palsy is usually not diagnosed until the child is at least two years old, whereas signs are present before that age and treatment in infancy produces better results. We have had cases under twelve months, and in most of our other cases the histories show that symptoms were present at an early age. It is true that, when questioned, many mothers will say that the child was noted to be backward in some way at six months or so; but on closer questioning they will not infrequently explain that the baby was "stiff" or "limp" or unable to balance the head, or that the thumb remained in the palm. As to the intelligence of spastics and athetoids, our child
so young that we cannot assess them by th
methods and we rely on previous history,
observation, and response to treatment.

Dr. Gerrard's letter[10] on kernicterus raises
important point, and he has obviously been
follow his cases much longer, and has seen more
type of case, than we have. As we said in our
our experience of this particular type is very limi

C. D. S. Agas
M. B. O'Don
E. Collis.

Queen Mary's Hospital for Children,
Carshalton, Surrey.

INTESTINAL SUCTION

Sir,—I was interested in the case-report
Frank in your issue of Jan. 7. The following
I think, also of interest.

On the 7th day after appendicectomy for acute app
and peritonitis, the patient, a man aged 45, complai
colicky pain, nausea, abdominal distension, and inabi
pass flatus. Examination revealed abdominal distensio
the prominent bowel sounds characteristic of obstruct

Oral feeding was stopped, and intravenous therap
tuted. A Miller-Abbott tube was introduced; this
into the intestine satisfactorily and deflation of the a
was accomplished in about twenty-four hours. Fla
again passed freely and oral feeding was reinstitute
three days later all the obstructive signs and sympto
in evidence again and nothing could be withdrawn f
Miller Abbott tube by suction, even after syringeing it
to ensure patency and also after withdrawing it by
this time, 5 ft. of the tube had passed beyond the nos

The obstructive symptoms increased and a lapa
was performed. This revealed a simple explanation
recurrent obstruction. Progressive deflation of th
had carried the Miller Abbott tube down to the sit
kinked intestine; local deflation of the bowel had allo
kinking to be overcome; and the tube had travelled
the normal bowel below. The post-inflammatory ad
had given rise, however, to further kinking and obst
The upper small bowel was collapsed and "gather
a concertina-like fashion over the Miller Abbott tu
several places it was intussuscepted to the extent of
Lower down, the bowel was dilated up to about 2 ft. f
ileocæcal valve, where it was kinked as a result
inflammatory adhesions. The Miller Abbott tube had
to within 1 ft. of the ileocæcal valve and was lying in c
bowel.

The offending adhesions were separated, the Miller
tube withdrawn 2 ft. proximal to the site of obstructi
bag deflated, and the tube anchored to the patient's
to prevent any further progress. Recovery was unevent

It is evident that several feet of small intesti
be "gathered" over one foot of Miller Abbott
In this case, 5 ft. of tube reached the ileocæcal
in Mr. Frank's case, only 6 ft. 9 in. was requi
traverse the whole alimentary canal.

This case shows very clearly that a Miller
tube should not be allowed to go too far. Had t
been deflated and the tube anchored at 3½ ft., th
would not have passed the obstructive site a
continued deflation might have allowed the
matory adhesions to subside, thus avoiding lapar
Possible impaction at the ileocæcal valve is a
reason for restricting the tube's travel. I am an
supporter of intestinal-suction therapy and
a loss to understand what had happened in thi
but the explanation was simple once the abdom
opened.

I now make it a rule that if deflation is proc
satisfactorily, progress of the tube is stopped at
4 ft. by deflating the bag and strapping the tube
patient's face. It would appear that at least 4 ft.
10-ft. Miller Abbott tube is superfluous.

Lewisham Hospital,
London, S.E.13.
J. Jem

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[5] Neumann, H. *Bull. U.S. Army med. Dept.* 1945, 4, 230.

[6] Dickson, J. G., Huntington, R. W. jun., Eichold, S. *Nav. med. Bull., Wash.* 1943, 41, 1240.

[7] Illingworth, R. S. *Lancet*, 1949, ii, 1157.

[8] Agassiz, C. D. S., O'Donnell, M. B., Collis, E. *Ibid*, p. 1030.

[9] Asher, P., Schonell, F. E. *Ibid*, p. 1201.

[10] Gerrard, J. *Ibid*, p. 1201.

so provides an alternative source of suitable veins—backs of the hands. These are easily accessible if næsthetic screen is in use.

yal Infirmary, Preston. A. J. GRAY.

MYSTERIOUS MARRIAGE

IR,—I have no wish to defend either myself or my nt book, *Mysterious Marriage*, against the criticism our review; but deeper issues are at stake than what call my whimsicalities.

'he review says: "exactness is the one thing which Howe nowhere approaches. . . . The fairies at the tom of the garden whom Jung invited . . . have long stayed their welcome."

n some horror and amazement, Sir, I ask whether u would have us all put such imponderables as love l faith, poetry and imagination, myth and dream, o exactly fitting, pseudoscientific, psychological ait jackets? I would rather keep the fairies at the ttom of my garden.

I believe that the fanatical followers of Freud have come a menace, as they suffer from obsessional neurosis thout knowing it. I said as much in *Mysterious Marriage*, it would not expect a Freudian reviewer to agree with me.

London, W.1. E. GRAHAM HOWE.

INFLUENZA COSMO

SIR,—I was much interested in Sir Henry Bashford's escription last week of a new influenzal syndrome, s I have been a victim of a very similar condition for he last ten years. The changeover from the "normal" old-complex, with which I had been familiar all my life, o the cold-plus-delayed-tracheitis complex, which has egularly recurred since the winter of 1939–40, was udden, dramatic, and infuriating. The tendency to profane and obscene language, which Sir Henry describes, s strong. I must disagree, however, with his description of the effects on smoking. All taste for a pipe disappears during the initial cold, but returns just when the dry tickling cough is at its worst. The resulting paroxysms incline me to call the syndrome, in honour of its discoverer, "Bashford's blasphemous bronchitis.'

Beaconsfield, Bucks. MICHAEL REILLY.

ARMY MEDICINE IN THE LATE WAR

SIR,—This series of articles by Dr. Todd was written, intentionally perhaps, in a dogmatic and provocative style calculated to produce dissent, if not resentment, in the minds of many, especially of those with experience as senior military officers. It is to be hoped, however, that this will not obscure the many sound views put forward; it may even be hoped that some of these will receive attention from higher authority.

I am particularly in sympathy with Dr. Todd's protest at the manner in which medical boards were induced to extract from the *Nomenclature of Diseases* some label which would serve to "invalid" from the Forces a person who was useless and inefficient as a soldier. I agree that these persons should be discharged as inefficient—not as invalids who can pose as heroes, broken in health as the result of their war service.

Croydon. T. W. PRESTON.

SIR,—May I reply to some of the adverse criticism of my article?

Dr. de Burca (Dec. 31) says: "Clinical diagnosis must have been easy for him if all his cases showed fever every second or third day, but why he should have waited this time to make a diagnosis I do not understand." All my cases did not, of course, reveal such fever, and I did not say that they did. So far from advocating waiting to make the diagnosis, I said that "regimental M.O.s should have been given instructions that whenever a soldier seemed to have malaria, the exhibition of anti-malaria remedies should commence immediately." His statement that a blood-slide would *invariably* give the diagnosis within thirty minutes is astonishing, since I have never heard it doubted, even by the most enthusiastic advocates of microscopy, that in some cases of malaria it is impossible in the early stages to find the parasite in the peripheral blood. Dr. de Burca finally says: "His account of the ease with which civilians dealt with malaria is ludicrous. I have known of deaths from M.T. infections among European civilians. . . ." I did not suggest that malaria in civilians is never fatal. or that it never causes serious illness. What I did say was that civilians began taking quinine as soon as they thought that they had malaria, and that if their attacks were mild they carried on with their ordinary life either immediately or the next day. Numerous civilians with whom I have spoken have certainly said this was their method.

Dr. Dimson (Dec. 31) and Dr. Crosby (Jan. 14) both defend the regulations about malaria and other conditions on the ground that they were intended for M.O.s who were very ignorant of tropical diseases. This ignorance no doubt did justify the making of regulations, and I was not condemning them in general but in particular. A regulation urging regimental M.O.s to begin anti-malaria treatment as soon as they suspected malaria would, I believe, have been excellent. Dr. Crosby says: "Failure to submit cases of malaria in particular to the full therapeutic course meant an enormous loss of man-power by subsequent relapse and subhealth; and for this reason, if for no other, insistence was placed on the official régime." I never suggested that malaria cases should not have "the full therapeutic course." My objection was to the practice of keeping all soldiers in hospital for the whole duration of the course. Dr. Dimson says that if I had had my way "bacillary dysentery would have been treated with emetine." Since bacillary dysentery is nearly always an acute self-limited disease of short duration, and I was advocating treating with anti-amœbic drugs those giving a history going back for weeks or months of recurrent diarrhœa, abdominal discomfort and dyspepsia, and the other symptoms of low-grade amœbiasis (even though the entamœba could not be isolated), I am unable to understand this statement.

May I say finally on the general subject of diagnosis by isolating the organisms of disease that I did not suggest—neither did I intend to imply—that it is always a waste of time to look for the organism. On the contrary, the positive finding of an isolated organism is often most valuable, and at times virtually conclusive. It is the negative finding ("no organism found") which usually proves nothing. As regards tuberculosis, syphilis. subacute infective endocarditis, kala-azar and many other diseases, moreover, this view is universally accepted. But in the case of malaria and amœbiasis (when cysts are discovered) even the positive finding is far from conclusive, since the organisms which cause them are frequently harboured by those who are well, though vegetative *Entamœba histolytica* is perhaps always evidence of active disease.

Dr. Keatinge (Jan. 14) cannot understand why I should object to medical examinations in industry while admitting that they have some value for soldiers. My explanation for this differentiation is that, whereas it seems reasonable to exclude a man from the Army who is unduly liable to fall sick, it is wrong to exclude him from an industrial job. For if there are reasons for excluding him from this job, frequently there are equally good reasons for excluding him from any other, with the result that through no fault of his own he remains unemployed or does blind-alley occupations.

Dr. Gordon Smith and Dr. Guymer (Jan. 21) say that I imply there should be no inquiry and investigation into various septic conditions affecting persons whom

MALE-TOAD TEST FOR PREGNANCY

SIR,—I summarise here the results of 116 pregnancy tests made on the Ceylon toad *Bufo melanostictus*, which Badhuri and Bardhan lately reported[1] as being susceptible to chorionic gonadotropin.

In contradistinction to the experience of Haines[2] with *B. arenarium*, I found that the injection of acid urine caused a considerable mortality in the early experiments, the toad dying within an hour. Acid urines were therefore neutralised with sodium carbonate and filtered before injection into the toad's dorsal lymph-sac. Positive results can generally be obtained in $1^{1}/_{2}$ hours. It is not necessary to collect the urine with a pipette, since handling of the toad generally causes spontaneous voiding of urine, which can be collected on a glass slide placed against the cloaca. If a negative result is obtained, more urine is collected from the toad up to 5 hours (in controls in this series up to 21 hours).

The results of the 116 tests were as follows :

	No. of tests	*Positive*	*Negative*
Known pregnancy—			
In first 5 mos. of pregnancy ..	41	39	2
In last 3 " " " ..	19	16	3
Doubtful pregnancy—			
(Amenorrhœa for 1–20 weeks) ..	19	..	19
Complete abortion—			
Proved	5	1	4
Doubtful	2	..	2
Hydatidiform mole after evacuation ..	4	2	2
Controls—			
Male	12	..	12
Female	14	..	14

The 2 negative results obtained in the first 5 months of known pregnancies were both in cases of abnormal pregnancy : one of the women had had pyelitis for 5 months, and the other hyperemesis for 2 months. The earliest positive result was obtained on the fifth day after the first missed period. There were no false negatives in 8 cases of amenorrhœa of less than a month's duration. The presence of pregnancy in the very early positive cases was confirmed by their later histories.

The later histories of the 19 women in whom pregnancy was doubtful were as follows :

Had periods subsequently	6
Negative Friedman test	3
Probably menopausal (aged 45–50)	3
Amenorrhœa over three months, no enlargement of uterus	4
Amenorrhœa less than three months, no clinical confirmation of pregnancy	3

The histories of the last three cases are as follows :

CASE 1.—Five previous abortions. Last regular menstrual period from July 9 to Aug. 1, bleeding one day. Tested negative on Sept. 26.

CASE 2.—Childbirth June 20. Breast-feeding continues. Uterus not enlarged, as felt per vaginam. Tested negative on Sept. 26.

CASE 3.—Last regular menstrual period on June 19. Uterus felt per vaginam to be retroverted, not enlarged. Tested negative on Aug. 31.

Confirmatory Friedman tests, which would have proved valuable, could not be done, owing to a dearth of suitable rabbits.

Of the 5 proved complete abortions 2 were negative a day before the fœtus was expelled. Similar observations are reported by Haines.[2] The case giving a positive result was negative 7 days later, and abortion took place on the 9th day. The 2 other cases were tested after the abortion. Further work is necessary to determine whether the test would be of prognostic value in cases of threatened abortion. In these cases negative results would probably be more significant positive ones.

The test was read with ease in every case. N positives were obtained. The toads did not lose sensitivity at any time during the period of obser Positive results were obtained with as little as l of urine. The results with *B. melanostictus* have so encouraging that this test is taking the place Friedman test in our institute.

Medical Research Institute,
Colombo.

L. G. JAYEWARDI

RISKS OF ANTI-HISTAMINE MEDICATIO

SIR,—I agree with Dr. J. Stanley White (Ja in his statement that histamine is no antidote in of poisoning by "antihistaminics." The drugs widely used as anti-histamines are not physiol antagonists of histamine, as adrenaline *is*; they blocking agents and prevent in some way the hista from reaching the receptors of effector cells.

Contradicting himself, Dr. White states that "in people, notably asthmatics, even *though* they saturated with an anti-histamine, it is possible injections of histamine would produce severe reacti This appears to me to be incorrect. On the con experimental and clinical experience shows clearl the effect of histamine in asthmatic as well as in subjects can be weakened or prohibited by thera doses of potent anti-histamine drugs. The effect inhalation of histamine aerosol, for instance, can be prevented or cut short, even in asthmatic su by drugs.[1]

Helsingborg, Sweden.

PAUL KA

POSTOPERATIVE PARALYSIS IN THE UP EXTREMITY

SIR,—In your issue of Jan. 21 Mr. Ewing and Dr. do great service in drawing attention to the inc incidence of the above condition and its possible re to the muscular flaccidity associated with the curare as an adjunct to anæsthesia.

The mechanism in gall-bladder operations is somewhat obscure, but stretching of the brachial by over-abduction of the arm and pronation of the arm can readily be demonstrated during any ope for radical removal of the breast. After the hu insertion of the pectoralis-major muscle has been se the humerus loses much of its protection against exc abduction and external rotation. When the ax glands have been removed it is easy to demonstrat mechanism described by Mr. Ewing—over-abductio external rotation bringing the head of the humeru in the axilla and stretching the vascular bundle tog with its partial investment, the brachial plexus.

I have three cases on record where such cond actually obliterated the radial pulse ; and in t these, a blood-transfusion simultaneously ceased t In each case adduction towards the patient's side *a* *lifting the arm-board at its free end* restored the puls allowed the transfusion to recommence.

King's College Hospital,
London, S.E.5.

A. H. GALL

SIR,—In a number of the cases described by E and Kiloh, it appears that the arm position respo had been chosen to facilitate repeated intrav injections by the anæsthetist. This factor can be nated if the anæsthetist uses, instead, one of the ext jugular veins. By slight finger pressure just abov middle of the clavicle, this vein can, with a little pra nearly always be distended and made readily piercea

The safe position of the arms described by Dr. (elbows by the side of the chest, forearms flexed a

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1. Badhuri, J. L., Bardhan, N. R. *Science*, 1949, 109, 517.
2. Haines, M. *Lancet*, 1948, ii, 923.

1. Kallós, P. Progress in Allergy. Basle, 1949.

Obituary

NORMAN PATTERSON

M.B. EDIN., F.R.C.S.

. Norman Patterson, consulting surgeon to the throat ear department of the London Hospital, died at his e at Ashridge Park on Jan. 16, at the age of 72.

on of the Rev. James Patterson, of Ancrum, he went his father's Border manse to Edinburgh. where attended Melville College and later the university. ce he held the Grierson bursary and was later awarded senior medal in anatomy. After qualifying in 1900 he came to London to continue his studies at King's College and at the London Hospital where he was appointed demonstrator in anatomy.

Of that period in his life Sir Arthur Keith writes: "Norman Patterson and I came together in the early years of this century at the London Hospital, where I was senior demonstrator of anatomy and he a junior one. A demonstratorship in years gone by had been a stepping-off place for ambitious Londoners who aimed at becoming full members of the hospital staff. Roxburgh, Sequeira, Harold Barnard, and Hugh Rigby had ade the passage safely. But then they were Londoners, hile Norman was from Edinburgh. Nevertheless he ade the passage; he was appointed to the staff as sistant surgeon in the ear department. He made his ay, not by any display of mental brilliancy but by s patent honesty of word and thought, and his genius r making and keeping friends. After his marriage the eith and Patterson households enjoyed many happy ocial evenings together; these times seem now very emote. One had to know Norman for a long time efore his special gifts were discovered. His powers as painter in oils impressed me."

Patterson was also on the staff at Golden Square, he Central London Ophthalmic Hospital, and the lorence Nightingale Hospital, and he was consultant o the Royal School for the Deaf and Dumb at Margate. He contributed the chapters on his specialty to Choyce's *ystem of Surgery* and to Walton's *Textbook of Surgery*. One of his most recent papers was the description in our columns in 1944 of a radical external operation for hronic sinusitis, in which he was particularly interested. By that time his love of the country had already drawn him away from London, and he had finally settled at Ashridge Park, where he spent more and more time in his garden, and competed successfully with professionals n the design and construction of modern beehives. He came to believe strongly in the emigration of specialists rom London, and during the late war this home served as a convenient base for his work in the E.M.S. After the war was over not only did he continue as an active consultant laryngologist and aurist to the Royal Bucks Hospital, Aylesbury, but for the past few years he had also worked regularly at the Mid-Herts Hospital at St. Albans; indeed he made his last tour of duty there only two days before his death. All the theatre staff liked to work for him: as one of the sisters put it. "there was never any panic or flap in the theatre even among the most junior nurses; he was always most courteous and fatherly towards them."

Writing of earlier days at the London, a former house-surgeon makes the same point: "He was an admirable chief—conscientious, quiet, courteous. To serve as his house-surgeon was not dramatic or very exciting but was a most useful and very pleasant experience. He retained the tradition of formal hospitality to his students and housemen, and many will have a delightful memory of dinners in Portland Place and of helping with the bog garden near Reigate in which his primulas flourished so famously." Many others, who did not know him as an artist in gardens, recognised him as an artist with the paintbrush or with the trout-rod. He had a full, interesting and valuable life, and will long be gladly remembered.

Mr. Patterson married Miss Winnie Crockford, who survives him with their daughter. Their only son was killed on active service in Greece in 1944.

WALTER SYDNEY LAZARUS-BARLOW

M.D. CAMB., F.R.C.P.

Prof. W. S. Lazarus-Barlow, who formerly held the chair of experimental pathology in the University of London, and was director of the cancer research laboratories at Middlesex Hospital, died at Bexhill on Jan. 15 at the age of 84.

His family tree was interesting, for his father, John Barett Lazarus, traced his descent to Moses Maimonides, physician to Saladin, while his mother, Martha Barlow, traced hers to Sarah Trimmer, founder of sunday schools and the friend of Dr. Johnson. He took the name of Lazarus-Barlow on his 21st birthday. From the City of London School he went to Downing College, Cambridge, where he was a scholar and prizeman, graduating B.A. in 1887. After continuing his medical studies at St. George's Hospital he took his M.B. in 1889, proceeding to the M.D. in 1894. At St. George's Hospital he had acted as demonstrator of morbid anatomy and curator of the museum, and later he became pathologist and lecturer on pathology at Westminster Hospital. In 1901 he was elected F.R.C.P. At the end of the same year he nearly lost his life from blood-poisoning following a thumb-prick during a necropsy. His left arm had to be amputated, but special messengers were sent to the Pasteur Institute in Paris for the new antistreptococcal serum. He was the first patient to receive the treatment in this country, and he himself always believed that it tipped the scales in his favour.

Lazarus-Barlow did not allow this handicap to interrupt his career. In 1910 he became director of the cancer research laboratories at Middlesex Hospital, two years later he became lecturer in pathology, and in 1920 he was appointed to the new chair of experimental pathology. A member of the grand council of the British Empire Cancer Campaign, he was also a member of the cancer committee of the Ministry of Health. S. R. writes: "He was one of the first pathologists in this country to carry on experiments designed to obtain fundamental knowledge about the effects of X rays and radium upon living cells and especially living cancer cells. Hector Colwell, Cecil Mottram, and Helen Chambers, among others, were inspired by his work, for Lazarus-Barlow was a man of ideas with an extensive knowledge of pathology. He was also a skilled experimentalist and his colleagues were often amazed at the way in which he accomplished with one hand what they could with difficulty achieve with two. It is nearly 40 years ago that, by strictly quantitative methods using a Rutherford emanation electroscope, he showed the presence of radium in normal and in cancer tissues. Turning his attention to radiotherapeutics he showed, by an ingenious experiment on the rectum of the rat, that two different varieties of cells responded quite differently to the same dose of radium irradiation according to whether the dose was administered in a long or a short time. Carcinogenesis has now become a big subject, and here again Lazarus-Barlow was early in the field in his very nearly successful attempt to produce carcinoma, by inserting in the gall-bladder of the rabbit small gall-stones in the middle of which was sealed a small quantity of radium. His research work at the Cancer Research Laboratories at Middlesex Hospital had a definite radiological aspect for many years, and this was continued on his retirement. A man of great capabilities and great industry, he retained an abiding faith in his fellow men."

His *Manual of General Pathology* first appeared in 1898 and his *Elements of Pathological Anatomy and Histology for Students* in 1903. In 1909 he chose as the subject of his Croonian lectures to the Royal College of Physicians radioactivity and carcinoma. As departmental editor of the 14th edition of the *Encyclopædia Britannica* he wrote many of the articles, including the monograph on cancer research.

Outside his work, his family, his home, and his garden occupied his life to the exclusion of all else. In an address it is proposed to employ in the preparation and handling of food. As I said that, when a candidate for a job is a potential danger to others, there may be the strongest grounds against appointing him, I cannot see any justification for their statement. I am nevertheless grateful to them for pointing out that I did not mention the special case of food-handlers. They also say that "no industrial medical officer is able . . . to *forbid* any prospective employee taking a job. His function is purely advisory to executive management . . ." But if managements accept the advice of the medical officer, as I presume they usually do, whatever the theoretical position he in fact is responsible for men being refused employment.

Farnham, Surrey.

J. W. TODD.

EPILEPSY AND ORGANIC DISEASE

SIR,—I should like to thank Prof. Nattrass for his courteous reply last week to my letter. I am glad that we agree about the importance of frequent re-examination of patients with epilepsy.

With regard to the suggestion that I only quoted his figures partially, I gave his post-mortem results in full. I purposely omitted those cases diagnosed clinically for two reasons: (1) a clinical diagnosis is partly a matter of judgment, and in some cases, no matter how expert one may be, one is later proved to have been wrong; and (2) I do not think that three years is a sufficiently long period of observation to exclude cerebral tumour. In Tooth's series of 500 cases, adult astrocytomas were found to have been present for periods varying from 67 to 89 months.[1] I think that it is more accurate to go by the results of findings at operation and post-mortem examination when these are available.

H. W. DALTON.

Public Health

Births and Deaths in England and Wales

THE following rates for births and deaths in 1949 are announced by the Registrar-General in his weekly return for the week ended Jan. 14 (rates for the fourth quarter only in parentheses): live births 16·7 (15·4) per 1000 total population; stillbirths 22·6 (22·5) per 1000 total live and still births; deaths 11·7 (11·6) per 1000 total population; and deaths of infants under one year 32 (32) per 1000 related live births.

Animal Health

The report for the years 1938–47 from the Animal Health Division of the Ministry of Agriculture[2] deals first with foot-and-mouth disease. This is the most important remaining epizootic; and the soundness of the slaughter policy—without which the disease would become endemic—is shown very clearly by the figures. Since 1942, when over 27,000 cattle were slaughtered, only 1000–5000 cattle have been slaughtered annually; over the same period 3000–13,000 sheep and pigs were slaughtered each year. Losses through swine-fever numbered 106,954 in 1940, but only 824 in 1947. The number of cattle slaughtered under the Tuberculosis Order dropped from nearly 20,000 in 1938 to 6545 in 1947; and this undoubtedly reflects a real decline in the number of cows with advanced tuberculosis. Each year about a quarter of a million calves and maiden heifers are vaccinated against contagious abortion—a procedure which has reduced very effectively the incidence of the disease. Rather strangely, isolated outbreaks of infection with *Brucella melitensis* took place during the period under review. The section of the report dealing with contagious abortion and bovine mastitis recalls that quarters can be freed of infection with *Streptococcus agalactiæ* by one or two injections up the teat canal of 50,000–100,000 units of penicillin.

Medicine and the Law

Claim of Official Privilege

Squadron Sergeant-Major J. E. Pettitt, ag
sent from the 5th Battalion, Royal Tank Re
Germany to undergo, with others, a special d
at the Guards' depot at Caterham. It was a
course for men not used to drilling. He colla
dropped dead.

At the inquest the pathologist who had made a
gave evidence that the dead man (6 ft. 3 in. i
had a heart twice the normal size, high blood-
and diseased arteries; to go through a strenuou
in that physical condition was "the worst thing
have done." Another non-commissioned office
to the same course, told the coroner that he
had a thorough medical examination by his ow
doctor before being sent.

The coroner asked what examination had been
of the deceased. An officer produced Army form
as the medical certificate which Pettitt had br
with him. The coroner pointed out that this certi
said no more than that the man was free from infe
disease and was going on a course; it gave no inf
tion about his fitness. Asked for the medical-hi
sheet of the dead man, the officer said that the
commandant had a ruling from the War Office tha
was a privileged document and could not be discl
The coroner, adjourning the inquest for a fortnig
order that the doctor who issued the certificat
Germany could appear and give evidence, observed
if the War Office declined to produce the medical-his
sheet, they could not object if unfavourable infere
were drawn. During the adjournment, he added,
War Office might consider waiving the official privi
if it existed; he would have thought they would h
wished to help the inquiry by producing this import
document.

Births, Marriages, and Deaths

BIRTHS

BRADY.—On Jan. 15, at Colchester, the wife of Dr. T. J. Brady—a son.

CANT.—On Jan. 11, in Trinidad, the wife of Dr. F. E. V. Cant—a son.

CHISHOLM.—On Jan. 16, the wife of Dr. John Chisholm—a son.

HOWAT.—On Jan. 17, to Dr. Margaret Howat (née Harker), wife of Dr. James Howat—a son.

LINDAHL.—On Jan. 11, in London, the wife of Mr. J. W. S. Lindahl, F.R.C.S.—a daughter.

LAYBOURNE.—On Jan. 8, in London, the wife of Dr. M. N. Laybourne—a daughter.

NICHOLL.—On Jan. 18, the wife of Dr. Patrick Nicholl—a son.

OWEN.—On Jan. 17, at Harrow, the wife of Mr. E. N. Owen, F.R.C.S.—a son.

WALKER.—On Jan. 15, at Southend-on-Sea, the wife of Dr. J. Walker—a son.

MARRIAGES

DURRANS—GOULDING.—On Jan. 11, at Wolton-under-Edg
Glos, John Faraday Durrans, M.R.C.S., to Gwendoline Ma
Goulding, S.R.N.

JACOBSON—HARVEY.—On Jan. 17, in London, Bernard Jacobso
M.B., to Moyra Harvey.

DEATHS

BOND.—On Jan. 14, at Ewell, Surrey, Charles Shaw Bond, B.A., M.B. Camb., D.P.H., aged 80.

CAMPBELL.—On Jan. 17, at Dundee, Henry Gordon Campbell, L.R.C.P.E.

FALK.—On Jan. 18, at Sanderstead, Herman Falk, M.B. Camb., D.P.H., D.T.M. & H., major, I.M.S. retd.

HORNIBROOK.—On Jan. 20, at Gerrards Cross, William Henry Hornibrook, F.R.C.S.I., D.P.H., aged 81.

LAZARUS-BARLOW.—On Jan. 15, at Bexhill, Walter Sydney Lazarus-Barlow, B.A., M.D. Camb., F.R.C.P., aged 84.

MARTIN.—On Jan. 11, in London, Charles Gutherless Martin, B.A. Camb., M.R.C.S.

MORT.—On Jan. 19, in Manchester, James Henry Mort, B.A. Camb., M.R.C.S., aged 78.

PATTERSON.—On Jan. 16, at Ashridge Park, Herts, Norman
Patterson, M.B. Edin., F.R.C.S.

SWEENEY.—On Jan. 16, in London, Edward Reginald Stanisla
Sweeney, M.R.C.S.

TAYLOR.—On Jan. 18, at Wareham, Ernest Charles Taylor, B.A., M.B. Camb., major, I.M.S. retd, aged 71.

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[1] Cited by Ewing, J. Neoplastic Diseases. Philadelphia, 1940; p. 437.

[2] Ministry of Agriculture and Fisheries: Report of Proceedings under the Diseases of Animals Acts for the Years 1938–47. H.M. Stationery Office. Pp. 104. 2s.

rsity of Glasgow

Jan 14 the following degrees were conferred:

.—Thomas Cochrane, David Douglas, J. D. Dow, R. M. , B. R. Hillis, Margaret H. Kelsall, A. A. Kirkland, J. C. W. rlane.

M.—D. H. Clark.

., Ch.B.—Thomas Baird, R. W. Ballantyne, Hanna R. Berg, Black, S. G. Brooks, G. R. Brown, G. T. Bryden, Isobel J. D. s. D. W. A. Byers, A. R. W. Climie, Margaret Cowie, G. T. Jean H. Dewar, Elizabeth Fagan, Rhoda M. Fullerton, J. M. er, R. E. C. Gibson, Alexander Gillie, K. W. M. Grossart, es M. W. Hamilton, J. R. Hood, Douglas Hutchison, G. E. A. , D. R. S. Leslie, Morven E. Macaulay, H. McG. McBryde, l McCue, James McEwan, M. MacA. MacKay, Anne M. chnie, I. M. Maclean, Alexander McQueen, J. B. Marshall, Miller, T. R. D. Moffat, A. W. Mollison, A. E. W. Morton, M. Muir, Mary C. W. Neilson, D. A. Player, L. G. Samuel, Smith, James Steel, Harry Steingold, Sarah F. Stevenson, Sturrock, W. M. Walker, J. R. Welsh, W. D. Wilson.

er of St. John

an investiture at St. Bartholomew's Hospital on Jan. 20 ollowing doctors received insignia of the order:

mmander: Dr. A. P. Spark.

icers: Dr. E. P. Scott and Dr. D. M. Macmanus (nominated rsonal esquires by Lord Webb-Johnson); Mr. F. W. Law, el T. J. L. Thompson, Major Albert Ehrmann, Dr. J. A. E. M. ey, Lady Wakeley.

ociation of Surgeons of Great Britain and Ireland

ne annual meeting of the association will be held in don on Thursday, Friday, and Saturday, May 4, 5, and 6. re will be discussions on Gravitational Ulcers of the Leg ner, Prof. M. Boyd), the Gastric Blood-vessels (Prof. H. Bentley), Anticoagulants in Surgery (Prof. R. M. es, Toronto), and the Alimentary Physiology after Surgical atment for Simple Peptic Ulcer (Prof. Charles Wells).

rveian Society of London

t the annual general meeting of the society on Jan. 18, a sentation was made to Sir Cecil Wakeley on his retirement n the office of honorary treasurer. The retiring president, Desmond MacManus, gave an address on General Practice the Last 30 Years, and Dr. R. R. Trail was inducted as sident for 1950.

nterian Society

The annual dinner of the society will be held at Grosvenor use, Park Lane, London, W.1, on Thursday, Feb. 16, 7.30 P.M. Tickets (25*s.*) may be had from Dr. Franklin knell, 14, Wimpole Street, W.1.

yal Institute of Philosophy

Today, Friday, Jan. 27, Mr. Karl Britton will give the first four weekly lectures on the Philosophy of Human Nature. the lectures will be given at 5.15 P.M. at 14, Gordon Square, don, W.C.1.

yal Society

On Thursday, Feb. 16, at 2.15 P.M., Prof. J. H. Burn, F.R.S., l open a discussion on the Mode of Action of Local Hormones. On Thursday, March 16, at 11 A.M., Prof. S. Zucker-n, F.R.S., will open a discussion on the Measurement of owth and Form. Both meetings will be held at Burlington use, Piccadilly, London, W.1.

nference on Fertility

A conference on fertility, which it is proposed will be the ugural meeting of a new Society for the Study of Comrative Fertility, will be held at the house of the Zoological ciety of London on June 16 and 17. Further particulars y be had from Dr. G. I. M. Swyer, Obstetric Hospital, iversity College Hospital, Huntley Street, London, W.C.1.

.H.O. Meeting

At the opening of the fifth session of the executive board the World Health Organisation, in Geneva on Jan. 16, Arcot Mudaliar (India), the chairman, expressed the hope t the governments of the Soviet Union, the Ukraine, elorussia, and Bulgaria would reconsider their decision to thdraw from the Organisation. Previously Dr. Melville ackenzie (U.K.) had suggested that any further attempt sway these countries from their decision "would not be the interest of the Organisation." The chairman said that the Organisation difficulties had arisen because 17·85% the budget for 1948 and 26·71% of the budget for 1949 e still outstanding. He also announced that a European alth conference is to open on March 6, when the question establishing a regional office for Europe will be examined.

International Conference on Tuberculosis and Diseases of the Chest

At a meeting of the British Tuberculosis Association on Jan. 20, Dr. Stephen Hall announced that a Conference on Tuberculosis and Diseases of the Chest will be held in September, 1951, in connexion with the Festival of Britain.

Anderson-Berry Prize

A David Anderson-Berry medal, together with a sum of money amounting to about £100, will be awarded this year by the Royal Society of Edinburgh for work on the therapeutic effect of X rays on human diseases. Applications, which may be based on published or unpublished work, should reach the general secretary of the society, 22, George Street, Edinburgh, 2, not later than March 31.

Symposium on Chloramphenicol in Milan

The Italian Centre of Studies on Antibiotics is holding an international meeting on the properties and use of chloramphenicol, with special regard to typhoid fever and brucellosis, in Milan during the Italian Congress on Antibiotics which takes place from June 3 to 5. Further information may be had from the centre, Via Francesco Sforza 38, Milan.

Treacher Collins Prize Essay

The subject for the next award of this prize (£100) is Exophthalmos in Relation to Endocrine Disorder. Essays should be submitted to the hon. secretary, Ophthalmological Society of the United Kingdom, 45, Lincoln's Inn Fields, London, W.C.2, before Sept. 30, 1951.

British Council

Sir Henry Dale, O.M., has been elected president of the council in succession to Lord Riverdale, who has resigned. Sir Henry was a member of the executive committee from 1943 to 1949, and chairman of the science advisory committee from 1942 to 1949.

London Lock Hospital

At a meeting on Jan. 9, the North West Metropolitan regional hospital board considered a letter from the Ministry of Health concerning the board's proposal for the future user of the Lock Hospital. The board agreed that, while it "had no alternative other than to accept the Minister's decision that the proposed change of user should not be proceeded with, a reply be sent reiterating the board's views on the matter."

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The Ministry of Health has asked hospital authorities to assist in carrying out the national policy on the stabilisation of personal incomes in a number of ways, including the following:

1. Where a wage or salary has been nationally determined, there should be no departure from it except in the case of staff who have protected personal rates because they are transferred officers who have elected to remain on their previous rates, or because they are covered by a no-detriment provision in the national agreement.
2. Where there is no nationally determined rate of pay, present occupants should continue to be paid in accordance with their present wage, salary, or salary-scale; and no increase should be made without reference to the Ministry.
3. Where posts fall vacant for which there is no nationally determined rate, the matter should be referred to the Ministry.
4. Where the grading of posts is a matter for boards or committees to settle within the framework of a national agreement, alterations in existing gradings should not be made unless there is either a substantial change in duties or a serious anomaly which must be corrected without delay.

Joint Advisory Committee in Otolaryngology

This committee has been set up by the following bodies: British Association of Otolaryngologists (Mr. Myles Formby), British Medical Association (Mr. E. D. D. Davis), British Postgraduate Medical Federation (Prof. F. C. Ormerod), Institute of Laryngology and Otology (Mr. C. Gill-Carey), Royal College of Surgeons of England (Mr. V. E. Negus). Professor Ormerod has been elected chairman and Mr. John H. Young honorary secretary. The objects of the committee are to consider and coördinate the facilities for postgraduate students of otolaryngology in London and the Provinces, and to give advice about posts as house-surgeons and registrars for otolaryngological departments or hospitals. An advisory bureau for postgraduate students is to be set up at the Institute of Laryngology and Otology, 330, Gray's Inn Road, London, W.C.1 (TERminus 4311). The postgraduate bureau at the Royal College of Surgeons of England is also available for inquiries.

on Playthings to a small local society he once said that the best playthings for parents were children, and for children, parents. He certainly lived up to this maxim. In 1907 he bought a small cottage in Essex called Smith's Hall, standing in two acres of rough meadow full of thistle which was the original home of that Squire Pudney, mentioned in Baring-Gould's *Mehalah*, who grew more thistles than wheat. But the rough ground was gradually tamed and turned into a beautiful garden which was the pride of his heart, till increasing years and the difficulty of getting help forced him to sell it in 1941. For many of his last years he did the *Times* crossword puzzle every day, and this he still managed even when small retinal hæmorrhages forced him to use a magnifying-glass. His brain remained alert and clear, and the day before he died he was talking happily to his son, Dr. Percy Lazarus-Barlow, on all sorts of medical topics, both recent and old.

OTTO RIESSER

M.D.

Dr. Otto Riesser, formerly professor of pharmacology in the universities of Greifswald and Breslau, died in Frankfort-on-Main on Dec. 1, aged 67. A pupil of Jaffé, Ellinger, and Embden, his main interest was the pharmacology and physiological chemistry of the muscle, and he published many valuable papers on creatine. During the Hitler régime he found refuge in Holland, but he returned to Germany in 1945. When the German Pharmacological Society was refounded in 1948, he was elected its first president. His death will be a loss to his colleagues and pupils, who valued his great friendliness and his criticisms, which were always stimulating and encouraging.

DR. A. G. GIBSON

F. G. H. writes: "From his earliest years, Gibson was a passionate naturalist, a keen and accurate observer, with a particular devotion to wild birds and wild flowers, and in his later years an expert and proficient gardener. To this pastime he gave his few leisure hours during the burden of overwork, inevitable in the years of the late war. The spirit and functions of the naturalist and the physician have so much in common that this happy combination has often been found in distinguished members of the medical profession.

"Gibson's appointment to the Radcliffe Infirmary staff in 1911 coincided with the appointment of Sir William Osler as regius professor of medicine, and between these two men there formed bonds of friendship, admiration, and affection, which were abundantly evident in their happy professional collaboration, and in their combined influence upon the reputation and standing of the hospital, and upon the general standard of medical work in the region served by the hospital. A sound pathologist provides the leaven without which no hospital staff can achieve excellence, however distinguished may be the ingredients provided by the clinicians; and Gibson was a sound pathologist, of the generation sometimes labelled clinical pathologist. As a clinician his whole outlook was based upon a sound pathology, and he played an important part in the formation and development of two major societies. An original member of the Association of Physicians, he was for many years an editor of the *Quarterly Journal of Medicine*. In 1922 he was in the chair at the first committee meeting to consider the possibility of forming the Cardiac Club, which was later enlarged to become the British Cardiac Society. To each of these societies he gave valuable service both as an officer and contributor.

"His contributions to the Oxford school of medicine were outstanding. To many generations of medical colleagues and students the sturdy courage which enabled him to master and subdue a lifelong shyness, and to give of his best where the duties of his office required, will be an unforgettable memory. Patient, understanding, kindly, and courageous, he possessed in a unique degree that *aequanimitas* which his friend Osler prescribed as a desirable characteristic of a good physician. Both of his sons have followed their father's profession."

Notes and News

ECONOMY IN PRESCRIBING

The following letter, signed by Sir Wilson Jam
chief medical officer of the Ministry of Health, is be
to medical practitioners:

"Recent investigations have shown that large
money are being spent on drugs and medicines of
value or on unnecessarily expensive brands of standa
prescribed in the National Health Service. The Cen
Scottish Health Service Councils therefore set up a
joint committee which consisted of members suggest
among others, the three Royal Colleges, the Scottish
Corporations, the British Medical Association, the
Pharmacopœia Commission and the Society of Apoth
On the recommendation of this Committee, the
Council has advised the Minister to send a letter to all
asking for their coöperation in the prevention of
prescribing.

"The Committee considered that much unnecessa
was due to the prescribing of proprietary brands—parti
those which are widely advertised—instead of standard
Many proprietary preparations do not differ materiall
the standard drugs of the British Pharmacopœia, the
Pharmaceutical Codex and the National Formulary
be ordered just as effectively and at much less exp
their official titles. The National Formulary recentl
by the British Medical Association and the Pharma
Society contains, in an Appendix, the official equiva
a large number of proprietary preparations. Doctors
therefore, before prescribing any proprietary prep
ask themselves 'Am I satisfied that a standard
combination of standard drugs cannot be prescrib
equal effect?'

"The Committee also thought that doctors shoul
asking themselves this question, bear in mind that wh
who provide general medical services in the Nationa
Service are required by their terms of service to ord
drugs and prescribed appliances as are requisite for t
ment of any patients'—and that a doctor is theref
to prescribe whatever drug he considers necess
Regulations do provide that action may be taken
Minister where 'investigation shows that the cost is i
of what was reasonably necessary for proper treatme

"The Minister therefore hopes that he will h
cooperation of all doctors in this matter. It is in
circumstances vital that all unnecessary expendi
avoided—in the provision of appliances and in the
of drugs prescribed as well as in the matters dealt
the Joint Committee."

INDEX OF NEW PHARMACEUTICAL PRODU

A YEAR ago the *Pharmaceutical Journal* began pub
of a series of index cards giving summarised data
pharmaceutical preparations. Each substance is de
on a separate card, which provides information on
tion, indications, dosage, packing and price, and s
together with references to relevant publications, an
necessary a note on contra-indications or special prec
In the last twelve months over 200 such cards ha
issued; and the service has now been extended
publication of an index to therapeutic uses. Thi
peutic index, with entries under diseases, provide
venient method of cross-reference; and it will be
every six months. The annual cost of the complet
is two guineas; and the cards published in 1949
obtained by new subscribers for an additional guinea
should be sent to the Pharmaceutical Journal (N
Bedford Place, London, W.C.1.

University of London

On Monday, Feb. 27, at 5.30 P.M., at the London
Hygiene, Keppel Street, W.C.1, Prof. J. W. Bigger,
on Synergism and Antagonism in relation to Anti
Substances.

University of Birmingham

On Dec. 16 the following degrees were conferred:

Ch.M.—J. N. Wilson.

M.B., Ch.B.—Joyce Bott, D. W. Davis, D. A. Gale, P.
C. C. Griffiths, K. A. G. Guy, R. S. T. Hoy, Pauline M.
I. E. J. McLauchlan, Brian MacMahon, E. T. Mathews,
Medcalf, Jeanne C. Poppitt, L. E. Tyler, Ruth A. Watson,
Wilkins, E. W. Witherspoon.

rsity of Glasgow

Jan 14 the following degrees were conferred:

—Thomas Cochrane, David Douglas, J. D. Dow, R. M.
B. R. Hillis, Margaret H. Kelsall, A. A. Kirkland, J. C. W.
lane.
I.—D. H. Clark.
.. *Ch.B.*—Thomas Baird, R. W. Ballantyne, Hanna R. Berg,
Black, S. G. Brooks, G. R. Brown, G. T. Bryden, Isobel J. D.
, D. W. A. Byers, A. R. W. Climie, Margaret Cowie, G. T.
ean H. Dewar, Elizabeth Fagan, Rhoda M. Fullerton, J. M.
r, R. E. C. Gibson, Alexander Gillie, K. W. M. Grossart,
s M. W. Hamilton, J. R. Hood, Douglas Hutchison, G. E. A.
, D. R. S. Leslie, Morven E. Macaulay, H. McG. McBryde,
McCue, James McEwan, M. MacA. MacKay, Anne M.
hnie, I. M. Maclean, Alexander McQueen, J. B. Marshall,
Miller, T. R. D. Moffat, A. W. Mollison, A. E. W. Morton,
M. Muir, Mary C. W. Neilson, D. A. Player, L. G. Samuel,
Smith, James Steel, Harry Steingold, Sarah F. Stevenson,
Sturrock, W. M. Walker, J. R. Welsh, W. D. Wilson.

r of St. John

an investiture at St. Bartholomew's Hospital on Jan. 20 llowing doctors received insignia of the order:

nmander: Dr. A. P. Spark.
ers: Dr. E. P. Scott and Dr. D. M. Macmanus (nominated sonal esquires by Lord Webb-Johnson); Mr. F. W. Law, el T. J. L. Thompson, Major Albert Ehrmann, Dr. J. A. E. M. y, Lady Wakeley.

ciation of Surgeons of Great Britain and Ireland

e annual meeting of the association will be held in lon on Thursday, Friday, and Saturday, May 4, 5, and 6. e will be discussions on Gravitational Ulcers of the Leg ner, Prof. M. Boyd), the Gastric Blood-vessels (Prof. H. Bentley), Anticoagulants in Surgery (Prof. R. M. es, Toronto), and the Alimentary Physiology after Surgical atment for Simple Peptic Ulcer (Prof. Charles Wells).

rveian Society of London

t the annual general meeting of the society on Jan. 18, a sentation was made to Sir Cecil Wakeley on his retirement n the office of honorary treasurer. The retiring president, Desmond MacManus, gave an address on General Practice the Last 30 Years, and Dr. R. R. Trail was inducted as sident for 1950.

nterian Society

The annual dinner of the society will be held at Grosvenor use, Park Lane, London, W.1, on Thursday, Feb. 16, 7.30 P.M. Tickets (25*s.*) may be had from Dr. Franklin knell, 14, Wimpole Street, W.1.

yal Institute of Philosophy

Today, Friday, Jan. 27, Mr. Karl Britton will give the first four weekly lectures on the Philosophy of Human Nature. the lectures will be given at 5.15 P.M. at 14, Gordon Square, ndon, W.C.1.

yal Society

On Thursday, Feb. 16, at 2.15 P.M., Prof. J. H. Burn, F.R.S., l open a discussion on the Mode of Action of Local Hornes. On Thursday, March 16, at 11 A.M., Prof. S. Zuckern, F.R.S., will open a discussion on the Measurement of wth and Form. Both meetings will be held at Burlington use, Piccadilly, London, W.1.

nference on Fertility

A conference on fertility, which it is proposed will be the ugural meeting of a new Society for the Study of Comrative Fertility, will be held at the house of the Zoological ciety of London on June 16 and 17. Further particulars y be had from Dr. G. I. M. Swyer, Obstetric Hospital, iversity College Hospital, Huntley Street, London, W.C.1.

.H.O. Meeting

At the opening of the fifth session of the executive board the World Health Organisation, in Geneva on Jan. 16, Arcot Mudaliar (India), the chairman, expressed the hope at the governments of the Soviet Union, the Ukraine, elorussia, and Bulgaria would reconsider their decision to thdraw from the Organisation. Previously Dr. Melville ackenzie (U.K.) had suggested that any further attempt sway these countries from their decision "would not be the interest of the Organisation." The chairman said that the Organisation difficulties had arisen because 17·85% the budget for 1948 and 26·71% of the budget for 1949 e still outstanding. He also announced that a European alth conference is to open on March 6, when the question establishing a regional office for Europe will be examined.

International Conference on Tuberculosis and Diseases of the Chest

At a meeting of the British Tuberculosis Association on Jan. 20, Dr. Stephen Hall announced that a Conference on Tuberculosis and Diseases of the Chest will be held in September, 1951, in connexion with the Festival of Britain.

Anderson-Berry Prize

A David Anderson-Berry medal, together with a sum of money amounting to about £100, will be awarded this year by the Royal Society of Edinburgh for work on the therapeutic effect of X rays on human diseases. Applications, which may be based on published or unpublished work, should reach the general secretary of the society, 22, George Street, Edinburgh, 2, not later than March 31.

Symposium on Chloramphenicol in Milan

The Italian Centre of Studies on Antibiotics is holding an international meeting on the properties and use of chloramphenicol, with special regard to typhoid fever and brucellosis, in Milan during the Italian Congress on Antibiotics which takes place from June 3 to 5. Further information may be had from the centre, Via Francesco Sforza 38, Milan.

Treacher Collins Prize Essay

The subject for the next award of this prize (£100) is Exophthalmos in Relation to Endocrine Disorder. Essays should be submitted to the hon. secretary, Ophthalmological Society of the United Kingdom, 45, Lincoln's Inn Fields, London, W.C.2, before Sept. 30, 1951.

British Council

Sir Henry Dale, O.M., has been elected president of the council in succession to Lord Riverdale, who has resigned. Sir Henry was a member of the executive committee from 1943 to 1949, and chairman of the science advisory committee from 1942 to 1949.

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Royal Medical Foundation of Epsom College

Applications are invited from women doctors or the wives or daughters of doctors for two vacant pensions from the Margaret and Josephine Hurd-Wood Gift Fund. Forms of application are available from the secretary's office, Epsom College, Surrey.

Royal Sanitary Institute

The institute will hold its Health Congress this year at Eastbourne from April 24 to 28.

The 1951 Congress will be held in Southport from April 23 to 27.

Pictures by Mental Patients

An exhibition of psychopathological art is to be held at the International Congress of Psychiatry in Paris from Sept. 18 to 27, 1950. Those who wish to show exhibits are asked to write to Dr. E. Cunningham Dax, Netherne Hospital, Coulsdon, Surrey, before the end of February.

Medicine Bottles

The Ministry of Health is sending to pharmacists copies of a humorous poster urging patients to return their medicine bottles. Since the campaign to secure the return of bottles was launched last September, the proportion returned has varied in different parts from 1% to 50% of those issued.

Course on Rheumatic Diseases

A weekend course on the chronic rheumatic diseases, with lectures, ward rounds, and practical demonstrations, is being held at the rheumatism unit of St. Stephen's Hospital, Fulham Road, London, S.W.10, on March 25 and 26. Prof. G. W. Pickering will open the course with a discussion on the Significance of the Effect of 'Compound E' in Rheumatoid Arthritis. Other speakers will include Dr. Francis Bach, Dr. Grace Batten, Dr. E. G. L. Bywaters, Dr. Colin Edwards, Dr. Philip Ellman, Mr. A. Timbrell-Fisher, Mr. H. E. Harding, Dr. David Shaw, and Dr. A. G. Signy. Further information from the medical registrar at the unit, or from the Fellowship of Postgraduate Medicine, 1, Wimpole Street, W.1.

British Railways Appointment

Dr. G. O. Hughes has been appointed medical officer Euston in the London Midland region.

Dr. Hughes was educated at Swansea Grammar School and Liverpool University, where he graduated M.B. in 1938. After holding an appointment as resident surgical officer at Macclesfield General Infirmary he joined the R.A.M.C., and with the rank of major he served in the Western Desert, Sicily, Italy (where he won the Military Cross), Middle East, Madagascar, and Germany. On his return to civilian life Dr. Hughes joined the Southern Railway in 1947 as medical officer, and he has held the post of divisional medical officer, Southern region, London Bridge.

Refresher Courses in Tuberculosis

The N.A.P.T. hopes to hold a course for doctors at Davos from March 25 to April 2. Courses for doctors, school nurses, health visitors, administrators, and social workers are to be held at St. Thomas's Hospital, London, S.E.1, on April 18, 19, and 20, on tuberculosis in children and the use of B.C.G. Three-day clinical courses are being continued at Cheshire Joint Sanatorium, Market Drayton, Salop, and at King George V Sanatorium, Godalming, Surrey. Dates for the first six months of 1950 are as follows:

Cheshire Joint Sanatorium: Feb. 8–10; March 8–10; April 12–14; May 10–12.
King George V Sanatorium, Godalming: Feb. 21–23; May 10–12.

Further information may be had from the secretary of the Tuberculosis Educational Institute, Tavistock House North, Tavistock Square, W.C.1.

The openings in the various branches of the Colonial Service have been described in an official publication, *Appointments in His Majesty's Colonial Service* (H.M. Stationery Office. Pp. 111. 1s.).

The 1949–50 edition of *Winter on the Sussex Coast*, a symposium on the various resorts, has been published, price 1s., by the Crabtree Press Ltd., 57, Tivoli Crescent, Brighton. Doctors who apply will receive a copy gratis.

The first volume of *Clementson's List of Scholarships, Fellowships, and Grants to Students and Research Workers*, which is now ready, contains a medical and dental section. It may be had from 2, Post Office Terrace, Cambridge (price 21s.).

Diary of the Week

JAN. 29 TO FEB. 4

Tuesday, 31st

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: Histopathology of the Skin.
PADDINGTON MEDICAL SOCIETY
9 P.M. (St. Mary's Hospital, W.2.) Dr. Jack Lieber:
of Obesity.

Wednesday, 1st

INSTITUTE OF PSYCHIATRY, Maudsley Hospital, Denm
S.E.5
4.30 P.M. Dr. E. Stengel: Lecture-demonstration.
HARVEIAN SOCIETY OF LONDON
8.15 P.M. (26, Portland Place, W.1.) Mr. B. W. Rycroft
Thoughts on Corneal Graft Surgery.
MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
8.30 P.M. (Royal College of Surgeons, 18, Nicolson
Dr. C. Kelman Robertson: Pneumoconiosis.

Thursday, 2nd

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.
5 P.M. Prof. W. G. Barnard: Contribution of Patholog
Diagnosis of Tumours in Otolaryngology.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. H. J. Wallace: Bullous Eruptions.
ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Antony Feiling: Neurology lecture-demo
ROYAL PHOTOGRAPHIC SOCIETY, 16, Princes Gate, S.W.7.
7 P.M. *Medical Group.* Mr. J. E. Andrews, F.I.B.P.: Int
to Infra-red Photography. Mr. Kenneth Bowes
Aspects of Infra-red Photography.

Friday, 3rd

MAIDA VALE HOSPITAL, W.9
5 P.M. Dr. Blake Pritchard: Neurological demonstr

Appointments

ADAMS, G. F., M.D. Belf., M.R.C.P.: physician, geri
Belfast City Hospital.
CAMERON, A. D. C. S., M.B. Edin., D.P.H.: deputy M.O.H. a
schools M.O., Luton.
CAMPBELL, J. A., M.A., M.B. Camb., M.R.C.P., D.T.M. & H.: c
physician, Norfolk and Norwich area.
CHURCH, G. E., M.B. Lpool, D.M.R., D.M.R.E.: consultant ra
King's Lynn area.
DAVEY, W. W., M.D. Belf., F.R.C.S.I.: surgeon (consultan
Whittington Hospital, London.
DAVIES, I. J., M.D., B.SC. Wales, D.P.M.: consultant ps
and medical superintendent, St. Audry's Hospi
Anglian region.
DAVIES, J. O. F., M.D. Lond., D.P.H., D.OBST.R.C.O.G.
administrative M.O., Oxford regional hospital board.
FINLAYSON, A. A., M.B. St. And., F.R.C.S.E.: ear, nose, a
surgeon, Peterborough area.
GIORDANI, ENNIS, M.R.C.S., D.M.R.: radiologist (consulta
Upton Hospital, London.
HAY, C. P., M.D. Edin., M.R.C.P., D.P.H.: consultant chest
West Suffolk area.
IRWIN, C. G., M.B. Belf.: obstetrician and gynæcolog
Antrim area.
JONES, A. E., M.D. Lond., M.R.C.P., D.M.R.T.: deputy
radiotherapeutic department, St. Bartholomew's
London.
KELHAM, GEOFFREY, M.A., M.B. Camb., D.M.R.E.:
(consultant status), Paddington Hospital, London.
KEMPTON, J. J., M.B.E., M.D. Brist., M.R.C.P., D.C.H.: pa
(consultant status), Canadian Red Cross Memorial Hos
LACK, C. C., M.A. Camb., M.R.C.S., D.P.M.: psychiatrist (
status), King Edward Memorial Hospital, Ealing.
LAIRD, W. H., M.B. Belf., D.OBST.R.C.O.G.: obstetrician an
logist, Mid-Antrim area.
LEWIN, W. S., M.B., M.S. Lond., F.R.C.S.: asst. neu
Radcliffe Infirmary, Oxford.
LEWIS, T. L. T., B.A., M.B. Camb., M.R.C.O.G.: surgeo
patients, Chelsea Hospital for Women.
MARCH, H. F., M.D. Durh., M.R.C.P., D.M.R.D.: M.O., Chape
Hospital, Leeds.
MURTAGH, G. P., M.B. Belf.: anæsthetist, North Antrim a
PARTINGTON, THOMAS, M.D. Lond., M.R.C.P.: consultant
Kettering and Northampton group of hospitals.

The *American Heart Journal* is now edited by Dr.
C. Meakins, of Montreal. Dr. Meakins was formerly
of medicine at McGill University, and of therapeuti
University of Edinburgh.

CORRIGENDA: *Treatment of Anthrax, Botuli Snake-bite.*—The telephone number of Nottingh Hospital, which was mentioned under this heading (p. 51), is Nottingham 66292.

The committee of the medical section of the Association for 1950 includes Mr. G. J. Hipkins Dental Association), and Mr. W. A. Lee (Liverpool Institution).

THE IRON AND STEEL INDUSTRY

CATHERINE SWANSTON
M.R.C.S., D.P.H., D.I.H.
the Department of Public Health and Social Medicine, University of Edinburgh

E Iron and Steel Act, which received the Royal t on Nov. 24, 1949, provides for the nationalisation eel-making plants with an annual output of 20,000 or more. To have nationalised all plants making and steel would have involved not only the iron and industry but also the firms which engage in these esses as part of their normal manufacturing trade. s, many engineering works maintain their own iron dry, and to put all such foundries under public ership would seriously embarrass the metal and neering trade. The new Act ensures that none of e ancillary departments will be affected, but that the n output of the industry will in future be a State onsibility. It seems pertinent at such a time to vey the special features of the different processes hin the industry and the health hazards to which the rkers in these processes are exposed.

ORIGINS OF THE INDUSTRY

The smelting of iron to fashion weapons and domestic d agricultural implements is one of the oldest industries, de widespread by the ubiquity of iron-ore deposits, ich are found in every part of the globe. Great itain is not particularly rich in these deposits, but deposits she possesses have been mined for centuries, d the smelting of iron ore was one of the country's liest industries. At first charcoal was used as fuel, d since it was easier to transport the ore than the fuel, elting works were set up in the forest area of the ssex and Kentish Weald and the Forest of Dean, d for centuries these remained the iron-manufacturing stricts. In Scotland there remain to this day traces the old smelting works in the Highlands where wood r charcoal was plentiful and the iron ore of West thian and Midlothian was not too far distant. During e 16th and 17th centuries the shortage of charcoal was coming serious, and the expansion of coalmining ovided an alternative fuel; by the turn of the th century coal was in general use. The opening of deep workings in coalmines, made possible Newcomen's mechanical pump, assured a steady pply.

With this change-over proximity to coalfields became sirable, so in time the coal-producing districts became e producers of iron (and later of steel). As the old e fields were worked out and new methods of steel-aking which required high-grade ore were introduced, e industry became more and more dependent on ported ore with an iron content of 50–60% (compared ith the 30% of native ore), and consequently tended to ove to the great ports in South Wales, Tyneside, and e Clyde.

The chief ores are hæmatite (Fe_2O_3), magnetite e_3O_4), limonite (hydrated iron oxide), and iron carbon-te ($FeCO_3$).[7] The largest deposits in the world are the esabi fields round Lake Superior on the borders of anada and the United States; but the Swedish ranges, pain, and the Lorraine beds along the Franco-German order provide much of the ore used in Europe. In reat Britain, iron ore is mined from the deposits which xtend in a broad strip from the coast of Yorkshire outh-west to the coast of Dorset and also from the elds in south-west Scotland. Imported ore has, generally peaking, a higher iron content than the native deposit, nd so the costs of transport and smelting are less. bout a third of the ore now worked in this country is mported.

In Great Britain the industry is established in all the main industrial areas, with its greatest concentrations in South Wales, the north-east coast, Lanarkshire, and the west of Scotland, and a widely scattered Midlands group. All these areas are near coalfields, and there are heavy local demands for steel. In Scotland, where a seventh of the crude steel of the United Kingdom is produced, nearly all is used on the Clyde—a factor which determines the type of product made. Thus in 1943 a sixth of Scotland's crude-steel output was alloy steel for armour plate as against a twentieth in other districts.[9]

FALL AND RISE

During the 1920s and 1930s the British steel industry was faced with increasing Continental and American competition both at home and abroad, and many of its plants were out of date and inconveniently situated. The 1931 depression hit the industry so hard that in some areas two out of every five workers were unemployed, and output dropped from 9·6 million tons in 1929 to 5·1 million tons in 1932. In Scotland the output was only 30% of normal (fig. 1).

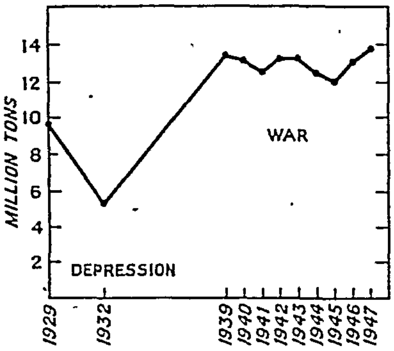

Fig. 1—Production in Great Britain of steel ingots and metal for castings.

During the inter-war period there was a decline in the number of insured persons in the five great basic industries—coalmining, cotton, wool, shipbuilding and ship-repairing, and iron and steel manufacture—and between 1923 and 1937 these industries lost 25% of their labour force. In some areas this was associated with a decline in the whole insured population. At the same time industries in some parts of the country were expanding, particularly in Greater London, which attracted many workers from other districts, and where the working population increased by 60% in the same period.

To stop the decline in the iron and steel industry the British Iron and Steel Federation was set up, with Government support, in 1933. A merging and disappearance of small firms produced a high degree of monopoly and led to the establishment of large new plants, some of which, like the Ebbw Vale Works in South Wales, helped to provide much-needed employment in distressed areas. This reorganisation of the industry was of the utmost importance in meeting the increased demands for steel in the late war. Fig. 2 shows the relative war-time production in relation to pre-war production[9]; and it may be noted that Scotland, which suffered more during the slump, made a greater

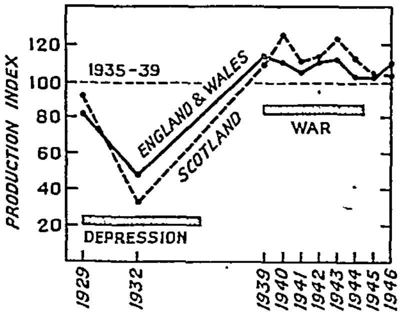

Fig. 2—Indices of steel production in Great Britain (1935–39 = 100. The average annual production in these years was 11,650,000 tons).

recovery than the rest of the country during the war.

In 1939–45 the British iron and steel industry handled 86 million tons of steel, of which 72 million tons was made at home. For this, 101 million tons of iron ore was mined, and 5 million tons of scrap obtained from three different sources—the national survey ($3^1/_2$ million tons), the salvage of steel from blitzed buildings (600,000 tons), and the conversion of iron railings (600,000 tons). The manufacture of the Bailey bridge is a good example of the way in which the industry rose to the demands of the Armed Forces. Production began in the summer of 1941, and by the end of the war over 200 miles of fixed, and 40 miles of floating, bridges had been produced by six hundred firms.[5]

In 1945 the "caretaker" Government called on the British Iron and Steel Federation and the Joint Iron Council to make recommendations for the future of the industry. In their report [17] the council drew attention to the desirability of further amalgamation of the smaller plants. To bring plant up to date, provide additional furnace capacity and new rolling-mills, and modernise iron foundries (where there is a serious shortage of labour), it was proposed that the enormous sum of £168 million should be allotted to capital expenditure over a period of five years. This would increase the production of steel ingots by 2 million tons a year, and of iron castings by 1–1·5 million tons. More recently, it has been estimated that the output of the industry can be increased to 18 million tons of steel a year by 1952.

Processes in the Industry

It is not easy to show where the iron and steel industry finishes and the metal and engineering trades begin. The absence of a common classification of processes makes comparison of industries difficult, and the fact that many iron and steel workers are ancillary to other trades adds to the confusion. The standard industrial classification of the Central Statistical Office [19] classifies the main processes of the industry as follows:

Order	*Process*
V—Metal manufacture	*Blast furnaces.*—Iron smelting and manufacture of pig-iron, ferro-manganese and spiegeleisen
	Iron and steel melting and rolling, including all processes of steel manufacture and casting
	Iron foundries.—All types of castings
	Manufacture of sheets and tinplate, including melting and rolling in integrated works, and the manufacture of galvanised sheets
	Manufacture of iron and steel tubes (all types)
VIII—Metal goods not elsewhere specified	*Wire manufacture,* including wire products made from both ferrous and non-ferrous metals

The industry can be divided into two main branches: (1) the manufacture of steel ingots and steel plates and castings; and (2) the manufacture of iron castings from foundry pig-iron. Fundamental to both these is the manufacture of pig-iron from the smelting of iron ore. The manufacture of tubes and wire from ferrous metals is also a branch of the industry. The iron-founding industry, which is concentrated in the Midlands with a large secondary producing area in Scotland, has an annual output of 2 million tons from 1750 foundries. These plants make a wide variety of foundry pig-iron, from which castings weighing anything from an ounce to 150 tons are taken. The present trend is towards greater standardisation of irons and reduction in the number of foundries, coupled with the replacement of s large capacity furnaces. The castings fall int main categories: (1) automobile and high-duty (2) building and domestic; (3) cast-iron pipes; (4) er ing and jobbing; (5) ingot moulds; (6) malleable ca and (7) railway equipment.

TABLE I—LOCATION OF THE STEEL INDU

Area	Chief industries	A
South Wales	Tinplate and sheet Billets for re-rolling Rails and sections	
North-East	Heavy commercial steel	(in joi tion
Midlands	Tubes, sheet, billets, wire and wire products	6
Scotland	Steel ingots, armoured alloys, iron and steel castings	2,

The steel industry proper includes blast furnaces billet, and plate mills; sheet and tinplate mills; section bar and strip mills; wire-rod mills; a manufacturers of joists, rails, and heavy-sectio These tend to concentrate in different areas as is in table I.

PRODUCTION OF PIG-IRON

In siderurgy the ferrous metals are classified a steel, or pig-iron according to their increasing c of carbon.[15] Wrought iron, like steel, is of low c content and malleable. Pig-iron is produced in a furnace by reduction of the metallic ore; this is with limestone and coke or coal and subjected powerful blast of hot air. The reduction is br about by the action of carbon monoxide, produce the partial combustion of the coke or coal, leadi separation of the metal from the ore with the forma of carbon dioxide. This is then reduced by more to form the monoxide again, so that the gases emer from a furnace may contain as much as 8% of car dioxide and up to 33% of the highly dangerous car monoxide. The exhaust gases are used for heating stoves connected with the blast furnaces and for rai steam for boilers. At intervals, the bottom of the furna is tapped and the iron run off into moulds or sand furrow where it is cooled and then broken up into lengths "pigs."

Once charged, a blast furnace is kept running co tinuously for years, only being stopped for repai For greatest efficiency it must be kept full of coke a ore, so continuous charging is necessary. Hand chargi has to a great extent been supplanted by mechani charging, but the work necessitates shift work on th part of the men in charge. The pig-iron produced in th way is used either for making steel or for iron-founding

MANUFACTURE OF STEEL

Bessemer Process

The modern manufacture of steel dates from Si Henry Bessemer's discovery, in 1855, of the process that bears his name. Today $7^1/_2$% of the steel output is produced in this way.

The constituents of pig-iron, such as carbon, silicon, and manganese, are altered in amount by blowing air under pressure through the molten mass, thus oxidising the various elements present. This oxidation generates great heat which produces the giant plume of flame of the converter "blow." The process can be controlled very precisely to produce different grades of steel, depending on how far oxidation has been carried. The whole process is carried out in a special furnace or "converter," which permits easy pouring of both metal and slag.

Bessemer process has undergone many changes since originally introduced, one of the most important being iomas modification to enable phosphorus-containing be used. Here the converters are lined with a basic ; and lime is added to the charge. This takes up the iorus in the pig-iron to form calcium phosphate, which a scum on the surface of the molten metal. This slag" is a valuable by-product, for it is used extensively artificial manure and also for the manufacture of ite of cotton"—a heat and sound insulating material ills of buildings. The Bessemer process is expensive ot satisfactory for the production of some types of steel oand today, and it is therefore giving way to the other ds of manufacture.

-hearth Process

e bulk of the British steel output—88½%—is produced by the Siemens open-hearth process.

-iron, together with iron and steel scrap, is melted bath-shaped furnace heated by a flame of coal-gas which s through the furnace from end to end together with a ir blast to produce oxidation. Each furnace may hold over a hundred tons of metal and take many hours to . Towards the end of the process more iron may be ed, and if this has to be fed into the furnace by hand, nen on this job are temporarily exposed to the intensely furnace contents. After tapping—in itself hot and heavy —the furnace floor may have to be mended by scraping filling in the holes and depressions caused by the melting ess. This is done with long steel rods called "rabbles" long-handled shovels, and the filling-in process itself is ned "fettling." This is extremely heavy work carried under trying conditions as the furnace is still red-hot after uring. Vernon[21] has estimated that an hour of continuous ling is more exhausting than eight hours' hand-charging blast furnaces. After fettling is complete, the furnace echarged and the whole process begins again.

ucible Process

Very pure steel for high-speed steel alloys cannot be oduced by the Bessemer or open-hearth methods, the crucible or electric furnace is used.

In the crucible process, which is gradually dying out, gh-grade iron is melted slowly in clay crucibles together with e metals required for the alloy. These crucibles are packed to coke furnaces, and formerly were lifted in and out by nd with the aid of tongs. The "teemer," or pourer, and the puller-out" were required to lift weights of well over 100 lb. uring the casting of the metal from the crucibles—an tremely hot and exhausting task.

lectric-arc Furnace Process

This is one of the most modern methods of steel oduction.

After charging, the furnace is traversed by a heavy current electricity which melts the iron and scrap as it passes rough, and temperatures of 3000–4000°C are obtained. ery fine steels are produced in this way.

As a result of improved mechanisation, and especially with fting and carrying cranes, much larger furnaces and ladles can now be used, and the mechanical charging of furnaces and improved methods of pouring have greatly reduced the physical wear and tear of smelting. Exposure to great heat is still unavoidable as men have to approach furnaces for testing, removal of slag, "puddling," and "fettling."

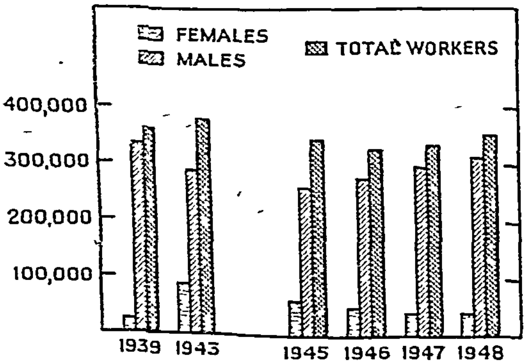

Fig. 3—Numbers employed in the iron and steel industry.

MANUFACTURE OF WROUGHT IRON

Wrought iron has a low carbon content and is malleable. It is made by melting pig-iron with slag and iron oxide, the molten mass being stirred vigorously with an iron bar to assist oxidation, a process known as "puddling."

The Labour Force

Between 300,000 and 400,000 people are employed in the main processes of the iron and steel industry.[14] The peak was reached in 1943 when about 368,000 people were employed, of whom over 80,000 were women (compared with 23,000 in 1939). By July, 1948, the total number of women in the industry had dropped to 43,500 (fig. 3), but judging from the trend of the figures over the previous three years it seems possible that the pre-war total of 23,000 may be permanently exceeded.

The proportion of skilled workers is not accurately known. The Registrar-General's decennial supplement of 1931,[16] in an analysis of some 270,000 workers in the metal-manufacturing trades—not necessarily all in the iron and steel industry—shows that 223,000, or 82%, were in social class III, indicating that they were skilled workers.

These trades are filled by apprentices, and today, apart from the over-all shortage of labour, there is a very serious lack of skilled workers. In the iron-founding industry alone there is an immediate need for 35,000 more people at once to fill jobs, many of which are highly skilled, and unless this increase is achieved plans for stepping up production in the next few years will be seriously embarrassed. The Joint Iron Council[17] noted that through the shortage of young physically fit men in the industry—due in part to the operation of the National Service Acts—the average age is now higher than at any time in the past; and the remaining skilled workers "on whom so much depends" are often not physically capable of producing a normal output. The depression of the early '30s saw a great falling off in the number of apprentices. The present rate of loss of workers exceeds the rate of intake of new workers, and it is evident that foundry work is not proving attractive to young men; while there is a shortage of workers and men can choose their jobs, foundry and other metal-manufacture work with its exacting demands does not attract recruits. It is difficult to see the answer to this problem; a long-term policy aiming at better environmental conditions will in time help to remove this handicap, but cannot ease the immediate shortage.

The metal-manufacturing trades include some of the highest paid workers in the country. During the last week in April, 1948, the average weekly wage paid throughout the metal, engineering, and shipbuilding industries was 144*s*., compared with 134*s*. for all workers; and the hours of work in these industries were only 43 per week compared with 43½ for all others. Within the iron and steel industry itself the highest wages were earned by tinplate and sheet workers with a basic wage of 3*s*. 7*d*. an hour, compared with 2*s*. 11*d*. for all others. The only advance on this, among all the industries listed by the Ministry of Labour, was that of fur-dressing, where the hourly wage paid was 3*s*. 8*d*. Therefore, in the metal industries long hours or low wages cannot be said to be the cause of the shortage of workers.

Because of the number of skilled workers, the problem of dilution during the war period was not easily solved. Mechanisation of such processes as moulding enabled the work to be done by unskilled or semi-skilled labour, some of it female, and the machine-made moulds could be turned out much faster than those made entirely by hand. Moreover, the opinion that the machine-made mould was as satisfactory as the hand-made—although not unanimously accepted—provides evidence that the lengthy apprenticeships for this and other crafts are unnecessary. This is important in view of the future inevitable shortage of adolescents and young adults resulting from the raising of the school-leaving age and the demands of National Service.

PHYSICAL DEMANDS

The iron and steel trades involve hard physical work, and the environmental conditions under which some processes are carried out increase the demands on the body. Exposure to extremes of temperature at furnaces and rolling-mills and in the open, and the inadequate winter heating in some of the older foundries together with constant draughts because of the absence of doors, combine to produce a most unfavourable working milieu. The work is not only hard but often hazardous and sometimes involves exposure to toxic material. Vernon,[21] in his investigation into the iron and steel industry after the 1914–18 war, classified all the processes he studied according to the physical demands, and showed that nearly all the actual productive processes involve intermittent heavy or very heavy work. Table II gives Vernon's assessment of some of the more important types of work.

TABLE II—CLASSIFICATION OF PROCESSES IN RELATION TO FATIGUE

Class of work	Process
Light	Control of gas-fed boilers Engine-room Weighers and checkers of blast-furnace barrows
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TABLE III—ACCIDENT-RATES IN 1947

No. of factories reporting	Industry
2	Blast furnaces
11	Iron and steel manufacture
13	Iron foundries
2	Sheet and tinplate manufacture
15	Iron and steel tube manufacture
4	Wire manufacture
77	
20	Non-ferrous metal manufacture
19	Light-metal trades
159	Engineering trades
1082	All trades listed

The accident-frequency rate is the number of accidents loss of working-time per 100,000 man-hours worked.

conditions by the prevention or removal of dust, and fumes.

The difficulties in providing a good standard of l in old out-of-date plants, where methods have c little during the last half-century, are great; but processes have been mechanised great improveme apparent, and thus hygienic considerations sho kept carefully in mind when new foundries ar built. For example, in foundries cramped w space is common, and rooms must be built large and high enough for work to be done safely. If c dust suppression cannot be achieved, special should be set aside for particularly dusty jobs, "knock-out" and "dressing operations."

ACCIDENT RISKS

The liability to accident in any industry dep a large number of factors, of which the most im are the type of process, environmental conditio age and sex of workers, and the safety organisatio plant. The compensation paid for reportable a in 1937 shows that workers engaged in iron a processes had an accident-rate of 90 per 1000 em compared with 58 for other metal workers, 50 fo and shipbuilding workers, 22 for other factory w and 200 per 1000 for miners. On the other ha ratio of fatal to non-fatal accidents was lower group engaged in extraction of metals than in an group with the exception of "other metal-work Significantly diminished death-rates from ac causes are reported by the Registrar-General fo groups of workers in the metal-manufacturing t

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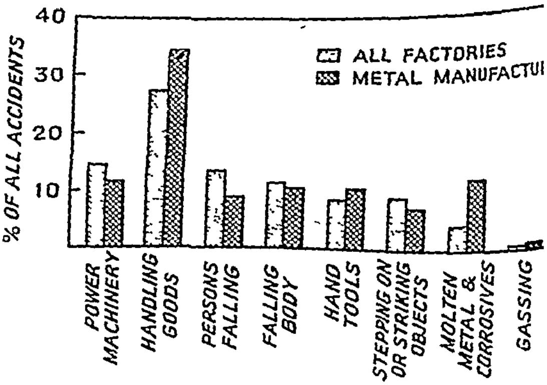

Fig. 4—Causes of all reported industrial accidents in 19

teel trades, the wide scatter of frequency-rates within ranch shows that these are probably correlated less the main type of process than with other and more ral factors.

metal-workers the pattern of accident causation not differ greatly from that found throughout stry in general. In 1946 metal-workers showed an ased rate from handling goods, from gassing, and accidents due to molten metal or other hot or osive substances. On the other hand, these workers fewer accidents from the use of power machinery, falling bodies, and from persons falling and stepping r striking against objects (fig. 4).

INDUSTRIAL DISEASES

he risk of contracting a specific occupational disease probably no higher in the metal-manufacturing ustry than in other trades, with the exception of lung osis and reticulation due to inhaling dust. In 1937 case-rate for industrial diseases per 1000 employed 0·7, compared with 0 6 among other metal workers, in miners, and 0·7 in other factories ; compensation s granted in 281 cases, of which 225 were new and 56 re carried over from the previous year.

Metal-workers are the main sufferers from some of the eduled industrial diseases. In 1937 this industry counted for 82% of all cases of industrial cataract, 0% of cases of nickel-carbonyl poisoning, 12% of ses of lead poisoning, 21% of cases of wrist tenonovitis, and (coalmining excluded) 33% of cases of beat hand " and 25% of " beat elbow." Silicosis and neumoconiosis are excluded from these calculations. he absolute numbers of cases of scheduled industrial iseases in iron and steel workers during 1937 were as llows :

Disease	*No. of cases*
Arsenical poisoning	1
Lead poisoning	24
Nickel-carbonyl poisoning	13
Dermatitis	109
Skin ulceration	3
Tar or pitch cancer	2
Chrome ulceration	3
Cataract	26
Beat hand	55
Beat knee	16
Beat elbow	3
Tenosynovitis of the wrist	26

Respiratory disease.—Sand-blasters and hand-fettlers r steel-dressers, whose job it is to clean castings by emoving the moulding-sand which adheres to them after ' knocking out," and grinders, who smooth off roughened astings with an abrasive wheel, are exposed to the risk f inhaling free silica from the sand on the castings, the sand of the sand-blaster, and particles thrown off by siliceous grinding-wheels. In general foundry-work the risk of silicosis is low,[13] but until abrasive wheels were made of substances containing no silica, and until the sand of the sand-blasting stream was replaced by steel shot, these workers showed very high death-rates for all respiratory diseases, and particularly phthisis. Of sand-blasters, the Chief Inspector of Factories wrote in 1933[3]: " Sand-blasting is the most serious silicosis-producing risk in the country, although of course not the most extensive." Of grinders, whose standardised death-rate for phthisis was 275 per 100,000 employed, the Registrar-General observed : " No occupation shows more clearly the progressive effects of siliceous dust inhalation upon an initially healthy body of men."

Steel-dressing is still a very dangerous job, for, generally speaking, there is no substitute for sand, and until moulds can be made of a harmless material the process of cleaning castings by hand tools is bound to produce a dust of silica particles. In a recent survey (personal communication) of nearly 100 foundry-workers in a steel plant, 75% of the dressers showed abnormal radiological chest findings and 40% definite pneumoconiosis, compared with 50% and 12% for grinders, and 40% and 20% for other workers. About a third of the whole group gave a past history of possible exposure to silica in coalmines, brickworks, or quarries.

The deaths from silicosis between 1939 and 1945 were as follows :

Industry	*1939*	*1940*	*1941*	*1942*	*1943*	*1944*	*1945*
Metal-grinding	19	24	13	13	11	7	11
Sand-blasting	13	13	4	4	6	7	6
Steel-dressing and cleaning of castings	4	4	9	9	4	10	5
All other metal-workers	403	481	380	391	449	421	486
(Coalmining)	(197)	(232)	(196)	(230)	(276)	(277)	(323)

For the reasons noted above, the risk of silicosis in foundry-work is now less than it was. Nevertheless, finely divided sand is constantly present and constitutes a menace in all cleaning operations ; and thus stringent safeguards have been laid down, notably by the committee appointed by the Ministry of Labour to investigate the problem of dust in steel foundries.[12] The Ministry's committee on iron foundries[13] recommended that wherever possible dusty processes should be carried out in separate rooms, so that the general atmosphere of the foundry should be kept as free as possible from harmful particles.

" *Dead hand.*"—A hazard to which workers using high-speed ripping, drilling, or grinding tools are exposed is " dead hand," or Raynaud's syndrome. In those using light rotary tools for metal-polishing the symptoms are rather different—pain, numbness, and swelling of the fingers. From recent detailed studies[1 2] it appears that the important factors are the speed of the tool and amplitude of vibration, the weight of the tool in the hand, and the heaviness of the work in relation to the size of the tool. A successful claim for compensation was made by a rotary fettler for disability due to Raynaud's disease on the grounds that the condition was brought about by a series of small " accidents " producing a cumulative effect (Fitzimmons *v.* Ford Motor Co., 1946).

Poisoning by noxious gases and fumes.—The commonest and most dangerous gas met with in metal manufacture is carbon monoxide. It is a source of danger in blast furnaces, coal-fired and coke-fired boilers, and gas-fired furnaces and melting crucibles, and wherever the combustion of coal or coke is carried on under enclosed conditions. In 1946, 117 cases of carbon-monoxide poisoning in factories, with 11 deaths, were notified to the chief inspector ; 20 cases, with 2 deaths, were reported from blast furnaces, and 42, with 6 deaths, from the use of power gas. Carbon monoxide is one of the most insidious of poisons, being both colourless and odourless, and each year cases of poisoning occur because it is present in an unsuspected place. Thus in 1946 a death was due to percolation of the gas through brickwork from a leak in a gas-producer plant ; another death resulted from the portable resuscitation apparatus being empty when it was wanted in an emergency.[4]

The smelting of metals and metallic ores may produce a variety of poisonous gases, of which the commonest are carbon dioxide, sulphur dioxide, and hydrogen sulphide. Many metallic ores contain arsenic as an impurity, and its sublimation as arsenious oxide may constitute a hazard. In the manufacture of steel alloys, the addition of other metals such as lead, manganese, and beryllium, some forms of which are toxic, introduces a health risk which is not present in the casting of pure steel. The workers most exposed to some of it female, and the machine-made moulds could be turned out much faster than those made entirely by hand. Moreover, the opinion that the machine-made mould was as satisfactory as the hand-made—although not unanimously accepted—provides evidence that the lengthy apprenticeships for this and other crafts are unnecessary. This is important in view of the future inevitable shortage of adolescents and young adults resulting from the raising of the school-leaving age and the demands of National Service.

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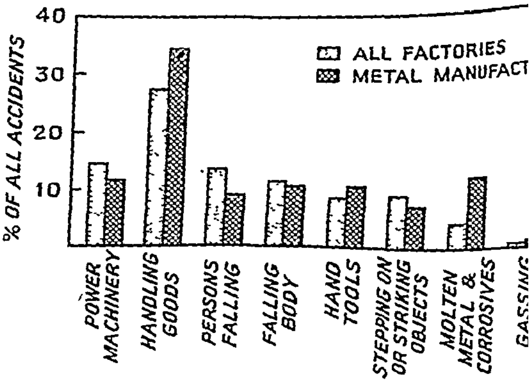
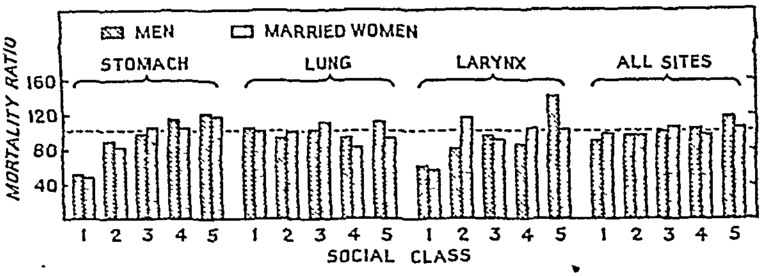


Fig. 4—Causes of all reported industrial accidents in I



g. 6—Social distribution of standardised mortality ratios from cancer in iron and steel workers aged 20–65 in 1930–32, and in their wives. Death-rates for the whole population are set at 100.

ncer in certain sites. Grinders of metal (group 25) show particularly high rate for phthisis, mainly in the age-oup 35–65 years. Some of the deaths recorded as ue to phthisis in all these workers (with the exception of ire and tube drawers and makers, who are not usually xposed to a silica risk) are probably deaths from silicosis ith superimposed tuberculosis; but the figures recorded o not indicate the extent of silica fibrosis, which in many ases is the underlying pathology. The other respiratory iseases in table IV may also be regarded as risks of ccupation since no corresponding increase is observed n an analysis of the wives' experience.

Mortality from cancer.—The risk of death from phthisis and other respiratory disease may well decrease in the future, but there is no such assurance in respect of cancer. Excess deaths are observed from cancer of all sites, cancer of the buccal cavity and larynx, cancer of the lung, and cancer of the œsophagus and stomach (fig. 5). In all these sites, except the lung, there is a well-marked social gradient (fig. 6).

The most striking increase is in deaths from cancer of the larynx in men of social class V. Since there is no corresponding gradient for married women, the Registrar-General suggests that "the factors responsible for the excess of cancer of this site for unskilled males are directly associated with occupation." This may also be true of cancer of the lung, but is not so in regard to cancer of the upper alimentary canal where the experience of wives accords very closely with that of their husbands.

Using the Registrar-General's occupational classification, Turner and Grace[20] have investigated the cancer mortalities in men in some Sheffield trades between 1926 and 1935. They found that, while all steel-workers showed a significant increase for cancer deaths of the whole respiratory system and parts of the alimentary system, this was particularly so for foundry-workers. Cancer of the skin, although the deaths were few, is also relatively common among this group and in a high proportion of these cases the site was the scrotum or penis. The writers consider that skin irritation from sweat and dust-impregnated clothing is the probable cause. An increase in deaths from cancer of the pancreas was found in iron and steel workers and also in non-ferrous-metal workers, and they suggest that long-continued absorption of iron or copper may be the cause.

A further analysis of the occupational factors of possible ætiological importance suggests that there are three common to most of the groups involved—namely, exposure to heat, dust, or fume and gas, with a wide variety of agents in the last two categories. The cancers occurred at sites constantly exposed to irritants, and furnacemen and other metal-workers are exposed to various reputedly carcinogenic substances—for example, silica, steel grindings, iron oxide, and aluminium have all been found to produce an increased incidence of lung tumours in mice.[6] Kawahata[10] has reported an increase of lung cancer among generator-gas workers in iron and steel mills; these men were exposed to an atmosphere containing gas and a heavy dust, 0·7% of which was made up of coal-tar derivatives. Of the substances mentioned, it is doubtful whether silica or aluminium can produce lung cancer in man; but the increase in deaths observed in metal-grinders suggests a possible link between malignancy and iron, and the potency of coal-tar products appears to be established.

The two remaining factors common to metal-manufacturing occupations showing raised cancer death-rates are intermittent exposure to great heat and heavy physical labour. Both these will produce increased inhalation of irritant gas or dust by raising the rate of respiration. It may be that frequent breathing of hot air and gases is in itself harmful and capable of producing tissue changes. Cancer of the lung is a disease which appears to be on the increase throughout the population. How much of this increase is real and how much is due to improved diagnosis, it is difficult to estimate; but the raised death-rates in many trades must suggest the presence of important occupational factors.

SUMMARY

A survey has been attempted of the iron and steel industry in this country.

The manufacturing processes are described, together with the health hazards to which workers are exposed.

The accident and sickness experience, both occupational and non-occupational, of workers in the industry is discussed. Compared with other industries, there is a significantly high accident-risk, an increased liability to respiratory and locomotor disease; and many occupations within the industry show significantly high death-rates for cancer, particularly of the lungs and respiratory passages.

I am indebted to Mr. B. Woolf, PH.D. and Miss E. Duncan, M.A., for the statistical analysis of accident records and for assistance in the interpretation of mortality figures; and to Dr. R. Passmore for much helpful criticism.

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these particular risks are the melters and pourers who come into close contact with the molten metal.

Dermatitis and skin ulceration.—Dermatitis due to the action of dusts or liquids is not a notifiable industrial disease, though voluntary notification is undertaken by many firms. The only accurate figures, therefore, are those relating to disabling cases when compensation has been paid. In 1937 the disablement case-rate was 0·23 per 1000 employed in the metal-extraction industry and 0·39 per 1000 for all factories. The principal causes are heat, friction with sand, oil, splashes of molten metal, and septic injuries.

Cataract.—Traumatic cataract due to continued exposure to molten metal occurs from time to time among furnacemen and casters. It is not a common disability, and with the increasing use of protective goggles and the mechanised charging of furnaces it should become even rarer.

The "beats" and tenosynovitis of the wrist.—"Beat knee," "beat hand," and "beat elbow" are trade names given to subcutaneous cellulitis at the knee, hand, and elbow-joint these conditions, and also tenosynovitis of the wrist, are caused by repeated friction combined with local trauma and infection. They are all predominantly diseases of miners, but they are also found to a small extent in other industries, notably heavy metal work.

MORBIDITY AND MORTALITY

The chief environmental factors likely to be reflected in the sickness experience of iron and steel workers are rapid changes of temperature, exposure to the weather, and the heavy nature of much of the work. A high incidence of rheumatic disease has been recorded among both smelters and foundrymen[11 21]; and this accords with the general experience that heavy physical work combined with frequent temperature-changes predisposes to locomotor disease. Heat cramps—a potential danger wherever hot and heavy work is being done—are not common, and are easily prevented by a proper fluid intake. The traditional preventive—beer—has today been largely superseded by the equally efficient, though perhaps not so palatable, saline drink.

Exposure to temperature changes and irritant matter inhaled in the form of dust or fumes are the probable causes of the high incidence of respiratory disease in furnace and foundry workers and those working in hot rolling-mills. Vernon[21] found that sickness absence owing to this group of diseases was increased in all iron and steel workers investigated by him, but was most pronounced among those whose work was largely done in the open, such as general labourers and barrow fillers. More recently Gafafer[8] has noted increased pneumonia-rates among steel-workers between 1939 and 1941.

The effect on the lungs of the continual inh of dust has been the subject of much research. 60 foundry-workers investigated by Keatinge,[11] showed clinical or radiological evidence of tuberc or silicosis; but in 12 of the men there was evide of dust changes in the lungs. Keatinge also found th while the workers in his series lost less total time f respiratory disease than workers in the constructi department of the factory, the average number of d lost per case was greater, indicating that the illnes were more serious in the former group.

Rheumatism and respiratory disease colour the pictu of the sickness experience of metal-workers in the occupations, but the Registrar-General's latest decen supplement[16] also shows increased mortality-rates f

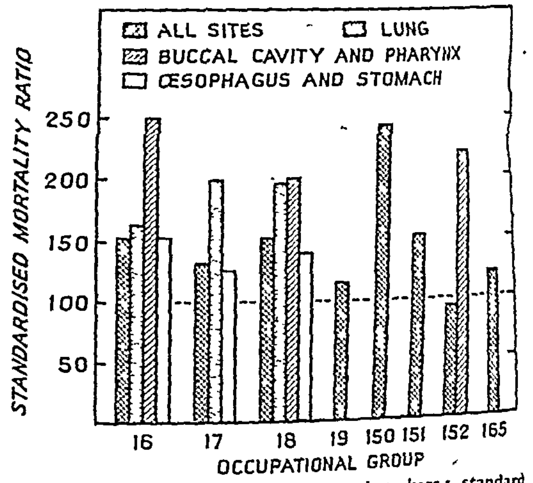

Fig. 5—Deaths from cancer in iron and steel workers: standard mortality ratios for men aged 20–65 years, 1930–32. Death-rates all males in the population are set at 100.

cancer. The Registrar-General's occupational gro do not always distinguish iron and steel workers fr other metal manufacturers and foundry-workers, there are so many risks common to all these work because of the similarity of the processes that they m be considered as integral groups.

The eleven occupational groups included in table have been surveyed. These groups comprise 257,2 male workers between the ages of 20 and 65 year of whom some 85% are placed in social class III as skill men, and 15% as semi-skilled in class IV (group or as unskilled in class V (group 152).

Many of these groups show significantly high mortali from respiratory disease, including phthisis, and fr

TABLE IV—MORTALITIES FROM CANCER AND RESPIRATORY DISEASES OF IRON AND STEEL WORKERS, 1930-32, EXPRESSED AS RATIOS OF DEATHS OF ALL MALES AGED 20-65 YEARS.

Occupational groups	Group no.	All causes	Cancer				Diseases of respiratory system	Phthisis	Influenza	Pneumonia
			All sites	Buccal cavity and pharynx	Lung	Œsophagus and stomach				
All males, 20–65 yrs.	..	100	100	100	100*	100	100	100	100	100
Furnacemen, rollers, and skilled assistants	16	121	154	250	16/10	153	150	..	..	..
Metal-moulders and die-casters	17	112	130	..	193	125	161	115	165	..
Iron-foundry furnacemen and labourers	18	132	150	200	15/8*	140	..	139	195	236
Puddlers	150	153	22/9*	..	..	..	20/11*‡	..	..	..
Rollers and skilled assistants	151	120	†	†	†	†	†	†	†	†
Unskilled assistants to furnacemen and rollers	152	91	..	11/5*	..	..	..	..	..	160
Tinsmiths and sheet-metal workers	165	93	133	..	..	..	..	..	..	..
Wire and tube drawers and makers	166	114	..	..	..	..	..	156	13/7*	..
Metal-grinders	25	137	..	..	..	..	..	275	..	171
Sand-blasters	272	304	..	..	..	..	733	30/4*	..	18/2*
Smiths and skilled forge-workers	19	98	113	..	..	..	..	..	..	..

* Registered deaths expressed as a fraction of calculated deaths. † Mortalities similar to group 16. ‡ Including phthisis.

ABLE III—AVERAGE STAY AFTER THIRD INJECTION

sery	Vaccine A		Vaccine B	
	Cases	Average stay (days)	Cases	Average stay (days)
1	5	97·0	3	243·0
2	24	281·8	23	237·3
3	26	236·4	22	243·3
4	5	92·0	4	168·7
5	21	174·5	12	158·9
6	56	204·3	57	191·6
7	44	142·8	35	106·0
als	181	196·9	156	183·8

y (1946) also reported striking results from a long- experiment in Quebec Province. Among 38,188 ren immunised with diphtheria antigen and pertussis ne there were no deaths, whereas among the 145,494 ols there was a mortality of 19·2 from diphtheria 15·8 from pertussis per 100,000 specified population. (1948) not only reported good clinical results from bined diphtheria toxoid and alum-precipitated ssis vaccine in children aged 2 months or more, also claimed that immunity to diphtheria was nced by the combination.

PRESENT INVESTIGATION

erial

he London County Council residential nurseries ride about 700 places for long-stay (deprived) children short-stay children whose homes have temporarily broken. These nurseries are situated partly in metropolitan area and partly in the country; retically the former provide for short-stay and latter for long-stay children, but so heavy has been demand that in practice this distinction is scarcely d. Neither type of nursery can therefore be described closed community, since there is a constant trickle hildren being admitted and discharged. In common h similar institutions they have experienced numerous breaks of whooping-cough, which have seriously uced the efficiency of the nurseries. Table II shows incidence of whooping-cough in 1944–48 in the series included in the present investigation.

n 1946 the L.C.C. decided that, in view of the good orts from the United States, an attempt should be de to reduce the incidence of whooping-cough in these idential nurseries, and the advice of the Medical search Council was sought in framing the trials. It s decided (1) to use the combined pertussis alum- cipitated vaccine and diphtheria toxoid A.P.T. ccine A), prepared by Glaxo Laboratories Ltd., l as a control, an A.P.T. diphtheria toxoid (vaccine B), prepared by Glaxo Laboratories; (2) to select en residential nurseries according to their accessibility the North-Western Group Laboratories; (3) to exclude children who had already contracted whooping-cough who had previously been immunised against the ease; and (4) to divide the remaining children into ir age-groups: 3–6 months, 6–12 months, 12–18 nths, and 18–24 months. Within these groups alternate ildren should be given vaccine A and vaccine B. To eliminate possible bias in the subsequent diagnosis, none of the doctors or nurses were told which was the combined vaccine. The result was that two groups of children of about the same age and sex distribution were randomly selected, one of which was vaccinated against whooping-cough and the other was not:

	Year of birth	*No. of children given*			
		Vaccine A		*Vaccine B*	
Males:	1944	2	94	1	82
	1945	4		9	
	1946	24		22	
	1947	39		34	
	1948	25		16	
Females:	1944	—	87	—	74
	1945	11		5	
	1946	19		19	
	1947	39		36	
	1948	18		14	
Totals		181		156	

TABLE IV—REACTIONS TO VACCINES A AND B

ose	No. of reactions				Total children
	Nodule	Pyrexia	Malaise	Nil	
t A	37 (*20·4%*)	6 (*3·3%*)	19 (*10·5%*)	129 (*71·3%*)	181
B	23 (*14·7%*)	5 (*3·2%*)	10 (*6·4%*)	123 (*78·8%*)	156
d A	26 (*14·4%*)	15 (*8·3%*)	9 (*5 0%*)	137 (*75·7%*)	181
B	12 (*7·7%*)	4 (*2·6%*)	12 (*7·7%*)	128 (*82·1%*)	156
d A	20 (*11·0%*)	10 (*5·5%*)	7 (*3 9%*)	146 (*80·7%*)	181
B	13 (*8 3%*)	4 (*2·6%*)	10 (*6·4%*)	130 (*83·3%*)	156

Dosage

The inoculations began in June, 1947. In each group three doses, of 0·5 ml., 0·5 ml., and 1 ml., were given at four-weekly intervals. Altogether 648 children received injections, but records of 311 had to be rejected because the children were discharged before the course of injections was completed.

Length of Stay

For the children included in the final analysis the duration of stay varied considerably; some were still in the nursery in June, 1949, when the records were tabulated, whereas others had left within a few days of the completion of the course of injections. There was, however, no selection of members of either sample in relation to length of stay. Table III gives the figures for each group.

REACTIONS TO THE INJECTIONS

Table IV compares the reactions to each of the two vaccines.

Nodules.—At all doses the combined antigen produced nodules more often than did diphtheria toxoid alone. The differences are not large in view of the numbers involved, but in view of the consistency of the excess at each dose the results must be accepted as indicating that the combined antigen is likely to produce a more pronounced *local* reaction than the diphtheria toxoid alone. The incidence of a nodule at the first reaction in 1 child in 5 cannot, however, be regarded as a serious effect, more especially since persistence of a depot of antigen is obviously desirable. For both antigens the purely local reactions were less marked at subsequent injections than at the first.

Pyrexia.—Over-all the incidence of pyrexia was low and at the first dose was the same for both types of antigen, but at second and third doses there was a higher incidence of pyrexia for the combined vaccine. The differences at these doses are barely statistically significant, and in view of the lack of difference at the first dose the evidence is not so convincing as for nodule formation. The rises in temperature were not on the whole large; 99·4°F was a common figure quoted.

Malaise.—At the first dose malaise was a more frequent sequel for the combined antigen, but the difference in incidence was reversed at the subsequent doses. None of the differences is statistically significant. There is no evidence for regarding the combined antigen as more likely than diphtheria toxoid alone to make a child feel unwell.

EXPOSURE TO WHOOPING-COUGH

In such a fluid population and in the absence of full-time medical supervision, which was not practicable, it was impossible to keep a detailed check on the exposure of individual children to whooping-cough infection. But children in most nurseries mingle intimately indoors

CONTROL OF WHOOPING-COUGH IN NURSERIES

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With a note on complement-fixation tests

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SINCE the virtual eclipse of diphtheria during recent years whooping-cough and enteritis have emerged as the most dangerous, infections to children. The dangers of whooping-cough have been consistently underestimated, and it is usually bracketed with measles in the public mind as more of a nuisance than a menace; but Butler's (1947) survey showed that, though the incidence of whooping-cough, as disclosed by notifications in England and Wales, may be only a seventh that of measles, more deaths may result from whooping-cough because its case-fatality ranges from four to seven times that of measles. The figures for London from 1940 to 1948 confirm and emphasise this conclusion (table I) and show that, though there were almost three times as many notifications of measles as of whooping-cough, there were more than twice as many deaths from whooping-cough, the case-fatality averaging six times that of measles.

The attempt to prevent whooping-cough has had a chequered career. Since those who recover from the disease usually possess a lifelong immunity, it seems reasonable to suppose that, given an effective antigen, similar protection could be artificially induced. Various products have been used from time to time in the hope of establishing immunity. Madsen (1933), using a vaccine prepared from freshly isolated strains of *Hæmophilus pertussis*, was the first to report any success. His trials were made in the Faroe Isles during the epidemics of 1923–24 and 1929. He reported a mortality of 0·15% among the vaccinated compared with 2·4% among the unvaccinated. Sauer (1935) carried out extensive trials with a vaccine made from fresh virulent phase-1 organisms grown on human blood. He found that only 1·3% of 4906 vaccinated children, but 16·5% of 3460 unvaccinated controls, contracted whooping-cough. Kendrick and Elderling (1936) and Brooks (1940) also reported impressive results, again from the United States. Bell (1941) reported considerable success with an alum-precipitated pertussis vaccine, and Daughtry-Denmark (1942) gave convincing statistical evidence of the value of pertussis vaccination. Similarly favourable results were obtained by Cravitz and Cauley (1945), from the Boston Health Department, using Sauer's vaccine and a detoxified antigen; the vaccine ga high degree of protection.

TABLE I—MEASLES AND WHOOPING-COUGH NOTIFICATIONS AND DEATHS IN LONDON COUNTY

Year	Measles			Whooping-cough		
	Notifications	Deaths	Case-fatality %	Notifications	Deaths	Case-fatality %
1940	5447	29	0·53	669	10	1·49
1941	11,039	51	0·46	7944	111	1·40
1942	19,987	31	0·16	6234	101	1·62
1943	22,882	50	0·22	6661	84	1·26
1944	7329	7	0·10	7136	116	1·63
1945	23,186	31	0·13	3264	47	1·44
1946	22,846	21	0·09	6887	53	0·77
1947	17,486	23	0·13	9267	83	0·89
1948	30,608	26	0·08	10,450	55	0·53
Totals	161,110	269	0·17	58,512	660	1·13

One of the few inconclusive reports from the Un States was that reported by Doull et al. (1939), used a vaccine in the preparation of which the suspen was washed with distilled water, a procedure which have caused deterioration of its antigenic pr. They reported little difference in the incidenc pertussis between immunised and non-immu groups of children.

In Great Britain, most of the few published re have been unfavourable. MacClean (1940) obta good results in laboratory tests and in a few cli trials of a contemporary commercial vaccine, McFarlan and Topley (1943) did not discover evidence of real protection from the vaccine they in a residential nursery in Berkshire. McFarlan e (1945) could not find any value in the immunisatio children in clinics and day nurseries in Oxford. B (1943) found Lederle's detoxified antigen ineffectiv hospital practice. One of the few favourable rep from this country has been that of Holt (1949) on field trials in Keighley with an alum-precipitated va among children, under the age of 5 years atten clinics, who had no history of whooping-cough.

One explanation of these discrepancies may lie i work of Leslie and Gardner (1931), who showed unless *H. pertussis* is in the smooth virulent ph antigenic variations are very likely to arise, and vaccines made from old rough cultures are espe likely to be disappointing. An alternative explan is that *H. pertussis* bears the same relationsh whooping-cough that *H. influenzæ* bears to influ the real cause of the disease being a virus. This op which does not lack suggestive theoretical supp difficult to reconcile with the reported success ach in immunisation with vaccines made from *H. per* since the cultural methods followed would be unlikely to favour the propagation of a virus. we are prepared to postulate some very unusual syn relationship between the virus and *H. pertussis*, the theory of causation seems to be untenable.

TABLE II—CASES OF WHOOPING-COUGH IN L.C.C. RESIDE NURSERIES

Nursery	No. of places on Dec. 31, 1948	Cases of whooping-cough in years			
		1944	1945	1946	1947
1	76	..	5 (*a*)	7	17
2	40	..	0 (*b*)	7	0
3	115	23	0	12	5
4	40	..	..	1(c)	9
5	40	0 (*d*)	1	17	1
6	156	4	1	16	15
7	61	1	1	6	9
Totals	528	28	8	66	56

(*a*) Opened January, 1945. (*b*) Opened September, 19
(*c*) Opened March, 1946. (*d*) Opened May, 1944.

Since the mortality from whooping-cough is high the youngest ages, the earliest age at which a bal be immunised is of considerable interest. Sako (1945) concluded that babies aged 2 or 3 months co effectively immunised against pertussis with an precipitated vaccine, as evidenced by agglutin titres. Sako (1947) provided further evidence same effect. Adams et al. (1947) also showed th immunisation of babies during the first few mon life was practicable. Meantime Sauer (1946), foll on the experiments of Schütze (1940), showed that possible to produce simultaneous immunisation a diphtheria and pertussis by combining diph antigen with an alum-precipitated pertussis va

INFANTILE PYLORIC STENOSIS

EW OF 100 CASES TREATED BY RAMMSTEDT'S OPERATION

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Rammstedt operation for pyloric stenosis in infants 1 to show results unparalleled by any other major tion; yet 100 consecutive Rammstedt operations tients in public wards of the Radcliffe Infirmary 38–48 were followed by no less than 11 deaths. urpose here is to analyse this series with special nce to complications and fatalities and to outline resent routine of treatment.

GENERAL ANALYSIS

le first-born infants are most often affected. In series there were 77 males and 23 females. Full y histories were available for 87 infants, and of 56 (64·4%) were first-born. The incidence according der of birth in the family was as follows:

1st child	56 (*64·4%*)
2nd child	13 (*14·8%*)
3rd child	11 (*12·7%*)
4th child	2 (*2·3%*)
5th child	2 (*2·3%*)
7th child	2 (*2·3%*)
8th child	1 (*1·2%*)

comparison, the Registrar-General's *Statistical Review England and Wales* for 1946 gives the incidence egitimate first-born children in the southern region, ch includes the Oxford area, as 41·2%.

he oft-noted *familial incidence* is illustrated in the ily histories of the 31 infants who were not first-born: ong these, 4 elder siblings had received medical treat- nt, and 1 had been operated on, for pyloric stenosis. two sets of binovular twins, where one was affected other was healthy.

he age of onset is usually 1–6 weeks, the incidence g greatest in the 2nd week, as the accompanying re shows.

preponderance of *breast-fed infants* is usual but in series the ratio of breast-fed to artificially fed nts was only 7 : 6. This is not necessarily significant, the number of breast-fed infants varies considerably different areas, and breast-feeding is often stopped the onset of symptoms.

acial incidence—The Anglo-Saxon race is most ceptible to pyloric stenosis, but the fact that all the nts in this series were of Celtic-Anglo-Saxon origin *f little significance.*

CLINICAL COURSE

The diagnosis of infantile pyloric stenosis is not ually difficult but requires a careful history and a orough examination, which must often be repeated to nfirm the presence of a pyloric tumour.

In a typical case the mother complains that the baby mits all its feeds, though its appetite is unimpaired, d that it is constipated and losing weight. Vomiting ually starts in the 2nd or 3rd week of life, but regurgi- tion may be present from birth, and is then followed projectile vomiting after 7–10 days. Bile is very ldom present in the vomit. Loss of weight and constipa- on follow, and frequent small green "hunger" stools on give way to one small formed stool every 2–4 days.

DIAGNOSIS

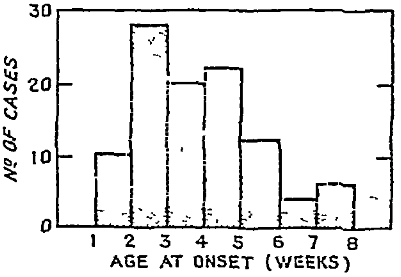
The diagnosis is confirmed by examining the infant hile it is being fed. Waves of gastric peristalsis are seen progressing across the upper abdomen from left to right. The hard mobile pylorus is felt, below the liver edge, with the flexed tip of the left middle finger, just beneath the outer edge of the right rectus muscle. As the feed continues, the baby appears restless and anxious and becomes obviously distressed. It then vomits, and the feed shoots across the floor and pours down its nose.

The findings may not, however, be conclusive, and the infant is then examined during its next and, if necessary, subsequent feeds. Gastric aspiration before a feed will often reveal a large residue and make palpation of the tumour easier. Provided the infant is in good condition, it is wiser to make these repeated diagnostic examinations without admitting him to hospital, thus avoiding the risks of intercurrent infection.

It is never permissible to give 'Eumydrin' as a therapeutic test, for the tumour may soften and never be felt, and the vomiting continues. A barium meal, and still less a diagnostic laparotomy, should rarely be necessary, if sufficient time and care are given to the examination.

Vomiting from duodenal atresia and other congenital causes of high intestinal obstruction starts from birth and the vomit usually contains bile; there is no palpable tumour, and the diagnosis may be confirmed by radiography. Acquired diseases, particularly otitis media, meningitis, and urinary infections, may cause vomiting in infancy; and pyloric stenosis may be present with any of these. The existence of pylorospasm as a separate clinical entity is regarded as doubtful, though there is a group of cases in which the vomiting is apparently functional.

In the present series a pyloric tumour was felt in 96 cases, and peristalsis was seen in 96 cases. Where one of these two cardinal signs was absent the other was present, except in one fatal case in which pyloric stenosis was doubtful. A barium meal was given only *four times*, confirming the diagnosis in 3 cases but not in the *fatal case just* mentioned. The average duration of symptoms before admission was 15·5 days for all the cases under review, and 10 days for infants admitted in 1948.



Age at onset of symptoms in 100 cases of infantile pyloric stenosis.

CHOICE OF TREATMENT

Medical treatment is used when vomiting starts late and is slight, for this is a self-limiting disease and its symptoms disappear at 6–8 months. Gastro-enteritis in the ward is another indication for a trial of medical treatment with the child as an outpatient. Treatment is carried out in the home to avoid the risk of intercurrent infection in the hospital. An intelligent mother is necessary for its success.

For all other cases operation is now the routine, for in favourable circumstances it carries a low mortality and is almost certainly curative, while the stay in hospital after operation need not be more than 3 or 4 days in an uncomplicated case, thus minimising intercurrent infections.

For the greater part of the period under review cases were admitted both to the surgical children's ward, where most of them were operated on, and to the medical children's ward, where a large proportion were treated medically. In the last three years, however, all the during the daytime and, as the records show, infection spreads readily. The incidence of whooping-cough in the nurseries (table II) indicates that a high proportion of the children included in the investigation must have come in contact with an infectious child. The figures for duration of stay and the method of selection of the two groups lead to the assumption that there can have been no difference in the risk of exposure between those receiving combined antigen and those receiving diphtheria toxoid only.

RESULTS

Of the 181 children receiving the full course of pertussis vaccine none contracted whooping-cough. On the other hand, among 156 controls 10 cases of whooping-cough were notified:

	Vaccine A	*Vaccine B*
Children receiving full course ..	181 ..	156
Cases of whooping-cough ..	0* ..	10

* One girl contracted whooping-cough after the first dose of vaccine A; she has been excluded from the analysis on the ground that she was not fully protected at the time of infection.

The probability that the whooping-cough cases would be concentrated in the unprotected group by chance is less than 0·001, and the result must be accepted as statistically significant. There is strong evidence that the combined antigen does give protection against whooping-cough.

Complement-fixation Tests

(DR. A. BECK)

Confirmatory evidence of the antigenic potency of the pertussis vaccine is provided by complement-fixation tests done in a random sample of cases. It is realised that complement-fixing antibodies are not necessarily a measure of real immunity against infection. The antibody titres are summarised in table V.

TABLE V—RESULTS OF COMPLEMENT-FIXATION TESTS ON 99 SERA

Vaccine	No. of sera giving titres * of								Total tested
	0	1/2	1/4	1/8	1/16	1/32	1/64	1/128	
A	6	2	8	11	6	13	4	3	53
B	34	3	1	2	3	1	2	0	46

* The highest serum dilutions giving a positive reaction.

Antigen: Suspension of 10,000 × 10⁶ *H. pertussis* per ml. diluted 1 : 5 for test.

Technique: 0·1 ml. quantities of twofold serum dilutions, ranging from 1 : 2 to 1 : 128, are added with 0·1 ml. of antigen and 0·1 ml. of complement (3 M.H.D.). After incubation at 37°C for 1½ hours, 0·1 ml. of sensitised cells are added. Further incubation for ½ hour. End point is the highest serum dilution showing complete absence or only faint trace of hæmolysis.

It is evident from this table that the pertussis vaccine produced a good antibody response, 89% of children receiving this vaccine giving a positive reaction. When these tests are analysed according to the time between the final injection and the examination of the sera (table VI) it will be seen that, with one exception, all the negative reactors in this group were tested later than sixteen weeks after their final dose of vaccine, when the intensity of the reaction is known to be decreasing.

The incidence of positive reactions in children who did not receive pertussis vaccine is difficult to explain. They might be due to normal antibodies or to a previous subclinical infection. It is, however, significant that the falling off in titre with increasing duration from final dose, seen in pertussis-vaccinated children, is not seen in the control group; this in itself is further confirmation that the titres observed in the former group were the result of the injections and not of the chance factors operating in the second group. At all durations, however, the shift to the right is evident for vaccine as compared with vaccine B.

TABLE VI—SERUM TITRES ARRANGED ACCORDING TO SINCE FINAL DOSE OF VACCINE

Vaccine	Weeks after final dose	Titres							
		0	1/2	1/4	1/8	1/16	1/32	1/64	1/128
A	1–8	1	..	2	3	2	8	4	2
	9–16	..	1	1	2	2	1	..	..
	17–24	2	..	..	2	..	2	..	..
	25–32	3	..	4	1	1	1	..	..
	32–	..	..	1	3	..	1	..	..
B	1–8	12	1	1	..	1	..	1	..
	9–16	4	..	..	1	..	..	..	..
	17–24	11	1	..	1	1	1	1	..
	25–32	6	..	..	..	..	..	..	..
	32–	..	1	..	..	1	..	..	..

* Excluding 4 cases where the period was not precisely

SUMMARY AND CONCLUSIONS

During 1947 and 1948 a trial of vaccination whooping-cough was made in London's nurseries with the Glaxo combined diphtheria pertussis antigen.

The results show a significant difference in the of whooping-cough between the vaccinated and controls.

It is concluded that the antigen given con useful degree of protection against whooping-co No undesirable effects were noted.

The antigenic potency of the pertussis vaccine confirmed by complement-fixation tests, though conclusions can be drawn from these on the presence protective antibodies.

We wish to thank Dr. J. Ungar, of Glaxo Laboratories for supplying the antigen; Dr. W. C. Cockburn, M Research Council, for help and advice in framing the the doctors in charge of the nurseries; and Sir Allen D Medical Officer of Health for the County of London, for encouragement and advice.

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"... Strictly speaking, science is a single entity: subdivision of science into separate branches is a matt convenience based on human limitations, which mak increasingly difficult for any one person to compass whole range. It seems a long way back to the days it could be said that the Bachelor of Science knew som the Doctor of Science knew *all*, or to the times when a such as Goethe could do effective research in anato physics, geology and botany as a part-time diversion his literary and other activities. ... The departmenta tion of science ... has led to serious confusion and los perspective. Nowhere is this more apparent than in field of mental science, where too often the diffe approaches, instead of complementing and broadening other, have resulted in futile rivalries and misunderstandin —Dr. DEREK RICHTER in *Perspectives in Neuropsychi* London: H. K. Lewis, 1950; p. 99.

ssibly occurred in another. A further operation nsidered where visible peristalsis and projectile g recurred after an operation at the fourth week, s infant had recovered under medical treatment tenth week. The duodenal mucosa was perforated ases, and the perforation was recognised and n with catgut. Nevertheless one of these children fever from the fifth to the sixteenth day, and ild died from a subphrenic abscess on the -third day.

1.—A Rammstedt operation was done under local esia; a tiny perforation of the duodenal mucosa osed with a catgut mattress suture. Postoperative s was not satisfactory; the wound did not heal; and in f parenteral fluids, including intravenous plasma the vent downhill and died on the twenty-third day. y revealed bronchopneumonia and a right posterior ritoneal subphrenic abscess containing 10 ml. of hich grew *Staph. aureus* on culture.

ment.—Death was due to subphrenic abscess. This d perforation of the duodenal mucosa, which had ecognised and repaired at operation. Possibly recog- and drainage of the subphrenic abscess might still averted death.

2 other occasions there was a "very doubtful ration" repaired with catgut: one of the children on the twenty-seventh day, not necessarily on this nt, and the other had a few days' fever in con- cence. An omental patch was used in another though there was no mention of perforation, and alescence was uneventful. Hæmorrhage from the ric tumour was noted 7 times—catgut stitches were 4 times, saline packs twice, and fibrin foam once d there were no ill effects. Such hæmorrhage can evere enough to be fatal. Two children who were ydrated and poor risks and who died within 24 hours peration may be said to have died of secondary k.

omplications occurring during anæsthesia were pro- e of the intestines and overdose of local anæsthetic. one infant there was sufficient "pushing" under l anæsthesia to cause prolapse of much of the intes- s, and the child suffered from severe shock but vered. There was no case of inhalation of vomit er anæsthesia, but one child died soon after inhaling it on the seventh postoperative day. Two children ived an overdose of local anæsthetic; one, weighing lb., became blue and cold during operation, under nl. of 1:1000 'Nupercaine' and 1:100,000 adrenaline local anæsthetic given by an honorary anæsthetist, caused no real anxiety and recovered; the other e 2) died.

ase 2.—A Rammstedt operation was done on a baby eeks old, in good condition and weighing 10 lb., under l anæsthesia given by the surgeon, who injected 20 ml. 1% procaine. The baby's condition was very poor two rs after operation; temperature 106·4°F, pulse uncount- e, unconscious, Cheyne-Stokes respiration. The baby d 7 hours after operation. Autopsy did not reveal the se of death.

omment.—The amount of procaine used (20 ml. of 1% tion) was three times what might be considered a e dose for this child. The postoperative course was sistent with that described in procaine intoxication.

Complications arising during convalescence were sepsis, morrhage from the wound, burst abdomen, and isional hernia. Superficial sepsis was noted 8 times, d deep suppuration twice. Local anæsthesia had en used in 6 cases, general anæsthesia in 2, and 2 ceived both local and general. The 6 cases in which absorbable buried sutures had been used healed eventfully. Hæmorrhage from the wound occurred the day following operation in 2 cases without ill fect; local anæsthesia had been used in both cases. One incision burst on the seventh day and was resutured, with recovery, and another infant developed an incisional hernia before discharge from hospital: these 2 paramedian wounds had been sewn up with difficulty by the same surgeon with catgut under local anæsthesia. There was an adhesion of the small intestine to the pylorus and to the wound at necropsy in one case, which showed how a volvulus or intestinal obstruction might later have developed.

Intercurrent complications during convalescence were gastro-enteritis, bronchopneumonia, and otitis media. Gastro-enteritis occurred 5 times, with 4 deaths. The discharge from hospital of a fatal case was delayed because the parents were mentally defective. One baby with severe bronchopneumonia recovered; and bronchopneumonia was a terminal event in 3 cases. Two infants required a mastoid operation during convalescence, and 1 was treated conservatively for otitis media; all recovered. Otitis media was found at necropsy in 1 case. Terminal inanition has been described as a further complication; 1 case could be classed under this heading. One infant developed osteomyelitis of the tibia *following a tibial drip transfusion.*

FATAL CASES

The causes of the 11 deaths were as follows:

Gastro-enteritis		4
Excess of local anæsthetic		1
Perforation of duodenal mucosa		1
Cause not definitely known		5
Poor risk, dehydrated infants dying within 24 hours of operation	2	
Terminal inanition	1	
Wrong diagnosis—terminal inanition	1	
Possibly incomplete division	1	

It is clear that many patients, especially the earlier ones, did not receive what would now be regarded as adequate preoperative preparation, with restoration of a normal fluid and biochemical balance. Their resistance to intercurrent infection was thus reduced.

Of these 11 infants 8 were breast-fed. Failure of medical treatment in 40 cases was followed by 4 deaths (10%), though it is more commonly followed by a higher mortality than in those cases treated originally by surgery.

COMMENT

A very comprehensive review of all aspects of infantile pyloric stenosis, and of the relevant published reports, was made by Szilagyi and McGraw (1943).

Levi (1941) reported on 100 consecutive breast-fed infants who underwent the Rammstedt operation without a death at the Infants Hospital, Westminster; in the same period 46 operations on bottle-fed infants were followed by 5 deaths, all from gastro-enteritis. Barrington-Ward (1937) gave the mortality at the Hospital for Sick Children, Great Ormond Street, as 18% in 1925; according to Paterson et al. (1941) this had fallen to 6·5% in 1939. Barrington-Ward (1943) states that 186 consecutive Rammstedt operations had been done at the Children's Nursing Home, London, without a death, and he ascribes this to the segregation and individual nursing of these private patients.

Ladd et al. (1946), in an account of 1145 Rammstedt operations done at the Children's Hospital, Boston, in 1915–46, gave the over-all mortality as 3·5%, with only 5 deaths in the last 557 cases, and no deaths in the last 225 cases. Donovan (1946), analysing 507 cases treated by the Rammstedt operation at the Babies' Hospital, New York, gave an over-all mortality of 1·8%, with only 2 deaths in the 389 cases treated in 1932–46. Schaefer and Erbes (1948), from the Milwaukee Children's Hospital, found 9 deaths in 232 Rammstedt operations done in 1924–47; there was no death in the 172 cases operated on in 1937–47.

infants have been admitted to the children's medical ward under the care of the pædiatrician, who has advised operation in most cases, and has been responsible for the preoperative and postoperative care of the infants. There has been a well-marked improvement in results.

The total number of operations each year, and the number following failure of medical treatment, were as follows, deaths being given in parentheses:

Year	*Total operations*	*Operations following medical treatment*
1938	9 (2)	3 (0)
1939	4 (0)	0 (0)
1940	4 (1)	1 (1)
1941	8 (0)	4 (0)
1942	5 (1)	1 (0)
1943	12 (0)	7 (0)
1944	4 (1)	3 (0)
1945	6 (1)	3 (0)
1946	14 (4)	12 (3)
1947	18 (1)	5 (0)
1948 (part)	16 (0)	1 (0)
Total	100 (11)	40 (4)

The numbers treated medically for infantile pyloric stenosis in the period under review could not be accurately estimated.

MEDICAL TREATMENT

Seven three-hourly feeds are given each day, preferably from the breast, but otherwise of any suitable artificial food, such as Half-cream National Dried Milk. 'Pylostropin' gr. $^{1}/_{750}$ is given 15 minutes before each feed, in a lamella placed under the infant's tongue; the daily total is just under gr. $^{1}/_{100}$. Older children receive larger doses. Stomach washouts are given only if the infant continues to vomit. The baby should be seen every day at first, so that, if treatment fails, he can be admitted for operation while still in good condition. If medical treatment succeeds, vomiting usually becomes less within twenty-four hours; treatment is continued until the child is at least 5 months old.

SURGICAL TREATMENT

Preoperative Care

All these babies are now admitted to the children's medical ward, and ideally mother and child are admitted to one cubicle. If this is impossible, the infant is isolated so far as is practicable. The restoration of fluid and electrolytic balance is regarded as urgent, but the operation itself is not an emergency.

Cases are grouped as those fit for immediate operation, those moderately dehydrated, and those grossly dehydrated. The first group are operated on when convenient, within twenty-four hours, and their only preoperative treatment is a stomach washout. Moderately dehydrated infants receive in addition frequent small feeds of water containing 0·225% sodium chloride and 2·5% glucose, and subcutaneous injections of physiological saline. Dehydration can usually be corrected within twelve hours, during which time up to 400 ml. of fluid can now be given subcutaneously.

The grossly dehydrated infants require intravenous fluid, which is usually given through a Keith needle tied into the long saphenous vein at the ankle. In gross dehydration the fluid-loss is equivalent to about a tenth of the body-weight; this is corrected with a mixture of equal parts of full-strength plasma and 5% glucose in distilled water. The infant's needs are then met by giving 0·225% NaCl and 2·5% glucose solution totalling $2^{1}/_{3}$ fl. oz. per lb. per day. The greatest improvement in the infant's condition is achieved after about 24 hours. The drip may then be continued during and after operation until the infant is taking sufficient by mouth.

Operation

The following procedure is most often adopted:

A premedication of atropine gr. $^{1}/_{200}$ is given, and the baby is bandaged to a padded crucifix splint. A bilateral rectus block and a weal for the skin incision are made, a solution of 0·33% procaine with 1 in 600,000 adre 15 ml. of this solution, which contains 50 mg. of p is certainly adequate and safe. There is no need to this dose for a 7 lb. baby, and indeed it may be dan to do so. A dummy soaked in equal parts of por glycerin keeps the baby quiet throughout the ope The tube used to wash out the infant's stomach is in during the operation, but it has occasionally been to withdraw air from a grossly distended stomach.

A high right paramedian rectus-splitting incision 2- long is made, and spurting vessels are tied with fine After the peritoneum has been opened, the pyloric tu delivered with Denis Browne intestine-holding forceps gently beneath the liver edge. The pylorus is rotated b finger and thumb, and the upper border, which is free vessels, is incised with a fine knife. The separation of the of the tumour is completed with a Denis Browne spreade the mucosa pouts through the whole extent of the in Particular care is paid to the duodenal end of the in to ensure complete division, while avoiding the s accident of perforation of the mucosa. Air is squ from the stomach through the duodenum to detec perforation; if one is found it is closed with catgut su Bleeding is unusual but may be controlled with a stitch. The pylorus is replaced in the abdomen, an peritoneum closed with a continuous catgut stitch. liver should cover the length of the incision, if this ha made high and kept small, but it may sometimes be nec to use a depressor for the lowest part of the wound. anterior rectus sheath is closed with fine catgut or ' sutures, the knots being buried, and the skin is close nylon stitches.

The 100 Rammstedt operations in the present were done by twenty different operators, but f these surgeons did more than half of them. In cases both morphine and atropine were given pre tively, though one or the other was occasionally o in earlier cases, and only atropine was given i recent ones. Local anæsthesia was used in 95 and in 10 of these had to be supplemented with g anæsthesia; in the remaining 5 cases general anæ was used from the outset. A high right param incision was used in the great majority of cases, a many of these the rectus muscle was split rather displaced. Midline and transverse incisions were used once only. Closure in layers was the rule, a most cases the buried sutures were of catgut. Una able buried sutures were used only 6 times; nylo used 4 times, and thread and silk once each.

Postoperative Treatment

Care is taken to prevent hyperpyrexia. The first is given 2 hours after operation, and consists of 1 dr of clear fluid. This is taken well after an operation local anæsthesia. Hourly feeds follow and are grad increased in amount; at the third feed breast-m given if available, otherwise Half-cream National Milk. The infant is put to the breast 36 hours operation if all is well. Feeds increase in amoun decrease in number, until on the third postope day the infant is on the correct 3-hourly feeding weight. If progress and home conditions are satisfa the infant is now discharged home. If postope vomiting occurs, it is controlled with stomach was and small frequent feeds. Stitches are remove the eighth postoperative day by the patient's doctor.

In the last 35 cases postoperative vomiting ceased, on the average, by the end of the postoperative day.

COMPLICATIONS OF RAMMSTEDT OPERATION

Complications arising during the operation in the pr series were incomplete division of the tumour, perfor of the duodenal mucosa, infection of the perit cavity, hæmorrhage from the pyloric tumour, and s Incomplete division was found at necropsy in one (under reflux) for an accurately timed 10 The liquid is then cooled rapidly, and when ransferred to a separating funnel containing NaCl, and extracted four times with 25 ml. benzene. The urine layer is now discarded nzene layers combined. The combined extract twice with 25 ml. portions of 9% Na_2CO_3 and s with 25 ml. portions of 2N NaOH to remove ubstances. The benzene layer is then shaken of freshly prepared 10% sodium hyposulphite a stoppered funnel until all red coloration , and is finally washed three times with 25 ml. distilled water. The solvent is then removed iced pressure at a temperature not above

esidue is added 0·5 ml. of dioxan, 0·2 ml. of O_4 and 0·25 ml. of 0·01N periodic acid. The allowed to stand at room temperature for s, additional 0·1 ml. portions of 0·1N $KMnO_4$ ed if the red permanganate colour is discharged. ion is then washed quantitatively into a sepa- nel with about 10 ml. of water and 30 ml. of id is thoroughly mixed. After the layers have he aqueous layer is discarded, any emulsion ned. One washing with 10 ml. of freshly % sodium hyposulphite solution destroys any anganate and breaks up any emulsion. This by three washings with 10 ml. portions of which the solvent layer is transferred to a and evaporated to dryness under reduced temperature not above 60°C.

Estimation

e is dissolved in 1 ml. of benzene; 0·2 ml. to a small tube, the solvent is removed l pressure, and 0·02 ml. of Girard-T solution e tube is rotated until all the residue has by the Girard-T solution, tightly stoppered, a boiling water-bath for 2 minutes. It is apidly and 2 ml. of the NaCl-NaOH base dded. This solution is polarographed at C), dissolved oxygen being removed by rogen through the solution for about 3 the wave height is not satisfactory (100 µg. d is the optimum amount) the amount of l for polarography may be modified. A recording polarograph is used in this labora- capillary used has an average drop time of d an average drop weight of 6·2 mg.

andard wave height is obtained by treating of isodehydroandrosterone with 0·02 ml. of solution, boiling for 2 minutes, and polaro- in the same way. Using a sensitivity where oamps gives a galvanometer displacement of the wave height obtained with 100 µg. of iso- androsterone is 17·5 mm. When using the same as continually it is only necessary to perform disation experiments about every two months.

tions

600 estimations have been done on hospital ts by the above method and the rather longer method (Barnett et al. 1946). The clinical value of of these estimations will be discussed in a paper published shortly.

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CLINICAL OBSERVATIONS WITH DEOXYCORTONE AND ASCORBIC ACID

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SINCE Lewin and Wassén (1949) reported their results with combined injections of deoxycortone acetate and ascorbic acid in rheumatoid arthritis—results we were able to confirm (Le Vay and Loxton 1949)—we have made observations in 80 cases of rheumatoid polyarthritis and also in monarticular varieties of this disease, in ankylosing spondylitis, and in osteo-arthritis. In another field, we have noted the action of these substances on painful stiff joints following injury and on localised post-traumatic œdema.

This report is chiefly concerned with the relatively transient clinical phenomena developing soon after single combined injections. Because it records the evolution and decline of this response, some importance may attach to the fact that all the injections on which it is based were given by one or other of us, and that in many cases progress was watched continuously for several hours afterwards. In some instances we have cinematograph records of the response.

TECHNIQUE

The technique originally employed was that initially described by Lewin and Wassén, in which 5 mg. of deoxycortone acetate in arachis oil is given intramuscularly, followed within five minutes by 1 g. of ascorbic acid intravenously (technique A). Later a single-dose intravenous technique was used, with an aqueous solution of 5 mg. of deoxycortone glucoside mixed in the syringe with the ascorbic acid (technique B). More recently we have been trying the effect of a single intramuscular dose of the oily deoxycortone and the aqueous ascorbic acid, mixed in and given with one syringe (technique C).

THE RESPONSE

In rheumatoid arthritis it is rare for there to be no response whatever at some time or other. In some cases it is dramatic, and apparent to the most superficial observation; and such a response provides one of the most exciting experiences of clinical medicine. In others it is slight but still recognisably of the same pattern. It not only varies from patient to patient but in the same patient from time to time. There are cases in which the initial response is barely appreciable but a second injection a week later is a dramatic success. The converse may also be true. In most instances the response is well established within an hour. In a few cases, using technique A, there has been a delayed reaction, coming on only after several hours. With technique B the response has usually been apparent within fifteen minutes. Technique C is as effective as the other methods; but, perhaps surprisingly, the response has been seen as soon as two or three minutes after injection, and in some cases the joint nearest the site of injection has been the first to show improvement.

The nature of the response has already been described (Lewin and Wassén 1949, Le Vay and Loxton 1949). Briefly, there is partial or complete disappearance of pain and spasm; an increased speed, ease, and range of joint movement; and a variable sense of exhilaration. A distinction must be made between measurable increase in joint range and the improved social performances allowed by the relief of pain and spasm; a patient with no great objective changes in the joints concerned may yet become comfortable enough to take off his coat, brush his hair, and climb stairs for the first time in many months. Though patients are often delighted with their

These workers differ in details of treatment. Levi (1941) does not believe in protracted preoperative preparation; he prefers local anæsthesia and uses the midline incision. The other workers emphasise the importance of protracted preparation and prefer general anæsthesia; the upper right rectus incision is used, except by Ladd et al. (1946), who prefer the oblique muscle-split incision described by Robertson (1940). Schaefer and Erbes (1948) are alone in emphasising the importance of diagnostic radio-opaque meals and routine postoperative blood-transfusions.

Jacoby (1946) treated 50 consecutive cases without a death; he selected medical or surgical treatment for each case according to definite indications. Medical treatment was successful in all of the 26 cases in which it was used.

The results in the present series compare unfavourably with those of the workers cited above, and afford little cause for complacency. This series is, however, reported with particular reference to the complications which may follow operation and, as a whole, does not indicate what results are being obtained at present. One reason for the high incidence of complications is the large number of surgeons concerned in these operations during the war years. Probably, however, these results are more representative of those obtained in this country as a whole, at least in hospitals where relatively small numbers of cases are seen yearly. Indeed, Aird (1949) goes so far as to say that in most centres the mortality usually varies from 12 to 25%. The remedies sought to lower the mortality in this hospital include early diagnosis before admission, isolation, and adequate preoperative preparation; premedication with atropine only, local anæsthesia, and gentle handling at operation; early postoperative feeding, and early discharge from hospital. Including 25 infants operated on after the series analysed above, there has been 1 death following the last 59 operations, and no death after the last 46. This indicates a more hopeful outlook for the future when compared with the 10 deaths in the first 66 infants in this series.

SUMMARY

A hundred consecutive cases of infantile pyloric stenosis treated in the public wards of the Radcliffe Infirmary by the Rammstedt operation are reviewed.

The routine management is outlined; all cases are treated by operation, except for those of late onset, or with intercurrent infections.

Local anæsthesia is used, and a dose of 50 mg. of procaine in 15 ml. is safe and adequate for a baby weighing 7 lb.

The complications arising during and after operation, and the 11 fatalities, are analysed.

The remedies sought to lower the mortality are outlined, and the need for isolation, adequate preoperative preparation, and early discharge from hospital is emphasised. There has been no death after the last 46 operations done at this hospital.

We wish to thank Dr. Victoria Smallpeice and Mr. A. Elliot-Smith for their helpful criticism, and the surgeons of the Radcliffe Infirmary for permission to publish the details of their cases.

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RELIEF OF PAIN IN RHEUMATOID ARTHRITIS WITH TETRAETHYLAMMONIUM BROM

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THE pain arising in the joints during acute [illegible] with the [illegible]hritis is one of the most [illegible] and [illegible] work being done [illegible] of rheumatoid arth[illegible] hope for the [illegible] all pains to relieve.[1] The [illegible] algesics [illegible] and adrenal hormones offer [illegible] avail[illegible] hitherto physical methods and [illegible] cases been the only forms of therapy [illegible] however, it has been found that t[illegible] bromide (T.E.A.B.) often relieves this [illegible] and sometimes for a considerable peri[illegible]

The origin of this form of treatment [illegible] statement[2] that "the nerve supply of [illegible] ligaments is derived from the sym[illegible] system." Since T.E.A.B. is known to bloc[illegible] impulses, it seemed rational to try its [illegible] pain. Accordingly 5 ml. of the solution [illegible] intramuscularly into an elderly man with an e[illegible] of rheumatoid arthritis in his hands. The r[illegible] within an hour, and he had no recurrenc[illegible] months. The next acute attack was treated [illegible] way and behaved likewise. The patient has no[illegible] from pain and swelling for five months.

Such a dramatic result led me to try th[illegible] T.E.A.B. in three male and twenty-three fema[illegible] with acute rheumatoid arthritis, with the[illegible] results:

	No. of cases	
No response	7	(only 1
No response 1st time, 2nd and 3rd times effective	3	
9 successive good results	1	lasting
4 „ „ „	1	„
3 „ „ „	4	„
2 „ „ „	4	„
1 „ „ „	6	„
Total	26	
	(55 injections	

Only one case with signs suggesting an [illegible] arthritis has not gained some relief from [illegible] seven cases which did not seem to be [illegible] no response. Three patients showed no [illegible] the first administration, but had freedom [illegible] after the second and third injections. Six[illegible] claimed either considerable relief or com[illegible] of pain for a time after administration. One [illegible] 9 successive good responses, one had 4, f[illegible] had 3, four had 2, and six had 1 satisfacto[illegible] The duration of freedom from pain varied [illegible] (in a woman who also had freedom from pain [illegible] and 21 days on other occasions) to 7 months. [illegible] of T.E.A.B. is usually felt within an hour [illegible] but in one or two cases the onset of r[illegible] delayed.

FAILURES

In the cases in which T.E.A.B. has not been [illegible] have usually found that the pain origin[illegible] circumarticular tissues and not in the joint. S[illegible] with massive fibrositis in addition to their r[illegible] arthritis state that their "soft-tissue" [illegible] worse by T.E.A.B., even when the joints [illegible] Patients with osteoarthritis do not seem to [illegible]

SUMMARY

T.E.A.B. has been given by intramuscular [illegible] patients with painful exacerbations of rheuma

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1. Balme, H. The Relief of Pain. London, 1936.
2. Mennell, J. B. The Science and Art of Joint

ocorticotropic hormone (A.C.T.H.), treated 6 patients with no effect whatever. Douthwaite (1949) writes of urable results in 5 patients, while Fletcher et al. (1950) o good results in 9 cases. Robertson (1950) in 9 cases had ramatic response and improvement in all. Landsberg), with 9 cases, and Nashat (1950), with 4, both report ent results.

ter having had the privilege of seeing Lewin and sén's work at Gothenburg, we found ourselves in lete agreement on the clinical phenomena at issue, ow regard it as rare for a case of rheumatoid arthritis to respond at some time. The completely negative lusions of some workers may be explicable on three nds: (1) failure to appreciate small but typical onses in a series which does not happen to include bvious reactor; (2) the variation in response at rent times often found with hormone action, which, ondek (1935) says, is not absolute but depends on momentary condition of the organ and the physico-nical condition of its cells; and (3) delay in the onse. It may be that the intensity of the response is ly determined by the existing state of salt and water abolism, and in this connexion Spies's report may ide negative evidence in so far as all his patients e suffering from severe artificially induced salt vation.

ne is inevitably led to compare the effects of deoxy-tone and ascorbic acid with those of A.C.T.H. or ortisone.' In some cases the effect appears to be at st as dramatic as with the latter substances. Neither nch (1949) nor Lewin and Wassén claim to have veloped a new therapy for rheumatoid arthritis, but merely to have made physiological observations which may point the way to future treatment. It is possible that the method of Lewin and Wassén holds out the most immediate promise of relief to sufferers from this disease.

SUMMARY

In the majority of 80 cases of rheumatoid arthritis, deoxycortone and ascorbic acid reproduced the phenomena reported by Lewin and Wassén.

A similar response was obtained in monarticular infective arthritis, ankylosing spondylitis, and gonococcal arthritis, and benefit may be obtained in traumatic states.

Evidence is given for believing that the action of these substances is peripheral.

We wish to thank Ciba Laboratories Ltd. for supplies of 'Percorten,' of aqueous percorten glucoside, and of blank injections of arachis oil.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

Obesity

On Jan. 24 the section of medicine met, under the airmanship of Sir ADOLPHE ABRAHAMS, the president, discuss obesity.

Dr. A. W. SPENCE remarked that obese patients were enerally referred as suffering from "some endocrine isorder," "pituitary dysfunction," or "hypothyroid-m"; but it was not so simple as that. Experience ith fattening animals would suggest that testicular eficiency led to obesity; but many eunuchoids were ot obese and testosterone had little effect. Whilst besity might occur in a patient with myxœdema, it as not the rule. Although obesity might develop in atients with hyperinsulinism and obese patients might xhibit low glucose-tolerance, there was no real evidence hat the ordinary case of obesity was the result of xcessive secretion of insulin; and Dr. Spence suggested hat diabetes and fatness might possibly be related to yperfunction of the adrenal cortex.

The pituitary was the gland usually implicated as the ause of fatness, but Dr. Spence rather thought this iagnosis was made when the real reason was obscure. He did not agree that hypopituitarism was a cause of besity. Simpson ascribed obesity at puberty and the enopause to hyperactivity of the anterior lobe, but Dr. Spence believed that it was more likely to be due to ts secondary effect on the adrenal cortex. With regard to obesity after pregnancy, it was known that during pregnancy there was hyperfunction of the pituitary and the adrenal cortex. He did not think that over-eating was responsible for obesity in many cases. He believed that the hypothalamus played a greater part than was generally thought, and that tumours of the pituitary caused obesity by pressing on the hypothalamus. Water retention might be present, and associated with it was diminished secretion of sodium chloride. This might be due to dysfunction of the hypothalamus.

In treatment the administration of the pituitary extracts so far available was valueless. For a reducing diet, Dr. Spence recommended a diet of low fat and carbohydrate content, and, because of its specific dynamic action, high protein content, in so far as this was now obtainable, to give an intake of 800–1000 calories a day; a vitamin concentrate of A and D; not more than 2 pints of fluid a day; and a minimum of salt. Where patients found it difficult to keep to a diet on account of hunger, he gave 5 mg. of 'Dexedrine' before breakfast, at 11 A.M., and at 4 P.M. Thyroid extract was rarely necessary, but might be given if the response to diet was unsatisfactory. Obese persons were often resistant to thyroid, and if they did not lose weight on 3 grains a day it was no good increasing the dose. Dr. Spence was not impressed by the effect on obesity of diuretics. Exercise, massage and purgation helped but very little. In children dieting should be avoided if possible—it was a hardship and it was doubtful if the child would keep to it—and the administration of thyroid extract was unnecessary if there was no evidence of hypothyroidism. A child might lose his excess weight spontaneously after puberty.

Prof. E. C. DODDS, F.R.S., agreed that thyroid extract was no answer to obesity, because so large a rise in metabolic rate was necessary to bring about a decrease in weight. Polynitrophenols were very dangerous. At an average hospital dinner in pre-war days—an annual dinner—700–800 calories would be consumed in the form of alcohol; to dissipate this by exercise a person would need to climb Ben Nevis at least twice.

The weight of an ordinary individual remained remarkably constant—the same to within a pound over long periods. That the weight of a normal person was reproducible to within $^1/_2$–1% showed that there must be an elaborate mechanism for its maintenance. The body appeared to be checking up against some external factor in the environment; and it seemed on general grounds that this external factor must be the gravitational pull. Professor Dodds had tried experiments to lessen the gravitational pull by attaching gas-filled bags, without new capacities, they exhibit no true euphoria. In some cases there is generalised decrease of sweating, with local warmth over the affected joints. Swelling, whether due to synovial effusion or periarticular œdema, may visibly shrink. The duration of the response varies between a few hours and several days, and is rarely as long as a week; but the end point is far from being as sharp as the onset. Though regression is usual, so that the disappointed patient may feel he is back where he started, some objective improvement is usually retained, particularly in the shoulders; and when the response to the first injection has been a particularly good one, this level of improvement is not far short of the best that is attained after subsequent injections. The results are better in the monarticular than in the polyarticular form of rheumatoid arthritis; and in the latter the shoulders, cervical spine, and wrists seem to react more favourably than do other joints. The action is non-specific in so far as active cases of ankylosing spondylitis and gonococcal arthritis respond in the same way. Osteo-arthritis, however, is not affected except in certain circumstances detailed below.

EFFECTS IN TRAUMA

We now wish to draw attention to some effects produced by deoxycortone and ascorbic acid in certain traumatic states—effects illustrated by the following examples.

1. A woman of 51 had fractured the head of her right radius nine weeks before and had a painful range of 70–150° at that elbow. Fifteen minutes after injection (all injections in this series were with technique C and given in the thigh) there was a painless range of 45–165° accompanied by intense local warmth at and around the site of injury.

2. A man of 58 had fractured his right external malleolus five weeks before. When the plaster was removed ankle motion was fair, but inversion and eversion of the foot at the subastragaloid joint were almost impossible and the attempt very painful. Fifteen minutes after injection there was a good easy inversion-eversion range estimated at 75% of normal, with only slight pain and marked local warmth.

3. A girl of 12 had suffered a minor displacement of her left lower radial epiphysis two weeks previously, and the range of wrist movement was between 15° dorsiflexion and 20° palmar flexion, with pain and apprehension and severe local tenderness. Fifteen minutes after injection she had a full painless range without tenderness.

4. A man of 55 had slipped while working on a roof three days previously, injuring his left elbow. An enormous hydrarthrosis developed, obscuring the normal contour, and there were only a few degrees of very painful motion. Thirty minutes after injection most of the effusion had subsided and there was a 45–120° range with only moderate discomfort. After this progress was rapid without further injection and recovery complete in ten days.

5. A girl of 13 had suffered a severe contusion of the right forearm muscles and as a result wrist movement was limited to a painful 20° arc. Fifteen minutes after injection she had a full painless range, and much of the swelling and tenderness of the affected muscle bellies had subsided.

Similar observations have been made in acute sprains of the ankle and the internal lateral ligament of the knee, in stiff painful wrists after Colles fractures, in stiff œdematous fingers after injury and tendon suture, and in impacted fractures of the neck of the humerus and lower end of the radius. The only instances of improvement in cases of osteo-arthritis have been when there was associated ligamentous strain and œdema, such as is often found at the inner side of the osteo-arthritic knee-joint. In general, the regression after the initial response is much less in traumatic cases than in rheumatoid arthritis, and sometimes a single injection suffices to clear up the whole condition, particularly in persistent localised post-traumatic œdema. There is a close resemblance to the action produced on the same conditions by blocking the sympathetic supply to the affected limb —e.g., the corresponding actions on local tem skin colour, and sweating.

SITE OF ACTION

We believe that deoxycortone and ascorbic acid peripherally, and not through the agency of the renal gland or other internal organs. Our reasons for belief are (1) that the response is so rapid, (2) that response is, if anything, more rapid with technique than either A or B, and (3) that with technique C response may appear first in the joint nearest the of injection. A simple clinical experiment was to decide this point.

We selected 10 cases of rheumatoid arthritis with more less symmetrical lesions. In the first 6 cases a sphygmomanometer cuff was placed on each upper arm and the pressure was raised to 80 mm. Hg. Into one forearm 5 mg. of deoxycortone glucoside and 1 g. of ascorbic acid was injected intravenously, and into the other 10 ml. of normal saline. The cuffs were maintained at 80 mm. Hg for fifteen minutes and the hands and wrists observed. In 5 cases there was no appreciable response in either hand and no general response was observed fifteen minutes after the cuffs were released. In 1 case there was a response in the hand on the side of the positive injection and no response in the control hand; but after releasing the cuffs there was a response in the control hand and one knee.

In 2 other cases 5 mg. of deoxycortone acetate in arachis oil and 1 g. of ascorbic acid was injected into the muscles of the upper forearm, and 1 g. of ascorbic acid alone into the other forearm, under similar conditions of venous occlusion. In 1 of these 2 cases there was a rapid response in the elbow on the side of the combined injection and a smaller response in the hand of the same side; on the side where only ascorbic acid had been injected there was no response until after the cuffs had been released. In the second case the result was indeterminate.

Unequivocal results were obtained in the last 2 patients.

In one, 5 mg. of deoxycortone acetate in oil was injected into the forearm muscles below an upper-arm cuff at 100 mm. Hg, and immediately afterwards 1 g. of ascorbic acid was given intravenously into the opposite arm, on which no cuff was applied. Within five minutes there was a dramatic response in the elbow of the cuffed arm, and the patient put her hand to her mouth for the first time in six years; nothing happened in any other joint. Five minutes after releasing the cuff the opposite hand, the shoulders, and one knee responded in the usual way.

In the second case there was symmetrical involvement of both ankle-joints. A cuff at 100 mm. Hg was applied below one knee, 5 mg. of oily deoxycortone acetate was given in the calf muscles of that side, and 1 g. of ascorbic acid was given intravenously in an arm. There was a rapid response in the ankle below the cuff, none in the opposite joint. After releasing the pressure the opposite ankle improved.

These findings indicate that the interaction between deoxycortone and ascorbic acid confined to the peripheral tissues is capable of producing all the observed clinical effects in the joints. This was well shown in the last 2 cases quoted, in which ascorbic acid was carried with the arterial flow into a limb containing a deoxycortone depot and from which the venous and lymphatic return had been occluded.

DISCUSSION

There is considerable disagreement among observers of small series of cases on the effect of this combined injection on rheumatoid arthritis.

Lewin and Wassén (1949) originally reported 9 successes in 9 trials, and we confirmed these findings in 21 of 23 cases (Le Vay and Loxton 1949). Kellgren (1949) had 1 dubious response in 6 cases and denied any benefit. On the other hand, Fox (1949) found that none of 10 patients failed to respond. Of the 17 cases of Hartfall and Harris (1949), 4 were worse, 1 better, and the rest improved only to the extent expected from physiotherapy. Lloyd Hart and Starer (1949) stated that the claims of Lewin and Wassén were not borne out in their 5 patients. Spies et al. (1949), in a comparison with ich therapeutic dose was the tracer dose, which ed urinary excretion and thyroid absorption to be sed. The quantity of isotope retained was measured tly on the patient. Only in a few cases did the our take up iodine. As a rule, neither primary cancer e thyroid nor its metastases were absorbing tissues, it was therefore necessary first to eliminate the al thyroid. This might be done either by surgery y therapeutic doses of radio-iodine, or by a combina- of the two. This procedure aimed at producing œdema, which forced metastases derived from the oid to concentrate iodine; but since the process was the possibility of keeping the patient going by the of ordinary X-radiation must be remembered. Once patient was ready for treatment by radio-iodine, the imum tolerable irradiation should be produced, as as possible, by a single therapeutic drink. Possibly, ever, only part of a tumour or one metastasis was tioning at any one time; and the tumours must a be destroyed by a series of treatments. The capacity absorb was reported to be increased by the use of rotropic hormones; but this had not been demon- ited in Manchester.

Dr. H. C. **Warrington** (Manchester) gave particulars the 21 cases of thyroid cancer treated at the Christie spital. Of these, 17 received tracer doses of I^{131}; only 2 were *tumours found to concentrate iodine,* d in both of these the tumours were metastatic. These cases received therapeutic doses of isotope after total yroidectomy, and were still under observation. In cases the tumour was non-functioning. Since it was lieved *that* after removal of the normal thyroid tissue e tumour might concentrate the drug, treatment was med at eradicating such tissue either by surgery or therapeutic doses of radio-isotope. In 10 cases there ere now signs of myxœdema; but in none had the mour yet acquired the ability to concentrate iodine. f the 2 tumours which took up iodine, one was highly ifferentiated with colloid formation, while the other was f Hurthle-cell type. Of the others, only 2 showed colloid ormation.

Mr. W. K. **Sinclair** reviewed the uses of radioactive sotopes for treatment of the internal surface of the ladder. For treatment a rubber balloon was inserted ato the bladder and inflated with a solution of radio- ctive sodium. For male patients a urethrostomy was equired, and in all patients the dose was about 3000 r ue to β-radiation and 3000 r due to γ-radiation.

Dr. R. J. **Walton**, reviewing the clinical findings, aid that of the cases treated by this method, all were pparently well at four months.

Dr. Walton then described a case of thyroid carcinoma which was referred to the Royal Cancer Hospital after a racheotomy had been performed. Tracer investigations with radioactive iodine revealed that the tumour was concentrating the isotope, and several therapeutic doses were then given—a total of 400 mC in all. The response was good; the tracheotomy was closed, and the patient was now well with no evidence of active malignancy.

Mr. C. J. L. **Thurgar** (Newcastle upon Tyne) described a surface applicator of radioactive phosphorus which had been used in the treatment of a malignant melanoma of the conjunctiva. A single estimated dose of 2000 r was given; a radiation reaction lasting forty-eight hours was observed; and the patient was well up to the present. The use of P^{32} in surface applicators was suggested for convex surfaces and for difficult sites, but not for general use.

Mr. G. W. **Blomfield** (Sheffield) described from the clinical standpoint a number of cases of thyroid disease treated with I^{131}; and he pointed out that the take-up of therapeutic doses in diseased tissue could not be accurately foretold from the take-up of tracer doses.

SOCIETY FOR ENDOCRINOLOGY

A.C.T.H.

At a meeting of this society on Jan. 26, with Mr. A. S. **Parkes**, sc.d., f.r.s., the president, in the chair, recent work on the constitution and actions of the pituitary adrenocorticotropic hormone was described by Prof. C. H. Li, of the University of California.

Professor Li, who has succeeded in isolating from the hormone an active mixture of peptides, observed that the hormone could be assayed on hypophysectomised rats in three different ways: (1) by repair tests of the adrenal cortex; (2) by the so-called "maintenance test," the hormone being able to maintain the body-weight and adrenal-weight after hypophysectomy; and (3) by the ascorbic-acid depletion test. A single dose of a.c.t.h. caused a prompt fall in the ascorbic-acid content of the adrenal cortex, followed after some hours by a very slow rise.

This hormone, continued Professor Li, had a half-*life time* of five minutes (compared with seven hours for the growth hormone); and it was destroyed by the adrenal, the kidney, and the liver. It stimulated production of all the adrenal steroids—the "desoxy-like," the 11-oxysteroids, and androgens and œstrogens. Animal tests had shown a.c.t.h. to have the following effects: (1) retardation of body growth and antagonism to the action of the growth hormone; (2) increase of nitrogen and potassium excretion; (3) increase in the free amino-acid content of the plasma; (4) glycosuria and hyperglycæmia in rats, but not in cats; (5) increase of body fat; (6) hypertrophy of the liver and increase of the liver fat; (7) increase of ketone bodies in urine and blood; (8) diminution of the plasma alkaline-phosphatase; (9) deterioration in chondrogenesis and osteogenesis of the tibia; (10) thinning of the epidermis, and atrophy of the sebaceous glands and the growing parts of the hair; (11) involution of the thymus and lymph-nodes, with depletion and dissolution of lymphocytes; (12) decrease of circulating eosinophils; (13) enhancement of work performance; (14) improved resistance, in normal rats, to cold, starvation, and low atmospheric pressure; (15) enhancement of adrenal regeneration in both normal and hypophysectomised rats; (16) inhibition of insulin effect on glycogenesis in isolated diaphragms of normal rats but not of hypophysectomised animals; and (17) inhibition of development of male accessories of normal rats but not of hypophysectomised animals.

This hormone, said Professor Li, was highly soluble in water; and in solution was strongly resistant to heat. No coagulation followed prolonged boiling in a neutral or *N*/10 acid solution. The molecule could, however, be broken down by heat treatment with the addition of strong acid and by pepsin; and an ether extract of the supernatant fluid, when dried, yielded a yellow powder. This powder contained a mixture of peptides which retained the original hormone's activity. But whereas the original molecule had a molecular weight of 20,000, these peptides had a molecular weight of about 1200 with an average amino-acid content of 8. The mixture could easily be fractionated; and on paper chromatography the "active spot" was 18 times more active than the original mixture. The individual peptides had all the beneficial effect of the original hormone; and perhaps a little more, judging by the ascorbic-acid test.

Professor Li concluded by listing the disorders which a.c.t.h. has been found to benefit. These include rheumatoid arthritis, rheumatic fever, nephrosis, glomerulonephritis, ulcerative colitis, asthma and other allergic disturbances, periarteritis nodosa, and virus pneumonia.

much result; and the opposite procedure—that is, weighting people down—was no use, because of the energy used to keep up the extra weight. The mechanism for the day-to-day control of weight was more elaborate than was realised, and if this mechanism could be discovered there would be a better chance of obtaining a response in patients.

Dr. **Raymond Greene** called for a shift of emphasis from fat retention to water retention. If one believed that "adiposity" was caused by the former, one was confronted by a series of insoluble dilemmas in the face of which one must either deny the law of the conservation of mass or else change one's belief. He preferred the latter alternative. Many clinical observations led to the conclusion that the essential point in the study of "adiposity" was the abnormal deposit, not of fat, but of water—a hypothesis which did not conflict with the law of the conservation of mass, and which accorded with the numerous experimental and clinical observations which put the blame on the hypothalamus—the seat of the nucleus supraopticus, which controlled water metabolism. He instanced particularly the "adiposity" which often follows encephalitis, concussion, and severe anxiety; and he quoted examples, pointing out the similarity between the increase in weight seen in women during anxiety and depression and that produced by Verney in dogs subjected to equivalent emotions. The excess of water appeared to reside chiefly in the adipose tissue.

He supported Dr. Spence in emphasising that neither thyroid nor anterior-pituitary deficiency was an important cause of "adiposity." In particular he pointed out that if the anterior pituitary was in fact concerned at all it was by overactivity, and that therefore the administration of anterior-pituitary extract was absurd: and that in any case anterior-pituitary extract was entirely destroyed by the normal processes of digestion.

Dr. **J. S. Richardson** described a small series investigated by Dr. H. J. Shorvon and himself at St. Thomas's Hospital as a result of finding a history of psychological trauma in two or three cases of pronounced obesity which did not respond to dietary restriction. The bombing of a home, the loss of a child, or the desertion or suicide of a husband had been followed immediately by rapid increase in weight. It was thought that this trauma might have led to impulses from the cortex acting on the hypothalamus to alter the water excretion and appetite, or weight control. There was no obvious psychological disorder, but abreactions produced a most intense release of emotion.

Altogether, 20 cases were under observation; and Dr. Richardson described the results of the investigation of 12 and the treatment of 9. They were a group of previously slim, young married women of average intelligence without previous neurotic illness who were mostly unhappy at home and had been rigidly brought up in sexual ignorance. All 9 patients who had had abreactions lost weight to an extent which, expressed as a percentage of their weight before treatment, averaged 13%. The average length of time taken to lose this weight was six months; and the average number of abreactions was twelve. Each of the 9 patients had lost over a stone in weight, although no other reducing method was employed; but one patient who had no abreaction did not respond at all to rigid dieting and dehydration. This loss of 13% could be compared with a loss of 23% in married women of the same age treated for the same time, as outpatients, with dietetic restriction and amphetamine.

Dr. Richardson made it clear that he and his colleague did not regard abreaction as a treatment for obesity. What they did say was that this method had shown that in some women obesity following traumatic incidents was associated with an extremely high emotional con that might well pass unrecognised since the patients not appear neurotic. They hoped that abreactions be helpful in managing certain selected cases.

Dr. **W. S. C. Copeman** thought that abnormalit body-fluid and adiposity need not be considered as separate subjects. He believed that in man, as in camel, the fat was the natural water-storage organ of body.

Radioactive Isotopes

A joint symposium was held by the radiology sec with the British Institute of Radiology on Jan. under the chairmanship of Dr. S. **Cochrane Sh** the section's president.

Mr. **N. Veall** discussed the uses of radioactive isot in measuring dynamic equilibria and the spatial di bution of ingested substances. As an example of first of these two uses, he quoted American workers had employed Na^{24} (half-life 12 hours) in studying rate of exchange between blood and body-fluids peripheral vascular disorders. However, the Med Research Council unit at Hammersmith had fo measurement of the time of exchange from blood body-fluids unsatisfactory, because the results influenced by changes in temperature and ext conditions. The reverse process was easier to meas the isotope was injected intramuscularly and the ra transfer from body-fluids to blood measured. For investigation of spatial distribution of the radioa isotope, Mr. Veall described a highly directional Ge Müller counter arrangement; with this it was pos to measure the distribution of radioactive iodine i thyroid gland. The same arrangement had been to locate the position of the placenta after a injection, and when the position was *later establ* by other methods the accuracy of the isotope test confirmed.

Mr. **Haigh** (Bristol) described a method for me ing the rate of fall in the blood-concentratio I^{131} in rabbits after an injection of the isotope. was led out of the carotid, passed round a Geiger co and back into the animal. The rate of counting recorded continuously on a rotating drum. He described a method for measuring an empirical cons of thyroid function, and an arrangement for measu the concentration of radioactive sodium in various p of the head.

Mr. **R. Marcus** (Liverpool), in a paper by himself Prof. **J. Rotblat**, described experiments to discover possibility of treating a case of multiple melanoma with radioactive copper and P^{32}. The copper, give colloidal form, concentrated in the liver only; but b tracer test, P^{32} achieved a concentration in the deposits ten times greater than that in normal ti Therapeutic doses of 5 mC and 15 mC of P^{32} were g Sections from the skin tumours showed necrosis, without radiation this was common in this ty disease.

Dr. **A. G. Macgregor** reviewed the extensive undertaken at Sheffield with radioactive iodine fo diagnosis of thyroid disease. The peak concentrati the thyroid, the time taken to reach the half-peak the urinary excretion, and the plasma clearance had all shown a degree of overlap between various g (normals, thyrotoxics, and others); but when concentrations of radioactive iodine in the plasma measured forty-eight hours after the dose, there wa overlap; in the diagnosis of thyroid disorders forty- hours after the dose had proved the most useful tim estimations.

Dr. **Ralston Paterson** (Manchester) observed the use of radio-iodine in cancer of the thyroid was on an entirely new principle. The essential prelimi

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Are the Beds Fully Occupied?

THE high and increasing cost of hospitals, and the essure for admission, have raised in many minds e question "could not something be done by nproving the proportion of beds occupied?" bviously, with total figures so large, even a small ercentage increase would mean that many more eds were in operation. Newcomers to hospital nanagement committees and regional boards are urprised and sometimes indignant to find that an verage occupancy of 80–85% for a fair-sized general ospital is often defended as satisfactory. After naking inquiries they quote other hospitals where he occupancy is reputed to be 100%; and from his point the discussion is apt to prove inconclusive.

The history of the subject is instructive. In the 890s, in his hospital annuals, Sir HENRY BURDETT nade many strenuous efforts to get to grips with it, and the definitions that were gradually evolved were ater taken over and used or modified by King Edward's Hospital Fund for London, and eventually in the *Hospitals Year Book* and the reports of the larger county councils. In the early 1930s the bed ccupancy of the big London hospitals was stated as about 83%, and though the figures for local-authority hospitals were often higher they were regarded with some distrust as an index of efficient management because they were thought to reflect overcrowding of the wards during part of the year. The Report on Unoccupied Beds made by the King's Fund in 1929–30 is now out of print, but in the absence of any more recent authoritative data the facts it gave are still of considerable interest. After pointing out that "beds temporarily closed" must be eliminated from the analysis before one can get at vacancies occurring between the discharge and admission of patients, it goes on to say:

> "A low all-over ratio of vacancy in the beds of a Hospital may cover a high ratio of vacancy in some beds through the operation of a very low ratio of vacancy in other beds. An inquiry into vacant beds therefore involves some segregation of the beds into various categories."

Clearly, as it remarks, "a high percentage of vacancy in beds reserved exclusively for accidents should not be criticised as showing that a hospital is not making the fullest effective use of its beds." and "it is to the interest of a Hospital, and an indication to some extent of its efficiency and health, that certain classes of beds should be as empty as possible." A table shows that when accident beds, isolation beds, pay beds, and staff beds were excluded, the average percentage of vacancy in the hospitals fell from 17 to 11. By pressing home the analysis in this way some striking discrepancies as between different hospitals in the same category were brought to light; for example, in the twelve teaching hospitals of London, arranged in random order, the percentages of open beds vacant were:

Hospital	*Medical*	*Surgical*	*Maternity*	*Gynæcological*
A ..	6·8	10·8	10·5	4·6
B ..	7·5	9·6	4·2	0·0
C ..	3·4	13·4	7·3	6·5
D ..	7·8	6·6	6·9	5·9
E ..	6·9	6·2	9·4	6·0
F ..	14·3	11·6	4·6	1·0
G ..	7·0	6·9	9·1	15·2
H .	12·2	16·3	0·0	7·1
I ..	7·0	18·2	12·4	11·1
J ..	9·0	11·1	12·0	10·5
K ..	2·2	1·9	0·0	0·0
L ..	5·3	7·3	10·9	5·7
Average	8·3	10·9	7·5	6·5

Similarly, an analysis showing the relative incidence of vacancy in beds allocated to men, women, and children in the medical and surgical wards revealed large differences in detail between comparable hospitals. For the same twelve hospitals the percentages of vacant open cots for medical cases were:

A	20·0	G	18·4
B	7·4	H	29·3
C	3·0	I	—
D . ..	10·3	J	12·8
E	8·2	K	2·9
F . .	17·9	L	8·5
		Average	14·3

It is thus abundantly evident that, as the report said, "a low all-over ratio of vacancy in the beds of a Hospital may cover a high ratio of vacancy in some beds through the operation of a very low ratio of vacancy in other beds," and that without close and detailed analysis no useful conclusions can be drawn.

Who can say whether or not the position today is much what it was in 1929–30? Maybe the Ministry of Health has the relevant figures in its archives: but so far as we are aware nothing has been published or found its way back to the hospitals in a way that would invite attention. The comparative statistics formerly produced by the voluntary hospitals, and to some extent by the larger local authorities in respect of their hospitals, were an external check—perhaps the only check—on each hospital's own ideas of what constituted a satisfactory standard; but the war years and the subsequent period of reorganisation and reclassification have upset the system. Inevitably, perhaps, the statistical and the financial sides of the Ministry tend to operate in separate compartments. But, if so, is it not high time for someone else to take a hand and throw a bridge from one side to the other by undertaking a fresh inquiry giving us figures comparable to those obtained by the King's Fund in 1929–30?

Reviews of Books

Epidemiology in Country Practice

WILLIAM NORMAN PICKLES, M.D. Lond., medical officer of health, Aysgarth rural district. Bristol: John Wright & Sons. 1949. Pp. 112. 10*s.* 6*d.*

THIS book, now reprinted in its original form, achieved immediate success on its first publication in 1939; and by 1941, when enemy action destroyed the entire stock and type, was regarded as certain to become a medical classic. This judgment needs no revision after the lapse of years. Pickles's simple yet careful method of studying infectious disease in Wensleydale, and his useful conclusions about the incubation period and duration of infectivity are now too well known to need description. Country practice seen through his observant eyes is packed with material for epidemiological observation, and his book, though short, abounds in the small glimpses of greater things which are apt to be missed altogether by the medical officer of health tied to an office desk. Consider for instance his remarks, made without comment, that he encounters an epidemic of measles about once every nine years, or that among a total of 56 patients seen during seven years with herpes zoster only 1 could remember having previously had chickenpox. The old assertion that no general practitioner can escape growing to know less and less about more and more is completely refuted by this book. There must be many in general practice who could apply the method of studying communicable and other diseases perfected by Pickles, and find it rewarding in a calling which is apt to be overfull of uncoördinated petty detail. They would at the same time be making positive contributions to the science of medicine.

The Neuroanatomic Basis of Surgery of the Autonomic Nervous System

ALBERT KUNTZ, PH.D., M.D., professor of anatomy, St. Louis University. Oxford: Blackwell Scientific Publications. 1949. Pp. 83. 16*s.* 6*d.*

Professor Kuntz has attempted the impossible task of condensing the anatomy and surgery of the autonomic nervous system into a short monograph. Perhaps no-one else could have done it so well in the space, but brevity is sometimes achieved at the expense of misleading over-simplification. It would be difficult for any reader without considerable previous knowledge to obtain an adequate picture from it of the autonomic innervation of any of the important structures in the human body; yet this is the essential basis for rational surgery. The illustrations, which are mainly diagrammatic, provide little additional help. A commendable feature is that, despite the title, physiology is often more fully described than anatomy. For a work designated as a monograph the bibliography is not exhaustive and is predominantly American, omitting any reference to the fundamental researches of Langley, Gaskell, Perman, Hovelacque, Braeucker, Lazorthes, and many others. More recent work on sympathetic pathways independent of the main sympathetic trunks is well summarised; but no mention is made of various other anatomical variations which help to explain the partial failure of some sympathectomies. The monograph is an interesting summary of an important subject and may stimulate surgeons to study larger works such as Kuntz's own textbook on the autonomic nervous system.

Resuscitation and Anesthesia for Wounded Men

The Management of Traumatic Shock. HENRY K. BEECHER, A.M., M.D., Dorr professor of research in anesthesia, Harvard University, and chief of the department of anesthesia, Massachusetts General. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1949. Pp. 161. 40*s.*

THIS book, the preface tells us, is a paste-and-scissors synthesis of various articles written by the author during his service with the American army in the campaign in Italy. It is in four sections, the first concerned with the mental and physical state of the wounded man, the second with the physiological derangements (i.e., the hæmatological and biochemical changes) of wounding, the third with resuscitation, and the fourth with anæsthesia for the recently wounded. Though ther nothing new to those with extensive experience casualty surgery, it is useful to have this record of hard-won lessons of war, set down in vivid American a man who not only was there but thought while was there. That most seriously wounded men are in pain and do not necessarily require morphine. the badly wounded cannot be resuscitated twic operation has to be postponed, that it is not necess to restore a low blood-pressure to normal before operat that spinal anæsthesia is a very dangerous and th pentone a dangerous anæsthetic in the recently wound —these things need restating often. This book is a us work for those treating severe injuries in civil life would be invaluable to a young generation of surge pitched into war without previous experience of special problems.

Advances in Carbohydrate Chemistry

Vol. IV. Editors: W. W. PIGMAN, University Alabama; M. L. WOLFROM, Ohio State Univers New York: Academic Press. 1949. Pp. 378. $7.5

THIS series is sponsored by an international editorial committee, and the authors of the various chapters are all acknowledged experts in their own fields. Vol. I appeared in 1945 and the structure and composition of vol. IV resembles those of its predecessors. Articles have been contributed by scientists in Canada, the United State the Argentine, Holland, and Britain, and some of th sections are of considerable general interest. The fir one, which deals with the structure and configuration of sucrose, is a good example of this, and the auth historical approach enables even those who are a litt out of date with their carbohydrate chemistry to foll the argument intelligently. Medical men with a thi for knowledge will also find much to ponder over the second section on the carbohydrate-amino complexe which are responsible for the A, B, and O blood-grou It is a far cry now to the days when the polysacchar in the animal body began and ended with glycogen.

Some other articles will appeal to all thinking men wh enough background of knowledge to understand them. Th problems involved in the saccharification of wood produ make interesting reading, and their importance is gr when one considers the enormous quantities of wood du and chippings which accumulate in the preparation of wood for commercial purposes. Some of the sections, however, are highly technical and specialised. The one on apiose and the glucosides of the parsley plant for instance can appeal only to a very limited circle, and the same applies to that on the acetylated nitriles of aldonic acids. The article on the plant gums and mucilages may interest dispensers and those who have to use these substances, but few of them will be able to grapple with the complicated chemical structure which has been suggested for their old friend gum-arabic.

Most of the articles contain a satisfactory though not an exhaustive list of references, and the book is one which many could consult with pleasure and profit for special points in teaching and research.

Rheumatism (2nd ed. London: Staples Press. 1949 Pp. 270. 17*s.* 6*d.*).—A note on the cover claims that, to brin his new edition completely up to date, Dr. Warren Crow has included a full description of advances in our knowledg of the rheumatic diseases and their treatment. The text however, does not support this statement. Though publishe in the autumn of 1949, the book probably reached the pre too early to carry any mention of the work on the relatio between the pituitary and adrenal hormones and rheumato arthritis; but the last reference given to any work by Henc is dated 1944. Dr. Crowe reiterates in a conversational styl his now familiar argument in favour of the infective origin of rheumatic diseases. Osteo-arthritis, he believes, has a mainly streptococcal, and rheumatoid arthritis a mainly staphylo coccal, origin; mixed forms can develop with mixed infection He continues to advocate the use of vaccines, and is at pain to explain why he does not consider controlled investigation into the efficacy of this method of treatment necessary. Th book is pleasantly presented and illustrated. References however, seem to have been selected more because the support the tenets of the Charterhouse Rheumatism Clini than for any other reason, and all the methods used at th clinic are described in great detail.

e trained psychiatric social workers are scarce, a large area had only one or two, with a team rained social workers under them. But this plan been found to answer well; for much of the k requires a knowledge of voluntary and other ncies, work opportunities in the district, recrea- nal and social possibilities, home-help schemes, ining prospects, and the like, rather than psychia- knowledge. In any difficulty the psychiatric ial worker, who kept in touch with the patient's n doctor, could see the patient herself, and get at advice seemed necessary. Encouraged by the ociation's reassuring name and reputation, people o had never needed mental-hospital care began seek advice because they feared a breakdown or re depressed or bewildered by the circumstances their lives: and here were opportunities—gladly ed—for genuine preventive work. The scheme anged from an aftercare service to a service of mmunity care for the maintenance of mental alth. A useful voluntary service, subsidised by overnment grants, was thus being built up when the ational Health Service came into action.

The Act unfortunately changed the position. ftercare became the legal responsibility of the cal health authorities, and the Government grants to he association for this work were withdrawn. The ssociation hoped that the local authorities would ubsidise the service, and allow it to pursue the work was already successfully doing; but this has nly happened in four places—the London area ncluding Middlesex and West Ham), Newcastle, nd Birmingham and Kent (which are changing the rrangement). Elsewhere the local health authorities ll elected to do this work themselves. Of the difficulties facing them, the most formidable is hat many patients will not bring their intimate personal troubles to a statutory body—and how many reject the opportunity can never be assessed. Again, the authorities have special staffing difficulties; they are obliged—and indeed glad, no doubt—to fit into the new service people who have been with them for many years holding posts as reliev- ng officers. These—now the "duly authorised officers" of the day—are many of them first-class people, with a long record of good service; but they have not been trained in psychiatric concepts, and are inclined to think them far-fetched. Moreover, they are oriented to local-authority service, which means they like things to be done duly and in order; they have lost, perhaps, some of the pliancy which is needed in dealing with people whose minds are a little sick. At all events psychiatric social workers are not at present responding very readily to the advertisements of health authorities, perhaps feeling that they could not easily build up the same team spirit inside the municipal service as was possible in a voluntary scheme. It is true that psychiatric social workers seconded to local health authorities have often been able to establish excellent working relations with their new colleagues and to interest them in a different approach to mental health; and clearly much progress can be made in this way. But it must also be admitted that a successful mingling of the old and the new can be achieved only when good will, and perhaps exceptional qualities, are to be found on both sides.

The closing down of the association's centres has meant hardship for patients in many parts of the country, as their letters to the association only too painfully testify. Those mental hospitals which counted on the association's help are also feeling their loss.

> "One great difficulty which social workers have found since July 5, 1948," writes Dr. LOUIS MINSKI, in the annual report of Belmont Hospital for 1948–49, "is the obtaining of social histories in respect of patients living in distant parts of the country. This work was formerly undertaken by psychiatric social workers from the National Association for Mental Health and in most cases they have now ceased to function. Nowadays there is often no psychiatric social worker available in the district where the patient lives and the local M.O.H. has to be approached. He may have no-one on his staff with experience of psychiatric work and the report is often of little or no value. Similar difficulty is also being encountered in arranging aftercare for patients because of the lack of psychiatric social workers. In some districts aftercare consists in referring patients to a psychiatric clinic which may be the last thing which is required. I am afraid aftercare as understood by us in the hospital has almost ceased to exist."

This loss is very serious, and it is regrettable that a useful going concern should be allowed to melt away when we have nothing to replace it. Even though the local health authorities may in time develop an excellent service, the outlook of the mentally sick will have to be changed before this succeeds in reaching all who need it. Voluntary care is here the more appropriate method; and, if the local authorities are unwilling to maintain the association's work, surely one of our rich voluntary funds could come to the rescue? The service has never been expensive: it has been run with the smallest possible outlay. But it has prevented a great deal of avoidable distress and restored to active work many people who would otherwise have remained despairing and useless. To keep and advance such an enterprise as this, funds should surely be forthcoming.

Continental Jubilees

JUBILEES are celebrated by two Continental journals with their opening issues this year. The *Wiener medizinische Wochenschrift* first appeared in 1851, since when the scientific world has learned to associate Vienna and its medical journal with such names as Hebra, Chvostek, Billroth, Virchow, Ehrlich, Lorenz, Freud, Eiselsberg, Wagner-Jauregg, Economo, and Pirquet. This journal had an early link with the younger *Deutsche medizinische Wochenschrift* through the publication in each of Robert Koch's article Über die Cholerabakterien in which he replied to the many criticisms of his work. When the German journal was founded by Paul Börner in 1875, Robert Koch was still an unknown country doctor whose wife had lately given him one of those new-fangled microscopes as a birthday present. Börner was quick to recognise the importance of Koch's work; and the journal's early fame was largely due to its publication of the classical investigations of Koch and his disciples—Behring, Brieger, Ehrlich, and Pfeiffer. After the advances in bacteriology and immunology at the end of the 19th century came the age of the great clinicians who applied them. Here again the *Deutsche medizinische Wochenschrift* played an important part, interpreting to the medical profession in Germany the techniques of the New World; and chemotherapy brought the tide of discovery back to Germany when Domagk's first paper on 'Prontosil' appeared in 1935.

Boric Acid Poisoning

Boric acid has long been used as an antiseptic, though its germicidal value is very slight and *Staphylococcus aureus* survives long exposure to a saturated solution.[1] Both boric acid and sodium borate have some bacteriostatic action, but Sollmann[2] questions whether under clinical conditions solutions of these substances check bacterial growth at all.

The purposes for which they have been used are many. Thus Ross and Conway[3] have no fewer than forty, ranging from the familiar eye lotions, douches, and mouth-washes to the now generally illegal use as a food preservative and the uncommon empirical use of sodium borate in epilepsy. Boric acid is regarded as a mild, bland antiseptic, and there is hardly a part of the body to which it has not been applied. That it is toxic when taken by mouth is fairly well known, though even this was not appreciated by twenty out of thirty doctors who were questioned.[3] Its toxicity from external application is less widely known, though severe poisoning and deaths have resulted from its employment in this way. According to Ross and Conway, the first fatality was reported in 1883, when a man died from 5 days' application of boric-acid powder to a sore on the leg.[4] Other deaths have been due to irrigation of septic cavities,[3] administration in enemas, and application as a burn dressing[5] and in the treatment of widespread eczema,[6] to mention only a few instances. Accidental ingestion —for example, by mistake for a saline purgative[7]— has been reported from time to time, and in one baby death was due to borax and honey given for thrush.[8] At least one breast-fed infant has died as a result of boric acid being used to cleanse the mother's nipples[9]; and in an epidemic of diarrhœa in a neonatal ward the evidence strongly suggested that the infecting organisms were conveyed to the infants by the pledgets of cotton-wool soaked in boric-acid solution used for cleansing the nipples of the nursing mothers.[10] It is among infants that the death-roll has been highest. Ross and Conway traced twenty deaths up to 1943, since when a further twelve have been recorded; and about half of these deaths—to which others could be added—have been of children under the age of 2 years. The most recent report[11] concerns a tragic accident in hospital, when six babies, aged 6–11 days, died because a 2·5% aqueous solution of boric acid was used in place of sterile water in preparing feeds. The infants died between 19 hours and $3^1/_2$ days after a single feed prepared in this way; the fatal dose was thought to have been less than 3 g. The lethal dose seems usually to be 5–6 g. in children and 15–20 g. in adults, but wide variations are recorded; one woman, for example, showed only mild toxic effects when given 15 g. intravenously.[12] Repeated doses, by whatever route, have a c lative effect—a fact which has led to the ba of boric acid as a food preservative.

The main signs and symptoms of poisoning those of gastro-intestinal irritation—nausea, vomi epigastric pain, and diarrhœa—accompanied increasing shock and ultimately collapse. Convulsi have been reported. There is an erythematous ra which may be very pronounced, and which is follo by desquamation. Death may take place up to 5 da after a fatal dose. Treatment, according to Pfeiffe and others,[13] consists in administering intravenou large doses of saline and plasma. Post mortem th usual findings are inflammation of the alimentar tract, toxic degenerative changes in the liver an kidneys, and cerebral œdema. Boric acid i concentrated most highly in the brain and the liver.

Boric acid is to be found in so many domestic medicine cupboards, and it is used so much, without special care, *in hospital, that it is really* surprising that there are not more cases of poisoning. It bears no poison label; and in the U.S.A. an attempt to insist on such labelling failed.[14] Hospitals can, however, make their own arrangements for marking solutions; and this precaution is particularly important in maternity wards. But is it necessary to use boric acid at all? In Watson's words[6] "When a drug can be shown to be almost entirely ineffective and at the same time dangerous, even when used in ordinary ways, it is time to remove that drug from general use as rapidly as possible."

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[1] Goodman, L., Gilman, A. The Pharmacological Basis of Therapeutics. New York, 1941.
[2] Sollmann, T. Manual of Pharmacology. Philadelphia, 1948.
[3] Ross, C. A., Conway, J. F. *Amer. J. Surg.* 1943, 60, 386.
[4] Brose, L. D. *Med. News*, 1883, 43, 100. Cited by Ross, C. A., Conway, J. F.
[5] Gissel, H. *Zbl. Chir.* 1933, 60, 1635. Abstracted in *Quart. J. Pharm.* 1933, 6, 714.
[6] Watson, E. H. *J. Amer. med. Ass.* 1945, 129, 332.
[7] Potter, C. *Ibid*, 1921, 76, 378.
[8] Birch, J. *Brit. med. J.* 1928, i, 177.
[9] Aikman, J. *J. Amer. med. Ass.* 1930, 95, 1661.
[10] Lembcke, P. A., Quinlivan, J. J., Orchard, N. G. *Amer. J. publ. Hlth*, 1943, 33, 1263.
[11] Young, E. G., Smith, R. P., MacIntosh, O. C. *Canad. med. Ass. J.* 1949, 61, 447.
[12] McIntyre, A. R., Burke, C. J. *J. Pharmacol*, 1937, 60, 113.
[13] Pfeiffer, C. C., Hallmann, L. F., Gersh, I. *J. Amer. med. Ass.* 1945, 128, 266.
[14] *Ibid*, 1944, 126, 310.

The Future of Community Care

Aftercare probably has a more important place in the treatment of the mentally ill than in that of any other type of casualty. The patient who leaves a mental hospital well enough to go home is seldom ready for the impact of ordinary responsibilities: his shattered self-confidence needs to be carefully restored, and relatives have not always been well enough prepared to help in this task, or even to realise how necessary it is. The visits of a psychiatric worker at such a time can make all the difference between consolidation of his recovery and a fresh breakdown—not because she attempts any "therapy" as such, but because she will explain his needs to the family, let him unburden his fears and hopes, help him to find the work he is fit for, see that he gets whatever grants or allowances are his due, stand by him in times of tension, and reassure him of his human value. It is important work which cannot easily be done through official channels; for it must maintain or establish contact with the man whose complaint is merely that he is afraid of life, or that he fears to become suicidal again, or that he is obliged to refuse the job his friends are pressing on him, because it is on the ninth floor and he dare not use a lift.

During the war, at the request of the Board of Control, the National Association for Mental Health started an aftercare scheme for Service psychiatric casualties, which was such a success that it was afterwards extended to civilian cases, and by June, 1948, was well established throughout the country.

far we have only one true example of this process, absorption of I^{131} in functioning cancer of the roid—a small gain in itself but one which opens a inating field of research.

NOMENCLATURE OF FUNGI

HE nomenclature of the medical fungi, never satis-tory, has been complicated by the indiscriminate ning of new names; mere mutants have been accepted l named as new species. Thus an unwieldy synonymy grown up. Diddens and Lodder have cited 87 nonyms of *Candida albicans* (Robin 1853) Berkhout 23, the common thrush fungus; while Conant puts number at 172. Fortunately, few of these synonyms to be found in current works; but misunderstanding sometimes caused by the use of two entirely dissimilar mes for the same species—e.g., *Monilia pinoyi* for *ndida albicans*, *Torula histolytica* for *Cryptococcus oformans*, and *Microsporum felineum* for *Microsporum nis*. The decision on what is the valid name of a ngus must accord with the international rules of tanical nomenclature; and careful research is needed establish priority.

The medical mycology committee of the Medical esearch Council has done a useful service in preparing list,[1] of names recommended for the fungi pathogenic o man and animals in Great Britain. The list gives the pproved names of the fungi with the authorities and the nore common synonyms, and the names and synonyms f the associated diseases. There is regrettable lack of greement on nomenclature between different countries, nd even among groups of medical mycologists in he same country; and the publication of this authori-ative list is a step—albeit a small step—towards securing ational and ultimately international agreement.

ULTRA-RAPID TRANSFUSION

A method of giving blood or infusion fluids very rapidly, y forcing them out of the transfusion bottle with xygen under pressure, is described by Pierce, Robbins, nd Brunschwig.[2] These workers have used this method o administer blood to patients who have collapsed luring extensive surgical operation, transfusing it at ates varying from 100 ml. to about 250 ml. per minute. he need for rapid transfusion in profound "shock" lue to hæmorrhage or trauma has been appreciated ince the late war,[3] but in this country blood is seldom given at rates much above 100 ml. per minute. Faster restoration of a depleted blood-volume may have certain advantages, but the dangers of air embolism[4] and "overloading"[5] associated with rapid transfusion are likely to be increased. If embolism is to be avoided, the oxygen propulsion method requires the full attention of a doctor throughout the transfusion, as Pierce et al. say. In considering the possibility of "overloading" they remark that "with patients in shock due to blood loss this danger does not exist at first, but once approximate replacement has been obtained and blood pressures are near the patient's normal, care must be exercised in continuing transfusions." A most important factor, which they do not mention, is the previous state of health of the patient. Rapid restoration of a depleted blood-volume is one thing in a previously healthy and robust adult, but quite another in a person who has been ill for months or years. Unless there has been adequate preoperative correction of such abnormalities as anæmia —whose effect on the heart in relation to transfusion has been described by Sharpey-Schafer[6]—even transfusions given at the more conservative rates carry some risk of "overloading." Another point which must be seriously considered is the possibility of defects developing in reducing valves on oxygen cylinders used to control the inflow of oxygen to the transfusion bottle. Such a defect might be quickly fatal.

The value of ultra-rapid transfusion must be proved by further careful observation before an opinion can be expressed on the need to use it. Unless it is performed by skilled and experienced operators, aware of its potential dangers, its adoption might well be followed by an increase in the number of transfusion fatalities. Often a sufficiently rapid inflow of blood can be obtained by far simpler and safer methods, such as the use of a 24/10 gauge needle in place of the usual 15/10 gauge needle.

END OF AGENISED FLOUR

SINCE Mellanby[7] announced three years ago that agenised flour can produce hysteria in dogs, and somewhat similar symptoms in the rabbit and the ferret, intensive experiments have been made both here[8] and in the U.S.A. to find out whether it has any harmful effects on man. Meanwhile, however, the U.S. and Canadian governments have prohibited its use in favour of another flour improver, chlorine dioxide. In this country a committee was set up, under the chairmanship of Sir Wilson Jameson and including representatives of the Ministries of Health and Food, the Medical Research Council, and the milling industry, to consider the whole problem and advise on the steps to be taken. According to a statement on another page (227), the committee finds no evidence whatever that the agenised flour is harmful to man, but it recommends that the agene process should be replaced by treatment with chlorine dioxide as soon as the necessary equipment can be imported from the United States, presumably the only source of supplies. This recommendation has been accepted by the Ministries of Food and Health and by the milling industry.

Assuming that flour improvers are essential if we are to get the type of bread to which we are accustomed —and the committee accepts that assumption—the decision to follow the North American example was perhaps inevitable. Nevertheless there is an obvious need for concentrated research to find a biological improver or other form of treatment which by its very nature would be beyond criticism. Chlorine dioxide has the advantage over agene that even in quantities greatly in excess of the normal treatment of 25–30 p.p.m. it produces no toxic symptoms in dogs or other animals. The toxicity of agenised flour to dogs must have created disquiet in many minds, and Sir Wilson Jameson's committee was wise to stress twice in its statement that there is no evidence that it is harmful to man. Oddly enough, two earlier public statements—the first in the B.B.C. news bulletins on Jan. 25, based on the Medical Research Council report for 1945–48 which was issued that day, and the other by Sir Edward Mellanby in a broadcast on Jan. 27—were not so definite.

Presumably the agene controversy in its practical implications is now ended, but the research which it inspired should make useful additions to pharmacological knowledge. In September, 1949, Moran and his colleagues[9] at the Cereals Research Station, St. Albans, announced the isolation of a crystalline toxic factor from agenised zein. The same team have since shown[10] that the factor is a new but relatively simple derivative of methionine—$C_5H_{12}N_2SO_3$—with the additional NH and O probably attached to the S atom. Furthermore, they point out that such a molecule can exist in isomeric

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[1] Nomenclature of Fungi Pathogenic to Man and Animals: Names recommended for use in Great Britain by the medical mycology committee of the Medical Research Council. Medical Research Council, memorandum no. 23. H.M. Stationery Office. Pp. 12. 6*d.*

[2] Pierce, V. K., Robbins, G. F., Brunschwig, A. *Surg. Gynec. Obstet.* 1949, 89, 442.

[3] Treatment of Wound Shock. Medical Research Council War Memorandum, no. 1 (2nd ed.), 1944.

[4] *Lancet*, 1949, i, 743.

[5] Drummond, R. J. *Brit. med. J.* 1943, ii, 319.

[6] Sharpey-Schafer, E. P. *Lancet*, 1945, ii, 296.

[7] Mellanby, E. *Brit. med. J.* 1946, ii, 885.

[8] Elithorn, A., Johnson, D. M., Crosskey, M. A. *Lancet*, 1949, i, 143.

[9] Bentley, H. R., McDermott, E. E., Pace, J., Whitehead, J. K., Moran, T. *Nature, Lond.* 1949, 164, 438.

[10] *Ibid*, 1950, 165, 150.

Annotations

TO BURP OR NOT TO BURP?

THERE is something to be said for a short word to convey the meaning of the phrase "bringing up the wind" as applied to the technical side of infant feeding. In the U.S.A. babies are "burped" during and at the end of feeds; and this somehow conveys a short, snappy sort of drill in contrast to the half-hearted stroking of the lower dorsal region which often seems to be the usual contribution of the average nurse or mother to a baby's postprandial comfort. Dr. Joan Tanner, in a letter on p. 230, speaks of her own experiences as a mother and is probably not far off the mark when she states that "wind" is the cause of many of the feeding difficulties of infancy. Air-swallowing is an inevitable accompaniment of liquid refreshment. In the early days of lactation the infant left too long at an only partially functioning breast gulps down more air than milk, and if not taught at this early stage the trick of bringing up the wind will develop a habit of discomfort and refusal to take enough milk when more is available, as Dr. Tanner recounts.

Exactly what this trick consists in is not easy to describe. It must entail some relaxation of the cardia and perhaps a flick of the diaphragm to give the cardiac end of the stomach the chance to expel the air-bubble there. Clearly the baby must be held upright. After this details seem to vary. The object must surely be to give a sudden squeeze to the distended stomach. With one hand or perhaps the shoulder in the epigastrium, the other hand bangs the back on the left side. This should almost certainly be done two or three times during a feed as well as at the end. At first sight the stroking-of-the-back method would seem to have little to support it, but farmers maintain that when choosing a calf at the market, passage of a walking-stick along the animal's spine produces a reflex passage of a stool which can be inspected to exclude an intestinal infection in the prospective purchase. If such a reflex in fact exists, it might conceivably be found in babies, working in the other direction so to speak. Animal studies might throw light on this and indeed on other aspects of the problem of wind. Do suckling animals also swallow air? Do they bring it up without training? It is perhaps significant that the common position for breast-feeding in the human race, at any rate among white peoples, is with the baby on his back and the head to some extent flexed on the body, whereas in the animal kingdom the animal either stands or lies prone with the head well extended. Does this prevent air-swallowing? African mothers often feed their babies with the infant lying parallel, the head in the mother's axilla, and the breast given by the mother slightly rolling over towards the baby. In this position is as much air swallowed as in the more usual European and American method of holding the baby? X-ray studies of the gas-bubble in animals and in human babies fed in various positions might help to answer these questions. Air-swallowing is certainly worse with underfeeding on the breast, and less troublesome with bottle-feeding than with breast-feeding. This explains why discomfort after feeds often disappears when the breast-fed baby is weaned on to a bottle—with the false deduction that cow's milk is more digestible for a particular baby than mother's milk.

Dr. Tanner has done a useful service in calling attention to an important part of management of infant-feeding. If discomfort can be prevented, breast-feeding obviously will proceed more smoothly and less weaning in the early months might result from greater care over burping. If the psychologists are right who attribute aggression in later life to difficulties at the breast, then the question of burping is important in national and international affairs. A campaign to study it seems overdue.

THERAPEUTIC USES OF RADIO-ISOTOPES

THE great interest being taken in the use of active isotopes in this country was illustrated by crowded meeting at the Royal Society of Me (reported on p. 212) to hear various workers di their experiences in the last two years. It seems clear the essential coöperation between clinician and phy has been achieved and that the need to go slowly, m taining the objective view of the scientist, has realised.

The two main applications of isotopes in medi are as tracers and as producers of therapeutic radiat Tracer methods are used in research and diagnosis, when therapy is proposed its accuracy may also depend tracer techniques. Dr. Ralston Paterson pointed out th the principles involved in the treatment of thyroid canc with radioactive iodine are new and differ considerabl from those of the standard methods of radiotherap When the radioactive isotope I^{131} is ingested, like ordinary iodine it enters the blood-stream and is then selectively absorbed by the thyroid. In the thyroid the isotope goes through the usual process of conversion into thyroxine and secretion into the colloid in the acini, and during this period it is constantly irradiating the cells in and near which it lies. This irradiation may be completely destructive of all functioning tissue. Such radiation of the tissue from within is completely different from that obtained by placing radium or radioactive cobalt into holes in living structures or by irradiating the patient from outside, but the mechanism of absorption of electromagnetic radiation and of beta particles is the same. Research has been necessary to find out how far the established principles of protection from radiation, tissue tolerance, and calculated dosage can be applied to the absorption irradiation.

Cancer of the thyroid is now being treated with I^{131} in Manchester and Sheffield, and at the Royal Cancer Hospital in London; but, since selective absorption is only possible in functional thyroid tissue, only a small proportion of these cases will respond to the treatment. Out of 17 cases of thyroid cancer examined by tracer doses of I^{131} in Manchester, Dr. H. C. Warrington told the meeting only 2 were found to have tumours which concentrated iodine, and both were metastases. Once it has been proved that the tumour absorbs iodine it becomes necessary to eliminate the thyroid, because normal thyroid tissue will segregate most of the available iodine. The aim then is to produce a myxœdematous patient whose need for thyroxine stimulates the metastases derived from thyroid tissue to segregate more iodine, so that when the isotope is presented to them they will destroy themselves. The thyroid is best removed surgically, but if this is impossible a radio-elimination can be carried out probably by a single "therapeutic drink" of I^{131}. Thereafter further high doses must probably be given, because only one part of the tumour or one metastasis may be functional at any one time, so each must be destroyed singly. The therapeutic drink consists of 60–70 mC of radio-iodine in water, and it has very little systemic effect. The other important use of this isotope is in the treatment of thyrotoxicosis. The possibilities of the method are being carefully investigated at Sheffield, and Dr. A. G. Macgregor emphasised the value of estimations of the level of I^{131} in the plasma 48 hours after a dose in distinguishing between the various thyroid disorders.

The therapeutic uses of other radioactive isotopes are also being explored. Radioactive phosphorus has already proved valuable in polycythæmia and leukæmia, and emitters such as radiosodium, which emit beta and gamma rays, have been used for intracavitary treatment of bladder cancers. In the future it may be possible to find ways of incorporating radioactive elements in substances which are selectively absorbed in tumours.

Public Health

SCHEME WHICH HAS SUCCESSFULLY EDUCED A SANATORIUM WAITING-LIST

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Sanatorium beds throughout England are lying empty cause of the shortage of nurses, and large numbers of tients who are suffering from pulmonary tuberculosis e in need of institutional treatment. Waiting-lists in ese circumstances are very long, and even cases that e still curable and in need of collapse therapy have, in ost parts of the country, to wait for six months or more obtain admission. Often those not requiring active eatment cannot obtain admission to an institution at l. This has three major disadvantages: in many cases e disease process spreads; the period of disability may e lengthened, and economic waste thereby increased, by he delay in starting treatment; and infection may e needlessly disseminated. Thus any suggestion that night shorten the period of waiting for sanatorium reatment is worthy of consideration.

An important contribution to the problem of disposal f cases needing collapse therapy has been made, over he last few years, by the great extension of domiciliary reatment—not a new method but the much more general se of an old one. Briefly, domiciliary collapse therapy consists in instituting artificial pneumothorax or pneumoperitoneum in the patient's own home and in taking him to a chest clinic, when well enough, for the necessary radiological examination. This is followed by admission to a sanatorium for further constitutional or other treatment, if necessary.

Two main methods of approach have been described:

(1) Heller (1949) starts collapse therapy in the patient's own home, reserving hospital beds for the division of adhesions. For all other operations, notably phrenic crush and bronchoscopy, the patients attend as outpatients at the hospital.

(2) MacLean and Gemmill (1948) induce artificial pneumothorax in hospital, keeping the patient for an average of four days. They do not describe their facilities, but apparently only 3 out of 150 cases had adhesions divided. This would not appear to be adequate treatment by modern standards. Of the last 100 successful artificial pneumothorax cases induced at the Bedfordshire Sanatorium 97 were thoracoscoped, and adhesions were found in all but 2 cases.

None of these authors recommend their procedures except for patients unable to obtain admission to sanatorium within a reasonable time.

The Bedfordshire Scheme

Our object is to describe an experiment which has been operating during the year 1949, with the dual purpose of shortening the waiting time before admission to sanatorium and giving the patient instruction in his illness at an early stage.

The area.—The population of Bedfordshire is just short of 300,000. The industrial town of Luton has a population of 107,000. The remainder is scattered among small country or rural communities with the exception of the county town, which contains 60,000 persons. Bedford is mainly residential although it contains an industrial minority of perhaps a third. The County Medical Officer recorded a mortality-rate of 0·34 per 1000 for pulmonary tuberculosis in 1948, with 100 actual deaths from this cause. Housing and living conditions are taken to be about average for the country and, of course, better than in the crowded areas of large cities.

The area is served by two chest clinics, one at Bedford with 8 hospital beds and one at Luton with 10 hospital beds. The Bedfordshire Sanatorium has 72 beds, of which 64 are allocated to the county. The medical staff consists of a chest physician for each clinic, a medical superintendent for the sanatorium, and an assistant chest physician shared by all three. Three health visitors are attached to each clinic. Latterly it has been necessary to appoint an outpatient sister to cope with the increased volume of work. The sanatorium has a nursing staff of a matron, five sisters, two staff nurses, two assistant nurses, and three ward orderlies. The ratio of nurses (S.R.N., T.A., and S.E.A.N.) to patients is approximately 1 : 6·5.

The success of the scheme depends: first, on the allocation of sanatorium beds to the clinic physicians, and the choice of a selected group of patients for these beds, as well as a general clinic organisation able to manage them after discharge at a very early stage of treatment; secondly, on the close liaison between the clinic physicians and the medical superintendent, to ensure a rapid turnover of suitable cases; finally, on the ability of the chest clinic to deal with a large group of patients not selected for institutional treatment. This scheme was partially operating in Bedfordshire for many months before January, 1949. For this reason the waiting-list at the beginning of that year did not show as grim a picture as it did in most parts of the country.

ALLOCATION OF BEDS

Late in 1948 a proportion of beds in the Bedfordshire Sanatorium were allocated by order of the North West Metropolitan Regional Hospital Board to each of the two chest clinics, on a population basis. This lead was encouraging; and by arrangement with the medical superintendent of the sanatorium the remainder of the beds were allocated to each chest clinic in the same proportion as that suggested by the region. In this way the central waiting-list was removed and each clinic became responsible for all admissions to its own allocated beds, which remained, of course, under the clinical and administrative care of the medical superintendent as before.

CASE SELECTION

Patients attending a chest clinic can be divided conveniently into five classes:

(1) Those under observation as regards activity or diagnosis.
(2) Those considered suitable for collapse therapy.
(3) Those unsuitable for collapse therapy owing to advanced disease, age, or some other reason.
(4) Emergencies.
(5) Those suitable for and awaiting surgery.

The first class must be treated as outpatients except in unusual cases, where admission to a chest hospital or unit (not a sanatorium) may be needed for ultimate diagnosis. This should not often be necessary, for most investigations can be performed on outpatients—as, for example, gastric lavage, laryngeal swabbing, tomography, bronchoscopy, and bronchography. The main resources of the sanatorium were concentrated on the second class, which is in line with the growing practice elsewhere in this country. Apart from those who would profit by training in the management of their disease, patients suitable for collapse therapy probably form the only large group of tuberculous patients capable of benefiting from a short period in a sanatorium. Simmonds and Martin (1948) seem to have shown the value of collapse therapy in prolonging life. We thought that admission to sanatorium as early as possible for the initiation of collapse therapy was more valuable than later admission, after domiciliary collapse, for the following reasons:

1. The final assessment of a case and the full investigations necessary can be performed more easily in the surroundings of an institution than in the rush of a chest clinic.

forms which may differ in biological activity. There is also another consideration; with such a molecule added methionine as such would be expected to suppress any toxic effect, and Heathcote,[11] working in the St. Albans laboratories, has in fact shown this to be the case with the bacterium *Leuconostoc mesenteroides* P 60. A similar mechanism may be at work in the higher animals.

MARRIAGE IN OUR DAY

IMPRESSED by the growing number of marriages which fail, the Society of Friends, in 1947, appointed a commission, with fourteen members, to study causes and possible remedies. The medical members were Dr. Mildred Creak, Dr. Cynthia Harris, Dr. Maeve Marwick, and Dr. Kenneth Southall.

In a liberal report[12] the commission note that refusal to tolerate a marriage regarded as a failure is, in one way, "a mark of healthy idealism and, as such, shows much promise. Many people are aiming high in marriage and are refusing to tolerate a second-best." This is qualified by the reflection that such an attitude may lead to disbelief in the permanence of the marriage relationship. First in their list of causes of failure the commission put the fading of our religious background and a decline in standards of personal truth and honesty. They give the next place to current social conditions, dwelling on our lost sense of security. Moreover shared local life has disappeared in many places; people living in large cities and dormitory towns feel they have no roots in their community, and hence no responsibility for it—and such an attitude may well spread to the marriage relationship. Housing shortages mean lack of privacy. The difficult personal adjustments of the newly married may have to be made in the society of other members of their families: "The 'mother-in-law problem' becomes even more acute when the parties concerned are sharing the same kitchen sink." Too much sexual stimulation by poor films, books, and advertisements; too few outlets and creative opportunities; too much social drinking, especially among girls; the breakdown of parental control; the misuse of contraceptive knowledge; the disruption of family life during the war; the old-fashioned habit of regarding a wife as a possession—all these have their bearing on the present picture. Young people are not taught what marriage will require of them in personal relations, and many are ignorant and selfish in their approach to the sexual function. Few are trained in home-making and parenthood, and many enter marriage for inadequate reasons. Moreover, "emotional and personal maturity are needed to make a really fine marriage." Many of those who marry cannot face the demands of a completely adult relationship—though even this, the commission affirm, is not beyond remedy. The engaged couple who reach a point at which they feel physical expression of their love to be essential should forthwith marry, the commission consider, even if it means a hard life, many sacrifices, and the postponement of childbearing. Those who hesitate to commit themselves to this step should examine their motives more closely. The question of divorce does not as a rule arise for those whose marriage is an expression of a Christian way of life; but it is human to fail, and where the nature of the difficulties are such as to drive the couple apart in bitterness, the commission believe there can be little reason for keeping within the bonds of legal marriage two people for whom no spiritual marriage exists.

As a preventive of this and other types of failure, they advise sex education which begins with a tranquil acceptance by the parents of the child's curiosity about his own body and the process of birth. His questions should be answered easily and naturally, but he should be told, at every stage, only what he asks. He will in any case learn much from harmonious relations between the parents. Children and young people should be encouraged in creative pleasures, enjoyed at home—hobbies, music, play-reading, and the like. Young people should be prepared for marriage as a growing, creative relationship, an adventure requiring much hard work and understanding. Neighbourliness should be fostered; and the social services should be directed less to supplying specific needs of mother and child than to improving the status of the family as an economic unit. The commission end, where they began, with the belief that a religious background makes for greater stability in home life. They have done their work with wisdom and charity, as well aware of half-tones as they are of black and white. Even a wayward generation living in a troubled time should be able to accept their guidance, if they are willing to accept any guidance at all.

AN ATOMIC GARDEN

ONE of the radioactive isotopes of carbon, C^{14}, has a half-life of 5100 years; and from this isotope a relatively stable carbon dioxide can be made. Plants grown in an atmosphere containing this radioactive carbon dioxide would contain radioactive carbon atoms; and the "marked" foods and drugs from these plants could be used for metabolism studies in animals. This theoretical possibility has been put into practical effect at the Argonne National Laboratory, near Chicago; and the *New York Times*[1] has described a visit, arranged by the United States Atomic Energy Commission, to the Argonne Atomic Garden. The plants growing there will not differ visibly from normal plants; but if an appropriate detector is brought near to them, or their leaves or stems, it will signal the fact that they contain a radioactive substance emitting β-rays. The garden must be carefully guarded, and it is perhaps as well that C^{14} emits only β-rays of relatively low intensity and not the more lethal γ-ray; otherwise the poisoned apple of the fairy stories would take a back place and "the gardener in white" truly herald death. Even as it is, a whole new world of possibilities is opened to our writers of detective fiction.

Plants being grown in the garden for pharmacological studies include opium poppy for radioactive morphine, manila hemp for radioactive marihuana, foxglove for radioactive digitalis, belladonna for radioactive atropine, and hyoscyamus for radioactive scopolamine. Other plants being raised are tobacco for nicotine studies, sugar-beet for studying carbohydrate metabolism, alfalfa which will be fed to animals from whose pancreas it is hoped to obtain radioactive insulin, and buckwheat for radioactive rutin. In addition, algæ and moulds are being grown. The algæ are a convenient source of fats, carbohydrates, and proteins, which will be traced in their metabolic journeys. It is proposed to grow *Streptomyces griseus* in this atmosphere and see whether radioactive streptomycin can be obtained from the mould; by adding a radioactive cobalt isotope to the medium it may be possible to prepare radioactive vitamin B_{12} and so help to discover the site of this anti-anæmic agent's activity.

If this technique succeeds, the results are likely to raise as many questions as they answer; but at least we should have a better idea of where drugs go when we give them, and what path food substances follow after absorption.

ON GOING ABROAD

NOW and again travellers find themselves in trouble when arriving in other lands, especially in the tropics, because they are not carrying the necessary certificates of vaccination or inoculation. How these difficulties may be obviated is explained on p. 224 in a note from the Ministry of Health.

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[11] Heathcote, J. G. *Lancet*, 1949, ii, 1130.

[12] The Marriage Relationship. London: The Society of Friends, Friends House, Euston Road, N.W.1. 1950. Pp. 27. 9*d.*

[1] *New York Times*, Dec. 15, 1948.

dfordshire at any time during the year 1949. It may refore be reckoned that we have had 99·25 beds at r disposal throughout the year. The number of deaths e to pulmonary tuberculosis in the area during 1948 s 100, and hence we have had available about, or ghtly less than, one bed per death.

Table I divides all cases admitted to the 82 beds in dfordshire during each quarter of 1949 into two sses, those recommended as suitable for collapse erapy and those unsuitable for collapse therapy. By llapse therapy we have meant those thought suitable r artificial pneumothorax or pneumoperitoneum and renic crush on the date of recommendation. Not all dmitted as suitable have actually had this form of eatment, and some of those admitted as unsuitable ave ultimately been judged as eligible. The number each class as well as the average time in days spent on e waiting-list was noted, the waiting time being lculated from the date of recommendation from the linic to the date of admission to one of the 82 available eds. The time spent in hospital by cases discharged uring the same quarters was tabulated, and also the verage waiting time and days of treatment of both lasses combined.

Table II combines the figures for the four individual quarters. It can be seen from table I that by the fourth quarter of 1949, the waiting-list for tuberculous patients as judged by normal standards of today, had become nominal and was often accounted for by the necessary arrangements for discharging one patient in order to admit another. The encouraging position had been attained in which patients, especially females, were sometimes being discharged when they had been graded up for more than two hours.

Discussion

A number of objections can immediately be raised in relation to such a scheme. Perhaps the most important is the poor equipment and accommodation to be found at many chest clinics. This inadequacy can be overcome in a number of ways. Mobile chest clinics with an X-ray screening set have been recommended for rural districts by Hoffstaedt (1949), to be used in conjunction with existing clinics without X-ray facilities. Mobile clinics, though perhaps useful in very scattered areas, have obvious disadvantages, one of the most important being the lack of means to take films. They are also unnecessary, in our opinion, where clinics exist, since these can, in a very few months, be modified and equipped with cheap X-ray apparatus capable of taking films as well as screening—as has been shown in the scattered North Buckinghamshire area (*Tubercle* 1949). It may further be contended that except in areas centred in a town or hospital of some size, there is great difficulty in assessing cases, both before and after institutional treatment. This difficulty can be overcome if transport is available and if the nearest chest centre is willing to arrange the investigation of cases on an outpatient basis. In fact this is being done already in many areas.

It might also be maintained that, since many chest clinics admit their cases to a number of different sanatoria, liaison between the chest physician and sanatorium superintendent is difficult to maintain and time-consuming. Arrangements can be made, however, for the bulk of patients from a particular clinic to go to a specific and not too distant sanatorium. Again, it may be said that the sanatorium physician will lose some of his interest if he is unable to follow his patients for the major part of their acute illness. This should surely be compensated for by the number of cases in which he can initiate active treatment early in the course of the disease. Furthermore, the sanatorium physician in many cases spends part of his time working in a chest clinic, and hence should be able to follow up his cases more effectively than ever before. It must not be thought that we are of the opinion that the sanatorium physician is less interested in this problem than the clinic physician; but the initiative must come from the clinics, since proper assessment of cases for treatment is their responsibility. They alone have the necessary accurate domiciliary information to pass on to the sanatorium staff who are often misinformed by patients or their relations about the home conditions. It might perhaps be useful if all admission forms were accompanied by a statement about the facilities at the patient's home for nursing, and at what stage of activity it might be suitable to discharge him for domiciliary treatment. The clinic staff should no longer admit cases to hospital for bronchoscopy or phrenic crush; it is not unknown for clinic physicians to recommend cases to the smaller sanatoria for such treatment, when they could have learned by telephone that no surgeon was visiting the sanatorium, perhaps for several weeks. Similarly, cases of incurable tuberculosis are often admitted, when adequate arrangements could have been made for nursing and isolation in the patient's home. Clinic physicians have a tendency to forget patients once they are in an institution; they complain of the long waiting-lists, but how often do they find time to arrange with the sanatorium staff that their cases should be sent out at the earliest moment?

It is urgently necessary to extend the principle that individual clinics should have an appropriate number of beds allocated to them. The chest-clinic physician would then always know how many beds he had at his disposal, and this would act as a direct incentive to use them to the best advantage of his area.

No mention has so far been made of the results of such a limited period of sanatorium treatment upon the prognosis of the individual patient. Beyond asserting that we have not observed any obvious increase in the relapse-rate, we do not feel justified in making any statement after such a short space of time.

TABLE II—TOTAL CASES FOR THE YEAR AS A WHOLE

Admitted	Dis-charged	Av. waiting time (days)	Av. treatment time (days)	Treatment	Admitted	Dis-charged	Av. waiting time (days)	Av. treatment time (days)
183	186	17·3	173·5	Collapse	107	102	18 9	158·3
				Non-collapse	76	84	15·0	192·0

TABLE I—TOTAL CASES, BY QUARTERS OF 1949

Quarter	Admitted	Dis-charged	Av. waiting time (days)	Av. treatment time (days)	Treatment	Admitted	Dis-charged	Av. waiting time (days)	Av. treatment time (days)
1	40	42	28 8	213 9	Collapse	24	24	32 8	211 1
					Non-collapse	16	18	22·7	217 6
2	41	43	23 5	205 6	Collapse	24	26	26·2	155·7
					Non-collapse	17	17	19·8	281 8
3	44	47	12 8	134·1	Collapse	23	22	13 8	148 6
					Non-collapse	21	25	11·7	121·4
4	58	54	8·4	150 8	Collapse	36	30	8·1	125·3
					Non-collapse	22	24	8 8	182·7

2. The growing practice of combining, or even prefacing, collapse therapy in the acute case with streptomycin and 'Paramisal sodium' needs careful and unhurried judgment.

3. Radiological control is far more easily undertaken in the sanatorium, where it can be arranged for the patient on strict bed rest without breaking his routine.

4. Any complications arising in the course of treatment can be immediately diagnosed and dealt with by the physician, who is always at hand.

5. Division of adhesions, phrenic crush, or bronchoscopy when needed, can be done at the optimum time.

6. Patients learn the reasons for sanatorium routine early, are instructed in their disease, and realise from seeing others that theirs is not an isolated case. This knowledge is of psychological benefit in many instances.

The third class consists of cases unsuitable for collapse therapy. We no longer recommend these patients for sanatorium treatment if arrangements can be made for them to be isolated and nursed at home.

The fourth class, the emergency, is always admitted at once, generally to the clinic physician's own hospital. This may mean the temporary erection of an extra bed until a case can be transferred to sanatorium. If no sanatorium patient is ready for discharge, the physician admitting an emergency can claim the next vacancy, whether it falls in one of his own beds, or a colleague's.

Those in the fifth class, awaiting major surgery, are kept at home and regularly assessed at monthly intervals as outpatients. They are admitted direct to one of the neighbouring thoracic surgical units. After operation such cases are transferred to the sanatorium as soon as the surgeon thinks it suitable. The week's notice normally given implies that the postoperative case has first call on the next empty bed, for it is considered even more important to clear surgical than medical beds.

THE SELECTED GROUP

The group selected for sanatorium treatment consists of cases from the second and fourth classes, as well as a few of the third class who—for social or other urgent reasons—must be admitted to sanatorium. If all are to enjoy the benefit of early admission for collapse therapy it is clear that patients can only be kept in an institution for a short time. Thus cases must be selected very carefully so as to ensure that, as far as possible, they are admitted only when suitable for immediate collapse treatment. Moreover, they must all be informed that they are getting in quickly because someone else is going home quickly. It is interesting to note how often patients who are loth to enter a sanatorium are even more loth (or the relatives are for them) to return home.

During sanatorium treatment the closest coöperation must be maintained between the clinic physician and the medical superintendent. Our aim has been to return a patient to his home when he is getting up for two hours daily. In practice the routine varies, for sometimes the home conditions are such that he must be capable of a greater degree of activity than this. It is important that patients should be returned home only if it is possible to obtain the amount of rest prescribed for them. The health visitor plays an important part in the team-work required; she will have up-to-date knowledge of the home conditions, and know whether it is desirable to employ home help, or in some cases nursing assistance. Patients are returned home whenever possible even if further sanatorium treatment is likely to be required in the future—as, for example, those with a pneumoperitoneum and phrenic crush awaiting thoracoplasty. Such patients may be discharged when they are still on bed rest only.

This policy of keeping patients for only a short period throws an added strain on the sanatorium staff. The amount of active treatment given per bed is much increased and the nursing staff have to deal with a much higher proportion of bed cases. This may necessitate actual increases in staff.

An efficient ambulance and car service is essential because many patients attending the clinic for refills are unable to get there by public transport except by breaking their prescribed rest, and this must be carefully guarded against. It is unreasonable to expect them to keep to their routine strictly if they have to break it in order to receive treatment. One of the disadvantages of any system which cannot treat the patient for a considerable period in an institution is that a number will not observe the rules laid down for them. It is perhaps surprising to find that such a small number do, in fact, break their prescribed routine. Tactful visiting at odd hours by health visitors undoubtedly can have a beneficial influence, and careful and systematic grading of the patient makes him take a serious view of this aspect of his treatment. Occupational therapy should be linked up with this graduated system.

NON-SELECTED GROUP

Those falling into the first and fifth classes, along with most of class three, make up the non-selected group. Chronic cases and those not recommended for sanatorium treatment are kept under careful supervision. Each of these patients must have a room to himself, and it is essential that a competent health visitor should give instructions on how to avoid spreading infection and on other preventive measures. She will arrange for the boarding-out of children and whatever other services are necessary. The patient who has no relations or who is living in lodgings or where there is overcrowding must be admitted to the sanatorium; and a proportion of beds is always blocked by longer-stay cases of this type. Patients who wish to go to a sanatorium but who do not require active treatment are told that no special measures would be helpful at the time, and that therefore no particular benefit will be obtained by leaving home. In these circumstances, only those who are exceptionally miserable wish to leave their accustomed surroundings. As far as possible monthly home visits are made by the clinic physician, and patients are brought by ambulance for regular radiography, sedimentation-rate tests, and weighing. Streptomycin is given, when indicated, in the patient's home by the district nurse; she has written instructions from the chest physician and is in constant touch with the health visitor. *p*-Aminosalicylic acid is also given, where necessary combined with streptomycin. These patients are also brought to the clinic at monthly intervals for assessment and for blood and urine examinations, as well as for other routine tests. In selected cases phrenic crush and pneumoperitoneum treatment is started on outpatients.

We consider it obligatory not to neglect in any way the patients whom we have advised to remain at home, and especially to review regularly their suitability for further treatment.

FIGURES DURING 1949

The scheme described above has been brought into operation at the Bedforshire Sanatorium, the St. Peter's Hospital, Bedford, and the St. Mary's Hospital, Luton, during 1949. The beds available have numbered 64, 8, and 10 at these three institutions. At all times during this year a number of patients undergoing treatment for pulmonary tuberculosis have been occupying beds outside the county. Some of these have been admitted to hospital for thoracic surgery, and of course the actual number has varied from day to day. We have therefore noted the numbers of beds filled in this way on the last day of each quarter. The four totals—viz., 19, 19, 20, and 11—have been added together and divided by 4. This gives the figure 17·25 which can be taken as a fair average of the beds in use by our patients outside

Special Articles

INDUSTRIAL PNEUMOPATHIES

CONFERENCE IN BELGIUM

HE Belgian Society of Industrial Medicine met at ssels on Dec. 17, under the presidency of Prof. LAMBIN, of Louvain, to discuss non-silicotic industrial umopathies. Once a year this society asks foreign sts to join in its deliberations ; and on this occasion re were delegations from France, Italy, Great Britain, l Holland.

PULMONARY REACTIONS

rof. J. FIRKET (Liége) opened the proceedings with eview of the reactions of pulmonary tissues in non-cotic pneumopathies. Industrial pollution of the air, said, gives rise to acute and to chronic processes. As the acute processes, irritant gases or fumes act only those respiratory surfaces where they become fixed, d whether that point is on the first surface they meet deeper in the alveoli depends on the specific gravity d the solubility of the substance. In the Meuse Valley 1930, fog contaminated by soot on which sulphur oxide had become adsorbed caused an acute outbreak th hundreds of victims, of whom 70 died. In these tients the disturbance was of two types—either) asthma with circulatory collapse, or (b) pulmonary dema with acidosis—and the type depended on the ze of the inhaled soot particles.

Dusts may cause asthma and other allergic phenomena ; xamples are the complex salts of platinum or the ust of the cotton-flower in byssinosis. Exceptionally, nhaling irritant substances may precipitate acute tuberulosis. Such chemical pneumonias as follow on breathing usts of manganese, vanadium, osmium, or beryllium esemble virus pneumonias both clinically and histoogically ; and this raises the question whether the dusts hemselves provoke the disease or whether they activate viruses.

Among chronic processes are the benign pneumoconioses caused by dusts which have no direct noxious action on the cells. (It seems that some vegetable dusts may cause allergic reactions, possibly owing to the fungi with which they are contaminated.) Apparently neither bronchitis nor the epithelial changes which follow on it predispose to such pneumoconioses ; and yet the bronchial epithelium undoubtedly has a protective action. This Professor Firket illustrated by an analysis of the fate of asbestos fibres, which become dangerous only when they reach the alveoli. He followed their phagocytosis by the histiocytes in the alveoli, and their migration into the peribronchial and periarterial lymphatics and to the hilar ganglia. There these macrophages may cause obstruction of the lymph-flow, and after wandering into the fibrous sheaths, die and leave the dusts they carried. Such is the fate of soot, coal-dust, iron-dust, and alumina. Radiopaque substances, including barium and iron, and others which are deposited as calcium phosphates or which produce a fibrous thickening then cause the appearance of reticulation in the X-ray picture.

When this clogging process becomes more severe, particularly about the arterial sheaths, ischæmia or true thrombosis may cause fibrous scars of more or less extensive areas in the lung ; bronchial obstruction then brings about atelectasis or bullous emphysema, ultimately causing dysfunction through loss of pulmonary elasticity and aeration. Then the pneumoconiosis can hardly be called benign any more—though neither tuberculosis nor other infection often complicate the non-silicotic forms.

Berylliosis and chronic asbestosis behave differently. In the former, granulomata develop which resemble Boeck's sarcoid, though they are not identical with it ; in the latter, asbestos bodies are found in the bronchioles, appearing also in the sputum, but not in the hilar ganglia.

It seems that industrial dusts only occasionally cause primary carcinoma of the lung. Radioactive substances (as in the Schneeberg miners) have, however, proved possibly carcinogenic ; so too, are some arsenical dusts ; but apparently not silica. In the case of asbestos the question is unsettled. The great divergence of opinions suggests that stringent criteria should be satisfied before illness is attributed to industrial dusts.

BERYLLIUM

Dr. DONALD HUNTER (London) recalled that in 1935, because of the valuable properties of its alloys, beryllium became an important metal. Its compounds produce two types of industrial poisoning—acute pneumonitis and chronic granulomatosis of the lung. In the acute disease conjunctivitis, pharyngitis, bronchitis, and dermatitis may all occur. The chronic disease is characterised by delayed onset, progressive dyspnœa, severe loss of weight, and granulomata in the lungs and liver. The histology in one case, that of a physicist engaged in research on fluorescent lamps, was demonstrated and shown to be distinct from sarcoidosis. Less than 5% of persons exposed have developed the chronic disease. In the neighbourhood of a factory in the U.S.A. which makes beryllium metal and its alloys, at least 10 cases are known to have occurred in people who had never entered the factory ; the atmosphere concentrations three-quarters of a mile from the factory ranged from 0 01 μg. to 0·1 μg. per c.m. Halophosphates containing no beryllium have now been introduced as phosphors in the fluorescent-lamp industry. In Great Britain beryllium poisoning has been made subject to compensation.

Dr. L. ROCHE (Lyon) reported on pneumopathies observed amongst workers engaged in the production of beryllium metal. The following substances were handled in the process : beryl ore, which is beryllium aluminium silicate ; beryllium fluoride or chloride ; the oxide, sometimes called *glucine* ; and the metal beryllium or glucinium. Two distinct clinical entities occurred, the first amongst workers handling beryllium fluoride or chloride, and the second, more severe, amongst those handling the oxide.

Workers exposed by an accident to sudden massive inhalation of the chloride or fluoride dust showed immediately signs of irritation, with smarting of eyes and nose, and a cough resembling whooping-cough. These symptoms cleared in a few days, but after a latent period lasting some weeks a new picture developed with fever and dyspnœa. Of radiographs of the lung taken at this point, one showed very characteristic miliary opacities, especially well-marked in the lower lobes, and three a less marked reticulonodular appearance ; a further eight radiographs were normal. All these pathological conditions cleared up in a few weeks, though complete recovery took longer in the more severe cases.

Beryllium oxide gave a very fine dust (Policard, measuring it with the electron microscope, showed that over half of the particles were under 0·2 μ). It gave rise to no symptoms of irritation. Dr. Roche had observed two cases of pneumopathy after moderately short but intense exposure to the dust of beryllium oxide. One of these patients, exposed for roughly sixty hours, remained well for the following three weeks. Rapidly progressive dyspnœa then set in, with cyanosis. On auscultation there were diffuse fine râles. Repeated examination of the sputum showed no tubercle bacilli, but radiographs revealed extensive nodulation of moderate density, most evident in the centre of the lung field. The patient, who was treated symptomatically, died ; at necropsy there was massive pneumonia affecting most of both lungs. The second case was exposed less drastically to the dust ; in him the clinical picture was

Finally, we would like to make it clear that this scheme is not offered as more than a temporary solution of the sanatorium-bed problem. If this system were generally adopted it could give the public at large a totally false impression. The great mass of patients still remain at home in need of institutional treatment and of the sanatorium-course, which time and experience have shown to be the best known means of stabilising their disease and preventing a recurrence. The large sanatorium waiting-lists throughout the country are the true indication of bed requirements. It is regrettable indeed that circumstances should force us to make experiments of this type with such a dangerous and infectious disease.

There is little doubt that patients suffering from tuberculosis deserve a higher priority in beds and nursing than patients with many diseases at present admitted relatively quickly to general hospitals. To give tuberculous patients equal opportunities would necessitate considerable reorientation in the allocation of beds throughout the country, and would reduce the number of general medical beds. By way of compensation, the possibilities of domiciliary treatment for many diseases that are not infectious might be more seriously explored. The larger numbers of general physicians and registrars now being appointed should, with their clinical assistants, make it possible to try this plan; while the general practitioner, who now deplores the loss of his more interesting work, would remain in contact with more of his patients, to their mutual benefit.

Summary

Attention is drawn to the length of the waiting-list for admission to sanatorium, and domiciliary collapse-therapy is discussed.

A scheme for early admission to, and rapid discharge from, sanatorium is described, and argued as more suitable under existing conditions than an extension of domiciliary collapse-therapy before admission.

Such a scheme depends particularly on the allocation of a definite number of beds to each chest clinic; an efficient ambulance and sitting car service; close integration between the sanatorium and clinic physicians; very careful selection of cases for admission; and the adoption of every possible means for treating and isolating patients at home who have either had a short period in an institution or who are unlikely to benefit from such treatment.

The figures for the first year of operation are given. These show that in an average area, with a proportion of beds in use that was less than 1 per pulmonary death, the waiting-list was reduced to negligible proportions—the average waiting time for the last trimester of 1949 being 8·4 days.

It is lamentable that such an experiment should be necessary with an infectious disease.

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Salmonella in a Necropsy Room

Wormald[1] reports that after necropsy of infected cases, *Salm. paratyphi-B* and were isolated, despite the use of drainage system, from cotton over-gloves, and from flies captured in the room. He recommends that: (1) open drainage systems should be regularly flooded with disinfectant, and (2) flies should be excluded and any gaining access should be destroyed.

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[1] Wormald, P. J. *Mon. Bull. Min. Hlth, P.H.L.S.* 1950, 9, 28.

Typhoid Fever in London

Six cases of typhoid fever in Walthamstow neighbouring districts in north-east London have traced to a carrier working in a café frequented workers in local factories and casual callers engaged transport. This carrier has been suspended from w in the café. The onset of illness in notified cases wa the latter half of December and the first week in The organism is of Vi-phage type E.1.

International Certificates of Vaccination and Inoculation

The Ministry of Health receive complaints from ti to time that travellers from the United Kingdom fi themselves in difficulty on arrival in other countr (and in some cases have even been placed in quarantin because they are not carrying the necessary certificat of vaccination or inoculation or because their certificat are not on the prescribed international form.

The onus of ascertaining the requirements of th country to be visited rests, of course, on the travelle himself, who should make careful inquiry of his trave agents or the consulate of the country concerned. Th attention of medical practitioners is, however, speciall directed to the following points, observance of wh will materially assist travellers requiring certificates avoid difficulties on their arrival abroad:

Smallpox.—A certificate of vaccination must be on t international form, which the traveller obtains from t travel agents and takes to his doctor. All headings the form should be carefully completed in legible scr Both parts of the form must be completed—the sec part after the result of vaccination has been obser Certificates only become valid fourteen days after vaccination and normally remain in force for three ye

Cholera and Typhus.—Certain countries dem certificates of inoculation against cholera or typ fever, or both. Here again the traveller must obtain appropriate international form and take it to his doc The certificate normally becomes valid six days a completion of the inoculation. In the case of choler generally remains valid for six months, and in the of typhus for not more than twelve months.

Enteric Fever.—Inoculation against typhoid paratyphoid fever is seldom an international requ ment, and no international form is prescribed certificates of inoculation.

To obviate difficulties, the doctor's signature on a certificates which he gives to a traveller proceedi abroad should be authenticated by the town counc urban district council, or rural district council in wh area the doctor lives. The council will do this free charge if the traveller takes or sends the certificate them.

Yellow Fever.—Where inoculation against yellow fe is required, the traveller can obtain it free of charg any one of the approved centres named in the list out in the "notice to travellers" issued at the pass office and travel agencies. The centre will issue necessary certificate on the prescribed internati form. It becomes valid *ten days* after completio inoculation and remains in force for four years.

The Ministry of Health gives the following ad as to the period which should elapse between small vaccination and yellow-fever inoculation:

1. Whenever possible, yellow-fever inoculation sh precede primary vaccination against smallpox.
2. There should be an interval of at least 4 days bet yellow-fever inoculation (when given first) and pri vaccination against smallpox (when given subsequently)
3. If primary vaccination against smallpox is done there should be an interval of 21 days from the date o vaccination before the yellow-fever inoculation is given.
4. Where there is evidence of previous successful vacc tion against smallpox, yellow-fever immunisation, revaccination against smallpox may be carried out at same session, but if time permits yellow-fever immunisa should always precede revaccination by at least 4 days.

stigations included dust-counts and measurements; onstration of asbestos bodies in the sputum; and cal, X-ray, and electrocardiographic examinations. 75 men more especially exposed, 70 were unaffected, howed doubtful symptoms, and 1 was definitely cted. The radiographic picture was not the classical of asbestosis, but suggested a bilateral fibrous erculosis.

)r. U. THIRY (Ghent) described pulmonary sclerosis h chronic bronchitis among workers long employed he textile industries round Ghent. The disorder was silicotic, but infectious, and was linked with very h bacterial counts in the factory atmosphere.

'he following short communications were given: Dr. R. NOT (Namur), "Les affections pulmonaires dans les loitations souterraines de terres plastiques"; Dr. P. NGOUX (Marcinelle), "Recherches sur les risques de umoconiose dans les moulins à scories métallurgiques"; A. UYTDENHOEF (Brussels), "Recherches sur les ques de pneumoconiose dans les centrales électriques"; l Dr. H. BASTENIER (Brussels) "Les pneumoconioses es aux métaux." A full report of the meeting will appear the *Archives Belges de Médecine Sociale*.

AGENE TREATMENT OF FLOUR

A STATEMENT issued last week by the Ministries of ealth and Food recalls that a scientific committee, ıder the chairmanship of Sir Wilson Jameson, chief edical officer of the Ministry of Health, and comprising presentatives of the Ministries of Food and Health, ie Medical Research Council, and the milling industry, as been reviewing the evidence regarding any possible oxic effects of the commonly used flour improver, itrogen trichloride, known as 'Agene.' The reason for his review was the discovery that the feeding of large uantities of flour treated with agene caused severe oxic symptoms (canine hysteria) in dogs and certain ess severe symptoms in a few other animal species —e.g., rabbits.

The committee, says the statement, has been unable o find any evidence that agenised flour is in any way oxic to man; experiments carried out both in this ountry and in the U.S.A. have failed to produce any oxic symptoms, even where heavily treated flour has een fed at a high level. Nevertheless, in view of its leleterious effect on certain animals, the committee has felt that the use of agene should be discontinued.

The committee is, however, satisfied that if a loaf acceptable to the general public is to be produced in this country, some form of "improver" must continue to be used to safeguard its baking qualities. There exists a suitable substitute in the form of chlorine dioxide. Extensive tests have shown that flour treated with this improver, which is used in quantities of less than 30 parts per million, causes no toxic symptoms in either animals or man. The committee, has, therefore, recommended that this improver should be adopted in the United Kingdom in place of agene. This recommendation has been accepted by the Ministries of Food and Health and by the milling industry.

A change in technique which affects over 90% of the flour used in this country cannot be effected overnight. The position is complicated by the fact that the necessary plant and supplies of the new improver have to be secured from the U.S.A. Every effort is, however, being made to accelerate the change, in the execution of which the representatives of the milling industry have given an assurance of their fullest coöperation. Meanwhile, the statement concludes, "the public can be assured that the present methods of treatment of flour, which have been in operation in this country, the United States, and Canada for some twenty-five years, and which include agenisation, have not been proved to be injurious in any way to human health."

In England Now

A Running Commentary by Peripatetic Correspondents

NOSTALGIA is a funny thing. Little did we think, when the four-engines droned constantly overhead, that we should regret their departure from the Station. At that time the thought of them departing never crossed our minds. But since they left, six months ago, something has gone from our day-to-day life as R.A.F. medical officers. It is the excitement that has gone, and, though we did not know it then, we like excitement. I am not saying that we all lived in a continuous state of mania —our systolics only rose the odd 10 mm. when the voice from Flying Control said "flap failure," or "undercart trouble," or "engine cut on take-off," or "coming in with no brake-pressure"—but a sense of tension and urgency was ever-present: for months on end we never went to sleep without wondering whether we should be disturbed, and if disturbed, whether this would be "it."

Of course we *were* disturbed. We lived beside our staff and patients—"on the job" in fact. We had to pass the inpatients on our way to our bedrooms every night, but they were not the disturbers of our rest. It was the pilot with wax in his ears who wanted them syringed at 4 in the morning after his last "lift" for the night; the navigator with a touch of conjunctivitis who wanted some drops for his eye before flying on the "graveyard shift"; the engineer with precordial pain who only needed a few words of reassurance to be able to report for duty at 6 A.M.; and the signaller we had seen that morning who wanted to see us again at 11 P.M. "just to make sure" we still thought he was fit for flying that night. I am afraid we thought them all somewhat inconsiderate then, but we *do* miss them now.

We are developing into bores, first-class. The number of times we stop ourselves saying "Of course, during Plainfare . . ." is only equalled by the times we don't stop ourselves saying "But then, that was while the Lift was on." The change-over has made a great difference to our sick quarters. No longer do the boys come in shivering at 8 in the morning after 15 hours' 'drome duty cramped in an ambulance at the end of the runway. Nor do they have to deal with a milling crowd of airmen waiting for "treatment." "jabs," or "F.F.I.S." They get more supervision, and frequent lectures from semi-reluctant medical officers to prepare them for trade-tests at the end of the month. I wonder if they look back on happier days too?

When we walk along the perimeter track of an evening, thinking of the times when we used to drive everywhere in our *Volkswagen*, we look out over the vast deserted "apron," and four eyes light up on the runway, and with a roar leap into the evening sky, turn, glinting in the setting sun, and disappear again. But it is only a mirage. Nostalgia is a funny thing.

* * *

I have been reading *Gardening without Digging*[1] —a fundamentally immoral book. We have all been brought up to believe that gardeners mustn't be afraid of hard work; but Mr. A. Guest comes along and says the best way to grow bumper crops is to eliminate the work—that is, the digging. The idea is to make a little hole in iron-hard ground, put in a little compost and a seed, and step back quickly or the plants will strike you smartly under the chin. Mr. Guest pins his faith on compost and earthworms. He maintains that applications of compost will allow for the same crop to be grown in the same place year after year, that it is better than farmyard manure (he of course, would *never* consider artificials at all), and that it tends to discourage weeds. He believes that earthworms, who turn up much more freely in the presence of compost, aerate the soil sufficiently; and that digging buries the bacteria—our main allies in fighting plant pests—80% of which are normally found in the top 4 in. of soil. Mr. Guest is also of the opinion that food grown on fertile soil leads to health; and claims that this is corroborated by feeding one lot of rats on grain grown on fertile soil and another lot on grain grown on infertile (in Mr. Guest's meaning of the word) soil. The two kinds of similar but less severe. The radiological lesions cleared completely in about two months, and a year after the onset he was still free from any sequelæ.

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[1] Doncaster: R. Wigfield. 1949. Pp. 47. 2s.

Prof. A. Policard had performed experimental work of great importance. Inhalation of beryl or beryllium metal proved harmless to animals under the experimental conditions; but inhaling beryllium fluoride caused very rapid death, with intense pulmonary congestion and œdema and very severe lesions of the bronchial mucosa. These early lesions seemed due to the formation of hydrofluoric acid in the pulmonary epithelium. With beryllium oxide the lesions were more delayed, arising about twenty days after exposure and resulting either in pneumonia or in granulomata.

Histological examination of both experimental and clinical material revealed notable proliferation of both the mesenchyma and histiocytes, histiocytic lobular pneumonia, nodular granulomata, and well-marked thickening of the alveolar walls. These accidents all took place in one plant; and very strict precautions should successfully prevent further accidents.

Dr. A. Uytdenhoef (chief medical inspector of factories for Belgium) pointed out that no beryllium metal, nor any of its salts, were manufactured in Belgium. The salts were used as a paste in the making of fluorescent lamps, and no accidents of any kind had been observed amongst such workers in Belgium, nor had they been observed in Sweden. Dr. P. A. van Luyt (Amsterdam) commented that though no accident had as yet occurred in Holland, workers' clothes in fluorescent-lamp factories were shown to be covered with beryllium dust.

The British delegation felt very strongly that since there were effective harmless phosphors for fluorescent lamps, and only a percentage of subjects were susceptible, and that with a latent period, the use of beryllium was unjustified. It was stated that in Belgium, too, beryllium was now being replaced by harmless substitutes.

EFFECT OF IRON-DUST ON THE LUNG

Dr. A. T. Doig (Glasgow) observed that exogenous iron inhaled as dust or smoke is harmless as long as free silica dioxide is absent: workers engaged in soldering, metal-polishing, or the production of iron oxide may, and often do, show reticular or nodular opacities in radiographs of their lungs; but they are fit men who remain at work. This finding is confirmed by the clinical statistical data, pathological findings, and experimental work. If, on the other hand, the iron-dust is coupled with free silicon dioxide, a siderosilicosis ensues with fibrosis of the lung which ultimately disables the worker: such is the fate of hæmatite workers or boiler-scalers. Dr. Doig therefore insists that the reticular or nodular opacities in the radiographs of iron-workers do not signify fibrosis of the lung, and that "pneumoconiosis" is no adequate diagnosis since the benign should be sharply separated from the progressive disabling forms.

WELDERS' DISEASE

Dr. Mignolet (Liége) reported a study of the *maladie des soudeurs.* Taking a group of 100 workers of unspecified trade as controls, he investigated 216 others working with: (*a*) blowpipe, (*b*) oxyacetylene cutting and, (*c*) arc-welding. The first two groups remain clinically fit and show essentially the same incidence of X-ray anomalies of the lung as do the controls. Amongst arc-welders there is a much higher frequency of such abnormalities (60%, compared with 17%), and also in 9·5% of cases limitation of diaphragmatic movement and other disturbances, including acute bronchitis. Moreover, 38 of the 85 men in this group complained of gastro-intestinal symptoms; some of those working with special electrodes had abdominal cramps and vomiting, and 61% were underweight. Dr. Mignolet ascribes these symptoms principally to the sublimation of metals at the point of fusion, especially when electrode contains fluorides; the toxicity is thus portionate to the density of dust at the welding. The whole clinical picture disappeared when p exhaust of fumes was instituted. It appears, t that the main problem arose out of the use of elec containing fluorides, as in welding of stainless (other metal poisons being cadmium and manga and from working in confined spaces without exha precautions. Even in the absence of metallic poiso under such circumstances there is a risk of gassing nitrous oxide produced by the action of the spark the air, and of metal-fume fever when galvanised me is welded.

PULMONARY CARCINOMA

Reporting on lung cancer in nickel, arsenic, an chromate workers, Dr. P. L. Bidstrup (London) stated that between 1921 and 1945 the number of deaths in male attributed to cancer of the lung in England and Wales has increased sixteenfold. This cannot be explained by improved diagnosis, nor by increased opportunity for necropsy examinations. Possibly workers handling nickel, arsenic, and chromium compounds are particularly liable to develop cancer of the respiratory system However, the number of men at risk in each case i small and the errors in sampling may be enormous There is little evidence that exposure to arsenic compound causes lung cancer. Workers engaged in the Mon nickel process frequently develop cancer of the ethmo or lung, but the carcinogenic factor to which they a exposed is unknown. Figures of the mortality experien of workers in Germany and the U.S.A. suggest that lu cancer occurs from four to sixteen times more commonly i the chromate-producing industry than in other industr groups. Monochromate rather than dichromate may b responsible; for preliminary environmental studies chromate-producing factories in Great Britain indica that the atmosphere contaminant in all parts of th plant is monochromate.

TALC PNEUMOCONIOSIS

Dr. A. I. G. McLaughlin (London) described what is believed to be the first fully proved case of talc pneumoconiosis. Amongst cases described in the past it had often been impossible to exclude asbestos as a possible cause; and, in other series, suggestive radiographs had not been accompanied by any clinical symptoms. His patient, aged 50, had worked since the age of 14 on the same tyre-extruding machine in the same factory. At the age of 12 he had had chorea with consequent heart-disease. He first complained of pain in the right hypochondrium at about 49 years of age, and he died 2 years later. X-ray examination showed generalised nodulation of the lung which could not be distinguished from asbestosis. Dr. McLaughlin studied the macro scopic and histological appearances of the lung and its chemical analysis, and investigated the composition of all the talc used in that factory. The dust in the lung had been analysed by the methods of petrographers and by X-ray crystallography. By these methods asbestos as a causal agent was excluded.

OTHER HAZARDS

Cases of pneumoconiosis in the sulphur and barium industries were reported by Prof. G. Pancheri (Milan). In the sulphur industry workers are exposed to both dusts and fumes with ensuing dyspnœa, cyanosis, bronchitis, emphysema, and even bronchiectasis. The condition is rarely complicated by tuberculosis, and it has sometimes been attributed to fumes rather than dusts. Professor Pancheri showed striking radiographs of nodulation in the lungs of barium workers. Clinically the condition is benign.

From Brussels Dr. J. Clerens presented a report of his experience as doctor to an asbestos works. His *appreciated, a change in the position of the arm* ying the infusion was made. Whenever a suitable in the dorsum of the wrist or forearm was present, was chosen. If a vein in the antecubital area was only choice, the arm was fixed on a padded arm-board he pronated position. In either event both arms e subsequently placed adducted to the patient's side held in place by a wide retaining strap placed under patient's buttocks and over each hand. The tubing the infusion was increased to allow the bottle to be ced conveniently at the foot of the table out of the y of the instrument nurse. Since this procedure was pted we have not been troubled with another case paralysis.

uring 1948, 145 cases, each carrying an infusion ring operation, were treated, with the 4 cases of alysis in the first four months. During 1949, 177 es, each carrying an infusion during operation, were ated without paralysis.

holt, Shipley, Yorkshire. WILLIAMSON J. FINNIE.

SIR,—The articles by Mr. Ewing and Dr. Kiloh raise estions of considerable practical importance. On one it of St. Bartholomew's Hospital during the last urteen months we have had 2 similar cases, which are re recorded briefly.

CASE 1.—A woman, aged 33, underwent appendicec- my, oöphorectomy, and myomectomy in November, 1948. fairly steep Trendelenburg position was maintained with dded shoulder-rests. The left arm was abducted and ternally rotated on an arm-board. The anæsthetic was iopentone, curare, and gas and oxygen.

Postoperatively she had a partial lesion involving all muscles pplied by the left brachial plexus, with sensory impairment cervical segments 5–7. This has improved progressively, ut she still has slight weakness of the long finger flexors d muscles of the thenar eminence. In addition, there is nsiderable functional overlay which renders the hand, from er point of view, practically useless. As she is an embroideress, is is a serious matter.

CASE 2.—A man, aged 43, underwent an operation for ansplantation of ureters and total cystectomy in July, 1949, he anæsthetic being thiopentone, curare, and cyclopropane. ere there was only a slight Trendelenburg tilt, maintained ith shoulder-rests, but the right arm was abducted on a oard.

He developed a lesion involving muscles supplied by the th and 6th cervical segments on the right side. This is now mproving but there is still considerable weakness of elbow- lexion and for this reason he is unable, so far, to resume is occupation of lorry-driving.

Since the last of these cases occurred we have abandoned the use of shoulder-rests, and use instead pelvic ests which support the patient against the iliac crests. hese have been made for some years by Messrs. Allen nd Hanburys, originally I believe for St. Peter's Hospital. The use of these rests does remove one of the two actors responsible for these lesions, but I agree that every ttempt should be made not to abduct an externally otated arm on a board.

St. Bartholomew's Hospital,
London, E.C.1. MAURICE LUNN.

SIR,—In view of the cases reported by Mr. Ewing nd Dr. Kiloh in their excellent articles, I wonder if I nay draw attention to an article written by me last year.[1]

In this article was described and illustrated a method of supporting the patient's arm during operations in the Trendelenburg position where tubocurarine was being used. The elbow is drawn across the patient's chest and anchored to the far side of the table with a strip of adhesive plaster; the hand rests on, or near, the face, and the veins of the wrist and hand are easily accessible for puncture.

I have used this technique, with minor modifications, for two years and have had no trouble. In many cases this arm has been used for a transfusion during operation; and the transfusion can be set up quite easily without disturbing the towels or the surgeon to get at the arm. For the administration of drugs intravenously, a Gordh needle is now most commonly used.

Lincoln. J. CLUTTON-BROCK.

SIR,—I was very interested in Mr. Ewing's article, and heartily endorse his views. I notice he suggests that it may be necessary to devise some method of utilising the iliac crests, &c., as points of pressure in the Trendelenburg position. May I draw attention to the pelvic rests in use at St. Peter's Hospital for Stone, which I feel go a long way towards preventing this complication?

Luton. S. H. C. CLARKE.

SIR,—I am glad that the important articles by Mr. Ewing and Dr. Kiloh received the prominence they deserve in your leading article of the same date. This is a problem which has long needed discussion.

In my own experience, I have had no cases of such injuries following the use of the Trendelenburg position. This is perhaps because I have always insisted that the shoulder-rests, of whatever design, are merely inserted as a precautionary measure, and that the shoulders must not actually touch them. The weight of the patient is taken *by the flexed legs, which are strapped to the dropped leaf* of the table over pads. I admit that theoretically this increases the risk of thrombosis, but in our hospital the incidence of this complication is no higher than elsewhere, whereas our incidence of brachial-plexus injuries is apparently much less.

I believe that the operation of radical mastectomy carries a high risk of this complication, though I can find little reference to it in the literature. My practice in this type of case is to insist that the weight of the arm is taken by a nurse who sits at my side during the operation. The only case of plexus injury I have had was in a case where this precaution was neglected, but the operation was only a local excision.

The other case of this sort that I have had was an Erb's type of palsy following operation for nephrectomy. This I attributed to the neck being overstretched by the removal of a pillow after the operation and while the arm was still attached to the arm-rest.

Another point to which I would draw attention is the importance of never bandaging an arm to a splint for a transfusion with the hand supinated. If anyone doubts the importance of this, let him lie for a few minutes only with his arm abducted at the shoulder and extended at the elbow, and with the wrist supinated. The relief obtained by pronating the wrist is remarkable, and in this position all the veins of the forearm are accessible, including those in the antecubital fossa.

These points are all simple, but I believe they should be brought to the notice of all anæsthetists.

Worthing. F. R. GUSTERSON.

SIR WILLIAM OSLER

SIR,—From the obituary notice last week of the late Dr. A. G. Gibson it would appear that Sir William Osler was appointed regius professor of medicine at Oxford in 1911. For the sake of historical accuracy, on which both these men were very keen, it should be stated that Sir William Osler was appointed in 1904 and arrived at Oxford in 1905.

Between Sir William and Dr. Gibson there were indeed bonds of friendship, admiration, and affection; and it was Dr. Gibson who attended Sir William in his last illness in 1919. P. T. C.

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[1] *Anæsthesia*, 1949, 4, 141.

grain, incidentally, showed no difference on ordinary analysis. However much this savours of black cats walking widdershins the compost heap at the full moon, most of us would be only too willing to believe that we can grow bigger and better vegetables *and* have our after-dinner nap. Though it should perhaps be mentioned that Mr. Guest seems to base his findings on only a few years of experiment.

* * *

There are various ways of leaving a hospital. Seeing a man leaving the outpatient department of a large London hospital at racing speed the other day reminded me of some dramatic exits I have witnessed in a West African colony.

One patient had symptoms which were alarmingly suggestive of commencing rabies, and he spoke no language known to anyone in the ward. On such occasions a certain male nurse, short and corpulent of form, flat of foot, and piscine of mouth, who spoke twenty different dialects, was always summoned. We had this worthy fetched, and requested him to ask the patient if he had been bitten by a dog. The question was put in all twenty tongues with rising exasperation but no response, and then our interrogator suddenly got down on all fours, barked sharply, and took a snap at the patient's ankle. We never saw the poor fellow again; it was a mere blurred streak that left the ward. His hospital pyjamas were duly written off.

Kwame, the mortuary attendant, had an uncanny flair for nosing out a dying patient, and his ghoulish face peering round a ward door was not a popular sight. Two patients died in a ward one day, and between them was the bed of a deeply concussed patient; nobody seems to have noticed that the bodies removed to the mortuary were from adjacent beds. Not long afterwards Kwame beamingly opened the door of the mortuary for the pathologist, took one look inside and did not wait to hand in his resignation. Whether he actually did clear the eight-foot hospital wall, as rumour says, is not certain, but even the pathologist admits that to see a corpse sitting up and gibbering at him was unnerving.

We had an earthquake in 1939, and among others the male urogenital ward was evacuated. There were three modes of exit: (1) the frankly timid pulled out the catheter and ran; (2) the rather more valorous removed the catheter from its continuation drainage tube and ran with catheter in situ; and (3) the outright heroic undid the attachment of the bottle into which they were draining and marched out grandly with the whole bag of tricks. From all these operations none of our catheters was missing.

I wonder why that man in London was running. To catch a bus? Oh no; this was real terror. Perhaps the Minister himself had caught him malingering.

* * *

Speaking for his confreres on Jan. 21, a member of the M.R.C.P. Faileds Club expressed approval of the new examination arrangements. I presume he has taken into consideration the increased plough-rate (since the alteration). Indeed, it may well be that he regards the higher mortality as a satisfactory feature, an indication that hitherto the Censors have been too lenient and that a nearer approach to justice has now been achieved.

I had predicted this result. I look back over my 20 years' experience as an examiner. I can see that in my earliest days my standard of expectation was almost preposterous: it was well that I had the curbing influence of a senior colleague. It takes time to develop a sense of proportion and you have to arrive at senescence to realise its value. The new arrangement will have the advantage of educating inexperienced junior examiners, but the price must be paid. And so some of the aspirants to M.R.C.P. who fall by the way may preen themselves on their altruism, that their sacrifice was *pro bono publico*.

* * *

I feel sure that readers will be glad to hear that my lucky friend of Jan. 28, who had seen the same patient with syringomyelia at three different examinations, has recently had a bash at the M.R.C.P., and one of his short cases was the same syringomyelic patient yet again, the fourth time in all. Alas, even this gift from the gods did not avail.

Letters to the Editor

CONTROL OF TUBERCULOSIS

SIR,—In the interesting correspondence on this subject no mention has been made of the place of village settlements or of how they might be used to relieve the present difficulties over sanatorium waiting-lists.

Local authorities have powers under section 28 of the National Health Service Act to provide aftercare. They have also powers to use in any other region facilities not available in their own. By arrangements with regional boards, patients could be transferred to village settlements when they are fit to be up and to take moderate exercise. All modern treatments can be carried on in those settlements, which are built round treatment blocks. The patients so transferred would have definite advantages. Once they are fit to undertake sedentary work for three hours daily they can receive the grants available through the Ministry of Labour's generous adaptation of the Disabled Persons' Employment Act. They would be refitted for return to their own employment, or trained for work more suitable to their disability and thereby become self-supporting within the settlements or in outside industry.

At the moment Papworth could take eighty such patients, and with added hostel accommodation could take up to two hundred more workers in its industries. By the autumn Enham-Alamein village settlement will have a hostel for fifty patients; this hostel is capable of extension up to three hundred beds. Other established settlements could make similar arrangements.

This scheme as outlined does of course require contributions from the local authority when the patient is fit to work five hours daily, at which stage he is no longer the responsibility of the regional board. This is surely a small price to pay for the greater use of our present sanatorium beds. It should not be difficult for the Ministries of Health and Labour to arrange details acceptable to regional boards, local authorities, and the managements of settlements.

Papworth Village Settlement. RICHARD R. TRAIL.

POSTOPERATIVE PARALYSIS IN THE UPPER EXTREMITY

SIR,—Your leading article of Jan. 21 and the articles by Mr. Ewing and Dr. Kiloh were of great interest to me. I would like to congratulate them on their excellent description of the mechanism involved, and to endorse their views on the prevention of this distressing postoperative complication.

During the first four months of 1948 I was worried at the apparent frequency of brachial paralysis following abdominal, pelvic, and major vaginal and perineal operations for which I anæsthetised the patients.

All were given curare or a curariform drug and had a glucose-saline infusion set up in the arm subsequently paralysed. The arm, at operation, was placed in the abducted, extended, and externally rotated position on an arm-board tucked under the mattress, or on a padded metal arm-table attached on a swivel to the operation-table. The patients were tilted very steeply—in a 45° tilt Trendelenburg position for the abdominal cases, and a 20° tilt Trendelenburg position for the vaginal and perineal cases.

During this period there were 4 cases of brachial paralysis. Of these, 3 were mild cases in which the most distressing complaint—persisting for about three weeks postoperatively—was inability to hold in the fingers, for any length of time, a cup or a pen. The 4th case was a serious complete brachial-paralysis lesion which did not clear up for four months.

When the connexion between these cases and the position of the arm in the steep Trendelenburg position believe that, by giving a mother sufficient practical p in the first few days of the baby's life, much needless ry and anxiety can be avoided, and the mother bled to take that responsibility towards the baby ich is her right and privilege.

ondon, W.C.1. JOAN TANNER.

APPROACH TO THE UPPER THORACIC SYMPATHETIC GANGLIA

SIR,—Your issue of Dec. 17 contained a letter from . Atkins on the peraxillary approach to the stellate d upper thoracic sympathetic ganglia.

I was very interested to see that Mr. Atkins has already de use of this approach eight times and found it of nsiderable help. Although it is perfectly correct that uggested the operation to Mr. Atkins during my visit London, I should like to emphasise that Dr. W. hulze was instrumental in devising this operation while was my registrar at Groote Schuur Hospital. At e time when Mr. Atkins's letter appeared, Dr. Schulze d I were engaged in preparing an account of the opera- ve procedure. This account was delayed partly by my sit to England but mainly because we wished to obtain ore experience with this approach before publishing d recommending it.

Actually, the peraxillary approach is a modification the transthoracic approach which we reported in 44[1] and which has the disadvantage of causing a ther unsightly scar. The peraxillary approach has efinite advantages, one of these being that the sympa- etic chain from the stellate ganglion down to D5 and 6 n be removed with the greatest of certainty and the ast possible trauma. Mr. Atkins has already pointed it that it is important to remove the third dorsal nglion when sympathectomising the upper extremity, Kirgis and Kuntz[2] have made clear. There is no doubt at the peraxillary approach is less traumatic and more anatomically certain" than the posterior approach; nd the dangers inherent in the anterior approach, such s bleeding from an intercostal vein, can be avoided; nd, if bleeding does occur, it is easily controlled with he peraxillary approach.

We have demonstrated on several occasions that the mpathetic chain may be removed with advantage by he peraxillary approach without actually entering the leural cavity. The incision is the same, but it is easier o strip the pleura from the thoracic cage if a piece of the econd or third rib is removed.

Dr. Schulze and I are hoping to present a full account f this approach in the near future and will be most nterested to hear the results obtained by those who have sed it.

Department of Surgical Research
University of Cape Town.

R. H. GOETZ.

SIR,—Mr. Atkins (Dec. 17 and Jan. 14) has, I think, et a new fashion in describing the technique and dvantages of an operation devised by another surgeon. erhaps this fashion has advantages in that the writer s not handicapped by *amour-propre* and the enthusiasm f an inventor. Examples will come to mind of a surgeon ontinuing to perform an operation merely because is name has been widely connected with it.

It is in this fashion that I would like to draw attention o an approach to the upper thoracic sympathetic anglia demonstrated to me by Mr. Norman Lake, and I believe devised by him. It is a modification of the anterior approach described by Sir James Paterson Ross, in that after division of the scalenus anticus the subclavian artery is cleaned from any surrounding areolar tissue and retracted upwards, and the approach is made between the artery and vein. By this route no arteries are ligated or divided, for no branches come off the inferior surface of the subclavian artery. It is amazing how far the artery can be retracted upwards: I have hesitated to retract the artery only once, and that was in a woman of 64 whose vessels might have been too rigid for this procedure to be safe.

I have performed the operation forty times, and have never failed to reach the 3rd ganglion; and in one case of severe axillary hyperhidrosis I took the 4th ganglion also. At first I divided the trunk below the 3rd thoracic ganglion and all the rami of the 3rd and 2nd ganglion. I avoided dividing the 1st white ramus, to prevent Horner's syndrome, I then anchored the cut end of the trunk to the scalenus anticus. The theory of regeneration of a gap of an inch has, however, strained my credulity, and I now take away the 2nd and 3rd ganglion and the trunk between them. I think that the explanation of so-called regeneration put forward by Boyd and Monro[1] —that it is due to a collateral supply—is more credible, so I no longer displace the trunk.

The advantages of this approach are simplicity, absence of pneumothorax as a rule; benefit, in certain cases from division of the scalenus anticus; and the benefit of the periarterial sympathectomy which results from cleaning and retracting the artery. The only added risk that I know of in this approach between the artery and vein is that one may damage the thoracic duct at the inner corner of the incision. I did this twice in my earlier cases, but there was no apparent ill effect. A pneumothorax may occur, especially if blunt dissection is used to separate Sibson's fascia, as the pleura gives way before the fascia—for this reason sharp dissection is preferable. A darkened theatre and illuminated retractors and a headlight I find helpful. I record with pleasure my gratitude to Mr. Norman Lake for demonstrating the method to me.

Hove, Sussex. H. J. McCURRICH.

INFLUENCE OF HEART-RATE ON CARDIAC OUTPUT

SIR,—Further correspondence gives an opportunity to clear up one or two misconceptions.

The Fick equation for estimation of cardiac output (C.O.) in litres per minute is:

$$\text{C.O.} = \frac{\text{Oxygen uptake in the lungs in c.cm. per min.}}{\text{Arteriovenous oxygen difference in c.cm. per litre.}}$$

Oxygen uptake is measured by a spirometer, the subject breathing *oxygen-enriched air*. This is done at the beginning of the observations; and, since the subject is at complete rest, this figure is taken as the numerator throughout the observations. The validity of this assumption has been checked by similar estimations made at the end of the experiments, which show that the coefficient of variation of this oxygen-uptake estimation is ± 5%. 3 ml. samples of right-heart blood and of arterial blood are shaken in air in the Haldane apparatus and their *oxygen uptake* measured directly. The difference between these figures gives the arteriovenous oxygen difference. Ferricyanide is *not* used. Since the subject is breathing room air at the time of sampling, no difficulties arise from extra dissolved oxygen. The coefficient of variation estimated from pairs of arteriovenous oxygen differences is ± 3·5%. Single estimations of cardiac output may thus have a coefficient of variation of ± 8·5%, but of course this error is reduced by multiple sampling at all critical points of an experiment, which is our habit. None of the reported figures is based on less than two estimations, and three is more usual.

With regard to some of the other points raised, normal subjects with rapid heart-rates from mild anxiety may have very high cardiac outputs, reaching 11–12 litres per minute; while in severe heart-failure the output may

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[1] Goetz, R. H., Marr, J. [illegible] n. Proc. 44, 3, 102.

[2] [illegible]

[1] Boyd, J. D., Monro, P. A. G. *Lancet*, 1949, ii, 892.

THE HEALTH OF NURSES IN HOSPITAL

SIR,—At last there seems to be a tendency to speak plainly about the long scandal of the exploitation of nurses. Some sentences of Dr. O'Daly's letter in your issue of Jan. 21 should sear the minds of hospital boards or nursing committees. Taking Dr. Court's survey of six hospitals he can think of no other group whose working hours are so long, and considers that quite sufficient to account for the high incidence of tuberculosis among them; he says, *starkly, it is wrong* of hospital authorities to force girls in late adolescence or early adult life to work under such conditions. Present-day authorities will argue that the doctors have always allowed it. Yes, the writing on the wall has been so largely ignored that we have allowed tuberculosis beds to be closed by tens and hundreds rather than face the implications of the quiet stay-out strike. We deserve what we have got. Even now we offer kindness and sympathy where we should be awarding reasonable compensation for the loss of vigorous health or wasted years. Many of us who have followed the ill fortunes of nurse-patients know that fear of anxiety and poverty still deter the sisters and friends of such girls from entering tuberculosis nursing. When our "sympathy" gets to the point of recognising the industrial hazards of the nursing life we may at last begin to stop the rot.

Moor Park, Northwood. ESTHER CARLING.

SIR,—I should like to thank all who have commented on my article,[1] and especially my old mentors, Dr. Brailsford [2] and Professor Stammers.[3] My main purpose was to discover and present the facts about one kind of hospital in the hope that others would complete the picture.

Dr. Hubble,[4] in his well-reasoned letter, took the process a stage further by stressing the inadequacy of a general-practitioner service to meet the special needs of nurses in hospital. I would support his plea, with that of Dr. Greenwood,[5] that this should be the concern of one physician "rather than a series of changing residents." For a physician in a teaching hospital, this continued study of health and sickness in a well-defined community might also have a beneficial effect on his teaching of the undergraduate. I would agree, too, that certain essentials of medical care to be expected from all hospitals might be laid down with precision, but I shrink from defining the process "in detail." I think Dr. Hubble will agree that we must avoid adding to the list of forms requiring automatic and, before long, unthinking completion. If the physician concerned is to maintain a lively interest in the subject, he must be free to initiate what special studies his interests, or the needs of the hospital, require and be free therefore to design the record-card best suited for the purpose.

The question of records is of some importance, and I am very sorry indeed that my paper contained no reference to the sensible card designed by King Edward's Hospital Fund for London, and their wise memorandum on the supervision of nurses' health. The latter needs no commendation from me, and I wish that its suggestions, especially those concerning the precautions which nurses should take with potential cases of tuberculosis, were more widely known.

My attention has also been called to the apparent fall in wastage during training which is now taking place. The index of student nurses, initiated by the General Nursing Council, reveals a wastage-rate for all training schools of 25% between June, 1947, and September, 1949. Although these figures are incomplete, as a number of nurses had not reached the end of their three years' training and the figures from sick children's mental training schools are less favourable, we reasonably hope that this stubborn professional is at last beginning to yield.

It has been hinted, too, that my picture of the incidence of sickness and the quality of health supervision has changed rapidly for the better in the last five years. If this is the case, no-one will be more delighted than I; but with some experience of how practice lags behind precept in this field, I will await the facts. It would, I know, be most encouraging to all who share my concern in this matter if the Medical Research Council or some other suitable body would decide the existence and extent of the risk to health in nursing, and the quality of supervision for which it calls.

The Children's Department,
Royal Victoria Infirmary,
Newcastle upon Tyne.

DONALD COURT.

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[1] *Lancet*, 1949, ii, 874.
[2] Brailsford, J. F. *Ibid*, p. 1107.
[3] Stammers, F. A. R. *Ibid*, p. 1011.
[4] Hubble, D. *Ibid*, p. 1011.
[5] Greenwood, J. M. *Ibid*, p. 1201.

HISTORY OF WESTMINSTER HOSPITAL

SIR,—The board of governors of Westminster Hospital have commissioned Mr. John Langdon-Davies to write the history of the hospital since its foundation in 1719. It is intended that, apart from recording the hospital's activities, the book shall be a social history of the conditions which brought the voluntary-hospital movement into being at the beginning of the 18th century, and which led to the founding of our hospital.

We should be grateful for the assistance of anyone who possesses documentary or other material useful for the writing of the history, and particularly for any reminiscences or notes about the hospital which past or present members of its medical staff would care to contribute. All original material will be carefully copied and returned.

Information or inquiries in regard to the history should be addressed to me.

Westminster Hospital,
London, S.W.1.

CHARLES M. POWER

FLATULENCE IN INFANCY

SIR,—I have devoted the past year to the care of my infant daughter, and by observation have learned a number of practical details which I believe would be useful to many mothers if more widely known. Mostly these observations concern wind, which is undeniably the cause of many of the feeding difficulties of infancy.

The mother should be instructed to bring up all the baby's wind during the course of each feed, and not only at the end. This is especially important during the early days, when the infant's stomach is relatively small in relation to the volume of its feeds. When the combined volume of milk and air is sufficient to distend the stomach, the infant ceases to suck although he may have taken as little as $^1/_2$ oz. milk. Efforts to force the baby to take more only cause vomiting, unless the wind is first brought up.

This is most effectively done by holding the baby up and patting or stroking firmly over the left lower ribs at the back and side. It must be remembered that the average mother does not know the position of an infant's stomach, and thumps indiscriminately over kidneys, liver, and lungs. Patting over a stomach full of wind elicits a hyper-resonant note which changes so much when the wind is shifted that an intelligent mother or nurse would soon learn to distinguish the "end point." "Splashing" is sometimes noticed when a baby is picked up or its position altered; this should be taken to indicate the presence of wind and calls for similar measures.

It is well known that an infant should be fed comfortably and quietly without hurry or fuss. The same conditions are just as essential when dealing with wind. It is impossible to bring up wind while a baby is crying—in fact, it usually swallows even more air.

that in the insane and in mental defectives tuber- sis runs a very sluggish course, as if in harmony the sluggish faculties of the mind.

hose who opposed the motion thought it was futile ittempt to assess the relative importance of seed soil in the ætiology of tuberculosis. They ignored case-histories of identical twins which suggest t the soil is the predominating factor in the develop- it of tuberculosis. In my view, little more knowledge be gained by further research on the tubercle bacillus ; ecially since observations by the late Dr. Galen— t, in A.D. 80, those who associated with tuberculous ients were more liable than others to contract the ease—have now been confirmed in the Prophit report. ose of us who support the motion realise that our iorance of what constitutes resistance is abysmal. natural immunity we know no more than the ysicians of 1850. Therefore I have said that when ich discovered the tubercle bacillus, he put the clock ck. For this epigram I am regarded as a heretic by ose who cannot see beyond the present bacteriological i in medicine.

Birmingham Mass
Radiography Centre.

HALLIDAY SUTHERLAND.

VITAMIN E

SIR,—In their letter of Jan. 7, Dr. W. E. and Mr. E. V. iute state that we have emphasised the powers of tamin E as a physiological and safe anticoagulant. his conclusion is a most unfortunate misinterpretation f our communication and imputes to us a suggestion hich was neither stated nor implied in our report.[1]

Despite much careful and thoughtful work the rôle f the tocopherols in physiological processes is still bscure. *Conclusions* regarding their function should be rawn only on the basis of the most rigorously proved ibservations. *Speculations* are welcome but should not nasquerade as anything more substantial.

K. L. ZIERLER
D. GROB
J. L. LILIENTHAL, jun.

The Johns Hopkins Hospital,
Baltimore.

THE SOCIAL ADAPTATION OF INSTITUTION CHILDREN

SIR,—Last week's article by Dr. Bodman and others bases important deductions about the hereditary factor in child maladjustment upon a table of constitutional factors in relatives which merits very close study. The general trend of studies suggesting that the attitudes, and even the apparent intelligence, of institutional children can be environmentally modified does not, of course, rule out the genetic element in maladjustment, but it may lead us to restrict its rôle. One of the problems of assessing family background is the extreme difficulty of getting unbiased information about "good" homes, and on this score the table seems suspect.

Children who are handed over to institutional care bring with them details of delinquency and insanity in the family based on reports by trained or semitrained observers. There is a greatly reduced opportunity for a social "cover-up." The information about the control population in this paper appears to be drawn from sources such as school records based upon interview, and it would be interesting to hear further details of its reliability. Suspicion is strengthened by the fact that the incidence of neurosis and "insanity" in test and control groups show an inverse correlation, while no antisocial individuals are detected in the control group. A certain unavoidable element of selection is likely to be introduced into any series of this kind: testimony that "uncle was a bad lot," or that a relative has been "put away" is freely forthcoming in any case which comes to court, or is investigated by child-welfare organisations: in the "better" home-group, psychoses are readily softened to nerves, and delinquency to "whereabouts unknown." One would like to ask the authors whether, and to what extent, this factor has proved controllable in their series.

Physiology Department,
London Hospital, E.1.

ALEX COMFORT.

ARMY MEDICINE IN THE LATE WAR

SIR,—In discussing the treatment of amœbiasis, Dr. Todd [1] makes the following statement:

> "The difficulties of assessing the value of a remedy for such a disease are very considerable even when it is given alone, and when numerous remedies are given simultaneously are even greater. So far as I know, nobody has yet published the necessary large-scale controlled series in which alternate cases are given a standard combination of remedies and the others this combination plus the preparation to be tested."

Much of the information sought by Dr. Todd is to be found in two papers published by us in 1949.[2,3] In these papers we have recorded the effect of most of the drugs commonly in use in amœbiasis, given singly and in combination to African patients all of whom suffered from acute amœbic dysentery. In all cases diagnosis and progress were checked by serial sigmoidoscopy and by stool examinations. All cases showed: (1) ulceration of the colon; and (2) actively motile *Entamœba histolytica* in stools or scrapings. Most of the series in which each drug or combination of drugs was tested numbered 50. In all, the records of some 600 cases were analysed.

A very brief summary of these results is given below. For the sake of objectivity and brevity, we are recording here only the absolute success and failure rates. The latter is the percentage of patients who still showed ulceration and actively motile amœbæ twenty days after the institution of a test drug. The discrepancy in the percentages is made up of "doubtful" cases in which open but healing ulcers were still present, but which showed no amœbæ in stools or scrapings. Unfortunately these figures give no information of the relapse-rate since follow-up was impossible. They are an indication only of immediate cure and failure rates in African patients with an unusually severe and acute form of the disease. An abbreviated table is set out below:

Series	*Therapy*	*No. of cases*	*Probable success (%)*	*Absolute failure (%)*
A	Emetine gr. 15	50	50	28
B	'Diodoquin' 20 days	50	58	24
C	Emetine gr. 15 and diodoquin	61	74	2
D	Emetine gr. 10 and diodoquin	60	75	2
G	Diodoquin and emetine bismuth iodide gr. 30	50	80	6
H	Emetine gr. 10 and carbarsone 2·5 g. in 10 days	45	58	11
I	Penicillin and 'Sulfasuxidine' for 7 days, followed by emetine gr. 10 and diodoquin	56	95	0
J	Penicillin, sulfasuxidine, emetine gr. 10, and diodoquin simultaneously	49	90	2
K	Sulfasuxidine for one week; emetine and diodoquin simultaneously	49	88	2
L	Penicillin and sulfasuxidine simul- s	11	82	0
P*	20 days	57	54	24
Q*	) units daily for 20 days.	55	46	38
T†	Carbarsone	52	48	42
U†	Emetine bismuth iodide	55	71	26

* In the press. † Not yet published.

In view of Dr. Todd's comments and our results, the following observations are made:

1. Dr. Todd states that it is widely believed that a variety of drugs are complementary. Our figures confirm this. Emetine and diodoquin are better than either alone. Results

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[1] Zierler, K. L., Grob, D., Lilienthal, J. L. jun. *Amer. J. Physiol.* 1948, 153, 127.

[1] Todd, J. W. *Lancet*, 1949, ii, 1143.
[2] Armstrong, T. G., Wilmot, A. J., Elsdon-Dew, R. *Trans. R. Soc. trop. Med. Hyg.* 1949, 42, 597.
[3] Armstrong, T. G., Elsdon-Dew, R., Marot, R. J. *S. Afr. med. J.* 1949, 23, 369.

fall as low as 2 litres per minute. The cardiovascular endothelium is, of course, different from the lining of the mouth and is completely insensitive, the subject being unaware of any subjective sensation with a catheter in situ. If the catheter tip presses on any point inside the heart, premature beats may be induced; but on slight withdrawal to the middle of the chamber these cease and there is not the slightest disturbance of contractile function.

Remarks on "power" and "performance" are mere verbal quibbling. We try to measure the observable—namely, changes in minute-volume of the circulation and in the degree of venous congestion. We cannot draw any conclusions on the significance of changes in stroke-volume, which is a dependent variable resulting from rate and minute output change. We at least know what we mean by change in minute-output, and restoration of this towards the normal is one reliable guide to clinical improvement.

Postgraduate Medical School of London, W.12.
R. I. S. BAYLISS
J. McMICHAEL.

HEAT CRAMPS

SIR,—With reference to Dr. Ladell's letter of Jan. 21, I think that the adrenal cortex may be involved but not in the almost immediate relief following intravenous medication. This almost instantaneous easement must, I think, be due to an effect on the motor end-plate(s) or nerve-supply of the voluntary-muscle focus.

St. Margaret's Hospital, Epping, Essex.
FRANK MARSH.

PLACEMENT MEDICAL EXAMINATIONS

SIR,—Recent correspondence prompts me to add a further point of view regarding medical examination of applicants for civilian employment.

In the interests of industrial morale and personal contentment, it is most desirable that faithful workers should be confident of their management's ability to find alternative employment for them if they become permanently unfit for their normal work on account of old age, sickness, or injury. It is wrong for a worker to give the best years of his life to his firm and then be thrown out when he ceases to be fully efficient.

In this factory, where most of the men engaged on production are unskilled or semiskilled, and do heavy shift work, the number of jobs available for the aged or infirm is regrettably small. We actually have waiting-lists of our own men who have been recommended by their doctors for light or permanent day work. As long as we continue this policy of filling vacancies in comparatively light unskilled jobs by a process of internal transfer, the only unskilled outsiders we require are those who are capable of heavy shift work; and they must show every sign of remaining fit for this work for years. We wish to avoid requests for transfer on medical grounds within a few months of starting work, because more often than not in such cases we are unable to comply, and the unfortunate employee leaves, to the annoyance of all concerned.

This may explain why some applicants are rejected by the doctor after being approved by non-medical officials. The actual number thus rejected is small, and utterly insignificant compared with the total turned away. At the present moment applicants outnumber vacancies by roughly five to one.

British Insulated Callender's Cables Ltd., Prescot, Lancs.
R. N. WILSON
Assistant Medical Officer.

SIR,—Sometimes a particular instance, rather than generalities, makes it easier to judge a situation more clearly. Would Dr. Todd [1] be happy to be a passenger in a ship in which one of the quartermasters had a visual acuity of 6/36, with a colour-defective navigating o on the bridge with him, and where the chief engineer recently recovered from an attack of hypert encephalopathy? This situation might easily arise anyone who had previously done a particular job, felt himself still to be capable of continuing with it, allowed to do so with no medical "screening." As the individual's personal liberty, it is surely reco that in any society some liberties have to be sac for the well-being of the whole.

The Shipping Federation Ltd., London, E.1.
ALAN WATSON.

EXFOLIATIVE DERMATITIS COMPLICATING STREPTOMYCIN THERAPY

SIR,—I have read with interest the article of Jan. 21 by Dr. Harris and Dr. Walley, and note the similarity between their case and those upon which I have reported.[1]

Since that time a further three cases showing dermatitis, sore tongue, and cheilosis have occurred in this hospital. The incidence of these manifestations of vitamin-B deficiency in this hospital alone is now about 3% of all cases receiving streptomycin. I do not include the skin eruptions, relieved by the administration of 'Benadryl,' which are much more common but of relatively little importance and certainly do not warrant reconsideration of the advisability of continuing streptomycin administration.

The last three cases were rapidly controlled by the administration of 'Benerva Compound,' containing in each tablet 1 mg. of aneurin, 1 mg. of riboflavin, and 15 mg. of nicotinic acid; three tablets were given thrice daily. Since January, 1949, it has been our policy to administer benerva compound or 'Becosym' (Roche) to all patients whether receiving streptomycin therapy or not. No further cases have arisen since then. The reference in my article to the reduction in intestinal organisms by streptomycin administration as an exciting cause of clinical vitamin-B deficiency is shortly to be followed by a more complete report from one of my colleagues.

Harefield Hospital, Middx.
JOHN SUMNER.

RESISTANCE TO THE TUBERCLE BACILLUS

SIR,—As reported in your last issue the British Tuberculosis Association debated on Jan. 20 the following resolution: "That infection, though necessary, is not the major factor in the prevalence of tuberculosis." For lack of time, I could not say all I would have liked to say in support of the motion, and for this I seek the hospitality of your columns.

Mass radiography discovers individuals who have always enjoyed good health although their lungs are studded with calcified lesions, which might be the result of successive infections rapidly overcome by resistant tissues. Some of these individuals give a history that one or other parent and one or more brothers or sisters died of pulmonary tuberculosis. This raises the question why, after presumably the same exposure to infection, some should survive and others die. Those of us who support the motion would like to know what substance is present or absent in the tissues of those who succumb to tuberculosis. Three years ago a fourth storey was being added to the tuberculosis dispensary at San Sebastian, and the tuberculosis officer told me that in this flat there would be three beds and all the necessary apparatus for investigating the metabolism of tuberculous patients. This seemed a promising line of research. There is also a psychical factor, and most clinicians will agree with Dr. Lionel Houghton who pointed out that anxiety will lower resistance to the tubercle bacillus. There is also the well-established

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[1] Todd, J. W. *Lancet*, 1949, ii, 1229.

[1] *Tubercle*, 1949, 30, 62.

Obituary

HENRY GORDON CAMPBELL

L.R.C.P.E., L.D.S.

. Gordon Campbell, who died at his home in
n Jan. 17, at the age of 79, was the first occu-
he first chair of dental surgery in Scotland.
ntment was apt to the tradition of his family,
her, Mr. Walter Campbell practised as a dentist
e, and his brother, the late Dr. W. Graham
was dean of the Dental Hospital in Dundee
tart in 1919. On his retirement in 1938 Gordon
succeeded him in that office.

Dundee High School he went to Edinburgh
y, but when he was 19 he broke off his studies
go on the stage in London under the name of
)oune. He also did some journalism, and he
end of Richard Le Gallienne. But this break
essional work was after all only an interlude,
eturned to Edinburgh to finish his studies.
e qualified in medicine and dentistry and settled
e in Dundee. In 1913 he was appointed dental
the Dundee school board and for some years
also dental surgeon to the maternity and
fare clinic.

nder of the Dundee Dental Health Association,
so a former president of the Odonto-Chirurgical
of Scotland and of the Dundee Dental Club.
lental school he lectured in dental anatomy
iology, and he was lecturer in oral hygiene in
e for the diploma in public dentistry conducted
ndrews University. He was appointed to the
dental surgery there when it was founded in
e retired in 1946.

ves a widow and two sons. The elder, Mr. W.
Campbell, is surgeon to the Royal Dundee
y, but like his father and his grandfather he
s a dental qualification.

Appointments

. G. M., B.A., M.D. Camb., M.R.C.P.: consultant physician, aster and Kendal group of hospitals.

). Mc R., M.B. Dubl., D.M.R.D.: radiologist, Bolton and ict group of hospitals.

ERHARD, M.R.C.P.: pathologist, Burnley and district p of hospitals.

G. H. H., M.B. Manc., M.R.C.P.: physician, Ashton, e, and Glossop group of hospitals.

FE, E. W., M.B.E., M.S. Lond., F.R.C.S.: consultant orthoc surgeon, Tunbridge Wells and Hastings group of itals.

. P., M.B. Edin., D.P.M.: deputy superintendent (psychia-), Shelton Hospital, Shrewsbury.

D. J. A., M.B. Lond., D.A.: anæsthetist, Rochdale and ict group of hospitals.

Brown, Jean, M.D. Lond., F.R.C.S., M.R.C.O.G.: consultant trician and gynæcologist, Canterbury and Isle of Thanet.

James, M.D. Belf., M.R.C.P., D.P.H., D.C.H.: physician, h Cheshire group of hospitals.

T, James, M.D. Glasg., F.R.F.P.S., D.P.H.: consultant chest ician, Leicester chest service.

I, Mark, M.D. Lwow: senior resident M.O., Southport nenade Hospital.

. H. A., M.B. Dubl., F.R.C.S., F.R.C.S.I.: consultant surgeon, ow and Furness group of hospitals.

IRE, S. B., B.A., M.B. Camb.: part-time consultant anæsist, Barrow and Furness group of hospitals.

B. S., M.D. Manc., M.R.C.P.: physician, Wigan and Leigh up of hospitals.

E. P. H., M.B. Camb., F.R.C.S.: consultant surgeon, caster and Kendal group of hospitals.

ALD, T. B., D.S.C., M.B. Birm., F.R.C.S.E., M.R.C.O.G.: æcologist, Ashton, Hyde, and Glossop group of hospitals.

, L. A., M.B. Manc., D.A.: anæsthetist, Ashton, Hyde, Glossop group of hospitals.

L. J., M.B. Camb., D.A.: part-time consultant anæsthetist, ston and Chorley group of hospitals.

H, J. L., M.B. Camb., F.R.C.S.: consultant thoracic surgeon, von and Cornwall area.

HS, Arthur, M.R.C.S., D.M.R.D.: radiologist, Macclesfield l Crewe group of hospitals.

. J., M.B. Camb., M.R.C.P.: consultant physician, Lancaster l Kendal group of hospitals.

ESS, J. E., M.B. Manc.: consultant pathologist, Barrow l Furness group of hospitals.

M. T. I., M.D. Lond., D.P.H.: deputy M.O.H. and deputy ool M.O., Bournemouth.

J. D., M.B. Camb., M.R.C.P.: physician, Aylesbury and gh Wycombe group of hospitals.

J. J. H., M.D. Durh., M.R.C.P., D.P.M.: psychiatrist, Crispin Hospital, Northampton.

DYEN, W. A. L., M.D. Edin., M.R.C.P.: consultant physician, ackburn and district group of hospitals.

Paine, D. H. D., M.B. Lond., D.P.M.: deputy superintendent (psychiatrist), St. Margaret's Mental Defective Colony, Great Barr, Birmingham.

Rackow, F. I., M.B. Lond., M.R.C.P.: senior medical registrar, St. Andrew's Hospital, London.

Rewell, R. E., M.D. Lond., M.R.C.P.: consultant pathologist, United Liverpool Hospitals.

Richmond, D. A., M.B. Manc., F.R.C.S.: orthopædic surgeon, Burnley and district group of hospitals.

Royde, C. A., M.D. Lond., D.P.H.: asst. administrative M.O., headquarters staff, Sheffield regional hospital board.

Shaw, D. A. F., M.B. Manc., M.R.C.O.G.: gynæcologist, Stockport and Buxton group of hospitals.

Sommerville, James, M.B. Glasg.: dermatologist i.c. wards at Western Infirmary, Glasgow.

Spacek, M. R. W., M.B. Dubl., D.A.: part-time consultant anæsthetist, Lancaster and Kendal group of hospitals.

Stokes, W. J., M.D. Lond., M.R.C.P., D.OBST. R.C.O.G.: physician, Aylesbury and High Wycombe group of hospitals.

Strahan, A. W. B., M.B. Edin., F.R.C.S.: consultant surgeon, Barrow and Furness group of hospitals.

Taylor, W. V., M.B. Lond., D.M.R.: radiologist, Oldham and district group of hospitals.

Waind, A. P. B., D.S.C., M.D. Leeds, M.R.C.P.: consultant physician, Barrow and Furness group of hospitals.

Watt, Leslie, M.D. Aberd.: venereologist, Rochdale, Ashton, and Oldham venereal-disease clinics.

Weir, J. H., M.D., B.HY. Durh., D.P.H.: M.O.H., Kensington and Chelsea.

Whitwell, Francis, M.D. Lond.: pathologist, Broadgreen Hospital, Liverpool.

Middlesex Hospital, London:

Boyle, A. C., M.D. Lond., M.R.C.P., D.PHYS. MED.: asst. physician, dept. of physical medicine.
Lloyd-Davies, O. V., M.S. Lond., F.R.C.S.: asst. surgeon.
Snelling, Margaret, M.B. Lond., M.R.C.P., F.R.C.S., D.M.R.: asst. radiotherapist.

Manchester Royal Eye Hospital:

Ophthalmic M.O. (senior hospital M.O.):
Ashworth, A. N., M.B. Manc., D.O.M.S.
Hoffmann, B. L., M.B. Manc., D.O.M.S.
Mitchell, E. J., M.B. Manc., D.O.
Shannon, T. E., M.B. N.U.I., D.O.M.S.

Local Treasury Medical Officers:

Blaquiere, H. M., M.D. Manc.: Liverpool 17 district.
Boyd, L. G., M.B. Aberd.: Northallerton.
Byrne, P. A., M.B. N.U.I.: Herne Hill, London.
Corrigan, J. K., M.B. N.U.I., D.P.H.: Spennymoor.
Dyson, C. B., B.A. Camb., M.R.C.S.: Misterton, Walkeringham, West Stockwith, Beckingham, and Gringley.
Foster, A. L., M.R.C.S.: Yoxford, Peasenhall, Darsham, and Westleton.
Gallaher, H. F. L., M.B. Belf.: Retford.
Gang, Marcell, M.D. Vienna: Cardiff eastern district.
Gleeson, E. W., M.B. N.U.I.: Ramsbottom.
Hallinan, J. A., M.B. Camb.: Maltby, Wickersley, and Bramley.
John, C. W., M.R.C.S.: Stoke-on-Trent.
Jones, D. V. M., M.R.C.S.: Harrow.
Lynch, C. E. B., M.D. Glasg.: Burnley.
McConaghey, R. M. S., M.D. Edin.: Dartmouth.
Marriott, I. A., M.R.C.S.: Derby.
Mullins, G. E., M.R.C.S.: Wells.
Nelson-Jones, Archibald, M.D. Lond., M.R.C.P.: West Brompton, London.
Parry, J. N. M., M.B. Lond., F.R.C.S.: Llanishen, Cardiff.
Sadler, W. R., L.R.C.P.E.: Glasgow E2 district.
Shashoua, Aboudi, M.B. Manc.: Bolton.
Staunton, T. P., M.B. N.U.I.: Runcorn.
Stephens, H. N. D., M.R.C.S.: Dunstable.
Stevenson, A. E., M.B. Edin.: Sanquhar and Kirkconnel.
Taylor, W. J. J., B.A. Camb., M.R.C.S.: Bury St. Edmunds.
Thurston, G. L. B., M.R.C.P., D.C.H.: Brentwood.

Birmingham Maternity and Child-Welfare Department:

Asst. administrative M.O.:
Alexander, Edith, M.R.C.S., D.P.H., D.C.H.
Stark, Vida, M.D. Glasg., D.P.H.
Asst. M.O.:
Domenet, Jacqueline, M.B. Birm.
Will, Margaret, M.B. Aberd., D.P.H.

Appointed Factory Doctors under the Factories Acts:

Anderson, J. N., M.B. Durh.: Helsby district.
Cameron, J. S., M.B. Glasg., D.P.H.: Dalmellington district.
Higgins, T. M. B., M.B. Belf.: Hawes district.
Merrick, H. P., M.R.C.S.: Wokingham district.
Reis, Ivor, M.R.C.S.: Poplar district.

Colonial Service:

Achmatowicz, Leon, M.D. Warsaw: M.O., grade 2 (temporary), Fiji.
Alakija, Afolabi, L.R.C.P.E.: M.O., Nigeria.
Anderson, T. F., O.B.E., M.A., M.D. Camb., D.T.M. & H. director of medical services, Kenya.
Gadd, K. G., M.B. Edin.: pathologist, Northern Rhodesia.
Hackett, E. W. R., M.B. Dubl.: ear, nose, and throat specialist, Nigeria.
Hall, A. H., M.D. Manc., F.R.C.S.E.: surgeon specialist, Nigeria.
Howat, C. H., M.B. Edin., D.T.M. & H.: surgeon specialist, Tanganyika.
Kryszek, S. H., M.B. Polish School of Medicine: M.O., Nyasaland.
Mackay, D. M., M.B. Edin.: M.O., Northern Rhodesia.
Renner, E. A., O.B.E., M.B. Edin., D.T.M.: deputy director of medical services, Sierra Leone.
Scott, D. B., M.B. Edin.: M.O., Gold Coast.
Wilson, Carmichael, B.A., M.B. Dubl.: headquarters deputy director of medical services, Nigeria.

are greatly improved if penicillin and sulfasuxidine are added. Anti-amœbic drugs appear to possess synergistic properties which are a justification of the old blunderbuss treatment.

2. Although imperfect, carbarsone is moderately potent and will produce immediate cure in 48%. Its shortcomings are better judged by the high absolute-failure rate of 42%, which is much higher than that of emetine.

3. Emetine bismuth iodide appears to have a higher success-rate than emetine, but the more objective absolute-failure rate is nearly the same. In series U the patients were treated with powdered emetine bismuth iodide tablets placed in gelatin capsules. In a previous series the unbroken tablets were used with most disappointing results; whole tablets were removed from the bowel at sigmoidoscopy and many more were shown intact radiologically. The clinical results were much worse than in series U and 5 patients died before we appreciated the reason. It is beyond belief that manufacturers continue to supply emetine bismuth iodide pills and that gelatin-coated powders are unobtainable.

4. Dr. Todd states that sulphonamides and penicillin are best reserved for cases whose attacks do not take a favourable course. Many cases of amœbic dysentery are so severe from the onset that both these drugs are of immense value. After all, when given separately and alone they are capable of curing the disease and statistically differ but little from emetine.

5. We have now treated 23 cases with 'Aureomycin.' It is the most potent curative agent which we have yet handled.

6. We have found with serial sigmoidoscopies that a proportion of cases which still have open ulcers at 20 days proceed to complete healing at 27 days or later without further treatment. With the drugs at present in common use we have found that many ulcers take 3–4 weeks to heal.

7. We believe that amœbic dysentery is a serious illness requiring precise diagnosis and coordinated treatment. In view of the time required for healing, forward units are at present unsuitable places for treatment.

8. The sulphonamides alone are capable of rendering patients free of amœbæ.

The normal treatment of bacillary dysentery is with these drugs. If all cases of dysentery, both bacillary and amœbic, were treated in forward units without microscopy, all would be treated with sulphonamides. The result would be a disastrous suppression of the diagnosis of amœbiasis and a consequent rise in the number of chronic undiagnosed cases.

T. G. ARMSTRONG
R. ELSDON-DEW
R. J. MAROT
A. J. WILMOT.

Amœbiasis Research Unit,
South African Council for
Scientific and Industrial Research.

URTICARIA COMPLICATING STREPTOMYCIN THERAPY

SIR,—I was interested to read Captain Lindars's article in your issue of Jan. 21. The following case is somewhat similar to that described by him.

A girl, aged 15 years, with tuberculous meningitis, was started on streptomycin treatment on July 16, 1949. She received forty intrathecal injections of 100 mg. each; and she also had 2 g. intramuscularly each day until Oct. 21, when the dose was reduced to 1 g. daily owing to increasing deafness. This dose was maintained until Jan. 11, when she received her 180th intramuscular dose. The streptomycin was then stopped. She had also been on 'Promizole'—1 g. daily—from Dec. 1. This was continued after the streptomycin was stopped.

On Jan. 16, five days after streptomycin was stopped, she developed a profuse urticarial rash on her body and limbs; and she also complained of diplopia. She had ptosis on the left side and her left pupil was dilated. She vomited once that day.

All drugs were stopped. The rash cleared gradually in three days. The diplopia is still persisting slightly (8 days after the appearance of the rash). Her ptosis is much improved. However she has vomited once daily since the rash appeared. She was afebrile after her intrathecal course was completed on Sept. 21 until Jan. 21. On the 4 days since then her evening temperature has varied between 100° and 101°F.

Cork Fever Hospital and
House of Recovery.

M. J. LYNCH.

THE CAPENER NAIL-PLATE

SIR,—It is true, as stated last week by Mr. C and Mr. Hosford, that many devices (in both one two pieces) have been invented for the fixation of t chanteric fractures. The method is a well proved and not only saves life but also makes easier the of such cases and minimises the duration of h care. Even if Coltart and Hosford are unable to that the method is "invaluable," no doubt they allow that, at any rate, it is *valuable* if it achieves results stated.

The nail-plate to which my name has been is, I think, an improved version of the Neufeld device. If eponymous names are to be used, the two should be joined. Surely, however, it is time that eponyms were discarded. It is given to few to be original. The catalogues of surgical instrument makers are cluttered with illustrations of appliances many of which provide poor memorials to the craftsmen named.

The Princess Elizabeth
Orthopædic Hospital, Exeter.

NORMAN CAPENER.

Medicine and the Law

A Forgotten Swab

AT a recent inquest at Oxford on the death of an elderly woman after an emergency operation, evidence from necropsy indicated that a swab was found in the pelvis. Death was stated to be due to cardiac failure and pulmonary congestion associated with partial intestinal obstruction following an operation for the relief of an intestinal volvulus.

The surgeon who had operated produced specimen swabs, large and small. It was a large swab which had been found in the body. Asked by the coroner whether it was not a big object to be overlooked, the witness agreed that it appeared large when spread out, but thought that in this case it must have been crumpled up into a small space and hidden behind a layer of intestine. The coroner directed his questions to ascertain the practice of counting swabs and the responsibility for the count. The surgeon said he usually tried to know how many were in use but the final count provided a check. The practice was for the nurses to record on a slate the numbers and types used; he himself invariably inquired about the count, if he had not already had the information. No similar accident had happened to him before, but his more senior colleagues could recall at least one example in the course of their professional careers.

There was evidence that a nurse had gone off duty and been replaced by another nurse during the course of the operation; she went to supper at 8 P.M. and returned to duty half an hour later. One witness observed that a change-over of this kind was unusual and undesirable; there was, however, no hospital regulation to prohibit it.

The coroner returned a verdict of death by misadventure. It seemed reasonable, he said, that a surgeon should keep a rough idea of the number of swabs used, but he could not be expected to have an exact memory of it; it was not surprising that he failed to remember this particular swab. A mistake had been made somewhere; possibly the additional swabs called for were not entered on the slate or one was missed in the final count. As regards the change-over of nurses, he did not suggest new regulations on this subject; but, if the replacement of a nurse during an operation became necessary, there ought to be a very clear understanding between the relieving nurse and the relieved nurse.

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1. See Evans, E. M. *J. Bone Jt Surg.* 1949, 31B, 190.

Obituary

HENRY GORDON CAMPBELL

L.R.C.P.E., L.D.S.

f. H. Gordon Campbell, who died at his home in ee, on Jan. 17, at the age of 79, was the first occu- of the first chair of dental surgery in Scotland. ppointment was apt to the tradition of his family, s father, Mr. Walter Campbell practised as a dentist ındee, and his brother, the late Dr. W. Graham bell, was dean of the Dental Hospital in Dundee its start in 1919. On his retirement in 1938 Gordon bell succeeded him in that office.

m Dundee High School he went to Edinburgh ersity, but when he was 19 he broke off his studies to go on the stage in London under the name of on Doune. He also did some journalism, and he a friend of Richard Le Gallienne. But this break professional work was after all only an interlude, he returned to Edinburgh to finish his studies. 904 he qualified in medicine and dentistry and settled actice in Dundee. In 1913 he was appointed dental er to the Dundee school board and for some years was also dental surgeon to the maternity and l-welfare clinic.

e founder of the Dundee Dental Health Association, as also a former president of the Odonto-Chirurgical ety of Scotland and of the Dundee Dental Club. the dental school he lectured in dental anatomy physiology, and he was lecturer in oral hygiene in course for the diploma in public dentistry conducted St. Andrews University. He was appointed to the ir of dental surgery there when it was founded in 8. He retired in 1946.

Ie leaves a widow and two sons. The elder, Mr. W. don Campbell, is surgeon to the Royal Dundee rmary, but like his father and his grandfather he holds a dental qualification.

Appointments

rrett, G. M., B.A., M.D. Camb., M.R.C.P.: consultant physician, Lancaster and Kendal group of hospitals.
rry, D. M. R., M.B. Dubl., D.M.R.D.: radiologist, Bolton and district group of hospitals.
hr, Gerhard, M.R.C.P.: pathologist, Burnley and district group of hospitals.
nham, G. H. H., M.B. Manc., M.R.C.P.: physician, Ashton, Hyde, and Glossop group of hospitals.
tcliffe, E. W., M.B.E., M.S. Lond., F.R.C.S.: consultant orthopædic surgeon, Tunbridge Wells and Hastings group of hospitals.
yle, E. P., M.B. Edin., D.P.M.: deputy superintendent (psychiatrist), Shelton Hospital, Shrewsbury.
own, D. J. A., M.B. Lond., D.A.: anæsthetist, Rochdale and district group of hospitals.
rton-Brown, Jean, M.D. Lond., F.R.C.S., M.R.C.O.G.: consultant obstetrician and gynæcologist, Canterbury and Isle of Thanet.
rson, James, M.D. Belf., M.R.C.P., D.P.H., D.C.H.: physician, South Cheshire group of hospitals.
thbert, James, M.D. Glasg., F.R.F.P.S., D.P.H.: consultant chest physician, Leicester chest service.
manski, Mark, M.D. Lwow: senior resident M.O., Southport Promenade Hospital.
aniels, H. A., M.B. Dubl., F.R.C.S., F.R.C.S.I.: consultant surgeon, Barrow and Furness group of hospitals.
arbishire, S. B., B.A., M.B. Camb.: part-time consultant anæsthetist, Barrow and Furness group of hospitals.
ck, T. B. S., M.D. Manc., M.R.C.P.: physician, Wigan and Leigh group of hospitals.
rake, E. P. H., M.B. Camb., F.R.C.S.: consultant surgeon, Lancaster and Kendal group of hospitals.
tzGerald, T. B., D.S.C., M.B. Birm., F.R.C.S.E., M.R.C.O.G.: gynæcologist, Ashton, Hyde, and Glossop group of hospitals.
fford, L. A., M.B. Manc., D.A.: anæsthetist, Ashton, Hyde, and Glossop group of hospitals.
ray, A. J., M.B. Camb., D.A.: part-time consultant anæsthetist, Preston and Chorley group of hospitals.
riffith, J. L., M.B. Camb., F.R.C.S.: consultant thoracic surgeon, Devon and Cornwall area.
riffiths, Arthur, M.R.C.S., D.M.R.D.: radiologist, Macclesfield and Crewe group of hospitals.
ay, W. J., M.B. Camb., M.R.C.P.: consultant physician, Lancaster and Kendal group of hospitals.
orrocks, J. E., M.B. Manc.: consultant pathologist, Barrow and Furness group of hospitals.
ones, M. T. I., M.D. Lond., D.P.H.: deputy M.O.H. and deputy school M.O., Bournemouth.
idd, J. D., M.B. Camb., M.R.C.P.: physician, Aylesbury and High Wycombe group of hospitals.
owe, J. J. H., M.D. Durh., M.R.C.P., D.P.M.: psychiatrist, St. Crispin Hospital, Northampton.
IacFadyen, W. A. L., M.D. Edin., M.R.C.P.: consultant physician, Blackburn and district group of hospitals.
Paine, D. H. D., M.B. Lond., D.P.M.: deputy superintendent (psychiatrist), St. Margaret's Mental Defectivo Colony, Great Barr, Birmingham.
Rackow, F. I., M.B. Lond., M.R.C.P.: senior medical registrar, St. Andrew's Hospital, London.
Rewell, R. E., M.D. Lond., M.R.C.P.: consultant pathologist, United Liverpool Hospitals.
Richmond, D. A., M.B. Manc., F.R.C.S.: orthopædio surgeon, Burnley and district group of hospitals.
Royde, C. A., M.D. Lond., D.P.H.: asst. administrativo M.O., headquarters staff, Sheffield regional hospital board.
Shaw, D. A. F., M.B. Manc., M.R.C.O.G.: gynæcologist, Stockport and Buxton group of hospitals.
Sommerville, James, M.B. Glasg.: dermatologist i.c. wards at Western Infirmary, Glasgow.
Spacek, M. R. W., M.B. Dubl., D.A.: part-time consultant anæsthetist, Lancaster and Kendal group of hospitals.
Stokes, W. J., M.D. Lond., M.R.C.P., D.OBST. R.C.O.G.: physician, Aylesbury and High Wycombe group of hospitals.
Strahan, A. W. B., M.B. Edin., F.R.C.S.: consultant surgeon, Barrow and Furness group of hospitals.
Taylor, W. V., M.B. Lond., D.M.R.: radiologist, Oldham and district group of hospitals.
Waind, A. P. B., D.S.C., M.D. Leeds, M.R.C.P.: consultant physician, Barrow and Furness group of hospitals.
Watt, Leslie, M.D. Aberd.: venereologist, Rochdale, Ashton, and Oldham venereal-disease clinics.
Weir, J. H., M.D., B.HY. Durh., D.P.H.: M.O.H., Kensington and Chelsea.
Whitwell, Francis, M.D. Lond.: pathologist, Broadgreen Hospital, Liverpool.

Middlesex Hospital, London:
Boyle, A. C., M.D. Lond., M.R.C.P., D.PHYS. MED.: asst. physician, dept. of physical medicine.
Lloyd-Davies, O. V., M.S. Lond., F.R.C.S.: asst. surgeon.
Snelling, Margaret, M.B. Lond., M.R.C.P., F.R.C.S., D.M.R.: asst. radiotherapist.

Manchester Royal Eye Hospital:
Ophthalmic M.O. (senior hosital M.O.):
Ashworth, A. N., M.B. Manc., D.O.M.S.
Hoffmann, B. L., M.B. Manc., D.O.M.S.
Mitchell, E. J., M.B. Manc., D.O.
Shannon, T. E., M.B. N.U.I., D.O.M.S.

Local Treasury Medical Officers:
Blaquiere, H. M., M.D. Manc.: Liverpool 17 district.
Boyd, L. G., M.B. Aberd.: Northallerton.
Byrne, P. A., M.B. N.U.I.: Herne Hill, London.
Corrigan, J. K., M.B. N.U.I., D.P.H.: Spennymoor.
Dyson, C. B., B.A. Camb., M.R.C.S.: Misterton, Walkeringham, West Stockwith, Beckingham, and Gringley.
Foster, A. L., M.R.C.S.: Yoxford, Peasenhall, Darsham, and Westleton.
Gallaher, H. F. L., M.B. Belf.: Retford.
Gang, Marcell, M.D. Vienna: Cardiff eastern district.
Gleeson, E. W., M.B. N.U.I.: Ramsbottom.
Hallinan, J. A., M.B. Camb.: Maltby, Wickersley, and Bramley.
John, C. W., M.R.C.S.: Stoke-on-Trent.
Jones, D. V. M., M.R.C.S.: Harrow.
Lynch, C. E. B., M.D. Glasg.: Burnley.
McConaghey, R. M. S., M.D. Edin.: Dartmouth.
Marriott, I. A., M.R.C.S.: Derby.
Mullins, G. E., M.R.C.S.: Wells.
Nelson-Jones, Archibald, M.D. Lond., M.R.C.P.: West Brompton, London.
Parry, J. N. M., M.B. Lond., F.R.C.S.: Llanishen, Cardiff.
Sadler, W. R., L.R.C.P.E.: Glasgow E2 district.
Shashoua, Aboudi, M.B. Manc.: Bolton.
Staunton, T. P., M.B. N.U.I.: Runcorn.
Stephens, H. N. D., M.R.C.S.: Dunstable.
Stevenson, A. E., M.B. Edin.: Sanquhar and Kirkconnel.
Taylor, W. J. J., B.A. Camb., M.R.C.S.: Bury St. Edmunds.
Thurston, G. L. B., M.R.C.P., D.C.H.: Brentwood.

Birmingham Maternity and Child-Welfare Department:
Asst. administrative M.O.:
Alexander, Edith, M.R.C.S., D.P.H., D.C.H.
Stark, Vida, M.D. Glasg., D.P.H.
Asst. M.O.:
Domenet, Jacqueline, M.B. Birm.
Will, Margaret, M.B. Aberd., D.P.H.

Appointed Factory Doctors under the Factories Acts:
Anderson, J. N., M.B. Durh.: Helsby district.
Cameron, J. S., M.B. Glasg., D.P.H.: Dalmellington district.
Higgins, T. M. B., M.B. Belf.: Hawes district.
Merrick, H. P., M.R.C.S.: Wokingham district.
Reis, Ivor, M.R.C.S.: Poplar district.

Colonial Service:
Achmatowicz, Leon, M.D. Warsaw: M.O., grade 2 (temporary), Fiji.
Alakija, Afolabi, L.R.C.P.E.: M.O., Nigeria.
Anderson, T. F., O.B.E., M.A., M.D. Camb., D.T.M. & H. director of medical services, Kenya.
Gadd, K. G., M.B. Edin.: pathologist, Northern Rhodesia.
Hackett, E. W. R., M.B. Dubl.: ear, nose, and throat specialist, Nigeria.
Hall, A. H., M.D. Manc., F.R.C.S.E.: surgeon specialist. Nigeria.
Howat, C. H., M.B. Edin., D.T.M. & H.: surgeon specialist, Tanganyika.
Kryszek, S. H., M.B. Polish School of Medicine: M.O., Nyasaland.
Mackay, D. M., M.B. Edin.: M.O., Northern Rhodesia.
Renner, E. A., O.B.E., M.B. Edin., D.T.M.: deputy director of medical services, Sierra Leone.
Scott, D. B., M.B. Edin.: M.O., Gold Coast.
Wilson, Carmichael, B.A., M.B. Dubl.: headquarters deputy director of medical services, Nigeria.

are greatly improved if penicillin and sulfasuxidine are added. Anti-amœbic drugs appear to possess synergistic properties which are a justification of the old blunderbuss treatment.

2. Although imperfect, carbarsone is moderately potent and will produce immediate cure in 48%. Its shortcomings are better judged by the high absolute-failure rate of 42%, which is much higher than that of emetine.

3. Emetine bismuth iodide appears to have a higher success-rate than emetine, but the more objective absolute-failure rate is nearly the same. In series U the patients were treated with powdered emetine bismuth iodide tablets placed in gelatin capsules. In a previous series the unbroken tablets were used with most disappointing results; whole tablets were removed from the bowel at sigmoidoscopy and many more were shown intact radiologically. The clinical results were much worse than in series U and 5 patients died before we appreciated the reason. It is beyond belief that manufacturers continue to supply emetine bismuth iodide pills and that gelatin-coated powders are unobtainable.

4. Dr. Todd states that sulphonamides and penicillin are best reserved for cases whose attacks do not take a favourable course. Many cases of amœbic dysentery are so severe from the onset that both these drugs are of immense value. After all, when given separately and alone they are capable of curing the disease and statistically differ but little from emetine.

5. We have now treated 23 cases with 'Aureomycin.' It is the most potent curative agent which we have yet handled.

6. We have found with serial sigmoidoscopies that a proportion of cases which still have open ulcers at 20 days proceed to complete healing at 27 days or later without *further treatment. With the drugs at present in common* use we have found that many ulcers take 3–4 weeks to heal.

7. We believe that amœbic dysentery is a serious illness requiring precise diagnosis and coordinated treatment. In view of the time required for healing, forward units are at present unsuitable places for treatment.

8. The sulphonamides alone are capable of rendering patients free of amœbæ.

The normal treatment of bacillary dysentery is with these drugs. If all cases of dysentery, both bacillary and amœbic, were treated in forward units without microscopy, all would be treated with sulphonamides. The result would be a disastrous suppression of the diagnosis of amœbiasis and a consequent rise in the number of chronic undiagnosed cases.

T. G. ARMSTRONG
R. ELSDON-DEW
R. J. MAROT
A. J. WILMOT.

Amœbiasis Research Unit,
South African Council for
Scientific and Industrial Research.

URTICARIA COMPLICATING STREPTOMYCIN THERAPY

SIR,—I was interested to read Captain Lindars's article in your issue of Jan. 21. The following case is somewhat similar to that described by him.

A girl, aged 15 years, with tuberculous meningitis, was started on streptomycin treatment on July 16, 1949. She received forty intrathecal injections of 100 mg. each; and she also had 2 g. intramuscularly each day until Oct. 21, when the dose was reduced to 1 g. daily owing to increasing deafness. This dose was maintained until Jan. 11, when she received her 180th intramuscular dose. The streptomycin was then stopped. She had also been on 'Promizole'—1 g. daily—from Dec. 1. This was continued after the streptomycin was stopped.

On Jan. 16, five days after streptomycin was stopped, she developed a profuse urticarial rash on her body and limbs; and she also complained of diplopia. She had ptosis on the left side and her left pupil was dilated. She vomited once that day.

All drugs were stopped. The rash cleared gradually in three days. The diplopia is still persisting slightly (8 days after the appearance of the rash). Her ptosis is much improved. However she has vomited once daily since the rash appeared. She was afebrile after her intrathecal course was completed on Sept. 21 until Jan. 21. On the 4 days since then her evening temperature has varied between 100° and 101°F.

M. J. LYNCH.

Cork Fever Hospital and
House of Recovery.

THE CAPENER NAIL-PLATE

SIR,—It is true, as stated last week by Mr. C and Mr. Hosford, that many devices (in both o two pieces) have been invented for the fixation of chanteric fractures. The method is a well proved and not only saves life but also makes easier the of such cases and minimises the duration of care. Even if Coltart and Hosford are unable to that the method is "invaluable," no doubt allow that, at any rate, it is *valuable* if it achieves results stated.

The nail-plate to which my name has been is, I think, an improved version of the Neufeld dev If eponymous names are to be used, the two should joined. Surely, however, it is time that eponyms discarded. It is given to few to be original. The catalogues of surgical instrument makers are cluttered with illustrations of appliances many of which prove poor memorials to the craftsmen named.

NORMAN CAPE

The Princess Elizabeth
Orthopædic Hospital, Exeter.

Medicine and the Law

A Forgotten Swab

AT a recent inquest at Oxford on the death of an elderly woman after an emergency operation, evidence from necropsy indicated that a swab was found in the pelvis. Death was stated to be due to cardiac failure and pulmonary congestion associated with partial intestinal obstruction following an operation for the relief of intestinal volvulus.

The surgeon who had operated produced specimen swabs, large and small. It was a large swab which had been found in the body. Asked by the coroner whether it was not a big object to be overlooked, the witness agreed that it appeared large when spread out, but thought that in this case it must have been crumpled up into a small space and hidden behind a layer of intestine. The coroner directed his questions to ascertain the practice of counting swabs and the responsibility for the count. The surgeon said he usually tried to know how many were in use but the final count provided a check. The practice was for the nurses to record on a slate the numbers and types used; he himself invariably inquired about the count, if he had not already had the information. No similar accident had happened to him before, but his more senior colleagues could recall at least one example in the course of their professional careers.

There was evidence that a nurse had gone off duty and been replaced by another nurse during the course of the operation; she went to supper at 8 P.M. and returned to duty half an hour later. One witness observed that a change-over of this kind was unusual and undesirable; there was, however, no hospital regulation to prohibit it.

The coroner returned a verdict of death by misadventure. It seemed reasonable, he said, that a surgeon should keep a rough idea of the number of swabs used, but he could not be expected to have an exact memory of it; it was not surprising that he failed to remember this particular swab. A mistake had been made somewhere; possibly the additional swabs called for were not entered on the slate or one was missed in the final count. As regards the change-over of nurses, he did not suggest new regulations on this subject; but, if the replacement of a nurse during an operation became necessary, there ought to be a very clear understanding between the relieving nurse and the relieved nurse.

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1. See Evans, E. M. *J. Bone Jt Surg.* 1949, 31B, 190.

Obituary

HENRY GORDON CAMPBELL

L.R.C.P.E., L.D.S.

H. Gordon Campbell, who died at his home in e, on Jan. 17, at the age of 79, was the first occu- f the first chair of dental surgery in Scotland. pointment was apt to the tradition of his family, father, Mr. Walter Campbell practised as a dentist ndee, and his brother, the late Dr. W. Graham ell, was dean of the Dental Hospital in Dundee s start in 1919. On his retirement in 1938 Gordon ell succeeded him in that office.

n Dundee High School he went to Edinburgh sity, but when he was 19 he broke off his studies to go on the stage in London under the name of n Doune. He also did some journalism, and he friend of Richard Le Gallienne. But this break rofessional work was after all only an interlude, e returned to Edinburgh to finish his studies. 4 he qualified in medicine and dentistry and settled ctice in Dundee. In 1913 he was appointed dental to the Dundee school board and for some years as also dental surgeon to the maternity and welfare clinic.

e founder of the Dundee Dental Health Association, s also a former president of the Odonto-Chirurgical ty of Scotland and of the Dundee Dental Club. he dental school he lectured in dental anatomy physiology, and he was lecturer in oral hygiene in ourse for the diploma in public dentistry conducted t. Andrews University. He was appointed to the r of dental surgery there when it was founded in . He retired in 1946.

e leaves a widow and two sons. The elder, Mr. W. don Campbell, is surgeon to the Royal Dundee rmary, but like his father and his grandfather he holds a dental qualification.

Appointments

RRETT, G. M., B.A., M.D. Camb., M.R.C.P.: consultant physician, Lancaster and Kendal group of hospitals.

RRY, D. Mc R., M.B. Dubl., D.M.R.D.: radiologist, Bolton and district group of hospitals.

HR, GERHARD, M.R.C.P.: pathologist, Burnley and district group of hospitals.

NHAM, G. H. H., M.B. Manc., M.R.C.P.: physician, Ashton, Hyde, and Glossop group of hospitals.

TCLIFFE, E. W., M.B.E., M.S. Lond., F.R.C.S.: consultant orthopædic surgeon, Tunbridge Wells and Hastings group of hospitals.

YLE, E. P., M.B. Edin., D.P.M.: deputy superintendent (psychiatrist), Shelton Hospital, Shrewsbury.

OWN, D. J. A., M.B. Lond., D.A.: anæsthetist, Rochdale and district group of hospitals.

RTON-BROWN, JEAN, M.D. Lond., F.R.C.S., M.R.C.O.G.: consultant obstetrician and gynæcologist, Canterbury and Isle of Thanet.

RSON, JAMES, M.D. Belf., M.R.C.P., D.P.H., D.C.H.: physician, South Cheshire group of hospitals.

THBERT, JAMES, M.D. Glasg., F.R.F.P.S., D.P.H.: consultant chest physician, Leicester chest service.

AMANSKI, MARK, M.D. Lwow: senior resident M.O., Southport Promenade Hospital.

ANIELS, H. A., M.B. Dubl., F.R.C.S., F.R.C.S.I.: consultant surgeon, Barrow and Furness group of hospitals.

ARBISHIRE, S. B., B.A., M.B. Camb.: part-time consultant anæsthetist, Barrow and Furness group of hospitals.

ICK, T. B. S., M.D. Manc., M.R.C.P.: physician, Wigan and Leigh group of hospitals.

RAKE, E. P. H., M.B. Camb., F.R.C.S.: consultant surgeon, Lancaster and Kendal group of hospitals.

ITZGERALD, T. B., D.S.C., M.B. Birm., F.R.C.S.E., M.R.C.O.G.: gynæcologist, Ashton, Hyde, and Glossop group of hospitals.

IFFORD, L. A., M.B. Manc., D.A.: anæsthetist, Ashton, Hyde, and Glossop group of hospitals.

RAY, A. J., M.B. Camb., D.A.: part-time consultant anæsthetist, Preston and Chorley group of hospitals.

RIFFITH, J. L., M.B. Camb., F.R.C.S.: consultant thoracic surgeon, Devon and Cornwall area.

RIFFITHS, ARTHUR, M.R.C.S., D.M.R.D.: radiologist, Macclesfield and Crewe group of hospitals.

AY, W. J., M.B. Camb., M.R.C.P.: consultant physician, Lancaster and Kendal group of hospitals.

ORROCKS, J. E., M.B. Manc.: consultant pathologist, Barrow and Furness group of hospitals.

ONES, M. T. I., M.D. Lond., D.P.H.: deputy M.O.H. and deputy school M.O., Bournemouth.

IDD, J. D., M.B. Camb., M.R.C.P.: physician, Aylesbury and High Wycombe group of hospitals.

OWE, J. J. H., M.D. Durh., M.R.C.P., D.P.M.: psychiatrist, St. Crispin Hospital, Northampton.

ACFADYEN, W. A. L., M.D. Edin., M.R.C.P.: consultant physician, Blackburn and district group of hospitals.

PAINE, D. H. D., M.B. Lond., D.P.M.: deputy superintendent (psychiatrist), St. Margaret's Mental Defective Colony, Great Barr, Birmingham.

RACKOW, F. I., M.B. Lond., M.R.C.P.: senior medical registrar, St. Andrew's Hospital, London.

REWELL, R. E., M.D. Lond., M.R.C.P.: consultant pathologist, United Liverpool Hospitals.

RICHMOND, D. A., M.B. Manc., F.R.C.S.: orthopædic surgeon, Burnley and district group of hospitals.

ROYDE, C. A., M.D. Lond., D.P.H.: asst. administrative M.O., headquarters staff, Sheffield regional hospital board.

SHAW, D. A. F., M.B. Manc., M.R.C.O.G.: gynæcologist, Stockport and Buxton group of hospitals.

SOMMERVILLE, JAMES, M.B. Glasg.: dermatologist i.c. wards at Western Infirmary, Glasgow.

SPACEK, M. R. W., M.B. Dubl., D.A.: part-time consultant anæsthetist, Lancaster and Kendal group of hospitals.

STOKES, W. J., M.D. Lond., M.R.C.P., D.OBST. R.C.O.G.: physician, Aylesbury and High Wycombe group of hospitals.

STRAHAN, A. W. B., M.B. Edin., F.R.C.S.: consultant surgeon, Barrow and Furness group of hospitals.

TAYLOR, W. V., M.B. Lond., D.M.R.: radiologist, Oldham and district group of hospitals.

WAIND, A. P. B., D.S.C., M.D. Leeds, M.R.C.P.: consultant physician, Barrow and Furness group of hospitals.

WATT, LESLIE, M.D. Aberd.: venereologist, Rochdale, Ashton, and Oldham venereal-disease clinics.

WEIR, J. H., M.D., B.HY. Durh., D.P.H.: M.O.H., Kensington and Chelsea.

WHITWELL, FRANCIS, M.D. Lond.: pathologist, Broadgreen Hospital, Liverpool.

Middlesex Hospital, London:

- BOYLE, A. C., M.D. Lond., M.R.C.P., D.PHYS. MED.: asst. physician, dept. of physical medicine.
- LLOYD-DAVIES, O. V., M.S. Lond., F.R.C.S.: asst. surgeon.
- SNELLING, MARGARET, M.B. Lond., M.R.C.P., F.R.C.S., D.M.R.: asst. radiotherapist.

Manchester Royal Eye Hospital:

Ophthalmic M.O. (senior hosital M.O.):

- ASHWORTH, A. N., M.B. Manc., D.O.M.S.
- HOFFMANN, B. L., M.B. Manc., D.O.M.S.
- MITCHELL, E. J., M.B. Manc., D.O.
- SHANNON, T. E., M.B. N.U.I., D.O.M.S.

Local Treasury Medical Officers:

- BLAQUIERE, H. M., M.D. Manc.: Liverpool 17 district.
- BOYD, L. G., M.B. Aberd.: Northallerton.
- BYRNE, P. A., M.B. N.U.I.: Herne Hill, London.
- CORRIGAN, J. K., M.B. N.U.I., D.P.H.: Spennymoor.
- DYSON, C. B., B.A. Camb., M.R.C.S.: Misterton, Walkeringham, West Stockwith, Beckingham, and Gringley.
- FOSTER, A. L., M.R.C.S.: Yoxford, Peasenhall, Darsham, and Westleton.
- GALLAHER, H. F. L., M.B. Belf.: Retford.
- GANG, MARCELL, M.D. Vienna: Cardiff eastern district.
- GLEESON, E. W., M.B. N.U.I.: Ramsbottom.
- HALLINAN, J. A., M.B. Camb.: Maltby, Wickersley, and Bramley.
- JOHN, C. W., M.R.C.S.: Stoke-on-Trent.
- JONES, D. V. M., M.R.C.S.: Harrow.
- LYNCH, C. E. B., M.D. Glasg.: Burnley.
- MCCONAGHEY, R. M. S., M.D. Edin.: Dartmouth.
- MARRIOTT, I. A., M.R.C.S.: Derby.
- MULLINS, G. E., M.R.C.S.: Wells.
- NELSON-JONES, ARCHIBALD, M.D. Lond., M.R.C.P.: West Brompton, London.
- PARRY, J. N. M., M.B. Lond., F.R.C.S.: Llanishen, Cardiff.
- SADLER, W. R., L.R.C.P.E.: Glasgow E2 district.
- SRASHOUA, ABOUDI, M.B. Manc.: Bolton.
- STAUNTON, T. P., M.B. N.U.I.: Runcorn.
- STEPHENS, H. N. D., M.R.C.S.: Dunstable.
- STEVENSON, A. E., M.B. Edin.: Sanquhar and Kirkconnel.
- TAYLOR, W. J. J., B.A. Camb., M.R.C.S.: Bury St. Edmunds.
- THURSTON, G. L. B., M.R.C.P., D.C.H.: Brentwood.

Birmingham Maternity and Child-Welfare Department:

Asst. administrative M.O.:

- ALEXANDER, EDITH, M.R.C.S., D.P.H., D.C.H.
- STARK, VIDA, M.D. Glasg., D.P.H.

Asst. M.O.:

- DOMENET, JACQUELINE, M.B. Birm.
- WILL, MARGARET, M.B. Aberd., D.P.H.

Appointed Factory Doctors under the Factories Acts:

- ANDERSON, J. N., M.B. Durh.: Helsby district.
- CAMERON, J. S., M.B. Glasg., D.P.H.: Dalmellington district.
- HIGGINS, T. M. B., M.B. Belf.: Hawes district.
- MERRICK, H. P., M.R.C.S.: Wokingham district.
- REIS, IVOR, M.R.C.S.: Poplar district.

Colonial Service:

- ACHMATOWICZ, LEON, M.D. Warsaw: M.O., grade 2 (temporary), Fiji.
- ALAKIJA, AFOLABI, L.R.C.P.E.: M.O., Nigeria.
- ANDERSON, T. F., O.B.E., M.A., M.D. Camb., D.T.M. & H. director of medical services, Kenya.
- GADD, K. G., M.B. Edin.: pathologist, Northern Rhodesia.
- HACKETT, E. W. R., M.B. Dubl.: ear, nose, and throat specialist, Nigeria.
- HALL, A. H., M.D. Manc., F.R.C.S.E.: surgeon specialist, Nigeria.
- HOWAT, C. H., M.B. Edin., D.T.M. & H.: surgeon specialist, Tanganyika.
- KRYSZEK, S. H., M.B. Polish School of Medicine: M.O., Nyasaland.
- MACKAY, D. M., M.B. Edin.: M.O., Northern Rhodesia.
- RENNER, E. A., O.B.E., M.B. Edin., D.T.M.: deputy director of medical services, Sierra Leone.
- SCOTT, D. B., M.B. Edin.: M.O., Gold Coast.
- WILSON, CARMICHAEL, B.A., M.B. Dubl.: headquarters deputy director of medical services, Nigeria.

Notes and News

ADMINISTRATION OF THE HEALTH SERVICES

In its report last year on the National Health Services, the Select Committee on Estimates[1] suggested that, while the costs of executive councils seemed to be reasonable, a review might be necessary later when the health services had settled down. Replying to this and to other suggestions by the committee, the Ministry of Health and the Department of Health for Scotland say[2] that the administrative machinery of these councils is being examined by organisation and methods officers; but "generally it seems that the administration of these bodies is economical." As to the committee's recommendation that entry into general practice should be facilitated, the Medical Practices Committee for England and Wales has completed its survey of the country; and its report, naming the areas where further practitioners are mostly urgently needed, should encourage doctors to settle in those places where the prospect of successfully establishing themselves is great. Furthermore, executive councils have been asked to consider the steps needed to increase the number of practitioners in areas classed by the Medical Practices Committee as urgently needing more doctors.

> "It has been suggested to Executive Councils that these steps might include advertising the need for a specified number of doctors to set up practices in the area, it being made clear that a fixed annual payment of £300 would normally be made in such cases; and that in sparsely populated or otherwise particularly unattractive areas the possibility should also be considered of recommending to the Minister that a payment from the Inducement Fund should be made."

With regard to the Select Committee's suggestion for reducing the number of cases where prior approval of treatment has to be obtained from a dental estimates board, "the Department's dental advisers are unable to recommend that there should be any reduction . . . nor has any recommendation for such a reduction been received from the Dental Estimates Boards."

In the field of hospital administration, the Central Health Services Council has set up a committee to inquire into this; and in Scotland there is a Standing Advisory Committee on hospital and specialist services. A joint committee of the Central Health Services Council and of the Scottish Health Services Council has been considering which "borderline" products are not properly to be regarded as drugs; and a further joint committee is considering what drugs ought (or ought not) to be prescribed.

The Minister of Health rejects, as wasteful, the committee's proposal for an internal efficiency audit by officers of regional hospital boards. He agrees, however, "that a uniform system of costing should be devised as soon as practicable for the Hospital Services in England and Wales, the only questions being the precise system to be adopted and the timing of its introduction. . . . As an interim measure hospitals have been asked to supplement the annual financial returns with statistical data which will enable costs per day or week to be calculated for each head of expenditure, thus providing a somewhat elementary form of costing." In Scotland the only costing units employed are beds and patients, but a more sensitive system of functional costing is being developed.

INFECTION AND THE COMMUNION CUP

The use of a common cup at the communion table has potential dangers which have been recognised probably from early times, and certainly from the time of Edward VI, when an injunction in the first prayer-book requires the priest to administer "last of all to the sick person." The danger comes, however, not from the person who is evidently sick, but from the unwitting carrier of harmful organisms, whether of mild disorders like the common cold, or more serious conditions such as tuberculosis. The danger is probably slight on the whole, but the notion of it is disquieting, and it may gain in importance in times of epidemic. With these considerations in mind the Rev. T. Grigg-Smith, canon chancellor of Portsmouth Cathedral, has written a short clear book[3] on intinction, the method of dipping the wafer in the wine and placing it directly on the communicant's tongue. He explains that the use of this inoffensive need do no violence to the traditional symbolism of eucharist; and quotes the resolution of the Lambeth ference, 1948, that "any part of the Anglican C by provincial regulation according to its own c procedure has liberty to sanction administration by i as an optional alternative to the traditional method. There are undoubtedly good hygienic grounds for the method universal.

"TOMORROW'S A WONDERFUL DAY"

Jewish children from the concentration camps of Europe are still entering Palestine in their th They are nearly all orphans with much misery to much bitterness to unlearn. Fifteen years ago, when an generation of such children were flying from Nazi the Youth Aliyah movement began the work of rescuing caring for them—not merely for their bodies but for hampered minds and spirits. By 1939 some 5000 had received; by the end of last year the total had 45,000; and another 15,000 are expected in 1950. They are received in 220 settlements and institutions, and are taught agriculture and crafts as well as being given ordinary schooling. The life in one such settlement was shown in a film which received great praise at the Edinburgh Festival last year. It was shown again in London, on Jan. 26, to an Jewish doctors and others.

Tomorrow's A Wonderful Day reveals the settlement as it appeared to one sullen suspicious boy, from the time he to the time when he could bring himself to laugh and and work again. All the actors are the children themselves. The photography is perfect, and leaves in the mind's some unforgettable pictures—the boy stealing bread to away; the thin musician's face of the child conducting orchestra; garlanded small children carrying the first- girls dancing lightly in bare feet; the struggle to b fence of great stones (not wire); the boy running with torch which commemorates the Maccabees; a child l the seven candles in their branched stick. All th the training of these children run the faith and custo Israel. It is as though they are constantly, wordlessly, "You have no father, but you now have a country, and you come of a race with a great religious and histo tradition. You are no longer alone, you are one of a fam and you will be cherished as the sons and daughters of you own people." This is the sort of security such children need a sense of belonging to something strong, safe, and friendly; and they have the added joy of being able to share in building up their country and making its barren places fertile.

Gentiles will be as much moved by the film as Jews, though perhaps they may regret the evidence of that intense inward-turning which has so often, and so disastrously, cut the Jewish people off from the rest of the world. The children are taught to read and write in Hebrew, and their songs deal often with the destruction of enemies (though who can blame them for that?). English audiences may also regret the commentary, delivered in an American voice, which crosses the t or dots the i far too often. Nevertheless, this a beautiful and remarkable film, which will surely stir many to contribute to the work of Youth Aliyah.

University of Oxford

On Jan. 19 the degree of B.M. was conferred on R. O. E Heape and M. J. P. Johnston.

University of Cambridge

To commemorate the Pavlov centenary Prof. J. Z. You F.R.S., will give a lecture on Wednesday, Feb. 8, in the phys logical laboratory. He is to speak on the Nature of the Learning Process.

University of London

On Feb. 15 and 17 Dr. Z. M. Bacq, professor of therap pathology in the University of Liége, will lecture at St. Mary's Hospital Medical School, London, W.2, at 5 P.M. At the first lecture he will speak on the Metabolism of Adrenaline, and at the second on the Substances which Increase the Sensitivity of Tissues to Potassium Ions.

Medical Photography

An exhibition of medical photography will be held at the photographic department, St. Mary's Hospital Medical School, from Feb. 7 to 13 (open from 2 P.M. to 6 P.M. Saturday, 10 A.M. to 1 P.M.).

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[1] Seventh Report from the Select Committee on Estimates: Session 1948–49. The Administration of the National Health Services. See *Lancet*, 1949, i, 1065.

[2] Twentieth Report from the Select Committee on Estimates: Session 1948–49. H.M. Stationery Office. Pp. 43. 1s.

[3] Intinction and the Administration of the Chalice. Portsmouth: Grosvenor Press. 1950. Pp. 24. 4s.

College of Physicians of London

meeting of the college held on Jan. 26, with Lord the president, in the chair, Dr. Donald Hunter and lip Hamill were elected to represent the college on ly *constituted Joint Formulary Committee.* Mr. . Goldsmith, Mr. L. H. Savin, and Mr. E. G. Mackie cted as examiners for the diploma in ophthalmology. following candidates having satisfied the censors' ere elected to the membership :

R. Allen, B.M. Oxfd, H. J. G. Bloom, M.D. Lond., F. G. Bolton, t., J. P. Bound, M.D. Lond., C. D. Calnan, M.B. Camb., . Cooke, M.B. Lond., L. G. G. Davies, M.B. Wales, J. J. Y. , M.D. Lond., G. C. de Gruchy, M.D. Melb., N. A. Durham, nbay, C. J. Earl, M.B. Lond., flying-officer, R.A.F., A. W. B. ls, M.B. Edin., J. W. L. Edwards, M.B. Lpool, J. J. Fleminger, nb., D. K. Ford, M.B. Camb., H. J. B. Galbraith, M.B. Lond., ash, M.B. N.Z., P. A. I. Gorer, L.R.C.P., W. P. Gurassa, d., R. C. Hallam, M.B. Lond., P. C. Harris, M.B. Lond., d Hierons, M.B. Manc., C. G. Hunter, M.B. N.Z., surg. cdr., an B. T. Logan, M.D. Belf., K. W. Lovel, B.M. Oxfd, W. N. Luntz, L.R.C.P., B. E. W. Mace, M.B. Birm., I. R. , M.B. Melb., N. B. Malleson, M.B. Camb., Andrew Meikle-.D. Glasg., J. P. Mostyn, M.B. Lond., L.R.C.P., T. E. Parry, nc., L.R.C.P., Velva Schrire, M.B. Cape Town, Raymond , B.M. Oxfd, S. J. Steel, M.D. Lond., L.R.C.P., J. K. Steward, nc., F. H. Stone, M.B. Glasg., A. I. Suchett-Kaye, ris, J. H. Thomas, L.R.C.P., D. C. Turk, B.M. Oxfd, E. G. M.D. Harvard, B.M. Oxfd, J. N. Walton, M.B. Durh., J. K. G. B.M. Oxfd, Ann H. Willcocks, M.B. Sydney, J. M. Winn, , F. J. Y. Wood, M.B. Camb., L.R.C.P., Allan Wynn, M.D. Melb.

nces to practise were conferred upon the following ndidates (108 men and 27 women) who have passed the xamination of the Conjoint Board and have complied he by-laws of the college :

. D. Abraham, Emyr Ap-Cynan, H. G. Arnall, Gordon Ascough, Badoe, A. M. Baker, Dudley Barker, J. L. R. Barlow, Roy , L. M. Barrett, P. S. I. Barry, Mary Bateman, J. D. Beavan, Beeson, C. A. Bentley, W. K. E. Bernfeld, N. P. Bhandari, M. Bishop, Irene F. A. Blakeney, S. D. Bradley, B. I. Brest, E. Bridger, W. A. Bullen, R. G. Bunn, Peter Burrows, S. H. F. G. T. Carter, N. F. Cockett, R. F. Coggins, June P. Cooper, . C. Corfield, Leslie Crystal, Margaret C. D. Daniel, Edith , Eluned B. Davies, D. S. Davis, Sheila F. Dawson, Vivienne ria, Kathleen M. de Ville, J. C. Doran, J. B. Dossetor, . A. Drew, W. E. Earle, I. D. Edeleanu, P. C. Farrant, G. A. , D. L. Fox, C. J. Frederick, D. A. Gale, Alan Gardner, S. R. h, W. S. Goodman, E. J. Goodsir-Cullen, R. E. G. Gosling, Goulding, J. P. Green, Jean E. Griswood, Jean M. Halliwell, . Hammett, C. G. J. Hardy, Ruth F. Harris, Helena J. Hart-n, Bryan Hartley, H. R. Hewitt, Frances M. Hill, Barbara D. on, Pamela J. Houchin, Samuel Hulme, G. H. Isaac, Syed di Hassan Jaffari, F. T. Jenkinson, E. L. Jones, Godfrey nedy, Mieczyslaw Koziol, E. B. Kraus, S. T. Langham, J. H. am, J. F. Le Clus, J. P. Lester, J. C. Lindsay, *D. H. Lloyd,* MacDermott, L. F. G. McLannahan, Michael Mason, K. R. n-Walshaw, G. A. Medhurst, H. A. Mitchell, H. D. S. Morgan, . Morgan, V. C. Morris, Cicely M. Murphy, B. E. C. Nordin, ot L. S. Norton, Aideen E. T. O'Brien, J. B. Parton, C. J. ra, J. M. Pirrie, W. A. Pollitt, J. A. Porritt, N. A. Power, M. M. Prat, Lucy J. Putnam, A. E. A. Read, J. D. Rees, V. Robertson, B. R. Robinson, K. F. Robinson, William er, J. J. O'C. Rorke, Ivor Rosen, J. E. Routh, Stella Salt, P. Shannon, Mary Soppitt, P. B. Sparke, J. T. B. Stewart, . Tannen, E. A. Tarleton, Susanne M. Tauber, J. D. Thomas, . S. Thomas, D. C. Thompson, L. E. Tyler, W. N. Vellacott, dine M. R. Vesey, F. P. Wallis, Cecilia M. Ward, W. H. Watson, W. Watson, R. H. R. White, P. L. G. Williams, P. F. Willis, . Wright, Henry Yellowlees, N. W. H. Young.

iplomas were conferred on those named in the report of meeting of the Royal College of Surgeons (*Lancet*, Jan. 21, 44) and on the following :

A.—Hafiz Muhammad Anwar Ansari, A. W. H. Ashbery, L. M. Bigby, P. J. C. Burton, Elizabeth P. Champion, K. A. an, H. T. Davenport, W. F. O'M. Doherty, A. W. Edridge, Farr, S. A. Fleming, N. H. Georgeff, W. R. Gilmore, Eric dsmith, I. M. Gow, W. A. Groom, G. F. Hawkins, F. W. Hill, h Howell-Jones, J. W. Keighley, Marie D. Kelleher, C. R. kpatrick, L. G. Kilpatrick, J. R. Kyles, W. E. Lawes, J. W. ris, Thomas McErvel, Eileen M. MacMahon, J. Q. Matthias, . Monro, Kathleen M. F. Murray, Sneh Lata Nath, J. G. Pegg, F. Pelmore, Cyril Prideaux, Gifford Frank, W. E. Quitman, H. Rea, A. L. Reynard, J. D. Scobie, D. A. Sherman, J. H. W. ith, S. D. K. Stride, J. W. Thomas, N. C. B. Trapps, Simone J. n Son, T. E. Waine, J. T. Wheldon, J. D. Whitby, H. O. White, R. D. Wiggins.

.P.M.—F. O'D. Finigan.

.P.H.—J. C. Day, Roy Franey, W. C. Kingston, D. D. Maitland, McG. Rogan, Asa Singh, W. M. Stewart, Peter Westcombe.

tional Institute for Medical Research

The institute has moved from Hampstead to Mill Hill d the address is : National Institute for Medical Research, e Ridgeway, Mill Hill, London, N.W.7 (Tel. : Mill Hill 66). The building at Hampstead has been retained by the dical Research Council to house one division of the institute d the whole or parts of several research units. The address ll be : Medical Research Council Laboratories, Holly Hill, mpstead, London, N.W.3 (Tel. : Hampstead 2232).

International Anatomical Congress

This congress is to be held at Oxford from July 25 to 28 under the presidency of Prof. W. E. Le Gros Clark, F.R.S. Further information may be had from the congress secretary, Dr. Graham Weddell, Department of Human Anatomy, University Museum, Oxford.

W.H.O. European Regional Conference

The European health conference which, as we announced last week (p. 189), is to be held with a view to establishing a regional organisation for Europe, has been postponed from March 6. It will now be held during or after the third World Health Assembly, which opens in Geneva on May 8.

National Hospital, Queen Square

Dr. Helgi Tómason, of Iceland, will give a lecture at this hospital on Friday, Feb. 10, at 5 P.M., on the Occurrence of Neuropsychiatric Disorder in Twins. At the same hour on Monday, the 13th, he will speak on the Reactions of the Human Nervous System to Weather and Climate in Northern Cold and Temperate Zones.

Medical Mycology Lecture-demonstrations

The Institute of Dermatology is holding a series of lecture-demonstrations (including practical work) on medical mycology at the London School of Hygiene and Tropical Medicine during March on Mondays and Fridays at 2 P.M. Full details can be had from the secretary of the institute, 5, Lisle Street, London, W.C.2.

Congress on Hæmatology

The congress of the International Society of Hæmatology will be held in Cambridge from Aug. 21 to 26 under the presidency of Sir Lionel Whitby. There will be discussions on anæmias, leukæmias, blood coagulation, and immunohæmatology. Applications should be sent as soon as possible to the congress secretary-treasurer: Dr. Martin Hynes, Department of Medicine, University of Cambridge.

Mental Health and the Family

The National Association for Mental Health is holding a conference on this subject at the Seymour Hall, Seymour Place, London, W.1, on March 23 and 24. The speakers will include Dr. J. L. Halliday. Further particulars may be had from the conference secretary of the association, 39, Queen Anne Street, London, W.1.

Association of Psychiatrists of the Scottish Western Region

On Nov. 18, at a meeting to which all psychiatrists known to be working in the Western Region were invited, this association was formed with the following office-bearers: chairman, Prof. T. Ferguson Rodger; vice-chairman, Dr. A. Dick; hon. secretary, Dr. Hunter Gillies, Crichton Royal, Dumfries; treasurer, Dr. M. M. Whittet.

Festival of Britain 1951

The theme of the festival exhibition, which is to be held in London on the South bank of the Thames in 1951, is that British contributions to civilisation have resulted from a combination of two forces—the initiative of the People and the resources of their Land. Besides the section on health in the sequence on the People, other advances in medical fields, such as industrial medicine and welfare, will be shown in the sections on power and production. Under the Dome of Discovery, which links the two great sequences, there will be exhibits, in the section on exploration, on advances in tropical medicine.

Conference on the Application of Scientific Methods

The Medical Research Council will hold a conference on this subject for industrial and Service medical officers at the London School of Hygiene, Keppel Street, W.C.1, from March 29 to 31. Lecture-demonstrations will be given by the staff of the council and by associated scientific workers. Prof. A. Bradford Hill, D.SC., Prof. J. R. Squire, and Dr. Alice Stewart will speak on Scientific Method in Field Surveys; Sir Frederic Bartlett, F.R.S., Prof. W. E. Le Gros Clark, F.R.S., and Mr. T. Bedford, D.SC., on the Improvement of Human Performance by Laboratory Studies; and Dr. Donald Hunter, Dr. J. M. Barnes, and Dr. C. M. Fletcher on the Investigation of Health Hazards. Applications for enrolment should be sent to the secretary, Medical Research Council, 38, Old Queen Street, London, S.W.1, as soon as possible.

Medical Artists' Association of Great Britain

This association is holding an exhibition at 1, Wimpole Street, London, W.1, from Monday, March 27, to Saturday, April 1.

Military Medicine

The 13th meeting of the Office International de Documentation de Médecine Militaire will be held in Monaco from May 3 to 7. Further information may be had from the secretariat, 2a, Boulevard des Moulins, Monte Carlo.

British Health Resorts Association

At a meeting held on Jan. 18 it was unanimously decided to revive this association, and a further meeting is being held today Friday, Feb. 3, at 4 P.M., at 11, Chandos Street, London, W.1, to elect officers. Dr. M. B. Ray, is the acting hon. secretary, and the temporary address of the association is Bourdon Street, Berkeley Square, W.1 (Mayfair 7330).

St. Thomas's Hospital Musical Society

This society will perform Mozart's *Requiem* on Tuesday, Feb. 14, at 8.15 P.M. (ending about 9.30 P.M.) in St. Mary's Church, Bryanston Square, London, W.1. Dr. W. Dykes Bower will conduct, and the organist will be Mr. J. Dykes Bower, organist at St. Paul's Cathedral. No tickets are required.

Medical Films

The Royal Society of Medicine and the Scientific Film Association will hold a joint meeting on Feb. 21, at 5.30 P.M., at 1, Wimpole Street, London, W.1, when Sir Kenneth Goadby will preside and Prof. R. J. S. MacDowall, Mr. C. J. Longland, and Dr. R. G. W. Ollerenshaw will open a discussion on What Constitutes the Ideal Medical Film.

Course on Industrial Medicine

The Nuffield department of occupational health of the University of Manchester is holding a course for industrial medical officers and nursing sisters from March 27 to April 1 on the Rôle of Industrial Medicine in the Welfare State. Further particulars will be found in our advertisement columns.

Medical Film Makers

A film-show discussion for makers of medical films will be held by the medical committee of the Scientific Films Association at Guy's Hospital on the third Wednesday of February, March, April, and May, from 6 P.M. to 8 P.M. Tickets may be had from the association, 4, Great Russell Street, London, W.C.1.

Dental Mission to New Zealand

An official mission is leaving at the beginning of February to obtain a report on the New Zealand system of school dental nurses. The members of the mission are: Prof. R. V. Bradlaw, M.D.S., F.R.C.S., dean of the dental school and professor of dental surgery at Durham University; Dr. T. H. J. Douglas, F.D.S. R.C.S., senior dental officer of the Department of Health for Scotland; Mr. H. T. Roper-Hall, M.B., F.D.S. R.C.S., president-elect of the British Dental Association; Mr. W. G. Senior, PH.D., F.D.S. R.C.S., principal dental officer, Ministry of Health; and Dr. A. T. Wynne, F.D.S. R.C.S., medical officer, Ministry of Education.

Mr. Ewing on European Health Services

After his six weeks' study of health, education, and social-welfare schemes in four European countries Mr. Oscar Ewing, the U.S. Federal Security Administrator, said that he had come home with even greater confidence in President Truman's proposal for national health insurance in the United States. According to *B.U.P.*, he believes that "the British plan is totally unsuited for the United States. In England, the health service is part of a broad programme to reorganise the basic social and economic structure of the country and eight-ninths of the cost comes out of general tax revenues. This is utterly foreign to the President's proposal." The latter is "strictly an insurance plan on a pay-as-you-go basis and intended solely to eliminate the dollar barrier between the average American and the medical care he needs." Mr. Ewing feels that the Swedish scheme, under which each patient pays one-third of the doctor's fees each time he needs medical attention, should be given some thought. It is intended to cut down abuses of the system by both doctor and patient.

British Medical Students Association

The London Hospital branch of the association
on Tuesday, Feb. 21, at 5.30 P.M., when Sir Hugh
will speak on the Injured Workman, and on Tuesday,
when Dr. Alice Stewart will speak on Social Medicine.
meetings will be held at the hospital at 5.30 P.M.

Sir Henry Dale, O.M., has left for a three months'
tour in New Zealand and Canada for the British Council.

The Hunterian Society has issued its *Transactio*
1948–49 session. The hon. secretaries of this soc
Mr. C. A. Francis and Dr. Franklin Bicknell.

CORRIGENDUM: *Some Actions of Chloramph*
the annotation of Jan. 28, p. 170, reference 1 should
Bell, J. A., Pittman, M., Olson, B. J. *Publ. Hlt*
Wash. 1949, 64, 589.

Diary of the Week

FEB. 5 TO 11

Tuesday, 7th

UNIVERSITY OF LONDON
5 P.M. (Westminster Medical School, Horseferry Road, S.W.1
Prof. J. G. G. Borst (Amsterdam): The Circul
Disease.
5.15 P.M. (University College, W.C.1.) Dr. L. C. Th
Visual Physiology. (First of three weekly lectures)

Wednesday, 8th

ROYAL FACULTY OF PHYSICIANS AND SURGEONS, 242, St. Vin
Street, Glasgow
5 P.M. Dr. G. J. Aitken: Diagnosis of Congenital Heart
(James Watson lecture.)

Thursday, 9th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. Denis Browne: Congenital Deformities o
Urethra, Vagina, and Anus. (Hunterian lecture.)
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. A. D. Porter: Urticaria.
ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Desmond Curran: Psychiatry
demonstration.
ADLERIAN SOCIETY OF GREAT BRITAIN
8 P.M *Medical Section.* (11, Chandos Street, W.1.)
F. L. Golla: Psychotherapy and Responsibility.

Friday, 10th

NATIONAL HOSPITAL, Queen Square, W.C.1
5 P.M. Dr. Helgi Tomasson (Iceland): Occurrence of
psychiatric Disorder in Twins.
MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. Helen Dimsdale: Neurological demonstration.
WEST-KENT MEDICO-CHIRURGICAL SOCIETY
8.30 P.M. (Miller Hospital, S.E.10.) Mr. Alistair Gunn: The
Discomforts of Pregnancy.

Births, Marriages, and Deaths

BIRTHS

BUCHANAN.—On June 21, in Edinburgh, the wife of Dr. J. W
Buchanan—a daughter.
BYRNE.—On Dec. 15, in Derby, the wife of Dr. P. H. Byrne—a son.
GOODMAN.—On Jan. 10, in London, to Dr. Ruth Goodman (
Sabel), wife of Mr. C. J. Goodman—a daughter.
JOHNSTON.—On Jan. 23, the wife of Dr. J. S. Johnston—a son.
KENDALL.—On Jan. 22, in London, the wife of Dr. John Ken
—a daughter.
LYDON.—On Jan. 17, in London, the wife of Dr. F. L. Lydon
a daughter.
MCALLEN.—On Jan. 22, the wife of Dr. P. M. McAllen—a daught
ROSS.—On Jan. 26, in Edinburgh, the wife of Mr. J. A. R
M.B.E., F.R.C.S.E.—a daughter.
SCHILLER.—On Jan. 29, at Didsbury, the wife of Dr. George Sc
—a daughter.
WHITE.—On Jan. 26, at Southborough, the wife of Dr.
White—a son.

DEATHS

ARNISON.—On Jan. 27, at Newcastle upon Tyne, William Drew
Arnison, M.A., M.D. Durh., F.F.A.R.C.S., aged 85.
COWPER.—On Jan. 28, in Cape Town, South Africa, Claude Mar
Lovell Cowper, M.R.C.S., aged 70.
DOUGLAS.—On Jan. 26, in London, Archibald Robert John Do
M.D. Lond., F.R.C.S., D.P.H.
MONTGOMERY.—On Jan. 26, in Kalk Bay, South Africa, Step
King Montgomery, B.A., B.SC. W. Australia, M.D. Lond.,
SMITH.—On Jan. 26, at Worthing, Henry Sandford Smith, M.R
STEWART.—On Jan. 22, in Manchester, Charles Hugh Stew
M.B. Glasg.

PARA-AMINOSALICYLIC ACID IN TUBERCULOSIS

LINICAL AND PHARMACOLOGICAL ASPECTS

D. G. Madigan M.B. N.U.I.
L. L. Griffiths M.D. Dubl., D.P.H.
J. G. Lynch N.U.I., M.R.C.P.
R. A. Bruce B.M. Oxfd
Sidney Kay M.B. Belf.
HE TUBERCULOSIS CHEMOTHERAPY UNIT, FARNBOROUGH HOSPITAL, KENT

George Brownlee
B.Sc. Glasg., Ph.D. Lond.
THE WELLCOME RESEARCH LABORATORIES, BECKENHAM

s pharmacological and clinical experience with ninosalicylic acid (P.A.S.) (Lehmann 1946a) accumu- s, it seems possible to discriminate between its direct eriostatic effect on the parasite and its various rmacological effects on the host.

he bacteriostatic action of P.A.S. against tubercle illi in man, described by Lehmann (1946a and b, 7a and b), has been amply confirmed by Sievers 46) and others, and extended to studies on laboratory mals by Youmans (1946), Feldman et al. (1947), umans et al. (1947), Alin and Difs (1947), Bray et al. 48), and Duca et al. (1948). Further, a direct effect on ercle bacilli identified in body-fluids after P.A.S. has n given to man has been commented on by most ical observers. Dempsey and Logg (1947) noted the ered morphology of the bacilli and described beaded, iated, and granular forms; they believe that the acid- t granules may survive after the acid-fast cell has appeared. Similar observations were made by Erdei l Snell (1948), Steinlin and Wilhelmi (1948), and gley and Logg (1949), the last workers speaking of attered bacilli."

The antipyretic effect of P.A.S. is noted by all observers. is to be seen in the published hospital charts of the t two patients treated by Vallentin (Lehmann 1946a). dei and Snell (1948) suggest that a direct pharmaco- ical mechanism is involved. Whether the rapidly veloping euphoria observed by all clinical workers in erculous patients treated with P.A.S. is a direct effect follows the alleviation of symptoms has not been wn by previous reports.

There is no unanimity about side-effects, a fact noted Erdei and Snell (1948), but nausea and sickness usually observed; some cases develop sensitisation osyncrasy (Hemming and Stewart 1949), and crystal- ia or aciduria, with occasional hæmaturia, has been en (Nagley and Logg 1949); but no serious toxic ects have been reported.

We report here the results of a study of the pharmaco- gical and antibacterial effects of P.A.S. in animals d man.

Clinically, the first observed effect is a peripheral sodilatation seen within about half an hour of giving e initial dose. The areas habitually exposed to sunlight e most affected.

Of more gradual onset is an antipyretic effect which ay be seen within 48–72 hours. This is greatest in atients with raised swinging temperatures and is less efinite or absent in those with only slight pyrexia. he fall in temperature occurs without any perceptible weating, which raises the question whether the increased eat loss by radiation due to the observed peripheral asodilatation is sufficient to explain the antipyretic ffect.

Also observed within 48–72 hours is the subjective mprovement in the patient, generally referred to as a eeling of well-being. If this is concurrent with a well- narked antipyretic effect, it is tempting to look no urther for an explanation. But the sense of well-being is also seen in apyrexial patients and in those with progressive disease which becomes terminal. In the absence of a more precise description it is convenient to call it a detoxicating effect. Whether this detoxicating effect is due to a direct reaction between P.A.S. and the parasite's metabolic products was one subject of our inquiry.

The direct antibacterial effect on the tubercle bacillus which is seen on microscopical examination did not appear until about the seventeenth day of therapy in our series.

METHODS AND CLINICAL MATERIAL

Sodium *p*-aminosalicylate 30 g. daily was given in six doses distributed over the waking hours, the schedule being similar to that described by Nagley and Logg (1949). A flavoured elixir containing 3 g. of P.A.S. in each ounce is the most convenient preparation. Potassium citrate 1 g. twice daily was given, if required, to keep the urine alkaline. A single dose of P.A.S.—e.g., 7·5 g.—is quickly absorbed, produces a peak in the blood-level within $^1/_2$–1 hour, and is rapidly excreted in about 4 hours. The curves (fig. 1) illustrate typical estimations. It follows that isolated estimations of the blood-P.A.S. level are of little value, but if they are to be relied on they should be made 30 minutes after a dose.

Estimation

Since P.A.S. is firmly bound to plasma and tissue protein, the problem is to free, in an unaltered state, the total quantity present. This is achieved by adequate dilution, and disaggregation at an acid pH. The resulting dilute solution may be diazotised and coupled by the Bratton and Marshall method, but the colours are poor; a more suitable yellow colour is obtained by allowing the free arylamino group of P.A.S. to react with *p*-dimethyl-aminobenzaldehyde. The pH of the reaction is critical and should lie between 2·0 and 2·2 for the maximum colour development. The method is described by Short (1949) and gives recoveries of 95% or better.

Choice of Cases

The P.A.S. was given to 64 patients with pulmonary tuberculosis; 53 of them received the drug alone,

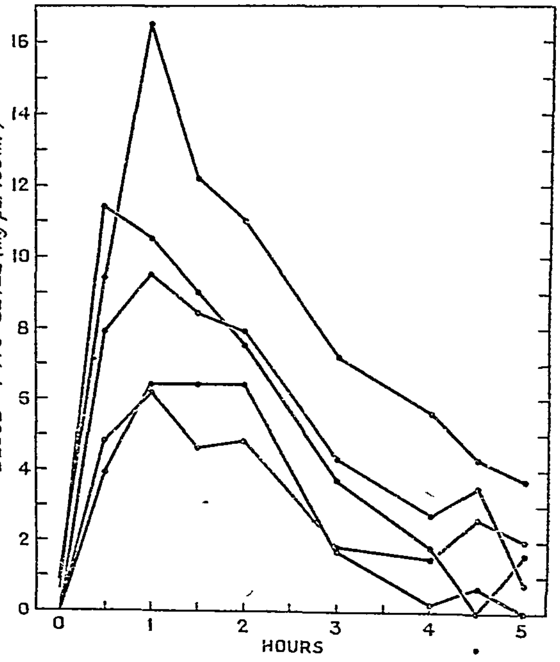


Fig. 1—Blood-P.A.S. levels in 5 patients given a single dose of P.A.S. 7·5 g., showing that by the third hour 2 patients had blood-P.A.S. of less than 2 mg. per 100 ml.

whereas 11 also received other chemotherapeutic agents. Patients were selected with a specific target in view. Thus 7 patients, recently discharged from sanatoria as having received maximum benefit (generally a euphemism for a bad prognosis), were given chemotherapy with the object of making them fit for major surgery ; 5 of these have since been accepted for operation and 2 rejected. In 17 patients treated by artificial pneumothorax for 6 months without complication, P.A.S. therapy was given at the same time ; this group included examples of those "hot" lesions in which immediate active intervention would normally entail an unjustifiable hazard of tuberculous empyema ; others were examples of bad risks with peripheral tension cavities. P.A.S. was given to 8 patients with complicated pleural effusions from which tubercle bacilli were isolated ; 2 of these had frank tuberculous empyemas, 1 of which was secondarily infected. A further 12 patients were admitted for surgical intervention after chemotherapy, and 10 of these have been accepted. There were 13 examples of bilateral tuberculosis with limited contralateral disease, exudative in 10, fibrocaseous in 3, and 2 patients presented with apical infiltration, complicated by a massive homolateral pleural effusion. Combined treatment with P.A.S., 'Sulphetrone,' and streptomycin was given to 2 patients with bronchopneumonia and 1 with tuberculous meningitis associated with pulmonary tuberculosis. The remaining 2 patients were in an advanced stage of tuberculosis, and for them no specific target was sighted.

RESULTS

Table I summarises the results obtained in these 64 cases. For convenience the grouping is based on a descriptive rather than a pathological classification. The therapeutic assessment of P.A.S. is based on the patient's general condition, changes in the erythrocyte-sedimentation rate (E.S.R.), the temperature, the pulse, and the bacteriology of body-fluids, clinical and radiological findings, and—in particular—on the achievement of the specific target.

We have not attempted a final assessment of the chemotherapeutic value of P.A.S. but have tried to emphasise the apparent clinical discrepancies which directed our attention to effects peculiar to this drug.

The changes seen in the tuberculous patient given P.A.S. may be divided into three groups. Group I comprises the effects of the drug on fever, E.S.R., blood-counts, and hæmoglobin level ; these are associated with and probably caused by the pharmacological dilator action of P.A.S. on the peripheral blood-vessels. The effects in group II are the direct ones on the tubercle bacillus, which suffers changes for a variable period, beginning about fourteen days after the first exhibition of P.A.S. ; with these are associated the changes which may be seen on X-ray films. Group III consists of toxic effects.

I. Effects on Fever, E.S.R., and Blood

The effect of P.A.S. on fever varies with its extent. When the temperature is high and swinging there is a rapid lysis to a range of about 99·5–100·5°F, usually within 48–72 hours. If the temperature excursion is already only about 99·5–100·5°F the alteration is less noticeable or absent. Usually, but not invariably, night-sweats are immediately relieved. In a few cases, however, the temperature at first rises.

The effects on the E.S.R. are also diverse and not strictly parallel to the temperature changes. They may take the form of (1) a quick fall to normal, (2) a fall from very high to a lower range with a long period (6–12 months) before the readings finally settle, or (3) a slow lysis to normal from intermediate ranges extending over 4–6 weeks.

Blood-counts and hæmoglobin levels return to normal in a lag phase which closely follows the temperature record.

Concurrent with the effect of the drug on pyrexia, a subjective response, which, in a descriptive sense, w have termed the "detoxicating effect."

In contrast to the immediate effect on temperatur the gradual reduction in pulse-rate, which seems reflect accurately the course of the disease.

II. Effects on the Tubercle Bacillus

After some 17 days' adequate P.A.S. therapy ther a change in the appearance of acid-fast stained organi which often show striations, are sometimes beaded, a may be granular. At a time when many acid-fast ba may be demonstrated in direct or concentrated smea adequately controlled culture methods may yield only sparse growth or none at all. This observation has a been noted with streptomycin (Madigan et al. 1947). 21 out of 64 patients there was sputum conversion (t 13 of these had had active surgical treatment in additi to P.A.S.). The effect of P.A.S. on exudative infiltration a on endobronchitis, either with segmental collapse alo or collapse with tension cavitation, cannot be assessed this stage.

III. Toxic Effects

Of the 64 patients reviewed, 32 had nausea, and had nausea, diarrhœa, and vomiting. The shortest up lasted only two days whereas the longest lasted th months. These symptoms were not controlled by alk but appeared to be relieved by 10 minim doses of tinct

TABLE I—ANALYSIS OF MATERIAL AND RESULTS OF P. THERAPY

Gp.	Form of tuberculosis	Improvement			No change	Worse	Died
		+ + +	+ +	+			
I	Pulmonary tuberculosis complicated by meningitis	..	..	..	..	..	1
II	Chronic miliary tuberculosis of lungs	1 CSS	..	..	..	..	..
III	Mainly exudative infiltration	..	..	1	1	..	..
IV A	Acute pulmonary fibrocaseous :						
	(*a*) Bilateral ..	..	..	2	1	..	..
	(*b*) Unilateral ..	..	1	2	..	..	..
	(*c*) Unilateral, with contralateral exudation	..	2	1	2	2	..
	(*d*) Bilateral, complicated by spread of tuberculous bronchopneumonia	1 CS	1 CS	..	1 CSS	..	[illegible]
IV B	Chronic pulmonary fibrocaseous :						
	(*a*) Bilateral ..	..	..	7 (3 CS)	6	2	..
	(*b*) Unilateral ..	..	..	1	2	..	..
	(*c*) Unilateral, with contra-exudation	..	..	6 (1 CS) (1 CSS)	1	..	..
	(*d*) Bilateral, complicated by spread of bronchopneumonia	..	..	..	..	1	..
V	Caseous pneumonic, unilateral	..	1	..	..	..	..
VI	Bronchopneumonia ..	..	2 CSS	..	..	..	..
VII	Serous pleural effusion	..	..	2	..	..	..
VIII							
	[illegible] guineapig	..	..	2	..	..	..
	(*b*) Containing tubercle bacilli	..	..	3	1	..	1
	(*c*) Frank tuberculous empyema	..	..	..	1	..	..
	Total ..	2	7	27	19	5	4

CS = Combined streptomycin therapy.
CSS = Combined sulphetrone and streptomycin therapy.

elladonna. Whether this gastro-intestinal action is uanical or pharmacological is still uncertain.

ıree cases of sensitisation to P.A.S. were observed. this was manifested by drug fever, with typical nting temperatures, the response after withdrawal g elicited by as little as 0·5 g. of P.A.S. Both were essfully desensitised with successive increments of ;. : the initial dose was 100 mg. daily for two days ; was raised to 200 mg. for two days, then 500 mg. wo days, 1·5 g. for four days, 3 g. for seven days, for seven days, 9 g. for seven days, 11 g. for seven ;, and so on. The third case of sensitisation presented generalised skin rash ; this was intensely irritating subsequently desquamated. Patch tests were positive ıspirin but not for P.A.S. The presumed sensitising en is acetylsalicylic acid or possibly salicylic acid, the allergic response is elicited to fixed antibody in skin by the near homologous P.A.S. hapten. The ıdilatation produced variable effects on the skin of and arms, only the fair-skinned showing true ıes. Some greasy skins and seborrhœic conditions e also been seen.

SITIVITY OF BACILLI TO P.A.S.: DEVELOPMENT OF RESISTANCE

trains of tubercle bacilli isolated before and after S. therapy were tested for sensitivity to P.A.S. Of 22 ins isolated before therapy all fell within the range ensitivity of 0·006–0·025 mg. per 100 ml. in a medium Dubos and Davis (1946), inoculated with 0·01 mg. per , after seven days' incubation. By comparison at the ne time the laboratory human strain, H37RV, was sitive at 0·006 mg., and CN844 at 0·025 mg. per 100 ml. 3 of the 5 patients from whom the organism could be overed immediately after 120 days' therapy its istance was found to have increased 50–100 times :

	Sensitivity (mg. per 100 ml.)				
	A	B	C	D	E
ore P.A.S. ..	0·012	0·012	0 012	0·012	0·012
er P.A.S.	1 6	0·8	0·05	1·6	0 05

contrast, the organisms recovered from 7 patients ated with sulphetrone during the period of more than) days in which they were exposed to P.A.S. were still sitive within the range of 0·005–0·05 mg. per 100 ml. P.A.S.

he slide test of Pryce (1941), recommended by Sievers 49), is well adapted for the detection of growth and the imation of drug-resistance. Sterile oxalated horse blood, ed 1 in 3 with distilled water, is a suitable medium, < $^1/_2$ in. glass microscopy slides are suitable mounts, and z. McCartney screw bottles are suitable containers. Bodyids are treated with 6% hydrochloric acid for 30 minutes 37°C and spun at high speed for a further 30 minutes. d the deposit is resuspended in sterile distilled water and eared ; or a first generation from a Lowenstein slope is spended in Dubos medium and smeared on the slide. Airying is followed by treatment with 6% sulphuric acid 5 minutes and thorough washing with distilled water. cubation at 37°C is for seven days.

EXPERIMENTS ON THE DETOXICATING EFFECT

It is widely believed that the extensive tissue destruction which characterises tuberculosis follows the conitioned hypersensitivity induced by the products of etabolism of virulent pathogens. The evidence for nplicating the diffusible protein component, thought be identical with tuberculin, is discussed by Brownlee 1948). That P.A.S. might exert its observed "detoxiating" effect by inactivating or otherwise interfering ith tuberculin hypersensitisation was the subject of the ollowing experiments on animals.

Forty-eight young adult guineapigs of either sex, eighing 350–400 g., were inoculated deeply into the right high muscles with 0·25 mg. of a fourteen-day-old subulture of human tubercle bacillus, strain CN844. The etails of diet and of animal management are those previously described (Brownlee and Kennedy 1948). By the end of the third week all the animals had palpable inguinal glands adjacent to the site of inoculation. In the fourth week 42 animals gave good positive reactions and 6 poor positive reactions to 0·00005 mg. of purified-protein derivative (P.P.D.) Old Tuberculin.

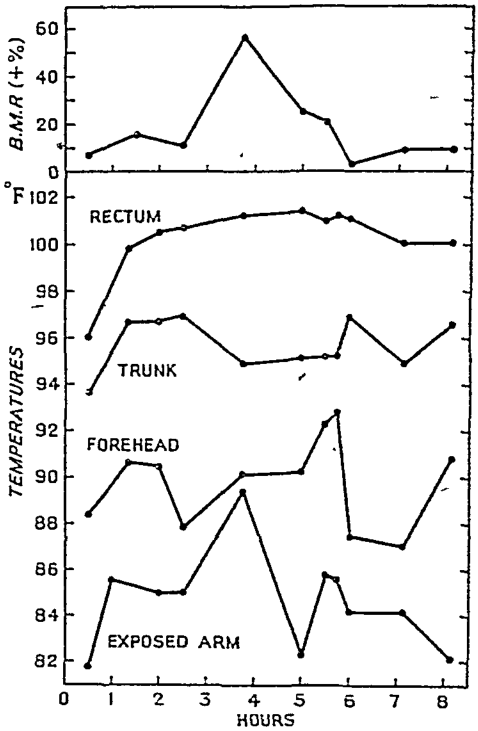


Fig. 2—Rectal and skin temperatures and B.M.R. in an untreated pyrexial tuberculous patient.

Exploratory Dosing Experiments with P.A.S.

In 5 tuberculous guineapigs the blood-P.A.S. levels an hour after they had received 90 mg. of P.A.S. (2 ml. of 4·5% solution) by mouth were 1·6 ± 0·4 mg. per 100 ml. Four hours later the same animals were given a further 90 mg. by mouth, and their blood-P.A.S. levels were 1·4 ± 0·5 mg. per 100 ml. 45 minutes after this dose.

Subsequently 17 tuberculous guineapigs were each given a single dose of 200 mg. of P.A.S. by mouth. Their blood-P.A.S. levels 30–85 minutes after dosing were 6·4 ± 4·4 mg. per 100 ml.

Preliminary Tuberculin-shock Experiments

The tuberculin used for these experiments was P.P.D. (batch T 2212 B) ; 156 mg. of this was dissolved in 6·5 ml. of N/50 sodium hydroxide and the pH adjusted to 8·5 with dilute phosphoric acid. The concentration was 12 mg. per ml. On the twentieth day after infection with tuberculosis 4 guineapigs were injected intraperitoneally with P.P.D. The guineapig given 10 mg. died within fourteen hours, and the one given 1 mg. was ill for two days ; those given 0·01 mg. and 0·1 mg. were unaffected.

On the twenty-first day after infection one animal injected intraperitoneally with 8 mg. of P.P.D. died within fourteen hours, that given 4 mg. was ill but survived, and that given 2 mg. died at seventeen hours. Two normal guineapigs injected intraperitoneally with 10 mg. of P.P.D. showed no ill effects and survived.

Main Tuberculin-shock Experiment

Thirty-three guineapigs now in the twenty-ninth day after infection remained for the main experiment, and these were divided into three groups.

Group 1 : eleven guineapigs were given P.A.S. 240 mg. by mouth and 25–42 minutes later were injected intraperi-

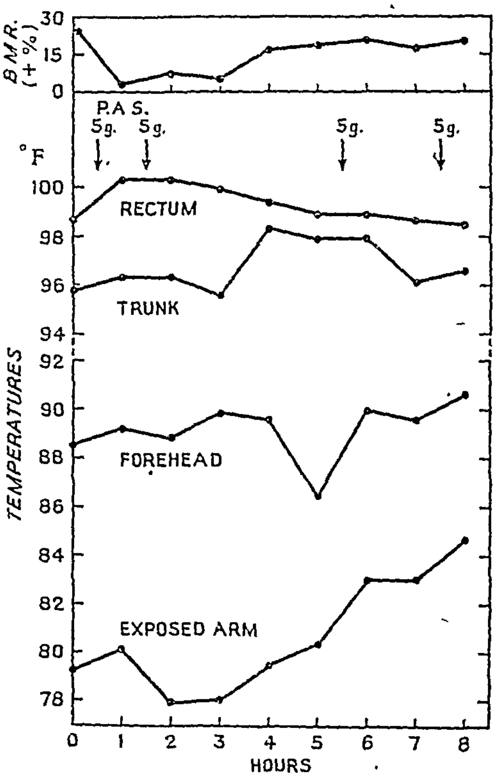


Fig. 3—Rectal and skin temperatures and B.M.R. in a pyrexial tuberculous patient given P.A.S. 30 g. in six divided doses daily, showing decrease in body (rectal) temperature and increase in skin-temperature.

toneally with 6 mg. of P.P.D.; this was followed 40–60 minutes later by a second dose of P.A.S. 340 mg. Eight guineapigs died within seven hours, and 3 within twenty hours.

Group 2: ten guineapigs were injected with a mixture of 100 mg. of P.A.S. and 6 mg. of P.P.D. which had been previously incubated for six hours at 37°C. Two died within six hours, 7 within twenty hours, and 1 which was ill was chloroformed after two days.

Group 3: twelve guineapigs were injected intraperitoneally with 6 mg. of P.P.D. Three died within six hours, 6 within thirty hours, and 3 which were ill were chloroformed after two days.

Conclusion

It may be concluded that a blood-P.A.S. level similar to that produced clinically does not protect the tuberculous sensitised guineapig from a lethal challenge dose of Old Tuberculin, P.P.D.; nor do previous admixture and incubation modify the challenge.

SKIN-TEMPERATURES AND B.M.R.

The observed peripheral vasodilatation in man given therapeutic doses of P.A.S., and the concurrent lysis of pyrexia, suggested that P.A.S. had a direct antipyretic effect.

Skin-temperatures were measured with previously calibrated constantan-copper thermocouples of large contact area, fixed tightly to the skin with openwork elastic strapping. The reference junction was held at 0°C by melting ice in a Dewar flask, and the potentials were read on a sensitive direct-reading millivoltmeter. The subjects were screened to prevent draughts, and the external temperature was carefully controlled. The basal temperature was provided by the rectal lead, and other leads were attached to forehead, trunk, and forearm.

Basal metabolic rates (B.M.R.) were estimated by calculation from indirect calorimetry with a closed air circuit in a Benedict-Roth apparatus. A respiratory quotient (R.Q.) of 0·82 being assumed, the normal values for oxygen consumption were calculated from tables (Sanborn 1922). The B.M.R. is expressed, as usual, as a percentage above (+) or below (−) the normal.

Control metabolism experiments on patients not receiving P.A.S. gave B.M.R. estimates within the range of + 7 to + 56%, with a mean of + 17% for ten estimations. The usual diurnal temperature sweep of the febrile tuberculous patient is accompanied by an increased B.M.R. (fig. 2). DuBois (1927) notes that the B.M.R. rises about 10% for each 1°C rise in body-temperature. Temperatures of forehead, arm, and trunk seem to follow the same pattern as the basal rectal temperature but show more fluctuation, probably because of imperceptible sweating.

This picture is modified by P.A.S. The effect of a single dose of 5 g. is to lower the body-temperature. The greatest effect is at about one and a half hours after P.A.S. has been given, a time at which blood-P.A.S. levels are highest (fig. 1). During the period in which the body-temperature is lowered there is a rise in the skin-temperature of the arm.

In febrile patients given P.A.S. during their waking hours the effects of the drug are least first thing in the morning when the patient wakes, and most last thing at night (fig. 3). In the case illustrated body-temperature fell progressively during the day but the skin-temperature progressively rose and the B.M.R. remained substantially unaltered. All febrile patients examined showed the same pattern of behaviour to P.A.S., but it should be emphasised that very variable records were made, of which fig. 3 illustrates an average experiment.

The record in the afebrile patient treated with P.A.S. is different (fig. 4). The body-temperature is maintained at a normal or slightly subnormal level, but there is raised skin-temperature and peripheral vasodilatation. In these patients, however, there is a well-marked increase in B.M.R.

It may be concluded that P.A.S. exerts a direct pharmacological effect, resulting in peripheral vasodilatation. This increases heat loss by direct radiation and is observed in both febrile and afebrile tuberculous patients. The increased heat loss in afebrile patients is compensated by an increase in B.M.R.

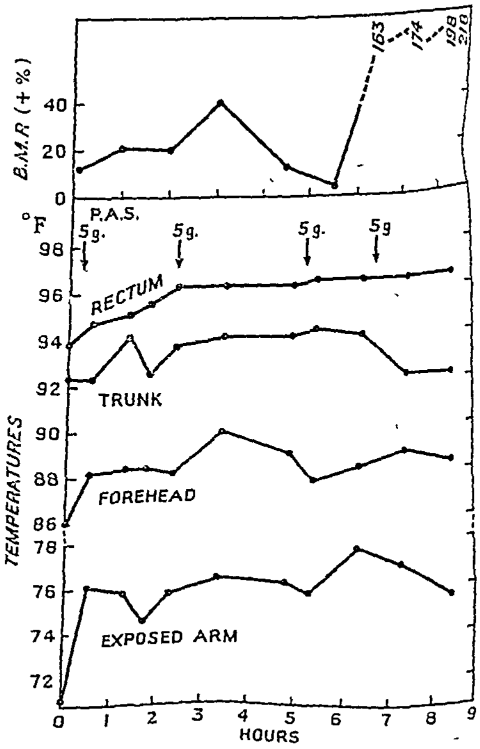
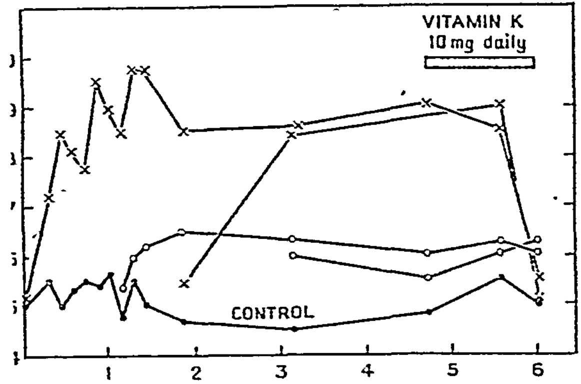


Fig. 4—Rectal and skin temperatures and B.M.R. in an apyrexial tuberculous patient given P.A.S. 30 g. in six divided doses daily, showing subnormal body (rectal) temperature, increased skin-temperature due to peripheral vasodilatation, and increased heat production shown by raised B.M.R.



:—Prothrombin-times of whole plasma in tuberculous patients en P.A.S. 30 g. daily and in a control, showing prophylactic effect -cles) and therapeutic effect (crosses) of synthetic vitamin K mg. daily by mouth.

EFFECT OF P.A.S. ON PROTHROMBIN-TIME

tahmann et al. (1941), Huebner and Link (1941), Link et al. (1943) had demonstrated the anti-thrombin activity of dicoumarol, and have shown t this is due to the action of salicylic acid, a degrada- ı product. Salicylates and their derivatives were) found to prolong the prothrombin-time, an effect ich was reversed by synthetic vitamin K. We made . following experiment in an attempt to find whether › salicylic-acid derivative P.A.S. behaves in a like ınner.

Methods.—With but minor modifications the method of ick (1936) was used for estimating the prothrombin-time. iplicate estimates were made on (*a*) whole plasma, and plasma diluted to 12·5% with physiological saline solution, om freshly drawn oxalated whole blood. Dried human ain carefully stored at 0–4°C in wax-sealed containers was e source of thromboplastin, of which fresh extracts were epared for each series of estimates. The now well-appreciated ecautions of providing calcium-free tubes and pipettes, and using clean carefully washed serum-free pipettes for serum utions, were rigidly enforced. Shaking by rotation was efully controlled, particularly in estimates made with uted plasma. Control estimates, provided by healthy oratory staff, were included in each test, all of which were mpleted within five hours of collection of the blood.

Results.—Two series of experiments are recorded. The st (fig. 5) shows the prophylactic and curative effect vitamin K by mouth in doses of 10 mg. daily in versing the anti-prothrombin action of 30 g. of P.A.S. ily. Prothrombin-times are given for whole plasma. the second series randomised observations of pro- rombin-times in 29 patients under continuous therapy r at least two weeks were made (table II). The results r both whole and diluted plasma are given as deviations om the mean value of the controls. The increases in rothrombin-times are small and probably of no clinical gnificance (see below).

EFFECT ON GLOBULINS

Concurrently with the prothrombin tests, estimates Kunkel 1947) were made of the gamma-globulin content f each plasma. The findings are shown as deviations rom the normal (table II). Except in cases 9, 15, 19, nd 26, there was no significant deviation from the ıormal. The significance of these observations is discussed elow.

DISCUSSION

Detoxication

The term detoxication, though it must not be taken in its precise pathological meaning, conveniently describes the clinical effect which follows the exhibition of P.A.S. to the tuberculous patient. Subjectively, it is described as a feeling of well-being, and was observed in each of the present series—in the pyrexial, the apyrexial, and those who died. It has been noted by all clinical observers. It seems to be a specific effect analogous (for purposes of description) to a toxin-antitoxin neutralisation and of definite therapeutic value. We have failed to demonstrate its existence in animals, but our experiment by no means exhausts the possible mechanisms of action.

Much attention has been given in recent years to the rôle played by tuberculin in inducing the hypersensitive state which marks the collaboration of the tuberculous host in the death of his own tissue cells. A recent review of the evidence (Brownlee 1948) justifies the view that tuberculin-induced hypersensitivity ends the symbiosis between tubercle bacillus and host and ushers in the pathological changes of tuberculosis. The present animal experiment was designed to test the hypothesis that P.A.S. circulating in the blood-stream of the guineapig in the concentration deemed therapeutic for man (and guineapig) would chemically combine or otherwise neutralise lethal challenge doses of P.P.D. Old Tuberculin. This was not so; nor did previous admixture and incubation modify the score. The limitations of an experiment of this design are obvious, and only the negative aspect of the test is of value. We continue in the opinion that a reaction between P.A.S. and the products of metabolism of the tubercle bacillus, or of the induced biochemical lesions, remains to be demonstrated.

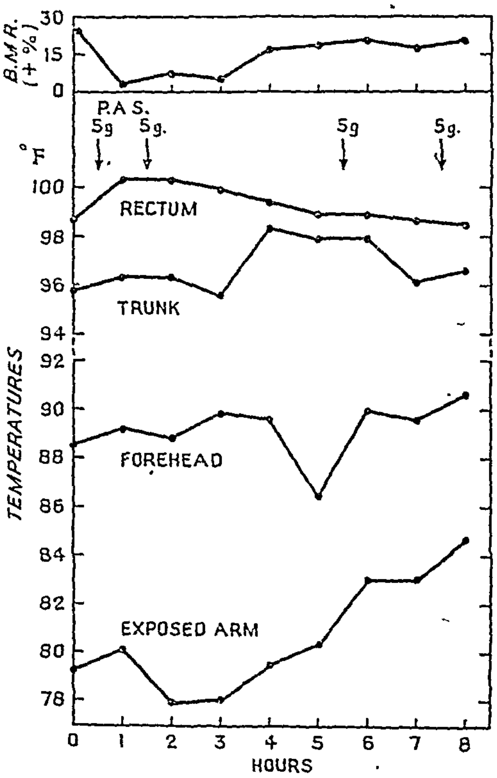
Antipyretic Action

Any analysis of the effect of P.A.S. on the fever of tuberculosis must explain the delayed antipyretic action and the apparent resolution by lysis. The classical picture of antipyretic action is provided by the coal-tar antipyretics, both in animal studies in which yeast or *Bact. coli* vaccine acts as the pyrogen (Brownlee 1939) and in human typhoid fever (Barbour 1921). Here, fall of temperature is by crisis in one to four hours. The less satisfactory response met in septicæmias generally, in

TABLE II—RANDOMISED PROTHROMBIN-TIMES IN TUBERCULOUS PATIENTS GIVEN CONTINUOUS P.A.S. THERAPY FOR AT LEAST TWO WEEKS

Case no.	Mean deviation from controls		
	Prothrombin-time (sec.)		Kunkel tests (units)
	Whole plasma	Diluted plasma	
1	+0·9 (*14*)	+ 5·2 (*12*)	+2·6 (*14*)
2	+1·4 (*14*)	+10·2 (*12*)	+2·8 (*14*)
3	+1·8 (*13*)	+12·4 (*11*)	+0·0 (*13*)
4	+1·6 (*15*)	+ 6·8 (*13*)	−0·8 (*15*)
5	+1·8 (*14*)	+12·6 (*12*)	+3·1 (*14*)
6	+2·1 (*14*)	+10·9 (*12*)	+2·0 (*14*)
7	+1·3 (*15*)	+ 8·1 (*13*)	−1·3 (*15*)
8	+1·3 (*13*)	+ 5·8 (*11*)	−1·9 (*13*)
9	+0·4 (*15*)	+ 1·8 (*13*)	+8·8 (*15*)
10	−0·5 (*4*)	− 6·2 (*2*)	+1·0 (*4*)
11	+2·0 (*10*)	+10·0 (*10*)	+0·9 (*11*)
12	+1·5 (*15*)	+10·4 (*13*)	+1·1 (*15*)
13	+4·8 (*6*)	+ 1·1 (*4*)	+3·7 (*6*)
14	+0·8 (*12*)	+ 0·1 (*10*)	+0·0 (*12*)
15	+2·8 (*14*)	+ 8·1 (*12*)	+5·5 (*14*)
16	+3·9 (*2*)	Not done	+2·8 (*3*)
17	+2·0 (*12*)	+15·4 (*12*)	+0·3 (*12*)
18	+2·1 (*9*)	+13·2 (*9*)	+0·3 (*9*)
19	+2·7 (*5*)	+11·4 (*5*)	+5·6 (*5*)
20	+1·8 (*4*)	+ 6·9 (*4*)	+1·1 (*4*)
21	+1·7 (*3*)	+ 9·8 (*3*)	+2·9 (*3*)
22	+0 0 (*2*)	+ 0·5 (*2*)	−0·7 (*3*)
23	+0·3 (*8*)	+ 1·8 (*8*)	−0·9 (*8*)
24	+2·3 (*7*)	+16·5 (*7*)	−1·5 (*7*)
25	+0·6 (*9*)	+ 4 9 (*9*)	+3·7 (*9*)
26	+2·3 (*6*)	+ 5·8 (*6*)	+8·1 (*6*)
27	+2·3 (*4*)	+11·8 (*4*)	+2·6 (*4*)
28	+0·1 (*6*)	+ 0·9 (*6*)	+0·8 (*6*)
29	+2·0 (*3*)	+ 3·2 (*3*)	+1·5 (*2*)
Mean value	+1·6 (*266*)	+ 8·0 (*238*)	+1·8 (*270*)
Mean of controls	16 3 (*15*)	42·8 (*13*)	8·6 (*15*)

Numerals in italics are numbers of tests (triplicate determinations in the case of prothrombin-times).



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The observed peripheral vasodilatation in man given therapeutic doses of P.A.S., and the concurrent lysis of pyrexia, suggested that P.A.S. had a direct antipyretic effect.

Skin-temperatures were measured with previously calibrated constantan-copper thermocouples of large contact area, fixed tightly to the skin with openwork elastic strapping. The reference junction was held at 0°C by melting ice in a Dewar flask, and the potentials were read on a sensitive direct-reading millivoltmeter. The subjects were screened to prevent draughts, and the external temperature was carefully controlled. The basal temperature was provided by the rectal lead, and other leads were attached to forehead, trunk, and forearm.

Basal metabolic rates (B.M.R.) were estimated by calculation from indirect calorimetry with a closed air circuit in a Benedict-Roth apparatus. A respiratory quotient (R.Q.) of 0·82 being assumed, the normal values for oxygen consumption were calculated from tables (Sanborn 1922). The B.M.R. is expressed, as usual, as a percentage above (+) or below (−) the normal.

Control metabolism experiments on patients not receiving P.A.S. gave B.M.R. estimates within the range of + 7 to + 56%, with a mean of + 17% for ten controls. The usual diurnal temperature sweep of the tuberculous patient is accompanied by an increased B.M.R. (fig. 2). DuBois (1927) notes that the B.M.R. rises about 10% for each 1°C rise in body-temperature. Temperatures of forehead, arm, and trunk seem to follow the same pattern as the basal rectal temperature but show more fluctuation, probably because of imperceptible sweating.

This picture is modified by P.A.S. The effect of a single dose of 5 g. is to lower the body-temperature. The greatest effect is at about one and a half hours after P.A.S. has been given, a time at which blood-P.A.S. levels are highest (fig. 1). During the period in which the body-temperature is lowered there is a rise in the skin temperature of the arm.

In febrile patients given P.A.S. during their waking hours the effects of the drug are least first thing in the morning when the patient wakes, and most last thing at night (fig. 3). In the case illustrated body-temperature fell progressively during the day but the skin-temperature progressively rose and the B.M.R. remained substantially unaltered. All febrile patients examined showed the same pattern of behaviour to P.A.S., but it should be emphasised that very variable records were made, of which fig. 3 illustrates an average experiment.

The record in the afebrile patient treated with P.A.S. is different (fig. 4). The body-temperature is maintained at a normal or slightly subnormal level, but there is a raised skin-temperature and peripheral vasodilatation. In these patients, however, there is a well-marked increase in B.M.R.

It may be concluded that P.A.S. exerts a direct pharmacological effect, resulting in peripheral vasodilatation. This increases heat loss by direct radiation and is observed in both febrile and afebrile tuberculous patients. The increased heat loss in afebrile patients is compensated by an increase in B.M.R.

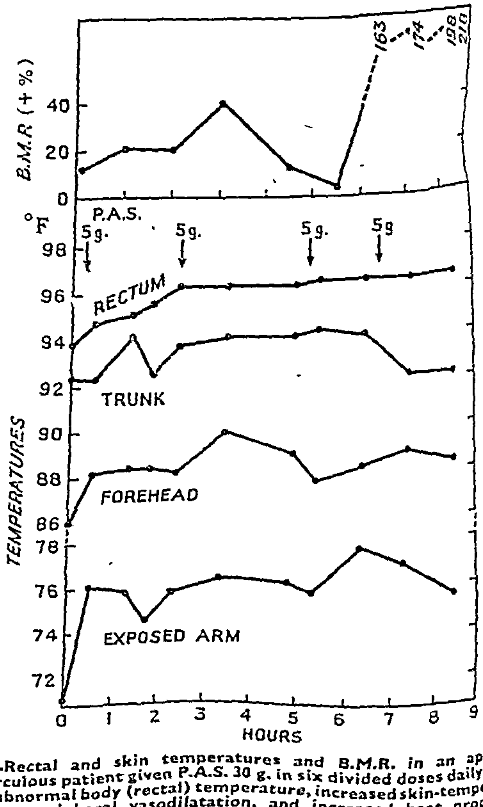

Fig. 4—Rectal and skin temperatures and B.M.R. in an apyrexial tuberculous patient given P.A.S. 30 g. in six divided doses daily, showing subnormal body (rectal) temperature, increased skin-temperature due to peripheral vasodilatation, and increased heat production shown by raised B.M.R.

py gave no evidence of impaired function. Cases 9, 19, and 26 did indeed yield evidence of significantly d titres. Case 9 is of great interest in that his current n, labelled chronic miliary tuberculosis, represents hird successful response to chemotherapy. The first n responded to rest, but the treatment was rounded with a course of gold therapy, as was the current ion. A breakdown two years later responded to hetrone, and during this period there was invasion secondary organisms. Cases 19 and 26 have also oured secondary invaders. No additional abnormal ure has been ascribed to case 15, and the cause of increased titre of gamma-globulins is not known.

r Side-effects

he further toxic effects reported have not been serious. hæmaturia seen by Nagley and Logg (1949) is pre- ably the result of crystalluria, due to the insoluble yl derivative of P.A.S. in acid urine, in which form ut 60% of the ingested dose is excreted (Way et al. 3). The difficulty does not arise in alkaline urine, and have not met it. The nausea, vomiting, and diarrhœa, n *persistent and frequently severe, which we observed* 2 out of 64 patients, has a high nuisance value and has sed the treatment to be abandoned in two other cases. ere is no complete antidote for the gastro-enteritis, alis, bases like magnesium trisilicate, and flavourings having failed. Belladonna relieves the vomiting but s not control the nausea; opium has been given to trol the diarrhœa when severe. About half of all tients receiving P.A.S. develop some intolerance to fatty ds. Three examples of sensitisation have been noted. o of these were of drug fever which responded to careful ensitisation. The third example was of an intensely ating generalised skin rash which quickly subsided withdrawal of P.A.S., and responded to desensitisation. original sensitising hapten may have been aspirin salicylic acid, and it must be supposed that the ginal antibody which was raised to these haptens was d by the skin. Rashes, probably of this kind, have n described by Hemming and Stewart (1949).

lue of P.A.S.

Though a final clinical assessment of our cases is not ng attempted at this stage, it may be asked why the ly promise seen in all cases is not sustained. Part of answer, we believe, lies in the direct pharmacological tion of P.A.S., which might in some cases be confused th a specific chemotherapeutic response. Nevertheless, is pharmacological response is valuable therapeutically. rt of the answer may also lie with the development of sistant strains at about the fourth month of therapy. e chemotherapy of tuberculosis seems to be evolving ng the line of a combination of drugs—streptomycin, lphetrone, and P.A.S.—to suppress the development of y single generation of drug-resistant organisms.

SUMMARY

The clinical description of "detoxication" is applied the immediate effect of P.A.S. therapy in the tubercu- us. Two pharmacological, as distinct from antibacterial, echanisms are involved. The first is thought to be ssociated with a direct action on the products of etabolism of the causal organism or on the biochemical sions it produces. It has not been identified. A blood- .A.S. level similar to that produced clinically does not rotect the tuberculous sensitised guineapig from a lethal hallenge dose of P.P.D. Old Tuberculin; nor do previous dmixture and incubation modify the effect of the hallenge. The second mechanism is an antipyretic ction due to peripheral vasodilatation. The heat loss s shown to be due to increased radiation associated with raised skin-temperature. Peripheral vasodilatation is lso seen in apyrexial patients, in whom heat losses re reflected in increases in B.M.R.

Changes in blood-counts, hæmoglobin, and E.S.R. estimates are secondary to the antipyretic effect. In contrast, improvements in the pulse-rate are not seen at this stage and are thought to indicate more accurately the course of the tuberculosis.

Of 22 strains of tubercle bacilli isolated before P.A.S. therapy all were inhibited from growth by 0·006–0·025 mg. per 100 ml. of Tween-albumin medium. After four months' treatment 3 of 5 strains showed an increase in resistance of 50–100 times, 2 strains growing in concentrations of 1·6 mg. per 100 ml. In contrast, cultures isolated from 7 patients treated for the same period with sulphetrone and P.A.S. were still sensitive to 0·005–0·05 mg. of P.A.S. per 100 ml.

After daily doses of 30 g. of P.A.S. a prolongation of blood-clotting time occurs within a few days; this is not cumulative, and is maintained throughout the course. The administration of 10 mg. of synthetic vitamin K daily by mouth prevents its onset, and the same dose is therapeutic. The greatest prolongation obtained on whole plasma was 22 seconds, which is equivalent to 32% prothrombin on our composite dilution curve. This is not clinically significant, unless there is concomitant liver disease or surgery is contemplated, when vitamin K should be given.

Simultaneous estimates of gamma-globulins gave no additional evidence of liver dysfunction.

Serious toxic effects have not been encountered, but the nausea, vomiting, and diarrhœa observed in 22 of 64 patients given the sodium salt of P.A.S. have a high nuisance value. No complete antidote is known.

Three drug sensitivities, two of drug-fever and one of generalised desquamating skin-rash, responded to desensitisation.

The clinical results of administering P.A.S. to 64 patients is summarised.

The animal experiments were made by G. B. with Mr. C. R. Kennedy, to whom our thanks are due. Our thanks are also due to Sister Clancy and the nursing staff of the unit.

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pneumonia, and in tuberculosis (Cushny 1947) is often forgotten. A re-examination of temperature records in patients given P.A.S. during waking hours (fig. 6) shows that, in fact, the antipyretic action does appear within two or three hours, but, because of the scheme of dosing usually followed, the first fall is often masked by a preliminary rise of temperature. The evidence that an abnormal amount of heat is still being produced by the body is provided by the records of the skin-temperatures of trunk or arms. At the times when the body-temperature, as measured by rectal thermometer, is falling, there is a corresponding rise in the skin-temperature of trunk or arms. We are satisfied that the consequent increase in heat loss is sufficient to balance the lowered body-temperature. Thus, the antipyretic effect follows from a direct drug action on heat-regulating centres, and not in the first instance, by causing metabolic changes or by interfering with the production or action of toxin. It is remarkable that the antipyretic effect of P.A.S. is unaccompanied by perceptible sweating. Indeed we believe this valuable property alone would ensure a place for P.A.S. in the management of tuberculosis. In the present series only one patient visibly sweated, and in this case complications were present. The reasons for this property of P.A.S. have not emerged from the present study.

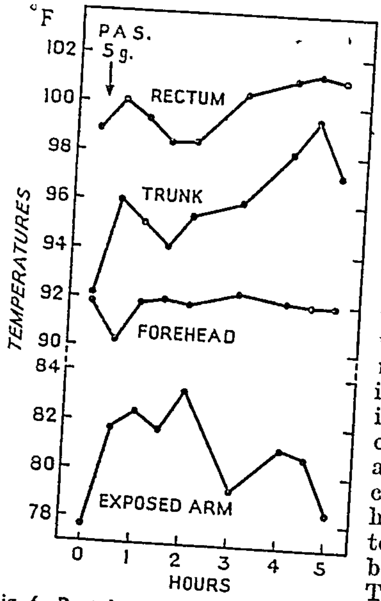

Fig. 6—Rectal and skin temperatures in a pyrexial tuberculous patient, showing fall of body (rectal) temperature while blood-P.A.S. level is highest (see fig. 1); during this time the peripheral vasodilatation is greatest and the exposed arm is radiating most heat.

An anomalous antipyretic effect of P.A.S. is observed in apyrexial patients. Unlike other antipyretics, P.A.S. causes in these cases a sufficient loss of heat by vasodilatation to lower the body-temperature by 2°F or more. The heat loss may be great enough to cause significant changes in B.M.R. Three possible explanations may be put forward : (1) that P.A.S. can so affect the "control" cells of the heat-regulating centre that the "thermostat" is set for a new low range ; (2) that P.A.S. stimulates vasodilatation by acting at a level below the hypothalamus and independently of the heat-regulating centre ; and (3) that the heat-regulating centre has been rendered unstable by long-continued toxic repression and reacts erratically to stimulation—in the words of the usual analogy, the range of the "thermostat" has been increased. We favour the last hypothesis.

Measurement of B.M.R.

Several aspects of the measurement of B.M.R. in tuberculous patients call for comment. We have already noted that control metabolism experiments on similar patients who were not receiving chemotherapy yielded B.M.R. estimates of + 7 to + 56 with a mean of + 17 for ten patients. All the patients were confined to bed from the evening before, but were allowed normal movement except for the limitations imposed by the length of the thermocouple leads. Our satisfactory control figures are in accord with the data of Robertson (1944) and Rabinowitch (1944) ; they are, however, in well-marked contrast with our own experience of "casual" B.M.R. estimates made in short-term hospital patients. T explanation for the steady base-line provided by tub lous patients may lie in their familiarity with ex- mental procedures. They are, moreover, in familiar friendly surroundings.

Changes in Blood

The several changes in the distribution of the for blood elements, in hæmoglobin concentration, and that aspect of E.S.R. which does show a return to nor seem to be secondary to the remission of fever result from antipyretic action. They are none the less val

Bacteriostasis

Observers mostly agree that human and bovine stra of tubercle bacilli are inhibited from reproduction favourable media in vitro by the incorporation of co centrations of P.A.S. ranging from 0·005 to 0·05 mg. p 100 ml., depending on the media used and the amo of the inoculum. In the present series, the inhibiting concentrations of 22 strains isolated before th were all between 0·006 and 0·025 mg. per 100 ml. u the conditions of the test. After four months' therap of 5 strains which were recovered immediately sho an increase in resistance of 50–100 times, 2 of the stra growing definitely, though slowly and sparsely, in c centrations of 1·6 mg. per 100 ml. In contrast, organisms isolated from 7 patients treated with sulp trone during the period of exposure to P.A.S. were sensitive within the range of 0·005–0·5 mg. per 100 of P.A.S. These observations are essentially simila those of Delaude et al. (1949), who found that cult isolated from 4 of 5 patients treated with P.A.S. 157–251 days could grow in concentration of P.A.S. 1·6–6·4 mg. per 100 ml. of medium. This increa resistance was not seen in cultures from patients w had received streptomycin and 'Promin' in additi

Prothrombin-time

In view of the adverse effect of dicoumarol, salicylates and acetylsalicylic acid on liver function, the adminis tration of P.A.S. 30 g. daily for periods measured in un of three months implies certain hazards. The prolonga tion of the clotting-time in the present series is substantial and statistically significant. However, serial estimations made at regular intervals for three and four months showed no evidence of a cumulative effect. Indeed it has been a constant feature that the increase of the prothrombin-time, which occurs within a few days inception of P.A.S. therapy, is maintained with m fluctuations throughout. The greatest prolonga obtained on whole plasma—i.e., 6 seconds—correspon to a prothrombin-time of 22 seconds, a figure which equivalent to 32% prothrombin on our composite dilut curve derived from six normal plasmas. Spontane hæmorrhages do not, in our experience, occur w prothrombin concentrations in excess of 15%. Howev the risk of such an occurrence must be increased wh there is concomitant liver disease, such as cirrhosis amyloid disease.

As with other salicylates, the simultaneous administra tion of synthetic vitamin K prevents the prolongat of prothrombin-time. Usually a simultaneous daily do of 10 mg. by mouth prevents it completely, and th same dose, used therapeutically, will produce a gra return to a normal clotting-time within eight da Apart from considerations of concomitant disease, th clinical significance of the prolonged clotting-times seem to be slight. However, where these considerations apply or where surgery is contemplated, simultaneous prophy lactic therapy with vitamin K is an obvious precautio

Globulins

In so far as production of globulins may be accepted as an index of liver function, 29 patients receiving P.A.S.

n unable to find any reports supporting immediate trectomy for this sequence, which, as we have noted, quite rare. Our own case is an example of the rewards ich radical surgery offers under suitable operating ditions.

n contrast, postoperative hæmorrhage affords an portunity for deliberate consideration about the isability of further operation, though, as in our t case, undue procrastination may prove fatal. The y replacement by modern methods of blood-transfusion, reluctance to advise a major operation soon after the ergency procedure, and foreknowledge of the possible iculties of the resection may blind the surgeon to the h mortality of conservative treatment. At the West ddlesex Hospital it is believed that an early gastrectomy he operation of choice; 2 of our cases treated by this thod had a smooth and uneventful recovery, whereas third, who received transfusions equivalent to nearly times his circulating blood-volume, deteriorated wly and progressively until his death.

CASE-RECORDS

Case 1.—A man, aged 46, was admitted to the West ddlesex Hospital on June 2, 1949. For many years he l had epigastric pain on and off after meals. His dyspeptic acks were treated by intermittent and perfunctory dosage h powders, and, while severe enough to cause the loss several working days in the year, they had never been rsistent and frequent enough to lead to a diagnostic restigation. During the last fortnight the pains had own worse, culminating in a violent and protracted paroxysm iich led to his admission to hospital.

On examination, the grunting respirations, the general pression of agony, and the exquisitely tender board-like dominal wall made the diagnosis obvious, though severe ock and a cachectic appearance gave cause for comment.

Operation was undertaken two hours after admission and ne hours after perforation, by which time restorative easures had improved his general condition. A perforated ronic gastric ulcer was closed with an omental graft and e abdomen closed without drainage. His convalescence rsued an uneventful and satisfactory course until the nth postoperative day, when he complained of a "catch the chest," *coughed up bloodstained sputum, and pre*nted the signs of dry pleurisy which in a day or two were ansformed into those of a small effusion.

This incident, trivial in itself, altered the whole course of s illness, by focusing attention on his chest instead of his omach; the short period when a radical intervention ight have been successful was therefore allowed to pass, d he never thereafter appeared fit enough to survive a astrectomy. He continued to bring up—or, as we then ought, to cough up—frothy blood, and a melæna stool duced his hæmoglobin sufficiently to demand a transfusion. mprovement was then rapid, no further blood or melæna ppeared, and the condition of his chest gave no cause for larm. Suddenly, on the twentieth day after operation, a iolent hæmatemesis nearly ended his life and he was only estored by a massive transfusion.

The subsequent course of his illness showed progressive leterioration, punctuated by dramatic episodes in which ppalling blood-losses were barely made good by repeated ransfusions. Though the man's condition improved remarkably after each blood-replacement, it became evident that e could not withstand these repeated circulatory shocks ndefinitely, and on July 11, thirty-eight days after his operation, he succumbed to a final profuse hæmatemesis. During this period he received no less than 46 pints of blood n addition to several pints of glucose-saline and plasma.

Necropsy disclosed that the ulcer had eroded the splenic artery.

Case 2.—A man, aged 51, was admitted to the medical wards for investigation of intermittent dyspepsia of two years' duration. Radiographic examination showed a large penetrating ulcer on the lesser curvature of the stomach. Three days after this examination he started a profuse hæmatemesis, and four days later, while the bleeding still continued, the ulcer perforated.

At operation, a large prepyloric ulcer with a small anterior perforation was found. An immediate partial gastrectomy was followed by an uneventful recovery.

The specimen showed an extensive prepyloric ulcer with a perforation anteriorly and an eroded vessel posteriorly.

Case 3.—A man, aged 43, had a nine years' history of dyspepsia, and elsewhere duodenal ulceration had been diagnosed. Sudden violent pains led to his admission, and the expected perforation was closed six hours after its onset.

Progress was satisfactory until the thirteenth postoperative day, when a large hæmatemesis occurred. His condition grew rapidly worse despite transfusion of 6 pints of blood, and eighteen hours after the onset of bleeding partial gastrectomy was performed; satisfactory recovery followed.

The specimen showed a prepyloric ulcer with an anterior perforation; the floor contained an eroded branch of the right gastric artery.

SUMMARY

Perforation and hæmatemesis form an uncommon but dangerous combination.

The event may usually be ascribed to an extensive single ulcer or to two separate lesions.

The best recovery-rate is likely to follow immediate partial gastrectomy.

Three cases are described, 2 of which were successfully treated by resection.

The two successful gastrectomies were performed by Mr. W. J. Ferguson, and I wish to thank him for allowing me to use the case-records and for much helpful advice.

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SOME OBSERVATIONS ON ANTIGEN-ANTIBODY REACTIONS

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THE antigen Rh is present on the surface of erythrocytes from Rh-positive people. It was noticed that sometimes the reaction between Rh antigen and the corresponding antibody was not followed by erythrocyte agglutination; in fact, the erythrocytes were apparently unaffected. The Rh antibodies in such cases were referred to as incomplete antibodies (Race 1944). That the union of Rh antigen and antibody had taken place was demonstrated by the use of anti-human rabbit serum (Coombs et al. 1945), commonly known as Coombs reagent. When a suitably prepared anti-human rabbit serum was added to Rh-positive cells that had previously been acted upon by Rh incomplete antibody, cell agglutination resulted.

It has been previously shown that this phenomenon is not confined to the Rh antigen-antibody system, but has a more general application. This paper describes a further extension of the principle involved, which has been studied in relation to sheep cells treated with a sheep-cell hæmolysin prepared in rabbits and an anti-rabbit hen serum.

METHOD AND TECHNIQUE

Three hens about 12 months old were injected intramuscularly with 5 ml. of alum-precipitated rabbit serum and reinjected a month later. They were bled 10 and 18 days after the second injection. Serum P (IV) taken from hen P on the 18th day was found to be the most suitable of the three and was used in most of the experiments.

PERFORATION AND HÆMATEMESIS

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SEPARATELY, perforation and hæmatemesis are everyday complications of gastric and duodenal ulceration, but together they are much less common and many experienced clinicians have not encountered an example. Indeed, the rarity has occasioned the aphorism: "Perforated ulcers do not bleed and bleeding ulcers do not perforate." Writings on the subject are scanty, and advice about treatment practically non-existent, but the prevailing impression is that the outlook is gloomy whatever is done. Since we had three cases in our unit at the West Middlesex Hospital, two of which were saved by bold surgical treatment, a review of the condition and an account of our experiences may be of value.

INCIDENCE

It appears that hæmorrhage in sufficient amount to cause anxiety follows perforation in about 1–2% of cases. James and Matheson (1934) described 2 examples in 75 cases at the Central Middlesex Hospital; and Forty (1946) reported one hæmatemesis following operation in 100 consecutive perforations. In a series of 240 perforations collected by Eliason and Ebeling (1934), 4 bled postoperatively. On the other hand, Raw (1944) did not meet with this complication in 312 personal cases of sutured perforation, and Finsterer (quoted by Winters and Egan 1939), in his extensive experience of gastric surgery, found perforation and hæmorrhage occurring together on only 3 occasions.

The reverse sequence—hæmatemesis followed by perforation—is probably still more uncommon. Hurst and Ryle (1937) found 1 perforation in 82 cases of severe hæmatemesis, and in 361 cases collected by Winters and Egan (1939) no less than 23 patients perforated within fourteen days of their last hæmorrhage; but most observers would regard hæmatemesis followed by perforation as a very rare event. Among the large number of hæmatemesis patients treated in the medical wards of this hospital in the last ten years, only one has perforated while under treatment.

PATHOLOGY

Most of the ulcers which perforate are on the anterior aspect of the duodenum or lesser curvature of the stomach, in which situation the larger arteries in the neighbourhood are protected from the erosive proclivities of the ulcer. On the other hand, posteriorly placed lesions may open up a vessel, but tend to burrow into a solid viscus rather than penetrate into the abdominal cavity. The margin of the perforation does not bleed because the adjacent vessels are obliterated by endarteritis and thrombosis. This occurs so uniformly as to eliminate the perforation itself as the source of the hæmorrhage, although in a unique case of simultaneous perforation and hæmorrhage encountered by R. L. Galloway (personal communication) an artery in the edge of the perforation bled vigorously and not only the stomach but the abdominal cavity was full of blood.

An attempt has been made to distinguish ulcers which bleed from those which perforate, on the basis of their morbid anatomy, and Behrend (1930) suggested that perforation occurs in the chronic type of ulcer with a sclerotic base, while hæmorrhage is more prone to complicate the acute ulcer with soft congested edges. It is true that severe and even fatal hæmorrhage may result from an acute ulcer, but the sclerotic variety is not immune, and in most of our urgent gastrectomies for hæmatemesis a chronic indurated lesion ha present. It is the situation rather than the type of which determines whether its active invasion will in perforation or in hæmorrhage.

It is apparent from a study of our own and reported cases that when hæmorrhage and perfor occur in the same patient either a single ulcer grown so large as to involve both anterior and po aspects of the stomach or duodenum, or else mu lesions are present. In the case reported by Hurst Ryle (1937): "A perforation which would admi tip of the little finger was seen on the anterior s of the duodenum. Almost the entire surface of duodenum was occupied by a chronic ulcer one by half an inch. On the floor a vessel had been compl divided." In each of our own cases there was a sol gastric ulcer of such dimensions that perforation occurred anteriorly and vascular penetration posteri

Kaye (1946) reports a case of double gastric with perforation and hæmorrhage. A prepy foration had been sutured; six days later a h hæmatemesis occurred which led to the patient's de and necropsy revealed an unsuspected ulcer on the l curve of the stomach.

In the 2 cases of James and Matheson (1934) perforations were in the duodenum, the hæmorrha each instance originating from an unsuspected s ulcer in the stomach. They suggest that prud would dictate examination of the stomach for a s ulcer when operating for perforation, and Winters Egan (1939) comment that hæmorrhage following su repair of a perforation should arouse suspicion another ulcer may be responsible for the bleeding.

The case reported by Monti (1946) is inte as a museum piece. A middle-aged man perf after a large hæmatemesis. At operation the p tion was found in the posterior stomach wall, nearby a nodular tumour, the size of an adult was evidently the source of the hæmorrhage. mortem the growth was secured for section, and p to be a neurinoma.

MORTALITY

The general belief that the syndrome is attended a high mortality is supported by the meagre statis available. Hamilton Bailey (1944) records 3 de from hæmatemesis in 118 sutured perforations. K patient died, as did the one under the care of H and Ryle; and both cases in James and Mathe series died. The solitary example described by appears to have survived without further su treatment, and R. L. Galloway's case was brought successful conclusion after an immediate resection our own series 1 patient treated conservatively di survive; the other 2 recovered after an emer gastrectomy.

TREATMENT

When perforation succeeds hæmatemesis, the nec for operation is not in doubt and the choice lies be simple closure of the perforation and a more amb intervention designed at once to deal with the perfo and control the bleeding. A partial gastrectomy these requirements and will ensure that multiple are not overlooked—visual examination of the st and palpation of its wall can be an unreliable met locating a bleeding gastric ulcer, particularly an one (Ives 1949). Though we regard immediate res as the ideal operation, circumstances may sugge lesser procedure, for many perforations are dealt in the small hours when a skilled team is usuall available. If continuing hæmorrhage does not re to transfusion, a planned resection may be carrie in the confident assumption that the risks of ope are outweighed by the dangers of further delay. I antibody system, and especially to see whether it ld be of any practical value. It must be emphasised once that the reagents in the sensitised-sheep-cell i-rabbit hen system are much weaker than in the esponding Rh anti-human rabbit system. Nevertless, the reagents used in this work could be made to clear-cut results provided that the right quantities e used. Once an immune hen serum has been absorbed standardised against a particular mixture of sitised sheep cells, the experiments may only be done h that particular serum using those particular test s.

he results are interesting since they show clearly t an immune hen serum can be prepared which will lutinate sensitised sheep cells, and that this activity pecifically prevented by rabbit serum but not by rat uman serum. Comparing this result with that in the nan Rh system, it seems that under certain conditions hæmolysin present on sheep cells gives reactions ilar to those of an incomplete Rh antibody absorbed to human cells. In fact, the latter state of affairs hat present in a baby affected with hæmolytic disease ere the erythrocytes are undergoing hæmolysis. It is eresting to note that, as far as it was possible to ermine, complement will still cause the lysis of sensied sheep cells which have been massively agglutinated immune hen serum.

When suitably absorbed anti-rabbit hen serum is owed to react with Rh-positive human cells sensitised th incomplete Rh antibody, agglutination occurs. is reaction is prevented not only by rabbit serum but human serum also. The addition of human serum mmune hen serum does not, nevertheless, prevent the ction of the immune hen serum with sensitised sheep s.

lthough proper quantitative evaluation is difficult, se and other observations seem to indicate that a tem of this nature (sensitised-sheep-cell immune serum) is fairly specific for the animal serum cerned—in this case rabbit serum. It is much more cific, for example, than the precipitin test.

The final experiments seemed to show that rabbit tibody absorbed on to human cells is detectable by ng this system. Control samples designed to give glutination in the presence of normal rabbit serum inly failed to show absorption of the immune hen um; but the technique was difficult, and especially control (5) it was not easy to prevent non-specific sorption. Nevertheless, the results were quite clear t.

Rat serum failed to prevent the reaction in the diluns used, and this leads to the hope that this system ay be of value in the study of experimental nephritis here an anti-rat-kidney antibody prepared in rabbits used. This latter work is proceeding in coöperation ith Dr. M. H. Roscoe of the Department of Medicine, anchester University.

SUMMARY

A method is described of using an immune hen rabbit rum with sensitised sheep cells as an indicator to detect bbit serum. The test is shown to be specific.

Using a well-known hæmolysin, like the sheep-cell ne, it can be demonstrated that when sensitised sheep ells are suspended in a suitable antiserum the reaction one of agglutination, and this is compared with the gglutination by Coombs reagent of the sensitised rythrocytes from a baby with hæmolytic disease of the ewborn.

This system may be useful in the detection of rabbit erum absorbed on to the tissues of another animal.

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ARTHRITIS MUTILANS ASSOCIATED WITH PSORIASIS

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THE association of psoriasis with rheumatoid arthritis was first noted by Alibert in 1822, and Bourdillon (1888) suggested the possibility of a common ætiology. Since then, numerous cases have been described, and criteria have been put forward in order to limit the title "psoriasis arthropica" to a specific condition, thereby avoiding its use in cases where the two conditions may be associated by chance.

The interest in the present case lies as much in the extent of the destruction of the bones of hands and feet as in the association of psoriasis with arthritis mutilans.

CASE-RECORD

A man, aged 63, was first seen in May, 1949, when the abnormal condition of his hands (fig. 1) and feet (fig. 2) was noted. In the 1914–18 war he served as a regular soldier and received a gunshot wound of the left forearm, for which he was subsequently invalided from the Service. As can be seen in the X-ray film (fig. 1), there is an ununited fracture of the left ulna, and some fragments of metal remain in the forearm. However, at present the movements of the wrist are full and strong, and the importance of this injury rests in the fact that because of it a thorough physical examination was done to assess Army pension. It is therefore certain that in 1921 there was no evidence of disability in the hands or feet. The patient says that the arthritis of his hands and feet came on between about 1925 and 1930. The onset was fairly rapid, with pain and stiffness of the hands and considerable difficulty and discomfort on walking. The only treatment adopted was local heat and liniments, and in due course the pain became steadily less, but the deformity of the hands and feet increased. The patient thinks that the condition has been stationary since 1930, and he has continued his work as odd-job man and gardener without much difficulty.

The patient first noted his skin disease about 1932–34, when it started on his hands and forearms; it has since spread to cover most of the trunk, buttocks, and limbs, the face being spared. Seventeen years ago psoriasis was diagnosed and chrysarobin ointment was applied. The patient has steadily continued with this ointment, but there was little improvement until he recently changed to soap and water. There have not been any associated fluctuations in the joint and skin conditions.

On examination there is very little voluntary movement in the fingers or thumbs, apart from an ability to oppose the thumb for a grip. Some fingers can be stretched about $^1/_2$ inch and rebound into their usual positions. The patient can dress himself, including tie, bootlaces, and important buttons, he can use the implements of his trade and of the table, and he is not particularly distressed by his condition. He has no serious disability of the other joints of the limbs or of the spine. Movements are strong at the elbows and wrists. Sensation to pinprick and cotton-wool is normal over his hands and feet. The upper-limb reflexes are brisk and equal, the lower-limb reflexes sluggish but equal, and the plantar responses flexor on both sides. Blood-pressure 150/90 mm. Hg. The vessel walls are thickened, but good pulsation is felt at the wrists and over the dorsum of each foot. The skin temperature of hands and feet is normal. The trunk, buttocks (fig. 3), and limbs are covered with psoriasis, and the nails are pitted.

Radiography.—There is remarkable similarity in the condition of the hands and feet, with gross destruction and absorption of the proximal and middle phalanges of all digits; in many cases only a small fragment of bone remains between metacarpal and terminal phalanx. The terminal phalanges are relatively intact, though rarified. The metacarpal bones have been damaged at their distal ends, and are deformed and distorted, but show little rarefaction. The 4th and 5th right metacarpals are mostly absorbed, and the distal end of the right first metacarpal has undergone absorption and bending. The metatarsals are less affected but show tapering of the distal ends. Though the carpometacarpal and tarsometatarsal joints are not distinct, except in the left hand, the small bones and joints of the wrists and ankles are clearly defined. The musculature of the

The anti-rabbit hen serum was inactivated by heating at 55–56°C for 30 minutes and then diluted 1 : 2 with physiological saline solution and absorbed at room temperature with washed packed normal sheep cells followed by washed packed rabbit cells. The reagent was tested against sheep and rabbit cells as described below, and if the absorption was complete it was considered ready for use. Normal hen serum diluted 1 : 2 was inactivated and absorbed in the same way.

Sheep cells were prepared in a 10% solution and sensitised with five minimal hæmolytic doses of anti-sheep-cell hæmolysin. (The hæmolysin used should be of high titre and free from agglutinin at this dilution.) The sensitised sheep cells and normal sheep cells were then washed three times with normal saline and resuspended as 10% suspension in normal saline. These reagents were now compared and were considered satisfactory if the sedimentation-rates of both were the same and there was no microscopic evidence of agglutination in the sensitised sheep cells.

Agglutination tests were carried out on microscope slides at room temperature. One volume of serum or of saline red-cell suspensions was used in the test. Titrations were done by doubling the serum dilutions using normal saline as diluent; one volume of test cells was then added. Macroscopic evidence of positive agglutination was noted, but absence of agglutination was confirmed microscopically. The time of agglutination was taken, and about 4–10 minutes was allowed before a result was pronounced negative, depending on the sensitivity of the sheep-cell hæmolysin mixture. Aggregation of the erythrocytes was assisted by the gentle agitation and mixing of the cells and sera equally in tests and controls.

Very large aggregate.	Few free cells	= + + +
Large aggregate.	Few free cells	= + +
Small aggregate.	Many free cells	= +
No agglutination		= Neg.

EXPERIMENTS

For convenience the reagents prepared as described above will be denoted by abbreviations as follows :

Anti-rabbit hen serum = P (IV)
Normal hen serum = N.H.S.
Sensitised sheep cells = S.S.C.
Normal sheep cells = N.S.C.

In the first group of experiments it was found that sensitised sheep cells were agglutinated by absorbed anti-rabbit hen serum P (IV) :

(1) P (IV) + S.S.C. = + + +
(2) N.H.S. + S.S.C. = Neg.
(3) P (IV) + N.S.C. = Neg.
(4) N.H.S. + N.S.C. = Neg.
(5) Saline + S.S.C. = Neg.
(6) Saline + N.S.C. = Neg.

In the second group of experiments it was found that normal rabbit serum diluted 1 : 20 would prevent the reaction between absorbed immune hen serum P (IV) and sensitised sheep cells. Here one volume of 1 : 20 normal rabbit serum was added to one volume of P (IV) and mixed at room temperature, and one volume of sensitised sheep cells was added to the mixture. In the control test an equal volume of saline was used :

(7) P (IV) + 1 : 20 normal rabbit serum + S.S.C. added after mixing = Neg.
(8) P (IV) + normal saline + S.S.C. added after mixing = + + +

These basic tests and their respective reactions, 1–8 inclusive, had to be undertaken on each occasion with the results as given above, before conducting any further experiments.

The serum P (IV) was next titrated in two ways : first it was tested in serial dilutions against sensitised sheep cells, and secondly it was tested undiluted against serial dilutions of normal rabbit serum to find the greatest dilution of rabbit serum which would just prevent its *agglutination* of sensitised sheep cells.

Test cells	*Dilution of serum P (IV)* 1:4	1:8	1:16	1:32	1:64	1:128	1:2
S.S.C. ..	+ + +	+ + +	+ + +	+ +	?	Neg.	Neg.
N.S.C. ..	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

Test cells	*Dilutions of normal rabbit serum with the addi each of an equal volume of P (IV)* 1:200	1:400	1:800	1:1
S.S.C. ..	Neg.	+ + +	+ + +	+ + +

It will be seen that the reagent had a titre of 32 and w inactivated by an equal volume of 1 : 200 normal rab serum.

Subsequently, sera from humans and rats we examined to determine whether they would prevent t immune hen serum from clumping sensitised she cells. Equal volumes of all the reagents were u The results were :

P (IV) + saline + S.S.C. = + + +
P (IV) + 1 : 100 rabbit serum + S.S.C. = Neg.
P (IV) + 1 : 20 rat serum + S.S.C. = + + +
P (IV) + 1 : 20 human serum + S.S.C. = + + +

P (IV) immune hen serum had already been absorbe with sheep and rabbit cells and was now further absorbed with human cells (P (IV) Hu.). Similarly, normal he serum was absorbed with human cells as well as she and rabbit ones (N.H.S. Hu.) as described above.

Sensitised human cells were prepared by saturating human group-O Rh-positive erythrocytes with incom plete Rh antibody, then washing the cells three time with saline. The following tests were then made, eq volumes of reagents being used :

P (IV) Hu. + group-O . . . = Ne
P (IV) Hu. + group-O . = + + +
N.H.S. Hu. + group-O . sensitised human cells = Ne

P (IV) Hu. serum was then mixed with an eig of its volume of normal human serum and this mixt divided into two parts and tested. Equal volume reagents were used. The results were :

Mixture + S.S.C. = +
Mixture + group-O Rh-positive sensitised human cells = N

P (IV) Hu. serum was also mixed with an eight its volume of normal rabbit serum and this mixture divided into two parts and tested as above. Result

Mixture + S.S.C. = Ne
Mixture + group-O Rh-positive sensitised human cells = Ne

It was finally decided to try to determine wheth rabbit antibody could be detected if it was absorb on to, or united with, an antigen or protein on a tis from different species of animal. For this purpo group-A Rh-positive human erythrocytes were sensitise with an absorbed incomplete Rh antibody of huma origin. These cells were then washed three times wi normal saline. To two volumes of these packed ce were added :

(1) 2 volumes of absorbed undiluted anti-human rabbit ser (Coombs reagent).
(2) 1 volume normal rabbit serum + 1 volume anti-A agglutinat serum.
(3) 2 volumes normal rabbit serum.
(4) 2 volumes anti-A agglutinating serum.

A further test was done by mixing 2 volumes of nor washed cells with Coombs reagent, viz. :

(5) 2 volumes normal human cells + 2 volumes of anti-hu rabbit serum.

Experiment 1 is the main test : 2, 3, 4, and 5 are contr

These mixtures were allowed to react at room temp ture for 30 minutes and were then washed three ti with normal saline, being thoroughly shaken at e washing to break up the cell clumps as much as poss To each mixture was now added one volume of P (all were thoroughly mixed and the cells were spun and the absorbed P (IV) serum was spun off and te in each case with sensitised sheep cells. The results w

(1) = Neg.
(2) = + + +
(3) = + + +
(4) = + + +
(5) = + +

DISCUSSION

The object of this study was to see whether principles implied in the paper by Coombs et al. (1 could be extended to a system other than the hu condition more closely resembled true rheumatoid ritis.

auer et al. (1941) describe the findings at dissection 26 cases of arthritis associated with psoriasis, and in there was typical rheumatoid arthritis. In 1 eptional case in a man who died at the age of 68 the ritis had been present for forty-four years but was fined to the distal interphalangeal joints and middle langes. The phalanges were destroyed, and the case a less extensive example of arthritis mutilans.

n all these cases the activity of the arthritis seems ave persisted, but in the present case, if the story may elieved, the arthropathy has been quiescent since 1930.

RELATION OF PSORIASIS AND ARTHRITIS

awson and Tyson (1938) reported that the incidence psoriasis in 1000 cases of rheumatoid arthritis was %, compared with 0·7% in 300 normal controls (Bauer al. 1941), a statistically significant difference. The n "psoriasis arthropica" describes this association is usually limited to a definite condition in which coincidental association is excluded:

1) Either psoriasis or arthritis may develop first, but the ditions should subsequently wax and wane in harmony.

2) The arthritis should affect the terminal interphalangeal nts; Bauer et al. (1941) go so far as to suggest the m should be limited to an arthritic condition affecting only terminal interphalangeal joints.

3) The psoriasis should be atypical and include pitting the nails of fingers and toes.

Dawson and Tyson challenge this view and describe cases of the associated conditions which all seem to of the same ætiology, though not strictly conforming those criteria. In 18 of their cases the arthritis and riasis fluctuated more or less together. Nail changes re present in most cases.

Comroe (1944) considers that the association of psoriasis d degenerative joint disease is purely a matter of chance, ough in such cases there is much greater likelihood of e terminal interphalangeal joints being affected and of ll-marked destructive joint changes. This is agreed Epstein (1939), whose study of 33 cases of psoriasis thropica showed that, when psoriasis coexisted, the int lesions tended to be more chronic and destructive d to persist until death. He describes the rapid provement in the joints when the psoriasis was treated.

DISCUSSION

The conclusion to be drawn from the cases of psoriasis thropica is that the joint lesion is usually typical rheumatoid arthritis, except that the terminal interalangeal joints are seriously affected (Poynton 1938, llmore 1946). Many cases are recorded, however, in hich the joint condition is not typical of rheumatoid thritis but shows some degree of arthritis mutilans ith absorption of the phalanges and metacarpals; e terminal phalanges tend to be spared. This is in cord with the general opinion that arthritis mutilans a rare variation of rheumatoid arthritis, but Comroe 944), Copeman (1948), and others say that it is more ely to occur when psoriasis is also present.

The typical features of the psoriasis are the pitting of e nails and the extensive generalised skin lesions which, cording to Epstein (1939), occur in 78·8% of such cases.

In the present case the arthritis and psoriasis seem to unrelated and have not waxed and waned in harmony, ut the unusual features of both conditions are those ore commonly found when the joint and skin lesions exist. It therefore seems probable that there is some mmon ætiological factor, and that the criteria suggested r "psoriasis arthropica" are too strict and would clude cases for which coincidence is not a satisfying planation.

The cause of the association of the conditions is nknown, but the possibility of a general circulatory abnormality is discussed by Garrod (1911) and Pemberton and Scull (1938). There is no indication of such abnormality in the present case, nor is there any evidence of a hereditary tendency, as Lane and Crawford (1937) and O'Donovan (1931) suggested—to the best of his knowledge the patient is the only sufferer from psoriasis or rheumatism in his family.

SUMMARY

A case is described in which arthritis mutilans was associated with psoriasis.

The joint condition preceded the psoriasis by eight years and, despite the extensive destruction of bone in hands and feet, it had apparently become quiescent before the skin disease started.

There have been no subsequent fluctuations in the two conditions.

Previous reports of psoriasis arthropica are reviewed, with special consideration of the variations from normal which are more common when the diseases are associated.

It seems probable that the skin and joint changes have a common ætiological factor.

I wish to thank the Agent-General for the Province of Ontario for permission to publish this case.

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HEXAMETHONIUM BROMIDE

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The chemistry and pharmacology of the drugs of the methonium series have been fairly fully investigated in the experimental laboratory (Barlow and Ing 1948, Paton and Zaimis 1948a and b, 1949, Balaban et al. 1949), and some observations on the action of decamethonium and pentamethonium in man have been published (Organe et al. 1949, Organe 1949, Davies and Lewis 1949, Hewer et al. 1949, Arnold et al. 1949, Arnold and Rosenheim 1949). Lately another member of the series, hexamethonium, has become obtainable for clinical administration. It has proved quite useful; but, since it may have dangerous side-actions, I wish to draw attention to the precautions which must be taken when it is given.

Hexamethonium bromide has a dual action. First, it reduces both the more obvious depressant and the lesser known stimulant effect of decamethonium on the contraction of voluntary muscle. This reduction does not, however, amount to nullification and is least obvious in patients who have received large doses of decamethonium. Thus I have found that hexamethonium restores only the abdominal respiration and does not undo intercostal paralysis either in man or in the cat anæsthetised with pentobarbitone. Hexamethonium is therefore a much less complete antidote than neostigmine is to the muscle-paralysing action of curare. On the other hand, it is my

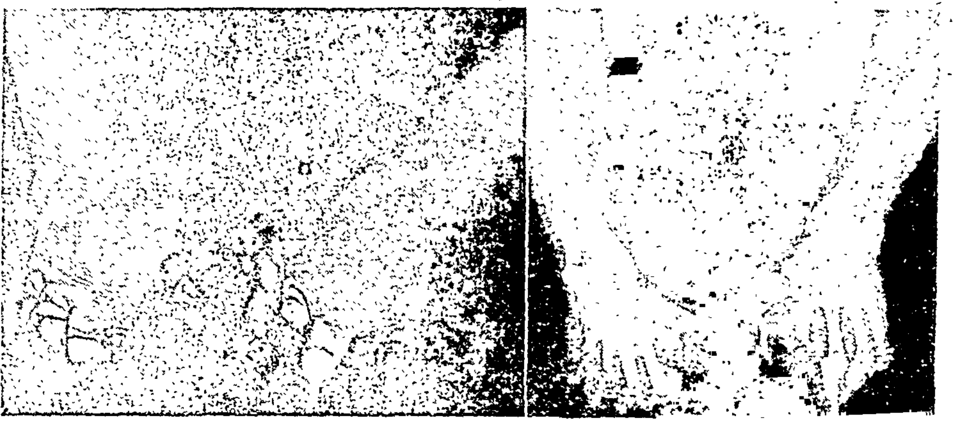

Fig. 1—Arthritis mutilans of hands. Note ununited fracture of left ulna.

forearm is well developed, and it is presumably because he has continued to use his hands that the rarefaction of wrist and metacarpals is limited.

Other Investigations.—Erythrocyte-sedimentation rate normal. Wassermann reaction and Kahn test negative. Blood-count: Hb 126% (Haldane); white cells 8000 per c.mm. (neutrophils 62%, lymphocytes 28%, monocytes 7%, eosinophils 2%, basophils 1%). Serum-phosphorus 4·2 mg. and serum-calcium 12·2 mg. per 100 ml.

Comment.—The patient had not been under medical supervision, so the history was only obtainable from him and the evidence of medical boards. From these sources the following facts emerge:

(1) In 1921 there was no abnormality of hands or feet and no skin disease.

(2) The arthritis lasted for about five years, during which time there was no psoriasis. This condition appears to the patient to have been quiescent since 1930, by which time his fingers had shortened to mere bags of useless flesh, without any pain or stiffness, but retaining normal skin sensibility. The course of the disease was unaffected by the simple treatment used, but even during the active stage he continued working, though with some difficulty and discomfort.

(3) The psoriasis did not start until about two years after the arthritis seemed to be quiescent.

(4) There is no evidence of any related fluctuations in the joint and skin conditions.

ARTHRITIS MUTILANS

Arthritis mutilans is generally considered to be an unusual variant of rheumatoid arthritis (Copeman 1948), but in the present case there are some differences. Typically, rheumatoid arthritis starts in the proximal interphalangeal joints of hands and feet and spreads centripetally to involve carpus and tarsus, wrist and ankle, and later other joints. Osteoporosis and destruction of the joint cartilage are followed by deformities and subluxations at the joints and finally by fibrous or even bony ankylosis. Kerley (19 also emphasises the bony ankylosis and the frequent destruction of the joints of the carpus and tarsus.

It is not known in which joints the arthritis originated in the present case, but the condition has remained localised, and there has been considerable destruction of bone, especially in the middle phalanges and distal interphalangeal joints. There is no sign of fibrous or bony ankylosis, and the carpus and tarsus are only slightly affected.

Cohen (1938) described a similar condition which had begun when the patient was a girl of 6 years and was still progressive at the age of 44; the metacarpals and phalanges of the hands were seriously involved, but the metatarsals were relatively unaffected. Radiography showed advanced changes in the distal interphalangeal joints of hands and feet, and the process had apparently attacked the phalanges in turn, taking 5–6 years to complete absorption of one bone . . . "slowly the bones of the hands seemed to melt away, leaving the soft structures unaltered." In this case, too, the soft tissues were extensible. Cohen suggested that the periosteum might assume some excessive resorpti function.

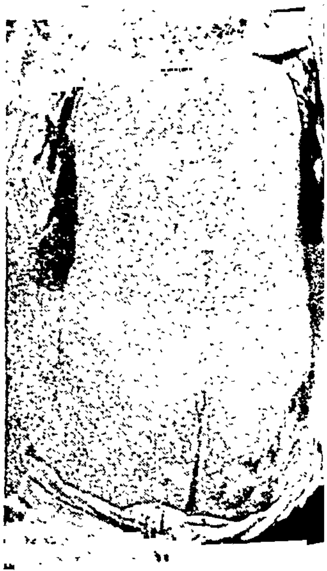

Fig. 3—Psoriasis of trunk and buttocks.

Marie and Léri (1913) described a case of *la main lorgnette*, which seems to have been a similar conditi In the hands and feet the long bones were larg destroyed, the soft tissues were too long for the phalan and the skin was loose and wrinkled. This condi resembled arthritis mutilans rather t rheumatoid arthritis, but the other jo of the limbs and spine were almost an losed by chronic rheumatoid arthritis.

Arthritis mutilans is commoner in conditions associated with psori (Copeman 1948), though in most of cases the joint lesion is almost typic rheumatoid arthritis. Such cases l been described by Shlionsky and B (1936), Schumaher and Lauter (1 Scholl (1925), and others. In the ca Shlionsky and Blake there was l destruction of the middle and d phalanges, whose joints seem to l been partly ankylosed, but the re of the metacarpophalangeal joints sho bone absorption, tapering, and subluxa

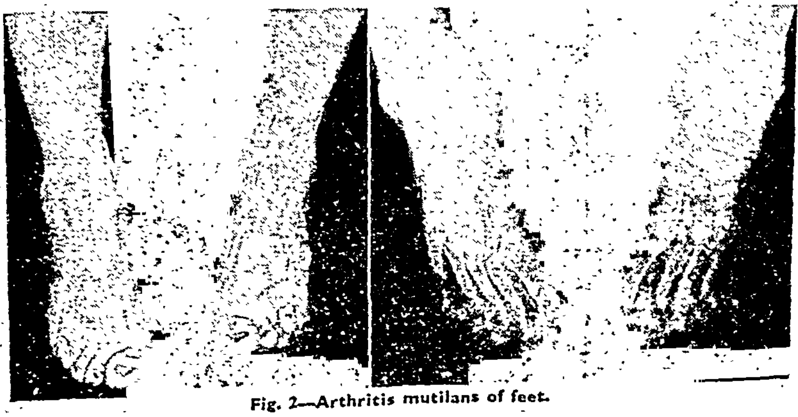

Fig. 2—Arthritis mutilans of feet.

The accompanying table shows the percentage fall in tolic blood-pressure after different doses of penta- thonium iodide. The percentage fall in systolic blood- ssure was calculated from the blood-pressure less n 5 minutes before and within 10 minutes after the ninistration of pentamethonium iodide. It will be preciated that the effect of this drug cannot equately be expressed by numerical blood-pressure dings.

The hypotension usually lasts about 15 minutes, after ich the blood-pressure slowly recovers, but in some es hypotension may last as long as an hour. The od-pressure seems to respond almost immediately to ravenous injection of ephedrine or 'Methedrine' in usual therapeutic doses.

OTHER EFFECTS

Besides its effects on the blood-pressure, penta- thonium iodide also dilates the pupil and relaxes the scles. The relaxation of the muscles is unlike that ained with curare and is more akin to the reduction muscle tone which occurs with mephenesin ('Mya- in'). Respiration may be irregular and inadequate, is easily controlled by manual compression of the ervoir bag. So long as the respirations remain con- lled or quiet, good relaxation obtains; as soon as the ient coughs or takes a deep inspiration the relaxation appears and generalised rigidity comes on, passing off soon as respiration is again brought under control. ch falls in blood-pressure and such respiratory effects y be extremely dangerous if the anæsthetist is not pared for them, and it is thought wise to draw atten- n to these side-effects of pentamethonium iodide which nder it unsuitable for clinical use as an antidote to camethonium iodide.

SUMMARY

In the anæsthetised patient pentamethonium iodide in ses as small as 10 mg. produces a profound fall in ood-pressure, even if the horizontal or head-down sition is maintained.

Effects on respiration and muscle tone are produced by ntamethonium iodide, and these may increase the nger of an unsuspected fall in blood-pressure.

Pentamethonium iodide should only be used as an tidote to decamethonium iodide with the utmost cumspection.

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ECAMETHONIUM IODIDE AS A MUSCLE RELAXANT IN ABDOMINAL SURGERY

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THE use of the decane member of the bistrimethyl- nmonium diiodide series of drugs (decamethonium dide, or 'C10') as a muscle relaxant in man has been escribed by Organe et al. (1949), and as an adjunct to eneral anæsthesia by Hewer et al. (1949). Its advantages clinical use over curarine (*d*-tubocurarine chloride) e claimed to be absence or diminution of histamine eration (Macintosh, F. C. quoted by Organe et al. 1949), d better minute-to-minute controllability of its effects ecause of its quicker detoxication. Its chief disadvan- ge is said to be the absence of a suitable antidote; entamethonium iodide ('C5') in many, though not ll, cases nullifies its relaxant effect, but also produces, mong other results, a profound fall in blood-pressure hich may endanger the patient's life (Hewer et al. 1949). Iexamethonium iodide ('C6'), in cats and rabbits, is said to be slightly *less* potent than pentamethonium as an antidote to decamethonium and *more* active in paralysing autonomic ganglia; but according to A. R. Hunter (personal communication) the reverse is true in man. In any case, hexamethonium is not entirely satisfactory as an antidote to decamethonium.

After these first reports had appeared, decamethonium iodide was tried in this hospital in a series of cases, all major abdominal sections. It was found to be satisfactory, with reservations, in nearly all cases. It was finally abandoned, however, and a reversion made to curarine because of the unpredictable occurrence, in a small proportion of cases, of a serious complication—delayed detoxication—a typical example of which is described below.

METHOD OF USE

Decamethonium iodide was used as an adjunct to thiopentone and endotracheal gas-and-oxygen, because this method of general anæsthesia had been eminently satisfactory when coupled with intravenous curarine.

Premedication consisted of morphine gr. $^{1}/_{6}$ and atropine gr. $^{1}/_{100}$ in adolescents and old patients; 'Omnopon' gr. $^{1}/_{3}$ and hyoscine gr. $^{1}/_{150}$ in the medium age-groups (18–55 years).

In the anæsthetic room a test dose of 0·5 ml. (1 mg.) of decamethonium was given intravenously, followed by a "safety pause" of 2 minutes for any undue effect to be observed. If all was well a further 1–1·5 ml. (2–3 mg.) was then given, the amount depending on the patient's physique and the site of the operation, followed immediately through the same needle by up to, but not more than, 10 ml. (0·5 g.) of 5% thiopentone. With the aid of a laryngoscope, direct intubation was then performed, and the tube connected directly, by the appropriate connections, to a standard Boyle's machine delivering 75% gas and 25% oxygen. The expiratory valve was kept shut, or nearly so, so that an element of insufflation was introduced. (With this technique the width of the glottal opening, and hence, provided the patient is "settled," the tone of the body musculature, can readily be estimated by observing the degree of distension of the re-breathing bag, since the surplus gases have to find their way out between the cords and the outside of the tube.)

The patient was then wheeled into the theatre and placed on the table. During the operation further doses of 0·5–1 ml. (1–2 mg.) of decamethonium iodide were given when relaxation appeared inadequate, as evidenced by obvious tightness of the abdominal wall or distension of the re-breathing bag. Signs that anæsthesia was returning to stage II (Guedel classification), were taken to be an indication for minute doses (0·5 ml.) of 5% thiopentone or sometimes latterly by 50 mg. doses of intravenous pethidine on the lines suggested by Mushin and Rendell-Baker (1949). In no case, with or without pethidine, was the total dose of 5% thiopentone more than 15 ml., and as experience was gained in the technique less and less was found to be necessary. Many cases were adequately controlled by their initial dose of 7–8 ml. (0·35–0·4 g.) alone.

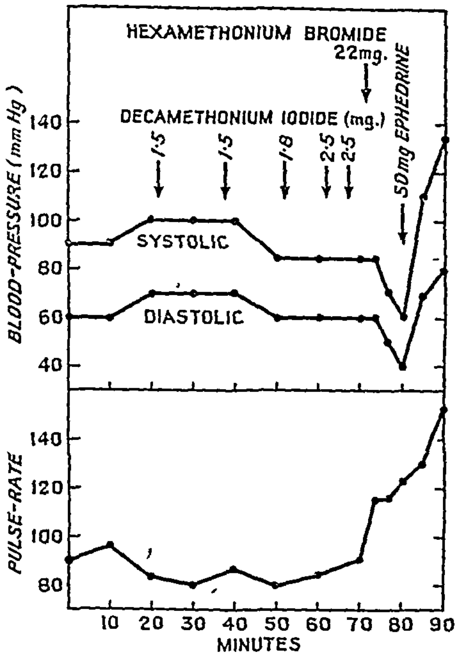
The average dosages used for different operations were as follows.

Site of operation	No. of cases	Average dose	
		Decamethonium iodide (mg.)	Thiopentone (ml. of 5%)
Appendix	36	5·0	9·5
Stomach	47	13·0	10·5
Rectum and large bowel	23	8·5	8·3
Gall-bladder	24	11·5	8·9
Uterus and appendages	3	6·4	9·4
Exp. laparotomy	13	7·5	10·4

It will be seen that the operations which last longest and require the deepest relaxation—i.e., gastric operations—received the highest average dose, and that the dosages for other types of operation were based on the same considerations.

There was one death related to anæsthesia in this series: a woman, aged 60, with hyperpiesia and myoimpression that hexamethonium is more effective than pentamethonium, since in the course of 15 administrations of 25–50 mg. of hexamethonium I have always observed some increase in the depth of respiration in the anæsthetised patient. This experience compares favourably with that of Hewer et al. (1949) with pentamethonium under similar conditions; they found that the drug failed on 6 out of 8 occasions, and in 2 of my own cases pentamethonium was given with a disappointing result. This short study of the antidotal action of hexamethonium suggests that it can be relied on to improve respiratory exchange, when it has been depressed by decamethonium, sufficiently to prevent patients from dying of anoxia, though it will by no means completely restore all muscle power.

The other outstanding action of hexamethonium is the paralysis of the autonomic ganglia which it is liable to produce. Pentamethonium also has this action (Arnold and Rosenheim 1949, Arnold et al. 1949, Hewer et al. 1949) though it is not quite so dangerous in this respect (Paton and Zaimis 1949). It is thus hardly surprising that when I began to give hexamethonium to patients I always observed some fall in blood-pressure. In the very first case it seemed that the ensuing hypotension might be severe enough to be fatal (see figure), but the injection of ephedrine quickly restored the circulation to normal. In view of this and several other less startling experiences I now give 30–50 mg. of ephedrine or 10–20 mg. of 'Methedrine' with each dose of hexamethonium. I have observed an analogous disturbance to this in cats, but in them evidence of paralysis of the autonomic ganglia appears only if the cat's circulation is already embarrassed for some other reason. Thus, when hexamethonium is given to a cat anæsthetised with pentobarbitone but otherwise normal, the blood-pressure does not change; but, if the cat is anoxic owing to respiratory depression produced by decamethonium, hexamethonium will cause an extreme fall in blood-pressure, which, however, will recover if the lack of oxygen is corrected by artificial respiration. If it is accepted that this observation is transferable to man, the importance of avoiding the use of hexamethonium until the oxygenation of the blood has been restored by artificial ventilation should need no further emphasis.



Effect of hexamethonium bromide (given after decamethonium iodide) on blood-pressure and pulse-rate, countered by giving ephedrine.

SUMMARY

Hexamethonium bromide is a partial antidote to the muscular paralysis produced by decamethonium iodide. It is probably sufficiently effective to be of value in clinical anæsthesia.

Hexamethonium bromide, however, also paralyses the autonomic nervous system and can thus cause a serious fall in blood-pressure. It should therefore never be given alone but should always be accompanied by a vasopressor.

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PENTAMETHONIUM IODIDE IN ANÆSTHESIA

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Pentamethonium iodide, also known as 'C5' and sold under the proprietary name of 'Antilusin' (Allen & Hanburys), was introduced to the medical profession as the antidote to decamethonium iodide, a synthetic muscle relaxant used to a considerable extent in anæsthesia whose action is said not to be reversed by neostigmine.

Organe et al. (1949) first described this action of pentamethonium iodide and recommended a dose of 10 mg. for each mg. of decamethonium iodide. Attention has since been drawn to the effect of pentamethonium iodide on the blood-pressure. Arnold and Rosenheim (1949) and Arnold et al. (1949) have shown that, in the conscious hypertensive person, pentamethonium iodide in doses up to 100 mg. causes a considerable fall in blood-pressure, whereas in the conscious normal person the blood-pressure does not fall so long as a horizontal position is maintained, but the subject's blood-pressure becomes extremely posture-sensitive and remains so for at least an hour.

EFFECT ON BLOOD-PRESSURE DURING ANÆSTHESIA

Pentamethonium iodide has been used in hypertensive and normal people in the Royal Victoria Infirmary, Newcastle upon Tyne, as an adjuvant to anæsthesia, to reduce blood-pressure and therefore hæmorrhage during such operations as sympathectomy, Millin's prostatectomy, and radical mastectomy. Anæsthesia was induced by inhalation of various agents, including nitrous oxide, ether, cyclopropane, and chloroform. In all the cases there was a severe fall of blood-pressure in $2^{1}/_{2}$–5 minutes. The systolic pressure always fell to 80 mm. Hg or lower (lowest 50 mm. *Hg*). This effect was obtained with the patient horizontal or head down and with doses as small as 10 mg.

FALL IN SYSTOLIC BLOOD-PRESSURE AFTER PENTAMETHONIUM IODIDE IN ANÆSTHETISED PATIENTS

Case no.	Age (yr.)	Anæsthetic	Dose of pentamethonium iodide (mg.)	Reducti systolic blood-pressu
1	83	N_2O and ether ..	10	40
			10	75
2	80	N_2O and $CHCl_3$ ..	10	50
3	72	N_2O and ether ..	10	30
4	11	N_2O and ether ..	60	64
5	69	C_3H_6	20	33
			20	30
			20	33
6	71	N_2O and ether ..	10	35
7	50	C_3H_6	10	20
8	53	N_2O and thiopentone	40	47
9	66	C_3H_6	10	54

ntamethonium) it was decided to discontinue the use decamethonium as a routine in abdominal surgery.

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DIMERCAPROL (BAL) IN ACUTE ANTIMONY DERMATITIS

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Fakhry[1] noted in 1929 that there were two types of rmatitis following the administration of antimony: e a fairly common mild papular eruption that required treatment; the other a scaly type which was rare. e described a case of the scaly type in a patient under atment with stibophen who had previously had two jections of tartar emetic a year; when the rash appeared e treatment was discontinued. In this instance Fakhry ve 10 ml. of a 10% solution of sodium thiosulphate travenously on two successive days, with good results.

Local papular or vesicopapular eruptions, usually nfined to a limited area of skin, have also been escribed; those resembling herpes often affect the istribution area of the accessory nerve. Alves and lair[2] and Ritchken and Cantor[3] have described such ases following both orthodox and intensive treatment ith intravenous antimony. A branny desquamation f the skin, particularly of the hands, is a common sequel all forms of antimony therapy. A true exfoliative ermatitis, such as developed in the following case, is ertainly rare.

CASE-RECORD

An African youth, aged about 18, was admitted to a native linic with hæmaturia. Eggs of *Schistosoma hæmatobium* were ound in his urine. Beginning on May 13, 1948, he was given ml. of a 6% solution of lithium antimony thiomalate intra-muscularly on two successive days. On the third day a fine rythematous rash appeared and by the next day this had ecome very severe and extensive. The patient had previously een treated at a mission hospital and had been given twelve ntramuscular injections of an antimony preparation, most kely either stibophen or antimony thiomalate, soon after hich a rash had appeared, which had ultimately disappeared ithout treatment. There was no history of venereal disease r of treatment with arsenicals, and none of any previous llergic manifestations in either the patient or his parents. There was no evidence of contact with any substance or drug other than the medicine) likely to have precipitated a kin rash.

On examination the patient complained of severe skin rritation and looked ill. He had nausea but no vomiting. The tip of his tongue looked red and raw. The eyes were suffused and the conjunctivæ injected. There was no enlargement of the liver or spleen and no other abdominal signs or symptoms. The urine contained a few red cells and hyaline casts and eggs of *S. hæmatobium*.

The skin was affected by a severe exfoliative dermatitis with bullous eruptions, severe excoriations in some areas, and a raw oozing surface in others. Anteriorly the areas affected included the lower abdomen and the front of the right thigh to the knee. The mammary area on both sides and the axillæ were affected, as were also the medial aspect of the left arm extending into the axilla, and the right deltoid area and wrist. Posteriorly the oozing surface extended from the axillæ on to the back. The natal cleft and neighbouring parts of the buttocks and the perineum were excoriated and fissured. A similar condition was found over both popliteal fossæ. There were also extensive areas of desquamation over both scapulæ, the elbows, and in a " waist band " 4 in. wide across the lumbar region.

Treatment.—On May 17, four days after his first antimony injection, the patient was transferred to the main clinic at Concession, where treatment with dimercaprol was started immediately. No local treatment of the lesions was instituted except for dry dressings to protect the oozing surfaces. On the first day 2 ml. of dimercaprol was given intramuscularly four-hourly for four doses. On the next three days 2 ml. was given twice daily, morning and evening. On the fifth and sixth days 2 ml. was given once each day.

Progress.—There was no evidence of intolerance to dimercaprol. By the fourth day of treatment the excoriations and fissurings had healed, and by the sixth day all lesions had disappeared.

COMMENT

This case is an instance of intolerance to a relatively small dose of antimony, and the first course of treatment seems to have sensitised the patient to the metal. The very extensive lesions cleared in a truly dramatic way, and it was difficult to believe that, six days earlier, large areas of his skin were raw oozing surfaces with fissures and excoriations. In addition to the skin eruption, other symptoms and signs of intoxication with antimony were present—nausea, and suffused and injected conjunctivæ.

I am grateful to Dr. R. M. Morris, O.B.E., secretary for health, Southern Rhodesia, for permission to publish this case.

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HEREDITARY HÆMORRHAGIC TELANGIECTASIA

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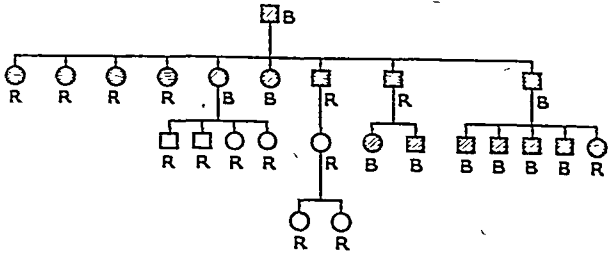
Hereditary hæmorrhagic telangiectasia is a well-recognised but rare condition. The characteristic lesions are telangiectases and angiomas which develop slowly on the face and body after puberty. Severe anæmia may result from hæmorrhage, most commonly recurrent epistaxis, but severe melæna and hæmoptysis have been described.

The following case is typical but illustrates an unusual form of heredity and an excellent response of the dermal lesions to treatment with contact X rays.

CASE-RECORD

A woman, aged 49, reported at the outpatient department, Royal Infirmary, Glasgow, with " multiple bleeding moles." As a child and young woman she had had epistaxis almost daily. After the age of 30 these attacks had gradually become less frequent, but two years ago the patient had had such a severe epistaxis that blood-transfusion was necessary. During the past eighteen months she had had repeated hæmorrhages from angiomas on the face and scalp. These angiomas had first appeared when she was 10 years of age. Since then they had gradually increased in number and size, and bled on the slightest trauma. Up to the age of 7 the patient had had numerous generalised convulsions. Since then they had disappeared, and her general health had been excellent except for the frequent hæmorrhages.

On examination the patient was a well-nourished healthy dark-haired middle-aged woman with multiple vascular nævi



Hereditary hæmorrhagic telangiectasia: square symbols, males; circular symbols, females; hatched symbols, angiomas and hæmorrhages; stippled symbols, hæmorrhages but not angiomas; B, black-haired; R, red-haired.

cardial degeneration collapsed and died from heart-failure during the first hour after completion of a synchronous combined abdominoperineal resection of the rectum. Undoubtedly a contributory factor was the patient's failure to regain normal depth of respiration. She had been given 7 ml. of 5% thiopentone, and a total of 2 ml. (4 mg.) of decamethonium iodide, the last mg. of this 20 minutes before the end of the operation.

RESULTS

Satisfactory operating conditions were produced in all cases, though inevitably in several instances the surgeon was held up momentarily while a supplementary injection was given and was taking effect. In operations lasting sufficiently long the patient became "tight" under stimulation, and required further decamethonium iodide about 20–30 minutes after the previous effective dose. The drug was therefore found particularly satisfactory in such procedures as straightforward appendicectomy, where the initial dose given in the anæsthetic room lasted long enough for the operation to be done and the peritoneum closed but had almost completely lost its effect by the time the patient returned to the ward.

DISADVANTAGES COMPARED WITH CURARINE

The patient's subjective sensations during the "safety pause" after the preliminary injection of 0·5 ml. (1 mg.) were considerably more unpleasant than when 0·5 ml. (5 mg.) of curarine was given. Nearly all patients, except those strongly sedated by their premedication, swallowed, moaned, and moved their head from side to side during this wait. That this difference is not entirely due to the earlier onset of the effect of decamethonium may be shown by waiting longer than 2 minutes after giving 5 mg. of curarine, when no such trouble is caused. Possibly it is a consequence of the less gradual loss of muscular power which is induced by decamethonium.

At laryngoscopy the cords were nearly always (95% of cases) found in spasm, as contrasted with equivalent doses of curarine where the cords are open in about half the cases. The well-lubricated tip of the endotracheal tube, however, provided the bevel was accurately aligned, was in all cases slipped through the closed glottis without trauma or undue difficulty. Between a third and half of the cases developed apnœa after intubation, and this lasted until the towel-clips were vigorously applied or the skin incision made. This high incidence of laryngeal spasm and postintubation reflex apnœa, compared with that after the use of curarine, is presumably connected with the fact that curare is a stimulant to the respiratory centre, antagonising thiopentone in this respect (Gray 1948), whereas decamethonium has no such effect.

The usual technique of administering additional doses of curarine, thiopentone, or pethidine during operations was, and is, by means of a syringe strapped to the neck, attached to a hypodermic needle (gauge no. 17) inserted and left in one or other external jugular vein. If this technique is attempted when using decamethonium, the minute clot which inevitably blocks the needle after a time is extraordinarily tenacious and quite "unshiftable" by ordinary thumb pressure, so either a larger needle or multiple punctures must be used. A Gordh needle was not obtainable for trial.

The margin between the dose required to produce adequate relaxation and that causing apnœa from muscular failure (as distinct from reflex apnœa mentioned above) is smaller than with curarine, being often less than 0·5 ml. (1 mg.), but no serious trouble arose from this factor. Assisted respiration keeps the patient in good condition until spontaneous respiration returns —in this series always less than 7 minutes.

In 4 cases in this series return of reasonable muscle tone, and hence of adequate respiratory exchange, was delayed beyond the end of the operation. The most serious of these cases, described below (by kind permission of Mr. R. M. Corbet, whose patient this was) was so disturbing that the use of the drug was abandoned except in isolated instances.

CASE-HISTORY

A married woman, aged 46, complained of vaginal bleeding for 6 weeks. She was a very stout woman, with no definite local signs apart from slight tenderness on the left side of the abdomen. Her general condition was fair (she had stopped bleeding 2 weeks before). Blood-pressure [illegible] mm. Hg; Hb 85%. It was decided to examine her under anæsthesia and operate if indicated.

Under anæsthesia it was possible to feel an enlarged uterus with a mass on the right. The abdomen was opened, and a uterus with multiple fibroids, including a pedunculated one (the mass), and both ovaries were removed. There was minimal bleeding and the entire procedure took 1 hour 25 minutes.

The Anæsthetic.—Premedication: omnopon gr. 1/3, hyoscine gr. 1/150. The patient was given 0·5 ml. (1 mg.) of decamethonium iodide, and the relaxation so produced after 2 minutes being normal, a further 1 ml. (2 mg.) of decamethonium plus 10 ml. of 5% thiopentone was injected. She was intubated, the endotracheal tube was connected to the usual flow of gas-and-oxygen, and she was taken into the theatre for examination in the lithotomy position. She was later placed in steep Trendelenburg position for the actual operation, at the start of which a further 1 ml. (2 mg.) of decamethonium was given. Because of the steepness of the Trendelenburg position, and the stoutness of the patient, respiration had to be assisted by synchronised squeezing of the re-breathing bag. During the operation two further doses of decamethonium were given, one of 1 ml. (2 mg.) and the last of 0·5 ml. (1 mg.). A total of 4 ml. (8 mg.) was thus given, the last dose of which was half an hour before the abdominal wall was closed. At no time was there apnœa.

Progress.—At the end of the operation the patient's respiration was slow, shallow, and jerky, being chiefly intercostal rather than diaphragmatic (feminine type). When the endotracheal tube was disconnected from the Boyle's machine and removed, the patient became cyanosed, though her pulse remained of good volume. A 1 ml. dose of pentamethonium iodide was "eased" into the circulation over a period of 2 minutes; the result was a gross deterioration in the volume of the pulse, which became undetectable at the wrist, without any significant increase in respiratory exchange. She was at once given 30 mg. of methyl-amphetamine ('Methedrine') intravenously, but her condition still remaining poor she was re-intubated and the tube was connected to a supply of pure oxygen, under slight pressure, from a Walton machine. There was an immediate striking improvement in both colour and pulse and she was accordingly left in the theatre under this treatment.

An hour later, despite her good colour and pulse, and the relatively small dose of thiopentone originally administered, her pupils were still widely dilated, and her reflexes were sluggish—for example, there was no response to firm pressure over the supraorbital nerve. The volume of respiration was, however, slowly returning though still far from normal.

Not until 1½ hours later still (3 hours after the last dose of decamethonium) was it thought reasonable to "wean" the patient from the pure oxygen. She stood this well and after another hour her reflexes and consciousness were returning.

Her subsequent convalescence was uneventful and she was discharged 3 weeks after the operation fit and well. This showed either remarkable constitutional resistance or unusual good luck, for the combination of prolonged shallow respiration, inhalation of pure oxygen, and temporary but severe fall in blood-pressure made the development of postoperative pulmonary complications extremely likely.

In view of the fact that this patient had (*a*) responded normally to a test dose of 0·5 ml. (1 mg.) of decamethonium; (*b*) required, without being unduly affected at the time by it, a further 3·5 ml. (7 mg.) of decamethonium to permit the operation to be satisfactorily performed, and (*c*) failed to regain her normal depth of respiration until 4 hours after the last dose of decamethonium despite the exhibition of the recommended antidote e equal and reacted normally, optic fundi showed slight rring of each disc but no papillœdema. There was no argement or tenderness of any of the salivary glands and evidence of middle-ear disease; the respiratory system wed no abnormality. The cardiac borders were normal, d the heart sounds were pure. The pulse was regular and good quality, rate 58 per min. Blood-pressure 105/80 mm. . There was no hepatic or splenic enlargement. The urine s normal. A blood-count showed Hb 95%, red cells 00,000 and white cells 6800 per c.mm. (lymphocytes 40%). ere was a typical epididymo-orchitis on the right side, with rm tender swelling and obliteration of the natural sulcus. ere was no urethral discharge, inguinal adenitis, or argement of the prostate.

Lumbar puncture on admission produced transparent C.S.F. der slightly increased pressure and containing 180 cells c.mm. (practically all lymphocytes), protein 80 mg., orides 740 mg., and sugar 60 mg. per 100 ml. No organisms re found in this or subsequent specimens.

Recovery was progressive and uneventful. The patient's nperature was normal two days after admission and nained so; his headache steadily diminished and had npletely disappeared after six days, neck stiffness was sent for four days, bradycardia was evident for the first rteen days in hospital, the pulse-rate varying between and 64 per min.; thereafter the rate gradually increased, ing 70–80 before the patient was discharged. The changes the C.S.F. are shown in the accompanying table. The

CHANGES IN CEREBROSPINAL FLUID

Date	Cells (per c.mm.)	Protein (*mg. per* 100 ml.)	Sugar (*mg. per* 100 ml.)	Chlorides (*mg. per* 100 ml.)
ay 11	180	90	71	750
„ 12	231	..	70	..
„ 14	144	60	Present	760
„ 16	78	40	65	730
„ 18	49	..	65	740
„ 24	18	..	75	750

olloidal gold test showed a moderate mid-zone curve. The lood Wassermann and Kahn tests and C.S.F. Wassermann st were all negative. The Schüffner reaction and Paul-unnell test were also negative. The patient was discharged ell on June 1, 1949.

DISCUSSION

The difficulties in diagnosing mumps meningitis in he absence of parotitis are obvious. Eberlein and ynxwiler (1947) emphasise the problem of differentiating he condition from lymphocytic choriomeningitis, poliomyelitis, and encephalitis due to other viruses. They onsider that the C.S.F. findings in mumps are characteristic, with commonly 200–400 cells per c.mm., but he count may be as high as 3000. Protein is usually normal, chlorides and sugar show little deviation, and he colloidal gold curve is seldom abnormal. Bang and Bang (1943) draw a definite distinction between mumps neningitis and mumps meningo-encephalitis, pointing ut that meningitis runs a benign course and that neningo-encephalitis is a rare and more dangerous complication which may be associated with various types of paresis, including hemiplegia and monoplegia, and with acute ataxia and convulsions.

In the present case the combination of meningitis with orchitis was strongly suggestive of mumps. The diagnosis was made practically certain by the patient's statement that he had not previously had mumps, and by his son's typical attack of mumps starting 14 days before the patient's first symptoms.

An interesting feature of the present case was the bradycardia. A slow pulse and absence of vomiting are considered by some French clinicians to be points of diagnostic importance in mumps meningitis, but Coe (1945) and Harris and Bethell (1938) did not find them in their cases.

The occurrence of cases such as the one described here suggests that the classification "benign lymphocytic meningitis" probably includes a proportion of cases due to infection with the virus of mumps. It also demonstrates the unsuitability of epidemic parotitis as a synonym for mumps.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

Fits and Fainting

ON Feb. 2 the section of neurology, with Mr. JULIAN TAYLOR, the president, in the chair, discussed Fits and Fainting.

Sir CHARLES SYMONDS, remarking that the symptom common to fits and faints was loss of consciousness, defined a fit as being a disorder of function which was in onset local in origin and therefore one would expect the symptoms to show variety depending on the part of the brain in which the impulse arose. There were many varieties of epileptic attack in which no local origin was apparent; the speed of discharge was so rapid that involvement at once became general. In a faint there seemed to be an order of susceptibility. The retina and areas concerned with postural equilibrium failed early. In a faint, if the onset of anoxæmia was not too abrupt, there was an order of loss of function which was characteristic: dimness of vision, loss of balance, unconsciousness. In certain cases, however, the loss of consciousness might be abrupt. Also it might be caused by emotion, and this might lead to confusion of a fit and a faint, which became even more likely where convulsive movement occurred in a faint. In a series of 362 cases of fainting, convulsions were noted in 7%. When together with loss of consciousness there was loss of balance, it could be taken that the attack was a faint; if there was loss of consciousness without falling, it was a fit. Ventricular standstill might also cause convulsions if it persisted for 10–20 seconds. Postural hypotension, producing pallor, unconsciousness and falling, might also be confused with epilepsy. Discussing epileptic attacks originating in the visceral centres, he said that pallor, nausea and palpitation and dizziness might usher in a complete epileptic attack or be the only manifestations of it. Vasovagal attacks were, he believed, very rare, and they were not to be confused with cerebral anxiety states. Gowers applied the term for attacks originating in the medullary centres and associated with epigastric discomfort, respiratory distress, coldness, pallor, and a sense of impending death. Later Lewis used the term for fainting, but vasovagal attacks were not faints or fits, in the ordinary sense, although they might be confused with them if seen separately. Fainting very rarely occurred except in the erect posture. If an attack took place after long standing or after emotional disturbance, it might be assumed to be a faint. But epileptic attacks might be due to a number of causes, of which emotion was one and the malaise preceding illness another. Sir Charles considered that urinary incontinence during unconsciousness was characteristic of epilepsy; though it might also occur with a faint if the bladder was over-full, but not otherwise. A spell of yawning was often a precursor of an epileptic attack. He stressed that excessive liability to fainting in childhood might be followed by excessive liability to epilepsy later; and some people exchanged migraine for epilepsy. Anyone might have a fit or a faint for sufficient cause.

on the trunk, hands, scalp, and face. The nævi varied in size from pin-point to several millimetres in diameter. The two largest were situated on the vertex. The angiomas in all areas were associated with definite telangiectases. On the mucosa of the hard and soft palates and inside of the cheeks telangiectases were particularly conspicuous, and on the tongue were multiple small nævi entangled in a mesh of telangiectases.

Examination of Blood.—Red cells 4,060,000 and white cells 4800 per c.mm. (differential count and film normal), platelets 300,000 per c.mm., Hb 92% (14·9 g. per 100 ml. = 100%). Bleeding-time 3 min., coagulation-time $5^1/_2$ min., and prothrombin-time 45 sec. (control 32 sec.). Capillary fragility normal. Blood-pressure 120/80 mm. Hg. Investigation of the other systems revealed no abnormality.

Family History (see figure).—The patient's grandfather was black-haired, had angiomas on both hands, and suffered from repeated epistaxis. Four aunts, all red-headed, had had repeated epistaxis but no angiomas or telangiectases. The first of these aunts died from a postoperative hæmorrhage; the second and third died from hæmorrhage when still children. The fourth was still living and having repeated epistaxis but had no visible signs of the disease. Two other aunts, black-haired, had angiomas and telangiectases of face and hands and a history of various types of hæmorrhage. One of these aunts died at the age of 72 from an unconnected disease. The other was still alive and had large bleeding angiomas on both hands. Two sons and two daughters of the dead aunt were completely free from the disease. One uncle of the patient died from postoperative hæmorrhage; during life he had had repeated epistaxis but no angiomas or telangiectases. His daughter and her children were completely free from stigmata. This uncle and his daughter had red hair. A second uncle had multiple nævi on the face and scalp and in the mouth. His four sons had vascular nævi on their faces and hands, and his one daughter suffered from repeated epistaxis but was otherwise free from stigmata of the disease. This uncle and his four sons had black hair, and his daughter had red. The patient's father, who had red hair, had had repeated epistaxis but no other evidence of the disease. The patient's brother, black-haired, had angiomas of the face and frequent hæmorrhages from these and his tongue.

Treatment.—The largest and most easily injured angiomas on the scalp and face were treated with the Philips contact-therapy machine; 750 r was given at 50 kV, 2 mA, 2 cm. skin target distance with no added filtration. Eighteen nævi were given contact X rays.

Progress.—Nine months after treatment many of the nævi have disappeared. There has been no further spontaneous hæmorrhage from those on the scalp or face and slight trauma does not produce bleeding from the two large angiomas on the vertex. These are now much less raised and the covering epithelium appears to be much thicker and stronger.

DISCUSSION

In the present family there seems to be two types of persons presenting different stages of hereditary hæmorrhagic telangiectasia: (1) red-haired members of the family who have either no signs or symptoms of the disease or else only repeated hæmorrhages; and (2) dark-haired members who present the typical text-book picture of repeated and varied forms of hæmorrhage, telangiectases, and multiple hæmangiomas scattered over the body.

Goldstein[1] described the condition as a hereditary hæmorrhagic dysplasia with normal cytological findings in the blood except for secondary anæmia. Penfold and Lipscomb,[2] however, reported a family in which the disease was associated with elliptical red cells. Examination of blood films did not reveal any abnormal red cells in the present case.

MacKee and Cipollaro[3] prefer to use radium for the treatment of angiomata, but in the present case it was decided to treat the lesions, which were widely scattered, with contact X rays. Andrews[4] is of the opinion that the best results are obtained with doses of 250 r through 2·5 mm. of aluminium and given at intervals of six weeks for from four to six doses. We, however, adopted the dosage we most often use in treating superficial angiomas, and the lesions responded well to the small dose of contact X rays.

We are indebted to Dr. George Harvey, physician to the department of dermatology, Royal Infirmary, Glasgow, for permission to publish this case.

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[1] Goldstein, H. I. *Brit. med. J.* 1936, i, 721.

[2] Penfold, J. B., Lipscomb, J. M. *Quart. J. Med.* 1943, 12, 157.

[3] MacKee, G. M., Cipollaro, A. C. X-Rays and Radium in the Treatment of Diseases of the Skin. 4th ed., Philadelphia, 1946.

[4] Andrews, G. C. *Arch. Derm. Syph., Chicago*, 1948, 58, 113.

MUMPS MENINGITIS AND ORCHITIS WITHOUT PAROTITIS

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THE causal virus of mumps has a special predilection for the tissues of the gonads and the central nervous system, orchitis, meningitis, and meningo-encephalitis being well-known complications. The incidence of orchitis in men with mumps lies, according to [illegible] and Ronaldson (1940) between 17% and 33%. Mumps meningitis is generally accepted as a much less common complication, but the reported incidence varies widely.

Of 74 cases of mumps parotitis in males over the age of [illegible] Bang and Bang (1943) found that 49 (66%) had either latent or manifest meningitis. Holden et al. (1946) investigated 100 consecutive patients in hospital with proved mumps; 33 of these showed clinical signs of meningitis, and 33 had abnormal cerebrospinal fluid (C.S.F.). Frankland (194[illegible]) found that 30% of 234 cases of mumps among soldiers admitted to hospital had signs and symptoms of meningeal involvement. Steinberg (1944) showed this complication to be present in 10 of 165 patients with mumps. On the other hand, [illegible] (1932) states that the incidence is 0·15–0·5%. [illegible] Brooks (1918) in a military population in Service cases analysed 6815 cases of mumps and on a clinical basis reported none complicated by meningo-encephalitis.

This wide variation is partly due to the fact that some of the figures are based on clinical findings only, whereas other investigations have entailed routine examination of C.S.F., and any degree of pleocytosis is accepted as evidence of meningitis. Further, some groups under investigation have been patients admitted to hospital because of the severity of the attack, whereas other groups have included all the patients developing mumps.

The occurrence of orchitis and meningitis without parotitis has been noted in epidemics. Coe (1945) and Harris and Bethell (1938) have each reported one case, but the condition is comparatively rare, so a similar case is reported here.

CASE-RECORD

A man, aged 33, was admitted to the County Hospital, Motherwell, on May 10, 1949, as a case of meningitis. [illegible] days before admission he developed pain and swelling of the right testicle, which he attributed to a strain at work. He continued at his work as a motor-lorry driver for the next three days, but was then forced to stay in bed because of the pain in the testicle. Two days later he developed severe occipital headache and what he described as a shooting pain in the spine. There was some vomiting at this time, but his mental faculties were not impaired, and his vision was normal. The headache and neck pain persisted and were still present on admission. The patient was emphatic that he had at no time had pain or swelling in the region of the salivary glands, earache, or difficulty in mastication. However, fourteen days before the onset of his orchitis his son, aged 7 years, living in the same house, had developed typical mumps.

On examination the patient was a well-built intelligent man of good nutrition. He complained of headache and stiffness of the neck; he was somewhat listless but answered questions sensibly and with a normal reaction-time. His temperature was 100°F. There was well-marked nuchal rigidity without head-retraction. Kernig's sign was positive. Babinski's sign could not be elicited, tendon reflexes were normal, pup

·. **Williams** thanked Dr. Campbell for drawing his ıtion to the manifold cardiac causes of fainting. ər epilepsy or syncope can be primarily cardio- ılar or primarily cerebral. The point was to keep in our minds what was a fit and what was a faint manage them accordingly. In Adams-Stokes se the onset of unconsciousness is too rapid to be ıined by cerebral anoxia. The vascular framework e brain suddenly collapses and the semi-fluid brain psed too—a neurogenic cause.

LIVERPOOL MEDICAL INSTITUTION

The Intervertebral Disc

MEETING of the institution was held on Jan. 19, r the chairmanship of Prof. **Charles Wells**, the dent.

discussion on the intervertebral disc opened with a r on the disc's physical properties read, on behalf r. **W. J. Virgin**, by Mr. **G. V. Osborne**.

an investigation into their elastic properties, vertebral discs, were compressed with an Olsen əression-testing machine. The effect of intermittent constant loading, saturation with Ringer's solution, deliberate incision of the posterior part of the ılus was studied. It was found that the disc was to sustain very great loads without disintegrating. overy of the disc after deformation depended upon ibition of tissue-fluid by the disc and removal of deforming force: and the extent of recovery was lified by the duration of the force. Herniations disc material were produced infrequently despite ry loads during compression. Angled incisions into annulus produced definite interference with the ticity of the disc, but this did not happen with a ple linear incision. The elastic limit of the intertebral disc was relatively greater in mature adult cimens, and it would appear that the resistance to ıpression of an immature disc was related to the sence of the nucleus as a distinct entity.

Ir. **E. N. Wardle** spoke on conservative treatment of disc lesion. Such a lesion involved the whole bar spine: and spinal deformity was the one thing ch distinguished this disorder from the many other ses of similar pain. The usual history of intermittent kache, culminating in acute sciatic radiation, the ciation of muscle-spasm with the characteristic ıal list, and the strongly positive leg-raising test, confirmed this point. The so-called conservative ıtment was based on the accepted principle of correcı of a deformity and retention of the corrected position. the several methods, Mr. Wardle liked best the headpension plaster-and-celluloid jacket, which had ved successful in 70% of 269 cases. This method tabilised the spine; and under the temporary condins of artificial equilibrium a proportion of degenerated cs recovered their elasticity. The 30% of relapsing es were those in which there was no power to regain sticity; and this incapacity was probably the true lication for removal of the disc.

Mr. **A. Sutcliffe Kerr** held that operative treatment ruptured intervertebral disc should be considered ly when conservative treatment had failed. He lieved that three weeks' absolute bed rest was an equate form of conservative treatment; this rested ɜ intervertebral disc at least as well as when the tient was ambulant in plaster. Neurological signs re usually present, the most constant being limitation straight-leg raising and diminution of the ankle-jerk. ıdiology was not of much help, and myelography ould be employed only where the history was not aracteristic and there was suspicion of other ætiology, ch as cauda-equina tumour. The procedure of choice as a fenestration operation with minimal removal of bone, and in difficult cases hemilaminectomy gave an adequate exposure. Fusion of the spine simultaneously with the disc-removal was not recommended, but fusion might occasionally be necessary if there was subsequent severe back pain. Operative treatment of lumbago was not advisable. Mr. Kerr believed that lumbago was due to degenerative changes in the disc, but the pathology was not fully understood and the condition was better treated conservatively. Cervical-disc lesions were less common than lumbar-disc lesions; the operation was more formidable but became essential if there were signs of pressure on the cord. Lumbar-disc protrusions were sometimes so big that paraplegia resulted, and he had had twelve such cases. Statistics showed that 50–60% of cases of sciatica were cured by removal of the protruded disc, and a further 25–30% were substantially improved; 10–15% were not relieved; and only about 1% were made worse.

Mr. **F. C. Dwyer**, whilst agreeing with the general principle of treating patients suffering from sciatica conservatively in the first instance, felt that unless patients obtained quite early relief after the application of a plaster jacket, they should not be subjected to the continued discomfort of a jacket on the assumption that by this means the condition would clear up. If treatment by a plaster jacket was going to succeed, it would do so in 8–12 weeks. If there was not early relief from pain, if some symptoms still persisted after twelve weeks on conservative treatment, and if there was recurrence at a later date, operative treatment should be undertaken. The fenestration operation was a straightforward procedure and did not result in any residual weakness of the spinal column.

Insulin-induced Skeletal Abnormalities

Mr. **P. K. Duraiswami** said that in recent years it had been repeatedly shown that congenital malformations that were sometimes genetically determined could be produced in the offspring by maternal nutritional deficiencies, especially of vitamins; by the mother contracting rubella early in pregnancy; by irradiation; and by certain irritants, such as insulin, artificially introduced during development. With developing chick embryos the injection of insulin into eggs between the commencement and the seventh day of incubation had resulted in skeletal abnormalities such as spina bifida, partial or complete suppression of development of vertebræ, deformities of the feet ("club feet," divarication of claws), congenital dislocation of the hip, arthrogryphosis, and a developmental disturbance of bone resembling osteogenesis imperfecta.

The action of insulin seemed to be specific, since the injection into control eggs of physiological saline did not give rise to deformed chicks. Again, the injection of inactivated insulin caused no deformities, whereas if inactivated insulin was reactivated before injection, deformities resulted. Insulin seemed to affect primarily the part or organ which was in the most active stage of development or differentiation at the time of injection. It produced a definite hypoglycæmia, which persisted until about the twelfth day of incubation, after which the blood-sugar gradually returned to normal. In the chick the embryonic liver started storing glycogen about the twelfth day of incubation, and it was about this time that the carbohydrate metabolism was controlled to some degree by the secretion of insulin and the hormones of the suprarenal and pituitary glands. Since embryonic cells almost exclusively metabolised glucose during the early period of development, persistent insulin hypoglycæmia during this critical period might induce malformations by causing disturbances to cellular carbohydrate metabolism. These skeletal deformities had been prevented to a remarkable extent by injecting nicotinamide and riboflavin into the eggs along with insulin.

Why should some have them for so little cause? In epileptics the nervous centres were unstable, but little was known of the actual "trigger" mechanism which started the attack. In a faint a fall in blood-pressure explained the symptoms and the "trigger" was probably in the central nervous system—the onset following emotional disturbance suggested this, and again the fainting after standing for a long period. In postural hypotension there was already a great deal of evidence pointing to a central "trigger" mechanism, probably in the hypothalamus. The common characteristic for faints and fits, therefore, was an unstable nervous system. Hence it was not surprising that one should find both occurring in the same person, and that as time went on the influence of the centre responsible for fainting became less and that for epilepsy became greater. Finally he pointed out that there was no absolute means of distinguishing a fit and a faint unless the blood-pressure and pulse-rate could be watched during an attack. Although there might be a distinction between the two, they were related in their dependence on nervous instability.

Dr. DENIS WILLIAMS began by quoting Gowers's description of fainting and remarked that today we are discussing the matter in the same way as 50 years ago—we are a little further on, perhaps, but not much. He agreed that vasovagal attacks were rare, and that they should not be confused with "faints." He had seen two cases in the past year, both of which had been due to an infiltrating lesion in the region of the third ventricle. The electro-encephalograms (E.E.G.) of both patients with fainting and those who had epileptic fits showed bursts of fast waves in the frontal lobes. Therefore it appeared that the two conditions had a common factor, although he would not say from it that fainting was epilepsy. It was most unlikely that these waves related to the circumstance giving rise to the fit or faint, or directly to the reflex instability of the cardiovascular system, but it was likely that they reflected some instability in the hemispheres. Faints and fits must not be confused in their pathology or ætiology, but they seemed to be linked by the failure of the hemispheres to maintain consciousness in a special situation.

Dr. MAURICE CAMPBELL thought the distinction between fainting and epilepsy a very real one. He considered it unfortunate that the same term, "syncope," was used for the loss of consciousness in fainting and for the loss of consciousness in death, and suggested the term *tachyapsychia*, for use where there was sudden loss of consciousness in a faint, and *bradyapsychia*, where there was a more gradual loss of consciousness. While loss of consciousness in a sense concerned the physiologist and neurologist more than the cardiologist, Dr. Campbell thought they had a considerable knowledge of the many cardiac mechanisms which resulted in loss of consciousness. The common point in all the cases associated with cardiovascular lesions was cerebral anoxia. Too rapid functioning of the heart, as well as too slow, reduced the cerebral blood-flow. In general, bradyapsychia carried the graver prognosis. The patient was often not able to tell whether his failure was cardiac or cerebral. Dr. Campbell thought it was sometimes impossible to make a diagnosis of this on a single attack. How often are conditions like cerebral tumour present with loss of consciousness, and no other cardiovascular signs. The duration of unconsciousness was a real help in differentiating a cerebral and cardiac attack. A short loss of consciousness, lasting 2 minutes or up to 5 minutes, might be due to either; one lasting over 5 minutes was not likely to be cardiac, for if the heart stopped for 5 minutes the patient was dead. A difficulty was that some attacks started with cardiac arrest, but when the heart started again, consciousness did not return, because anoxæmia had been produced for long enough to cause cerebral damage showing itself in long unconsciousness. Stokes-Adams attacks where there was ventricular standstill in one side of the heart were often indistinguishable from fits and were also a good imitation of petit mal and grand mal. Standstill of the heart for 5–10 seconds would cause a sudden loss of consciousness. He recalled some American experiments in which a sphygmomanometer cuff was put round the necks of students and blown up to obstruct the cerebral circulation. Consciousness was lost in 5–10 seconds and recovered in the same length of time as soon as the cuff was allowed to collapse. All the students recovered completely in 2 minutes. The experiments were repeated on some schizophrenic patients who were kept unconscious for 110 seconds. These too were said to have recovered completely. Referring to Dr. Williams's observations with the electro-encephalograph, Dr. Campbell agreed that persons who were subject to fainting and those who had fits seemed to be a special type, but he did not think the two conditions were clinically related.

Dr. M. N. PAI, speaking as a psychiatrist, stressed the dangers of mistakenly diagnosing epilepsy as hysterical fits. Of 100 patients referred to him from military hospitals as cases of hysterical fits, only 31 had given a normal E.E.G.; 18 had definite evidence of epilepsy; 28 gave the spike-and-wave pattern associated with petit mal, and reports on the remaining 23 stated either that the E.E.G. suggested a predisposition to epilepsy or that it was compatible with epilepsy.

Dr. W. RITCHIE RUSSELL thought it was simpler to think of all people as being epileptics and regard the matter as one of threshold. He considered that anyone who suffered from automatic behaviour after an attack had had a fit, and he made a plea that someone who witnessed the attack should be sent with the patient to hospital. Forms should be posted to persons who had seen the attack. Patients who were liable to postural syncope should be told how they could stop an attack. There were various ways in which this could be done without drawing undue attention to oneself; the most effective was to bend down to tie up one's shoe lace; or—if stooping was out of the question—to contract the abdominal muscles vigorously.

Prof. E. P. SHARPEY-SCHAFER had found that one could faint anyone by bleeding him. If the person had a fall in blood-pressure which was great enough, he would inevitably have a fit. Professor Schafer did not think it was easy on the fit alone to distinguish between a fit and a faint. The pallor was of great interest. It had been shown that there was secretion of posterior pituitary hormone during the attack.

Dr. SHEILA SHERLOCK said that not only had secretion of the posterior pituitary hormone been observed, but also secretion of adrenaline. It seemed this might be the effect of faints and not the cause. She wondered whether the abnormal rhythm which Dr. Williams observed in the E.E.G. was the result of the faint or whether it might be causative.

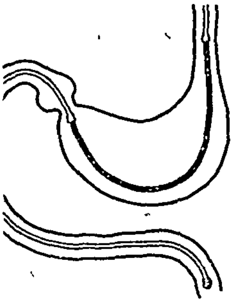
Dr. C. G. BAKER discussed unconsciousness occurring with coughing. Such cases, he recalled, were first described in 1876, when they were termed "laryngeal vertigo." All these cases occurred in men who were overweight, suffering from chronic bronchitis and emphysema. Dr. Baker thought the coughing led to cerebral anæmia, the high intrathoracic pressure preventing the return of blood to the right heart, and that the condition was commoner in men than women because men coughed with more force and severity. The prognosis was good.

Sir CHARLES SYMONDS, replying to the discussion, welcomed Dr. Williams's new concept that some people are more liable to lose consciousness than others, whether from epilepsy or not.

New Inventions

JEJUNAL TUBE FOR INTESTINAL LAVAGE IN URÆMIA

N the treatment of uræmia by intestinal lavage, nodified Miller-Abbott tube is very difficult to use ause the patients are restless and easily tired, and they n vomit, thus displacing the tube. Removal of the ge fluid by suction is often difficult and incomplete. these reasons Brun[1] and Selvaag[2] recommended junal tube for the inflow and a rectal tube for the out- of the lavage fluid. With this technique practically whole of the small intestine and colon are used for ysis. A gastric tube is impracticable for the inflow, use it will cause vomiting. Intubation with a jejunal tube in these very ill patients is also difficult. ctimes vomiting makes intubation impossible, and etimes the jejunal tube is regurgitated and coiled in the stomach. Frequent radioscopic control he position of the tube is often necessary, and is very fatiguing for the patient. A jejunal tube able for intestinal lavage must be capable of g easily and quickly introduced and must resist lacement by vomiting.



l tube made in three s. The stiff middle part, wn in black, prevents ing in the stomach and ors the terminal part ly in the small intestine.

At the Municipal Hospital at Kampen, in Holland, we have devised a tube which meets these requirements satisfactorily. It is constructed in three parts. The distal part (30–40 cm. long) is made of radio-opaque flexible rubber and has at its tip the usual metal olive. The middle part (about 30 cm. long) is made of stiff and rather hard 'Polythene' (outside diameter 3 mm., inside diameter 2 mm.). The proximal (nasal and œsophageal) part is made of polyvinylchloride ('Koroseal') tubing (outside diameter 5 mm.), which is very soft and less irritating to the nasal mucosa than are other erials.[3] The two ends of the middle part are inserted the tip of the proximal part and the beginning e terminal part and silk thread is tied firmly round joins.

efore intubation a mandrin, consisting of well- icated wire 0·5 mm. in diameter, is pushed through entire length of the tube. This mandrin has been n two curves—one to the right at the distal end, and to the front at the proximal end—but it is flexible ugh to allow the tube to be passed through the nose œsophagus. When the tip of the tube reaches the nach, the elasticity of the mandrin bends it to the right, preventing it from coiling in the fundus. Under oscopic control the tube is passed gradually along greater curvature to the pyloric region. The passage he tip of the tube past the pyloric sphincter needs leness and patience, for the operator must wait the periodic opening of the sphincter. As soon as tip reaches the duodenum, the mandrin must be ed out a few centimetres; otherwise the distal of the tube will be too stiff to pass through the ply curved duodenum. The tube is then easily hed further into the duodenum, and at the same time mandrin is pulled out more and more. When the middle part of the tube has reached the pylorus, mandrin is removed altogether. The middle part not be passed beyond the pylorus, but the distal t is now firmly anchored in the duodenum and cannot displaced by vomiting.

Vith this technique the small intestine has been ubated in a few minutes. Fluoroscopy for so short a e is not a serious disadvantage. We have used this e successfully on uræmic patients when intubation with the usual type of duodenal tube had proved impracticable because of severe vomiting.

Sometimes, during irrigation, the lavage fluid is partly regurgitated into the stomach and causes vomiting. We therefore now fasten a rubber balloon just proximal to the tip of the tube, and fill it with air, after it has passed the pyloric sphincter, through a thin flexible polythene tube (diameter 2 mm.) fastened alongside the main tube. This balloon effectively prevents lavage fluid being regurgitated into the stomach.

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[1] Brun, C. *Ugeskr. Laeg.* 1949, 111, 229.

[2] Selvaag, O. *Ibid*, p. 227.

[3] Wild, J. J. *Surgery*, 1948, 24, 70.

Reviews of Books

History of the Primates: an Introduction to the Study of Fossil Man

W. E. LE GROS CLARK, F.R.S., professor of anatomy in the University of Oxford. London: British Museum. 1949. Pp. 117. 2*s.* 6*d.*

MAMMALS, which evolved about 150,000,000 years ago in the Mesozoic age, gave rise to small tree-shrews which flourished at the beginning of the Tertiary age about 70,000,000 years ago. From these in turn evolved lemurs, tarsiers, apes, monkeys, and man. All of them, from tree-shrews to man, are classed zoologically as Primates, the subject of this beautifully clear, admirably concise, and plentifully illustrated account. Intelligible reasons are given why apes, monkeys, and man are grouped together as Anthropoids, apes and man as Hominoids, and the different forms of modern and fossil man as Hominids. The puzzle to be solved is the line of evolution of man from the tree-shrews. Prof. Le Gros Clark shows that monkeys are not on that line, but that both monkeys and apes are in all probability derived from tarsiers. The apes gave rise both to other apes, not on the line, and to man; and it remains to be found from which apes man is descended. Candidates for the position of ape ancestor of man are rapidly being dug up in South Africa. Prof. Raymond Dart's discovery of Australopithecus in 1925 is ancient history now, but Dr. Robert Broom is still finding others. Unfortunately their geological dates are doubtful because they come from unstratified deposits; but the associated fauna points to either the end of the Pliocene age or the beginning of the Pleistocene age, which began about 1,000,000 years ago. The anatomy of these South African apes shows many affinities with the Hominids, but the earliest Hominids, *Pithecanthropus erectus* from Java and *P. pekinensis* from China, are also assigned by some geologists to the early part of the Pleistocene age, and artefacts first appear at the beginning of the same age, if not earlier. Moreover, a Hominid remarkably like, if not identical with, *Homo sapiens* was found at Swanscombe, Kent, in an Acheulian context of some 250,000 years ago, and a lower jaw with a well-developed chin was found in association with pebble tools and a fauna of very early Pleistocene type in East Africa.

Having pointed out that the special feature in the evolution of the Primates is the growth and elaboration of the brain, Prof. Le Gros Clark says: "If Man has gained his intellectual dominance over his fellow creatures by concentrating his evolutionary energies on the development of his brain, it remains to be seen whether he can now maintain his position by contriving a method of living in orderly relations with members of his own species"—or become extinct.

Woman and Happy Marriage

ALLAN WORSLEY, M.B. Birm. Birmingham: Cornish Brothers. 1949. Pp. 318. 21*s.*

NO-ONE can doubt the sincerity of the author of this book, though his self-assurance may occasionally raise a smile. Much of it reads like the after-supper musings, reminiscences, and good advice of an elder brother G.P., and from the liberal mixture of exhortation and explanation a number of young people may find some help in their marital difficulties. The value of the book lies in its insistence on feelings as the basis of so many difficulties and in the author's admiration and appreciation of women. There is a risk, however, that those people who

MANCHESTER AND LIVERPOOL PÆDIATRIC CLUBS

Prematurity

THE first annual joint meeting of these two clubs was held in Liverpool on Jan. 6, with Miss ISABELLA FORSHALL (Liverpool) in the chair.

A discussion on prematurity was opened by Prof. W. I. C. MORRIS (Manchester), who spoke on the causes and prevention of prematurity. The commonest recognisable causes were toxæmia of pregnancy, antepartum hæmorrhage, plural pregnancy, and hydramnios; but in some 40% of cases no definite cause could be elicited. Malnutrition might be an associated, if not the primary, ætiological factor. The prophylaxis of prematurity was a matter for sociological study and communal action. The provision of many more antenatal beds was necessary to enable the obstetrician to institute treatment of toxæmia of pregnancy at its very commencement, and to allow of inpatient study of those conditions which appeared to predispose to prematurity. Not all the beds need be in hospitals; antenatal rest-homes would be particularly valuable.

Dr. J. D. HAY (Liverpool) discussed high-protein feeding for the premature infant. He described his experience at Mill Road Hospital where three groups, each of 15 premature infants, had been studied. Each group received the same routine care, and all infants were fed with expressed breast-milk (E.B.M.) until breast-feeding was established. 'Hepovite' was added to E.B.M. (gr. 18 to the oz.) in group 1 so as to give an additional 2·2% amino-acid content. Group 2 received an additional 4·4% 'Dextri-maltose,' and group 3 E.B.M. alone. Observations of the weight-gains, the total plasma-protein levels, and the hæmoglobin levels showed that the addition of hepovite had no influence on the rate of weight-gain; that the plasma-protein levels rose somewhat during the first few weeks when maximum doses of hepovite were given, but that these levels were not maintained; and that the hæmoglobin levels in the three groups were similar.

Dr. SYLVIA GUTHRIE (Manchester) reviewed the cases of 280 premature babies admitted in the first two weeks of life to the Duchess of York Babies' Hospital between January, 1944, and September, 1949, and attempted to assess the infection-rate and the mortality due to infections. Within this group the mortality-rate fell in 1947 and 1948 but rose slightly in 1949, when there was an increase in the number of deaths within forty-eight hours of admission. Despite this increase, there was a pronounced drop in the percentage of deaths due to infection. This fall coincided with the transfer of infants from the old premature-baby wards to a new cubicled unit; and Dr. Guthrie concluded that the decrease was due to this isolation in cubicles with a fully trained nursing-staff throughout the twenty-four hours, and to improved ward-cleaning facilities.

Dr. A. E. MCCANDLESS (Liverpool) spoke of the value of straight X-ray films of the abdomen in the diagnosis of intestinal obstruction in the newborn. Gas was present in the stomach immediately after birth, and within the first hour the proximal portion of the small bowel was outlined. At the third hour the colon could be visualised, and by the eighth hour gas in the pelvis. In Liverpool an investigation was being undertaken to determine the rate of passage of gas through the bowel of premature infants; preliminary observations suggested that this was similar to that in full-term infants. In congenital intestinal obstruction, arrest of the passage of gas could be seen on the straight X-ray film a few hours after birth. A barium meal, which involved the risk of aspiration, was a less safe procedure.

Dr. P. D. MOSS (Liverpool) described an apparent periosteal reaction found in radiographs of the long bones of premature infants. Of 63 such infants 26 had shown these changes in one or more bones. Syphilis was excluded; and the explanation was still unknown.

MANCHESTER MEDICAL SOCIETY

Peritoneal and Retroperitoneal Effusions

AT a meeting on Dec. 7 Prof. G. A. G. MITCHELL gave a lecture on the Spread of Effusions in the Peritoneal and Retroperitoneal Regions. From clinical and experimental evidence, he argued that the orthodox [illegible] about the spread of fluids from the right subhepatic space (Morison's pouch) were wrong. The experiments involved the production of artificial visceral perforations, the injection of barium emulsion under controlled pressure, and subsequent study on the radiographic screen. They revealed that an effusion in the right subhepatic space escaped into the right infracolic space through the interval between the quadrate lobe of the liver, the gall-bladder, the transverse colon, and the falciform ligament, and not, as was usually stated, by passing through the interval between the liver, right kidney, and hepatic flexure. Overspill was facilitated by the relative narrowness of the transverse mesocolon to the right of the midline. The right subphrenic space escaped involvement in the early stages, possibly because fluid accumulating in the pouch pressed the thin inferior margin of the liver against the parietes, so producing a valvular seal.

The fluid passed downwards and outwards in the right infracolic space to the ileocæcal region; some of it flowed into the right external paracolic groove and then spread upwards to invade the right subphrenic space. It also extended into the left infracolic space, passing over or between the coils of ileum or [illegible] the cæcal margin, and then it gradually infiltrated upwards to involve the left subphrenic space, and downwards to invade the pelvis, which often escaped contamination when the body was recumbent unless large amounts of fluid were injected. Contrasting diagrams showed how the methods of spread differed from those described in monographs and textbooks.

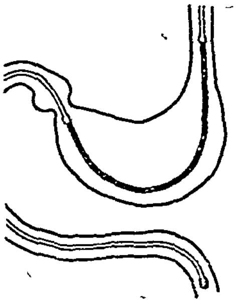
The spread of fluids in the retroperitoneal regions was also influenced by anatomical arrangements, and investigations and experiments had been devised in order to reveal how these factors determined the spread of fluid from the perinephric space. The descriptions of the renal fascia given in textbooks of anatomy and applied anatomy were all more or less inaccurate; the layers of fascia were united along the entire renal and suprarenal margins and not only above and laterally as was usually stated. There was a weak spot in the vicinity of the ureter, and extension from the perinephric space into the retroperitoneal region invariably commenced in this area. Medially there was neither actual nor potential communication between the opposite perinephric spaces because the renal fascia blended with the mass of connective tissue surrounding the great vessels and in the root of the mesentery.

An effusion in the perinephric space or retroperitoneal region remained unilateral unless the pressure exceeded 100 mm. Hg, and then extension to the opposite side might take place in the lumbosacral, renal hilar, and suprarenal regions, in that order of frequency. If a rupture occurred in the hilar region, the anterior layer of renal fascia and adjacent peritoneum usually gave way with involvement of the peritoneal cavity, but the opposite perinephric space was not invaded. The [illegible] of extension into the pelvis with invasion of the pararectal and paravesical areas was also demonstrated, and [illegible] the occasional spread into the inguinal canal and scrotum in the loose extraperitoneal tissues around the processus vaginalis peritonei.

New Inventions

'EJUNAL TUBE FOR INTESTINAL LAVAGE IN URÆMIA

ɿ the treatment of uræmia by intestinal lavage, ıodified Miller-Abbott tube is very difficult to use .use the patients are restless and easily tired, and they ɑ vomit, thus displacing the tube. Removal of the ge fluid by suction is often difficult and incomplete. these reasons Brun [1] and Selvaag [2] recommended unal tube *for the inflow and a rectal tube for the out-* of the lavage fluid. With this technique practically whole of the small intestine and colon are used for ƴsis. A gastric tube is impracticable for the inflow, use it will cause vomiting. Intubation with a jejunal tube in these very ill patients is also difficult. etimes vomiting makes intubation impossible, and ɜtimes the jejunal tube is regurgitated and coiled in the *stomach. Frequent radioscopic control* he position of the tube is often necessary, and is very fatiguing for the patient. A jejunal tube *ıble for intestinal lavage must be capable of* g easily and quickly introduced and must resist lacement by vomiting.



al tube made in three ts. The stiff middle part, ıwn in black, prevents ling in the stomach and hors the *terminal* part nly in the small intestine.

At the Municipal Hospital at Kampen, in Holland, we have devised a tube which meets these requirements satisfactorily. It is constructed in three parts. The distal part (30–40 cm. long) is made of radio-opaque flexible rubber and has at its tip the usual metal olive. The middle part (about 30 cm. long) *is made of stiff and rather* hard 'Polythene' (outside diameter 3 mm., inside diameter 2 mm.). The proximal (nasal and œsophageal) part is made of polyvinylchloride ('Koroseal') tubing (outside diameter 5 mm.), which is very soft and less irritating to the nasal mucosa than are other erials.[3] The two ends of the middle part are inserted the tip of the proximal part and the beginning ɑe *terminal* part and silk thread is tied firmly round joins.

efore intubation a mandrin, consisting of well- icated wire 0·5 mm. in diameter, is pushed through entire length of the tube. This mandrin has been ·n two curves—one to the right at the distal end, and to the front *at the proximal end—but it is flexible* ugh to allow the tube to be passed through the nose œsophagus. When the tip of the tube reaches the nach, the elasticity of the mandrin bends it to the right, 's preventing it from coiling in the fundus. Under ioscopic control the tube is passed gradually along greater curvature to the pyloric region. The passage the tip of the tube past the pyloric sphincter *needs* tleness and patience, for the operator must wait the periodic opening of the sphincter. As soon as tip reaches the duodenum, the mandrin must be led out a few *centimetres; otherwise the distal* 't of the tube will be too stiff to pass through the ırply curved duodenum. The tube is then easily ,hed further into the duodenum, *and at the same time* mandrin is pulled out more and more. When the f middle part of the tube has reached the pylorus, mandrin is removed altogether. The *middle* part ınot be passed beyond the pylorus, but the distal 't is now firmly anchored in the duodenum and cannot displaced by vomiting.

Vith this technique the small intestine has been ubated in a few minutes. *Fluoroscopy for so short a* ıe is not a serious disadvantage. *We have used this* ɔe successfully on uræmic patients when intubation with the usual type of duodenal tube had proved impracticable because of severe vomiting.

Sometimes, during irrigation, the lavage fluid is partly regurgitated into the stomach and causes vomiting. We therefore now fasten a rubber balloon just proximal to the tip of the tube, and fill it with air, *after it has passed the pyloric sphincter, through a* thin flexible polythene tube (diameter 2 mm.) fastened alongside the main tube. This balloon effectively prevents lavage fluid being regurgitated into the stomach.

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[1] 1. Brun, C. *Ugeskr. Laeg.* 1949, **111**, 229.
[2] 2. Selvaag, O. *Ibid*, p. 227.
[3] 3. Wild, J. J. *Surgery*, 1948, **24**, 70.

Reviews of Books

History of the Primates: an Introduction to the Study of Fossil Man

W. E. Le Gros Clark, F.R.S., professor of anatomy in the University of Oxford. London: British Museum. 1949. Pp. 117. 2*s.* 6*d.*

MAMMALS, which evolved about 150,000,000 years ago in the Mesozoic age, gave rise to small tree-shrews which flourished at the beginning of the Tertiary age about 70,000,000 years ago. From these in turn evolved lemurs, tarsiers, apes, monkeys, and man. All of them, from tree-shrews to man, are classed zoologically as Primates, the subject of this beautifully clear, admirably concise, and plentifully illustrated account. Intelligible reasons are given why apes, monkeys, and man are grouped together as Anthropoids, apes and man as Hominoids, and the different forms of modern and fossil man as Hominids. The puzzle to be solved is the line of evolution of man from the tree-shrews. Prof. Le Gros Clark shows that monkeys are not on that line, but that both monkeys and apes are in all probability derived from tarsiers. The apes gave rise both to other apes, not on the line, and to man; and it remains to be found from which apes man is descended. Candidates for the position of ape ancestor of man are rapidly being dug up in South Africa. Prof. Raymond Dart's discovery of Australopithecus in 1925 is ancient history now, but Dr. Robert Broom is still finding others. Unfortunately their geological dates are doubtful because they come from unstratified deposits; but the associated fauna points to either the end of the Pliocene age or the beginning of the Pleistocene age, which began about 1,000,000 years ago. The anatomy of these South African apes shows many affinities with the Hominids, but the earliest Hominids, *Pithecanthropus erectus* from Java and *P. pekinensis* from China, are also assigned by some geologists to the early part of the Pleistocene age, and artefacts first appear at the beginning of the same age, if not earlier. Moreover, a Hominid remarkably like, if not identical with, *Homo sapiens* was found at Swanscombe, Kent, in an Acheulian context of somé 250,000 years ago, and a lower jaw with a well-developed chin was found in association with pebble tools and a fauna of very early Pleistocene type in East Africa.

Having pointed out that the special feature in the evolution of the Primates is the growth and elaboration of the brain, Prof. Le Gros Clark says: "If Man has gained his intellectual dominance over his fellow creatures by concentrating his evolutionary energies on the development of his brain, *it remains to be seen whether* he can now maintain his position by contriving a method of living in orderly relations with members of his own species"—or become extinct.

Woman and Happy Marriage

Allan Worsley, M.B. Birm. Birmingham: Cornish Brothers. 1949. Pp. 318. 21*s.*

NO-ONE can doubt the sincerity of the author of this book, though his self-assurance may occasionally raise a smile. Much of it reads like the after-supper musings, reminiscences, and good advice of an elder brother G.P., and from the liberal mixture of exhortation and explanation a number of young people may find some help in their marital difficulties. The value of the book lies in its insistence on feelings as the basis of so many difficulties and in the author's admiration and appreciation of women. There is a risk, however, that those people who do not respond to his hearty advice may feel that there is no hope for them: he seems to consign them to a limbo of non-coöperators who may or may not get help from psychiatrists. His views on the upbringing of children seem excessively repressive. Also his facts are sometimes questionable: a Dutch cap does *not* fit by suction.

Vitaminology

The Chemistry and Function of the Vitamins. WALTER H. EDDY, PH.D., emeritus professor of physiological chemistry, Teachers College, Columbia University, New York. Baltimore: Williams & Wilkins. London: Baillière, Tindall, and Cox. 1949. Pp. 365. 46*s.* 6*d.*

VITAMINOLOGY is not a pleasant word, and many people will disagree with the statement on the dust-cover that "for the first time in a single volume, this monograph covers the vitamin field in an up to date manner"; but that is not to say that this is not a good book. Professor Eddy has been associated with vitamin research and teaching for a great number of years, and his experience and knowledge have enabled him to produce a book on the vitamins which many will read with pleasure and profit. The historical touches are particularly pleasing, and the simplicity of the presentation makes the book easy to read. The vitamins are considered in turn, and each is discussed under the headings of action, chemistry, practical importance, and requirements. Their chemistry and chemical relations are set out in a way that should prove very valuable to those who wish to understand this part of the subject—and who does not, now that the mode of action of these mysterious minutiæ is beginning to become clear? Each section or chapter closes with a substantial body of references; so additional information on any point should be easy to obtain. B_{12} does not appear on the table of contents but is dealt with, satisfactorily and in an interesting fashion, under "other postulated vitamins."

No book is perfect, and no human being could compress all the present knowledge about vitamins into a book of this size; but the claim on the dust-cover is too challenging to escape some comment. The author has inevitably relied on previous vitamin reviews for much of his information, and some of this is a little out of date; there is no mention of the interesting effects of polar-bear liver in the section on vitamin-A overdosage, and no reference to any of the Medical Research Council's experiments at Sheffield on vitamin A or C requirements. Hyperkeratosis is not given as a sign of C-deficiency, and the Danish work on phytase has been overlooked. Yet in spite of such reservations, Professor Eddy's book (and its preface by Casimir Funk) may be commended to the teachers and students for whom it was written and also to many others who want clear information on a quickly growing and important subject.

Advances in Pediatrics

Vol. IV. Editors: S. Z. LEVINE; ALLAN M. BUTLER; L. EMMETT HOLT, jun.; A. ASHLEY WEECH. London and New York: Interscience Publishers. 1949. Pp. 316. 52*s.*

VOL. IV of *Advances in Pediatrics* differs from vols. I–III in having half its articles contributed by European authors. It would be satisfying to say that this international flavour has improved its value; but in fact the contributions of most worth and containing most new material derive from the United States. The authors of the seven articles tend perhaps to give too detailed an exposition of their personal experience, and the editors have selected some subjects on which there is nothing strikingly new to report and which have not yet been developed beyond the stage of uncoördinated facts.

Examples are erythema nodosum and the reticulo-endothelioses. The criticism also applies to E. Freudenberg's article on cystinosis, the classification of which is in a very muddled state. It might have simplified the author's task if he had considered the part played by renal tubular incompetence in causing amino-aciduria; for C. E. Dent has shown that the blood level of amino-acids may be normal in such cases of resistant rickets with dwarfism, even if there is heavy amino-aciduria as well as the more common glycosuria, proteinuria, and excessive phosphaturia. There is thus no need in these cases to postulate any inborn error of metabolism of amino-acids except possibly in the renal tubule cells.

A. Lichtenstein presents with force and skill his plea for a free diet in diabetes. When, however, one reads his destructive criticism of the dietary disciplinarians and assesses what in fact he recommends for his own patients, one is left with the impression that even his diet has significant controls, as indeed it must to avoid hypoglycæmia and insulin fatalities. The real test of Lichtenstein's treatment is, of course, its results; and, though his early ones are promising, the later ones will throw more light on the possible harm done by hyperglycæmia per se.

Two American articles, one on the treatment of congenital syphilis with penicillin and the other on combined immunisation, are comprehensive reviews of a mass of literature. Hence they make intricate reading, and it is a relief to follow a story of more individual achievement in Ingraham's and Matson's clear and well-illustrated article on subdural hæmatoma in infancy.

There are more misprints than one would expect in a volume otherwise so well produced; but except perhaps for that on p. 274, where cystine appears instead of cysteine, they are unlikely to cause confusion. Besides a detailed index relating to this volume there is a cumulative author and subject index including also the [illegible] the three earlier volumes. This collection of articles provides information of wide interest and not easily obtainable elsewhere.

Textbook of Histology (5th ed. London: Heinemann Medical Books. 1949. Pp. 432. 25*s.*).—Miss Evelyn E. Hewer, D.SC., has revised her good and well-known textbook. Besides giving the basic minute structure of organs and tissues she has described the reactions of tissues so that students may learn to distinguish between physiological variations of structure, and those which fall into the realm of pathology. The illustrations in this book were always good, and have now been augmented with new photographs. With the help of Dr. L. M. Dickinson, Dr. Hewer has brought the terminology into line with that used currently by anatomists—a language so fleeting that he who runs may read.

Health is Our Adventure (London: Church Missionary Society. 1949. Pp. 95. 3*s.*).—This little book, by Dr. G. Jeffree, is written with charm and humour as well as with deep missionary zeal. Within its small compass it shows how modern medicine, particularly its preventive aspects, can be aligned with missionary pioneering; and the adventure is there no less than it was in earlier days. The writer knows village life in South India well; and the book touches also on conditions of medical work in other parts of Asia and Africa. The many illustrations show vividly how modern medical practice can be adapted to conditions in hospitals and health centres in backward areas. The book should appeal strongly to the pioneer spirit in medical students and nurses in training.

The Premature Infant: Medical and Nursing Care (2nd ed. Philadelphia and London: J. B. Lippincott. 1949. Pp. 381. 42s.).—For many years Prof. Julius H. Hess and Miss Evelyn Lundeen, of Chicago, have made a special study of the premature baby, and this book is based on their experience. The new edition has been thoroughly revised and modernised. Additions have been made to the sections on follow-up care and on physical and mental development, and whole chapters are now devoted to medical therapeutics, erythroblastosis fœtalis, the eyes, the ears, and men[illegible]. These chapters include the use of sulphonamides and antibiotics in the premature infant, an up-to-date account of hæmolytic disease including the present knowledge of haptens, and a section on retrolental fibroplasia, a condition causing blindness in premature babies. The sections on procedure for manual expression of breast-milk and immunisation, have been improved, and the chapter on incubators now includes descriptions of the Gordon Armstrong X4 baby incubator and the Chapple isolotte, both of which are in limited use in this country. The last two chapters give valuable suggestions for the teaching of the care of the premature baby, and a comprehensive picture of the organisation of this care in the various cities and States of the U.S.A. A useful section on the care of the full-term infant appears as an appendix. Most of the original illustrations are still present and many new ones have been added. The book is full of interest for nurses as well as doctors, since nursing procedures are given in detail.

THE LANCET

LONDON: SATURDAY, FEB. 11, 1950

Atomic Defence

ROM the studies made at Hiroshima and Nagasaki
have a fair idea of the medical problems likely to
e after an atomic explosion in a populous area.
RK[1] points out that the explosion may cause
ries in three ways: (1) by its actual force, which
y hurt people up to $3^{1}/_{2}$ miles away; (2) by heat,
h a range of $2^{1}/_{2}$ miles; and (3) by radiation, with
ange of 2–3 miles. The direct injuries may be
sed either by blast, or by flying fragments of
terial or falling debris; blast injuries are relatively
, but 70% of casualties are likely to be injured by
gments or debris. Burns are also of two types:
re are *flash burns*, which may affect people in the
n as far as $2^{1}/_{2}$ miles away, and then there are
ondary burns from fires caused by the explosion.
rious estimates put the proportion of casualties
o have burns—usually in addition to injuries—at
m 65% to 90%. About 35% of casualties have
iation injuries. These are mostly due to direct
osure to γ-rays, but they may also be caused by
osure to substances rendered radioactive by the
losion; and there is a further unknown proportion
o have inhaled radioactive dust or who have
ested substances contaminated by such dust or
ve even been rendered radioactive themselves. This
eading of radioactive dust and possibly water-
oplets by the explosion and by subsequent wind is
e of the main and most incalculable dangers that
y system of atomic defence would have to face.
cause it is so insidious; and obviously it may
d to contamination of water, food, clothing, and
edical supplies.

To avoid contamination, the rescue services would
ve to be at least 3 miles from the explosion, and
the leeward side perhaps even further away.
l rescue workers would have to be provided with
otective clothing and a complete change, including
derclothing. Their duty would be simply rescue
d first-aid in the contaminated area—stopping
emorrhage, immobilising broken limbs, and so on
and they would concentrate on getting the casualty
the decontamination centre and the "base"
ospital as soon as possible. Forward blood and plasma
ansfusion, so well exploited in the late war, is no
se in atomic work; nor must hypodermic injections
e given: morphine, if given at all, must be given
y mouth. PARK holds that rescue-workers should
oncentrate on casualties beyond a 2-mile radius from the explosion centre, since those within this radius are likely to die anyhow of radiation sickness, unless shielded by, say, buildings. Extensive provision will have to be made for decontaminating casualties; and the necessary buildings, with good water-supply and ventilation, and the protective arrangements for workers, cannot easily be improvised. After decontamination, the casualty can go to hospital. Here his wounds, and almost certainly his burns, will be treated on established lines. The many cases of burns will call for good laboratory facilities and ample blood and plasma for infusion. In addition, radiation sickness will have to be watched for, and here the important criterion is the white blood-cell count. PARK thinks that if the count is less than 2000 per c.mm. treatment is a waste of time and material; if the count is over 2000 per c.mm. a transfusion of 500 ml. of whole blood is given, and if it remains above this figure twenty-four hours later the full supportive treatment for radiation sickness can be undertaken with a good chance of success. One of the peculiarities of atomic warfare is that, when the immediate casualties have been dealt with, the defence planners must prepare for a fresh wave of radiation-sickness cases 8–14 days after the explosion. Those affected may have had some sickness on the first day. Thereafter they are quite well until symptoms associated with granulopenia appear; then follow hæmorrhages due to thrombocytopenia and increased heparin in the blood; and after about three weeks—if the patient survives—comes an aplastic type of anæmia. This syndrome requires intensive treatment by repeated blood-transfusion, penicillin against infection, and intravenous *toluidine-blue to control the hyper*heparinæmia. In each case a large amount of laboratory work is clearly needed for proper control. The later effects of radiation on the blood have so far not been conspicuous. SNELL, NEEL, and ISHIBASHI[2] carefully examined the blood of some 900 people in Hiroshima who had had epilation of the scalp after exposure to the atom-bomb explosion two years before. Compared with the population of a nearby town, their red-cell count was 1·6% lower and their hæmoglobin 2·1% lower: the white-cell counts were not significantly different.

Here, then, in brief outline, are the problems. On what scale must the defence services be provided? Some guiding figures are known. The Hiroshima bomb devastated 4 square miles, killed about 60,000 people, and injured some 69,000; the Nagasaki bomb blew up $1^{1}/_{2}$ square miles, killed 39,000, and injured 25,000. PEARSE and PAYNE[3] estimate that at Hiroshima there were probably 34,000 severely burned casualties, and calculate that to cope with this number of burns 170,000 "professional persons" (doctors, nurses, technicians) would be needed, eight thousand tons of medical supplies (enough to fill a Liberty ship) would be used, and the cost would be about 10 million dollars. And all this is for only one aspect of treatment. PERRIN LONG[4] believes that the explosion of a single bomb of the Hiroshima type would create within the first twenty-four hours the need for 300 first-aid teams, 500 stretcher-bearer teams, 400 casualty-collection points, and 24 neuropsychiatric centres. No wonder **Park** says that it is probably impossible to handle all the cases; we can only try to save some. And these grim estimates apply only to the original atomic-bomb explosions. Bombs capable of causing ten times this destruction are reputed to be a practical possibility, if not already made; and the proposed hydrogen bomb is said to be many times more powerful and destructive than even these.

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[1] Park, W. E. *Canad. med. Ass. J.* 1949, 61, 473.

[2] Snell, F. M., Neel, J. V., Ishibashi, K. *Arch. intern. Med.* 1949, 84, 569.

[3] Pearse, H. E., Payne, J. T. *New Engl. J. Med.* 1949, 241, 647.

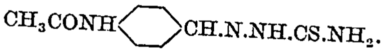
[4] Quoted by Snyder, L. T. *Med. Ann. Distr. Columbia*, 1949, 18, 505.

Will any defence system be able to do more than rescue those at the fringe of the affected area? And if both sides in a war use these engines of obliteration, who will call himself the victor? It is of course suggested that fear of retaliation may prevent resort to atomic bombs and biological warfare.[5] But those who start wars are prepared to take risks; and it is as well that everyone should realise what is involved in the "atomic defence" of which some politicians speak so glibly.

Thiosemicarbazone in Tuberculosis

Here and in the United States the only chemotherapeutic agents that have shown much promise in the treatment of tuberculosis have been the sulphones, streptomycin, and *p*-aminosalicylic acid. But a fourth group, the thiosemicarbazones, has now appeared on the scene from Germany, where these drugs have been developed by **Domagk** and the workers of the Farbenfabriken Bayer Laboratories at Elberfeld[6] and clinical trials have been made.

These compounds were developed through a study of the sulphonamides, sulphones, and sulphathiodiazoles, all of which show some antituberculosis activity. **Domagk** found that this activity depended not on the presence of sulphonamide or sulphone groups or thiazole or thiodiazole rings but on an open-chain arrangement of nitrogen and sulphur atoms, as in the thiosemicarbazones. Of the large number of substances tested the most active was found to be 4-acetyl-aminobenzaldehyde thiosemicarbazone,



This has been submitted to extensive clinical investigation in Germany under the names 'Conteben' and TBI-698. The sulphur atom in the thiosemicarbazones is essential for activity, and compounds derived from aldehydes are more active than those derived from ketones. The aromatic aldehydes appear to be more active than the aliphatic, and activity is increased by introducing substituents into the aromatic ring.[7] **Hoggarth** and his co-workers[8] of the I.C.I. Research Laboratories have recently examined a number of thiosemicarbazones and find that the thiosemicarbazone of *p*-ethylsulphonylbenzaldehyde is more active than TBI-698 in the mouse. TBI-698 is effective by mouth and parenterally; it is only sparingly soluble in water, but can be rendered suitable for injection by solubilising agents such as antipyrin, propylene glycol, and some acid amides. **Levaditi**,[9] at the Institut Pasteur, and **Domagk**[10] have investigated the antituberculous activity of TBI-698 in vivo. According to **Levaditi** its effect in the experimentally infected mouse is comparable to that of *p*-aminosalicylic acid, though inferior to that of streptomycin. On the other hand **Domagk** reports that in the guineapig TBI-698 is a hundred times as active as *p*-aminosalicylic acid weight for weight, and its activity is of the order of that of streptomycin. TBI-698 inhibits the growth of *Myc. tuberculosis* on an egg culture medium containing *p*-aminobenzoic acid at a dilution of 1:300,000; the comparable dilutions for *p*-aminosalicylic acid and streptomycin are 1 : 5000 and 1 : 50,000–100,000. Besides inhibiting the growth of tubercle bacilli TBI-698 produces morphological changes—abnormal size, granular disintegration, and thread formation—in the bacilli. It also changes their staining properties; the bacilli losing their capacity for taking first the Ziehl stain and then Gram's stain. The mode of action of the drug is not yet clear; it may act directly on the tubercle bacillus itself rather than indirectly via the host. **Domagk** believes that a combination of TBI-698 and streptomycin is likely to be more effective than either drug alone.

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lobulins of the plasma and an increase in the lobulins ; since some antibodies are included among γ-globulins this is considered to be a favourable ct. The drug has a strange and deceiving action the erythrocyte-sedimentation rate. After a few s of treatment there is usually an impressive fall normal levels. This action is non-specific and ırs in patients with and without tuberculosis. The nge in sedimentation-rate in patients receiving I-698 therefore rather loses its significance as an ex of their progress.

he evaluation of any drug in the treatment of erculosis is difficult unless it can exert an impressive ct on the miliary or meningeal forms. The er clinical types wax and wane without any ific treatment. The evaluation of TBI-698 in the man cases is further complicated by the nutritional lition of the patients, many of whom were triated prisoners-of-war, at the start of treatment. eover, in many areas X-ray films were scarce paper film had to be used. It seems certain that -698 has no effect on tuberculous meningitis iliary tuberculosis, but 90–100% of the cases of ngeal tuberculosis treated have shown consider- improvement ; pain, dysphagia, and hoarseness ppear in a few days and complete healing is rved in most cases after six to eight weeks. erculous enteritis, which seems to be common German sanatoria, responds favourably, although drug has to be continued for a long time and pse may occur after its withdrawal. It should be ted out, however, that the diagnosis of tuber- us enteritis was often based on radiological ings only. Many of the patients with pulmonary erculosis were in a deplorable physical condition he start of treatment and it was very difficult to how far their improvement was the effect of d food and nursing rather than of specific chemo- apy. The German workers are enthusiastic ut the results in pulmonary patients, but HINSHAW McDERMOTT are more sceptical, though they at that the improvements are "suggestive" of e drug effect. The German and American ervers agree that the drug is most likely to have a ourable effect in fresh exudative non-destructive es of pulmonary tuberculosis, and that its action pulmonary lesions is neither as dependable nor apid as streptomycin's. In Germany the economic tor is important because TBI-698 is much cheaper l more readily procured than streptomycin or minosalicylic acid. German workers claim to have ained good results in patients with cavities by ans of local treatment and Monaldi drainage ; al treatment of tuberculous empyemas is also said be effective. In tuberculosis of the genito-urinary ct and tuberculous sinuses, fistulæ, and abscesses, NSHAW and McDERMOTT say that TBI-698 rarely dicates the tubercle bacilli completely and the ults cannot compare with those of streptomycin.

Even if we fully accept the enthusiastic German orts, there is no question of TBI-698 replacing eptomycin. Its clinical activity seems to be on a r with that of *p*-aminosalicylic acid, and its toxicity embles that of the arsenicals used in syphilis. it in spite of its toxicity it can be safely given for long riods under careful medical supervision, and the results, even on the most conservative view, call for further carefully controlled investigations. Plans are under way for the manufacture and clinical evaluation of TBI-698 in America, and trials will no doubt be conducted in this country, preferably under the auspices of the Medical Research Council and by workers who have had experience with both streptomycin and *p*-aminosalicylic acid.

Men and Women

It is no sinecure to be human ; but, even allowing for the difficulties, we cannot claim to have made much of a hand of it so far. MARGARET MEAD,[1] considering mankind anthropologically, hints that by taking thought we might do better ; and especially that men and women, as complementary partners rather than rivals, might each make a better contribution to our society. What should be man's contribution, what woman's ? We have so long thought of attributes as either male or female, so long assigned one group of tasks to men and another group to women, and so often protested when either invades the territory of the other, that few of us stop to ask what is fundamental behaviour in either sex. Miss MEAD, in an attempt to identify this fundamental behaviour—the essential differences, rather than the learnt differences, between the sexes—has compared seven Pacific peoples : the tranquil harmonious Samoans ; the prudish toiling Manus people ; the paternal altruistic undernourished Arapesh ; the laughing hating cannibal Mundugumor : the Tchambuli, among whom women are unadorned and managing, and men decorative dilettantes, and the Balinese—musical, ritualistic, incapable of enduring warmth of feeling—who have turned all life into an art.

It might be thought that we and these diverse people at least had in common the fundamental experiences of birth and suckling ; but even these can vary. True the abrupt change from the perfect comfort of the womb to the multiple troubles and discomforts of life outside is a universal experience. But it is one thing to be born in the warmth of an obstetric theatre, and to be lapped at once in cotton wool, and another to be dropped on cold wet leaves in a leaky hut and to lie there for five minutes while your mother ties the cord. The experience may differ for the sexes as well as for races ; for if, as Miss MEAD suggests, girls have keener skin sensitivity than boys, then the experience of birth in any society may be different for each sex. In other ways—from the mother's handling, from her voice—the child will early begin to learn the pattern of its own sex ; and her method of suckling it will colour its first opinion of human behaviour. The loving Arapesh suckle children tenderly. The Mundugumor women dislike both childbearing and children ; the child is never fed until he cries, and then he is made to wait. His mother stands beside him to feed him where he lies, and gives the breast grudgingly. This early struggle for the bare means of life must help to fashion this angry avid cheerful people, among whom every male is at war with every other—even with his own young sons.

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[1] Male and Female. London : Gollancz. 1949. Pp. 477. 18s.

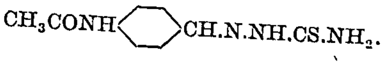
teams, 400 casualty-collection points, and 24 neuropsychiatric centres. No wonder PARK says that it is probably impossible to handle all the cases; we can only try to save some. And these grim estimates apply only to the original atomic-bomb explosions. Bombs capable of causing ten times this destruction are reputed to be a practical possibility, if not already made; and the proposed hydrogen bomb is said to be many times more powerful and destructive than even these.

Will any defence system be able to do more than rescue those at the fringe of the affected area? And if both sides in a war use these engines of obliteration, who will call himself the victor? It is of course suggested that fear of retaliation may prevent resort to atomic bombs and biological warfare.[5] But those who start wars are prepared to take risks; and it is as well that everyone should realise what is involved in the "atomic defence" of which some politicians speak so glibly.

Thiosemicarbazone in Tuberculosis

HERE and in the United States the only chemotherapeutic agents that have shown much promise in the treatment of tuberculosis have been the sulphones, streptomycin, and *p*-aminosalicylic acid. But a fourth group, the thiosemicarbazones, has now appeared on the scene from Germany, where these drugs have been developed by DOMAGK and the workers of the Farbenfabriken Bayer Laboratories at Elberfeld[6] and clinical trials have been made.

These compounds were developed through a study of the sulphonamides, sulphones, and sulphathiodiazoles, all of which show some antituberculosis activity. DOMAGK found that this activity depended not on the presence of sulphonamide or sulphone groups or thiazole or thiodiazole rings but on an open-chain arrangement of nitrogen and sulphur atoms, as in the thiosemicarbazones. Of the large number of substances tested the most active was found to be 4-acetyl-aminobenzaldehyde thiosemicarbazone,



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An epileptic attack can be provoked by emotion or the ght of some feared scene (a bleeding wound, a hospital); ut so can a faint. Cerebral anæmia from whatever ause—heart-block, ventricular standstill, fall of bloodressure, or occlusion of the carotids—will produce nconsciousness. Dr. Williams disposed of the notion hat damage to the nerve-cells of the brain by anoxia night be the responsible factor in the Adams-Stokes yndrome; the loss of consciousness is too rapid to make uch an explanation plausible. He pictured the porridgy rain supported on its tree of blood-vessels: suddenly hey collapse, and the brain collapses with them—a neurogenic cause for loss of consciousness, secondary to a cardiac disaster. In either epilepsy or syncope the immediate cause of the attack may be primarily cardiovascular or primarily cerebral. With postural hypotension, a sudden fall of blood-pressure, or hæmorrhage the trouble is primarily cardiovascular; in epilepsy something goes wrong in the brain. The cardiovascular causes of loss of consciousness are legion, as Dr. Maurice Campbell was able to show; but it should be kept in mind that fainting from organic heart-disease is not common in practice. The cardiac disorders which produce it, though multiple, are relatively rare.

The crux of the discussion, as Sir Charles Symonds remarked, was Dr. Williams's new concept that some people are more liable to lose consciousness than others, whether from epilepsy or not. This view of things, if generally disseminated, might do much to make life easier for epileptics.

SIGNIFICANCE OF A RISE IN SERUM-AMYLASE

THE estimation of serum-amylase deserves a large place in the diagnosis of acute pancreatitis, for a normal level rules out this disorder while a very high level confirms its presence. A moderate rise may be found when the pancreas becomes involved in an adjacent pathological process, and sometimes in cases of acute inflammation of the salivary glands or renal failure. To these causes Musgrove,[1] of the Mayo Clinic, has now added a fourth—free perforation of gastroduodenal lesions, with liberation into the peritoneal cavity of pancreatic amylase which is subsequently absorbed.

During 1948 the emergency surgical service at the Mayo Clinic dealt with three cases in which the serum-amylase levels were raised but the pancreas was subsequently found to be normal. These cases all had a perforation high up in the gastro-intestinal tract and severe generalised peritonitis. Musgrove concludes that when a large free perforation of a peptic ulcer occurs during the phase of active digestion, a large amount of gastroduodenal chyme may be poured out into the peritoneal cavity and the subsequent absorption of pancreatic amylase will cause a moderate rise in the serum-amylase. This supposition has been confirmed experimentally by Pemberton et al.[2] Of 14 dogs with anterior perforations of the duodenum, they found 4, all of which had eaten a large meal 1–2 hours before perforation, with high amylase values both in serum and in the peritoneal fluid. The amylase content of their peritoneal fluid, expressed in arbitrary units based on the number of mg. of maltose liberated by the amylase present in 1 ml. of fluid, was 130–352 units. The other 10 dogs, which had no rise of serum-amylase after perforation, had eaten their last meal 2–3 hours before perforation, and their peritoneal fluids contained only 23–58 arbitrary units of amylase per ml.—a sixth of the amount in the 4 animals. When the interval between the last meal and perforation was more than 3 hours the serum-amylase never rose; when the interval was about 2 hours the level was raised a little; and when the interval was only an hour or so there was always a distinct rise. The site of perforation apparently did not influence the subsequent behaviour of the serum-amylase. In normal dogs, the intraperitoneal administration of amylase produced a prompt, well-marked, and long-continued rise in serum-amylase. Further experiments showed that an associated pancreatitis or peritonitis had no appreciable effect on the post-perforation serum-amylase level. In 2 dogs with a persistently patent ulcer there was no rise in serum-amylase in the early hours after a perforation; but the level was high at 70 hours after perforation. The explanation of this

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[1] Musgrove, J. E. *Proc. Mayo Clin.* 1950, 25, 8.

[2] Pemberton, A. H., Grindlay, J. H., Bollman, J. L. *Ibid*, p. 5.

In lightly clad societies the bodies of males and females are taken for granted. The small Balinese girl early learns that she is female, and has only to *wait to become a mother*; *and the boy accepts this* as something she will achieve which he never can. The girl child in our own civilisation has no such certainty, nor does the boy usually think of her as a potential mother; he is far more likely to regard her as an incomplete and partial male—as she is also apt to regard herself. "The difference between the sexes that is forced home on children in our world of walled-in self-contained flats," as Miss MEAD says, has to do with differences in occupation, in dress, in privilege. All women do not have babies, but most men don't have to wash dishes." (That, of course, is in America.) In some of the Pacific societies, however, appreciation of women's childbearing capacity goes very deep as a cause of envy to the other sex—envy expressed in initiation ceremonies at which adolescent boys are reborn symbolically of men, not of women.

The outward manifestations of sex—the deep voice, hairy chest, great height, or heavy musculature which some societies regard as manly, and the big breasts (*or conversely the small high breasts*) which are felt to be particularly womanly—are not directly related to fertility. Differences in appearance—between the large "manly" man and the small rabbity man, the billowing "motherly" woman and the boyish girl—are differences not in reproductivity but in biological type. The small rabbity man is quite often more fertile than the large muscular one; and if he had been bred among a people, like the Arapesh, where men are small, kindly, and unassuming, nobody would have questioned his manliness. Small breasts lactate as well as, and sometimes better than, heavy ones: one type is not more essentially feminine than the other. We might gain, Miss MEAD thinks, by recognising that among our own people—or anyhow among Americans, for whom she is primarily writing—there are many biological types. We should then cease to expect all men and women to conform to standard types of behaviour or to follow a rigid set of occupations. The boy with *artistic leanings would not be suspected of effeminacy*, and the girl who shows a greater need to take things apart than most other little girls would not be reproached. "In such a world," says Miss MEAD, "no child would be forced to deny its sex membership because it was shorter or taller, or thinner or plumper, less hairy or more hairy, than another, nor would any child have to pay with a loss of its sex membership for the special gifts that made it, though a boy, have a delicate sense of touch, or, though a girl, ride a horse with fierce sureness."

Applying her method of observation *and deduction* to her own people, Miss MEAD reminds us how many cultures have gone to the making of Americans. They have no single traditional pattern to follow, no small closed tribe hedged and comforted by customs. "Every home is different from every other home, every marriage, even within the same class, in the same clique, contains contrasts between the partners as superficially striking as the difference between one New Guinea tribe and another." Even in America, however, there are some patterns of behaviour which mould the child. Boys and girls are consistently urged towards success—urged to *make good, get on*, be happy, be fulfilled, be the ideal. Some feel keenly the discrepancy between *the real and the ideal, asking themselves* "Am I getting on enough?" or "Am I as happy as I ought to be?" In adolescence they have to learn the exigent routine of "dating." To be a good date—popular and sought after by your own set—is to be a success. *To choose to be solitary when you have* been asked to go out is to be selfish and lacking in good sportsmanship. "Petting" is almost another duty, in which the boy is expected to ask more than he hopes to be granted, and the girl is expected to refuse him—capably, gaily, and with poise. This in itself has unforeseen effects later, when the young people finally seek permanent mates; for the girls have acquired in this exacting game a degree of self-control which makes it hard for them to surrender fully as wives. Easy divorce, strangely enough has added another anxiety to life; for it has become a duty to free the other partner if he or she wishes to be freed, and many a conscientious couple endure such self-questioning as "Ought I to give him a divorce?" "Would he develop more with someone else?" "Would she be happier if she were free?" Every quarrel becomes a prospective rupture, every day renews their solicitous care for the marriage relationship, lest it grow too brittle to hold together. There are good points about this, of course, but it seems a hard way of doing it compared with the older method of marrying for good with no except through a destructive scandal. However, there is no going back to former patterns; and Miss MEAD hopes that such things as marriage counsellors, nursery schools, and housekeeping services may ease the strain on young married couples and help them to keep together with less emotional tension.

It is impossible to pack into a nutshell the trunk, spreading branches, and innumerable little twigs of this vast tree of Miss MEAD's book; but it is clear from all she says that American society—and ours too in equally well-defined ways—has not produced the pattern in which both sexes can make, easily and generously, their full contribution. Boys *are made jealous and resentful of girls, girls are made* envious of boys—a useless rivalry which every generation perpetuates afresh. In seeking the fundamentals of human behaviour she has found a permanent pattern: in all known human societies there is some form of the family; and it is distinguished from the families of other primates by the fact that the male helps to provide food for the females and children. Inside this simple pattern there is room for both sexes to live constructively as colleagues sharing a task. She outlines the *generally rather than specifically. Our* mistakes at least are clear.

> "Either sex may be distorted by the presence of the other sex, or it may be given a fuller sense of sex membership. . . . If parents define one child as less complete, less potentially gifted, with less right to be free, less claim to love and protection, or less a source of pride to themselves than the other, the child of that sex will, in many cases, feel envy. If society defines each sex as having inalienable qualities of its own but does not relate those qualities to the reproductive differences between the sexes, then each sex may be proud and strong, but some of the values that come from sex contrast will be lacking. . . . Externally

some given period of history and in some set of social arrangements it may often look as if one sex gained and the other lost, but such gains and losses must in the end be temporary. To the extent that women are denied the right use of their minds, their sons suffer as well as their daughters. . . . If our analysis s deep enough and our time perspective long enough, f we hold in mind all the various possibilities that other cultures hint at or fully embody, it is possible o say that to the extent that either sex is disadvantaged the whole culture is poorer, and the sex hat, superficially, inherits the earth, inherits only a very partial legacy.”

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To the public mind, fainting attacks are still a harmless order, whereas epilepsy still carries a stigma. Yet w much they may have in common was made clear the discussion at the Royal Society of Medicine ported on another page.

The chief differences are in onset and symptoms. In ittle more than half the cases a major epileptic attack gins with an aura; and unconsciousness, stiffness, d twitching follow in rapid succession. In a faint, e retina fails early, then the centres for muscle tone, and nsciousness goes next; thus the patient experiences ness of vision and loss of balance before he loses nself. Moreover he is nearly always standing; the leptic may get his attack when he is asleep in his d. If both disorders always behaved in the classical anner, probably no confusion would arise; but, as Charles Symonds pointed out, some 7% of fainting ople twitch or are convulsed, whereas many of those o have epilepsy are not convulsed. Faints in childod may be supplanted by epilepsy in later years, just migraine may sometimes be exchanged for epilepsy. r the faint and the fit the essential common factor is unstable nervous mechanism with the trigger in the ntral nervous system. Some distinguishing marks n be trusted to point to epilepsy, notably the aura, continence of urine, automatic behaviour, and perhaps odromal yawning and biting of the tongue, but these e not always present. The electro-encephalogram ll not give a cut-and-dried answer, as Dr. Denis illiams showed. Patients who had faints only and tients who had fits only both produced bursts of fast aves, especially in the frontal lobes. But this is only say the two conditions have a common factor, not at they are identical. The waves reflect some instability the cerebral hemispheres which can be increased by arious situations and lead to unconsciousness. In ilepsy the onset is local, the site of the trouble is in the rain itself, and the spread is so rapid that the convulsion ten becomes generalised at the start.

An epileptic attack can be provoked by emotion or the ght of some feared scene (a bleeding wound, a hospital); ut so can a faint. Cerebral anæmia from whatever ause—heart-block, ventricular standstill, fall of blood-ressure, or occlusion of the carotids—will produce nconsciousness. Dr. Williams disposed of the notion hat damage to the nerve-cells of the brain by anoxia ight be the responsible factor in the Adams-Stokes yndrome; the loss of consciousness is too rapid to make uch an explanation plausible. He pictured the porridgy rain supported on its tree of blood-vessels: suddenly hey collapse, and the brain collapses with them—a neurogenic cause for loss of consciousness, secondary to a cardiac disaster. In either epilepsy or syncope the immediate cause of the attack may be primarily cardiovascular or primarily cerebral. With postural hypotension, a sudden fall of blood-pressure, or hæmorrhage the trouble is primarily cardiovascular; in epilepsy something goes wrong in the brain. The cardiovascular causes of loss of consciousness are legion, as Dr. Maurice Campbell was able to show; but it should be kept in mind that fainting from organic heart-disease is not common in practice. The cardiac disorders which produce it, though multiple, are relatively rare.

The crux of the discussion, as Sir Charles Symonds remarked, was Dr. Williams's new concept that some people are more liable to lose consciousness than others, whether from epilepsy or not. This view of things, if generally disseminated, might do much to make life easier for epileptics.

SIGNIFICANCE OF A RISE IN SERUM-AMYLASE

THE estimation of serum-amylase deserves a large place in the diagnosis of acute pancreatitis, for a normal level rules out this disorder while a very high level confirms its presence. A moderate rise may be found when the pancreas becomes involved in an adjacent pathological process, and sometimes in cases of acute inflammation of the salivary glands or renal failure. To these causes Musgrove,[1] of the Mayo Clinic, has now added a fourth—free perforation of gastroduodenal lesions, with liberation into the peritoneal cavity of pancreatic amylase which is subsequently absorbed.

During 1948 the emergency surgical service at the Mayo Clinic dealt with three cases in which the serum-amylase levels were raised but the pancreas was subsequently found to be normal. These cases all had a perforation high up in the gastro-intestinal tract and severe generalised peritonitis. Musgrove concludes that when a large free perforation of a peptic ulcer occurs during the phase of active digestion, a large amount of gastroduodenal chyme may be poured out into the peritoneal cavity and the subsequent absorption of pancreatic amylase will cause a moderate rise in the serum-amylase. This supposition has been confirmed experimentally by Pemberton et al.[2] Of 14 dogs with anterior perforations of the duodenum, they found 4, all of which had eaten a large meal 1–2 hours before perforation, with high amylase values both in serum and in the peritoneal fluid. The amylase content of their peritoneal fluid, expressed in arbitrary units based on the number of mg. of maltose liberated by the amylase present in 1 ml. of fluid, was 130–352 units. The other 10 dogs, which had no rise of serum-amylase after perforation, had eaten their last meal 2–3 hours before perforation, and their peritoneal fluids contained only 23–58 arbitrary units of amylase per ml.—a sixth of the amount in the 4 animals. When the interval between the last meal and perforation was more than 3 hours the serum-amylase never rose; when the interval was about 2 hours the level was raised a little; and when the interval was only an hour or so there was always a distinct rise. The site of perforation apparently did not influence the subsequent behaviour of the serum-amylase. In normal dogs, the intraperitoneal administration of amylase produced a prompt, well-marked, and long-continued rise in serum-amylase. Further experiments showed that an associated pancreatitis or peritonitis had no appreciable effect on the post-perforation serum-amylase level. In 2 dogs with a persistently patent ulcer there was no rise in serum-amylase in the early hours after a perforation; but the level was high at 70 hours after perforation. The explanation of this finding is that the pancreas goes on secreting amylase into the duodenum after a duodenal perforation; so if the perforation remains open there will be a continued flow into the peritoneal cavity and hence, by absorption, into the blood-stream. Clinically, therefore, a persistently raised serum-amylase level might indicate patency of a perforation and a guarded prognosis.

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[1] Musgrove, J. E. *Proc. Mayo Clin.* 1950, 25, 8.

[2] Pemberton, A. H., Grindlay, J. H., Bollman, J. L. *Ibid*, p. 5.

TRACER STUDY OF SPINAL ANÆSTHESIA

WHAT happens to a spinal anæsthetic after its injection has been only partly revealed by the methods of investigation hitherto used. Recently, however, the radioactive tracer has been brought to bear on this problem by Howarth and Cooper,[1] of Manchester University, and Howarth has elsewhere[2] described how procaine was made radioactive by the *introduction of Br^{82} into its molecule.* The spinal-anæsthetic properties of the radioactive dibromoprocaine (D.B.P.) thus obtained was investigated in cats, and both its potency and its lack of toxicity were established. A satisfactory method of radio-assay was evolved, and finally a study made of the fate of the brominated benzene rings of the injected D.B.P. The brominated procaine contents of cerebrospinal fluid, blood, and urine were estimated at short intervals. It was found that D.B.P. rapidly leaves the theca and appears in the urine in high concentration while maintaining a persistently low blood-level. Of the body tissues, only the spinal roots showed consistent capacity to concentrate the drug above the level in the cerebrospinal fluid at the site of injection; and only the kidney and liver appeared to concentrate D.B.P. above the level in the circulating blood. It seemed, too, that so far as the cat is concerned the veins are the main route of departure of this anæsthetic from the spinal theca.[1]

LATENT PROSTATIC CANCER

THAT carcinoma of the prostate is quite commonly latent has been confirmed by Andrews,[3] who has found cancers in 17 (12%) of 142 prostates removed at necropsy from males aged 15–79 years in whom prostatic carcinoma had not been diagnosed clinically or on gross examination at necropsy. Sections at roughly 4 mm. intervals were examined and the diagnosis of malignancy was based on the presence of abnormal stromal relationship plus any three of the following: nuclear changes, mitotic figures, anaplasia, heteroplasia, lymphatic invasion, and invasion of the blood-vessels. All the cancers were in men over 40; the incidence rose significantly between the sixth and seventh decades but not beyond the seventh—which runs counter *to Moore's*[4] *observation that the* incidence increased steadily up to a maximum at the ninth decade. In one case the tumour was so extensive that its site could not be determined (this was the only gland where the middle lobe was involved and the seminal vesicles were infiltrated). In 4 glands two separate areas of carcinoma were found; in 2 of these there was a well-marked difference in the size of the tumours, but in the other 2 the tumours were of much the same size, supporting the view *that prostatic carcinoma may* be multifocal in origin.[4] Among the 20 small growths that could be localised with fair accuracy, 12 were confined to, or affected chiefly, the posterior lobe, while 8 arose in the lateral lobes; 11 tumours in the posterior lobe and 2 in the lateral lobes arose just beneath the capsule, and in 8 of these the capsule was infiltrated. The tumours were all adenocarcinomas, composed mainly of small acini. In 15 of the 17 affected prostates perineural lymphatic *invasion* was present, and in 5 this was extensive; "it was often remarkable that the perineural lymphatics were invaded by the most differentiated acini in the tumour." Invasion of blood-vessels was not common. Andrews describes a characteristic precancerous hyperplasia, affecting not only carcinomatous glands but also normal glands, and particularly those with benign hypertrophy; and benign hypertrophy, he remarks, is closely associated with latent carcinoma.

This high incidence of microscopic carcinoma in the prostate is puzzling; but, as Andrews points out, the prostate is of a convenient size for the thorough microscopical examination needed to detect such growths; and an unexpectedly large incidence might be found in other organs submitted to a similarly careful search.

"CHEMOCRACY"

CAN chemistry help to provide enough food for the world's growing millions? In a striking article, published in the U.S.A., Rosin[1] replies with an emphatic Yes. He goes further, believing that if we apply our minds to the synthesis of foodstuffs, agriculture can disappear. "The result will be the greatest revolution in the history of mankind since the time man learned how to make fire."

Throughout recorded history man has depended on *the soil for his very life; and the natural impulse is to* dismiss such a revolution as a flight of fancy. But is it?

> "The slow process of replacement of agriculture by *chemical industry started* about 80 years ago with the synthesis of alizarin (in 1868) and indigo (in 1870).... Other victories of chemistry over agriculture followed in swift succession. Synthetic dyes, textiles, drugs, vitamins, cosmetics, and food products replaced their natural counterparts."

Among the most recent advances is the manufacture of synthetic rubber by the improved "cold" process developed last year, which is claimed to be both better and cheaper than the natural product; and "*there can* be no valid reason to assume that the rest of the natural products, including foodstuffs, could not be equally synthesised." As to foodstuffs, when the last secrets of photosynthesis are penetrated, the behaviour of plants may be imitated in factories; and it is noteworthy that at the University of Chicago C^{14} has helped to disclose the hitherto unknown intermediates in the transformation of carbon dioxide into sugar and starch by chlorophyll. Sugar and starch, Rosin believes, may be produced by polymerisation, with formaldehyde as raw material. Similarly synthetic fat and protein is not beyond the chemist's reach; and even taste can be added artificially *or reinforced by sodium glutamate, which, without being* a flavour is said to be "the substance that makes food taste in the expected way."[2]

Our dependence on the plant in producing food represents a double bondage: first, in terms of man-power, for more than half of all the available man-power of the world is engaged in agriculture; and secondly, in terms of space, agriculture taking up 4 billion acres—of the habitable part of this planet. Raising the efficiency of agriculture by various chemical means may well stave off starvation from the 3000 million people who are expected to inhabit the earth at the end of this century, or the 4000 million seventy years from now. "However, we do not want our children merely to be saved from starvation, we want them to have an actual abundance of food."

THE death is announced of Dr. R. P. RANKEN LYLE, emeritus professor of midwifery and gynæcology in the University of Durham.

Dr. L. HADEN HADEN-GUEST has taken the name, style and title of Baron Haden-Guest, of Saling in the county of Essex.

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1. Howarth, F. *Brit. J. Pharmacol.* 1949, 4, 333.
2. Howarth, F., Cooper, E. R. A. *Lancet,* 1949, ii, 937.
3. Andrews, G. S. *J. clin. Path.* 1949, 2, 197.
4. Moore, R. A. *J. Urol.* 1935, 33, 224.

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1. Rosin, J. *Chem. Engng News,* 1950, 28, 97.
2. *New York Times* Suppl., Feb. 5, p. 7.

Points of View

IE SOCIAL SIGNIFICANCE OF SYMPTOMS

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N this “ age of the common man,” the employment of nptoms has become part of the everyday technique ocial existence. Security has become the prerogative ts all, and much of it is administered through medical nnels. The public are repeatedly reminded of this npulsory provision of welfare, and many people have been slow to realise that by trading upon the good ure, uncertainty, and fatigue of those employed in medical and ancillary services, they can avoid esired consequences of their actions and circumnces. By claiming symptoms of diseases from which y do not suffer, they can obtain the same sympathy concessions as would be their right if in fact they these diseases. Thus the idle and improvident make d their losses and the criminal escape their punishment.

here are signs that this process is spreading, and will tinue to spread, with increasing speed. It is the ect of this article to discuss the nature, causes, and itment of the ill effects that are likely to ensue.

he question is by no means of purely academic or lical interest. Recent statements of a judge on the rce ” of the death penalty, and of a bishop on the enic aspects of physical and mental defect, show t a problem of general importance is raised. It is now evident that the original financial estimates the National Health Service quite inadequately ssed the cost of managing the total problem of the ion's health. But we are not concerned here with the or and probably self-adjusting difficulties over tacles, dentures, and wigs, nor with the great cost nvestigations, medicines, and administration for the te and chronic sick. There is nothing strange nor easonable in them. It is towards the dangerous tenncy to place the incapable, the ineffective, and the rupt in positions of power, responsibility, or material afort that our attention must be directed. Unless are alert to this trend we shall penalise those of ater strength and merit who disdain to avail themves of facilities which they feel are to be obtained by aggeration or deception. If we make things comfortle, happy, and “ soft ” for everyone, regardless of eir characteristics, we shall weaken our national ity ; for we cannot do these things at present without noving the necessary rations of ease and satisfaction m people who have deserved them.

I do not, of course, mean to criticise the conduct or atment of those who are truly sick in body or mind, to reflect on the humane advances of psychiatry in ent years—though these advances may provoke the estion as to how one can tell just who is sick and who not. I am, indeed, clear that there is no excuse for glecting psychosomatic disorders, and that harsh atment of neurosis shows a defect in the physician. et how much more severe than a whipping from a hoolmaster or a few brisk words from the doctor are, r example, electroconvulsive therapy and leucotomy. l in all, as much harm is done in pronouncing illness esent when none exists, as in declaring established sease absent.

Some authorities urge that if a patient is unhappy nd has symptoms of ill health in surroundings which re distasteful, such as a dull job with low wages, but is ontent and symptom-free when transferred to a conenial occupation with a good wage, cure consists in roviding him as nearly as possible with what he wants. his might be true if it were possible for everyone to have, all their lives, an easy job with a large salary. But these ideal conditions are still only suggestions of what the future may provide. We do not live in the Utopia of Thomas More, nor in the community of the Abbey of Thélème described in 1532 by the physician, Rabelais, where :

> “ All their life was spent not in laws, statutes, or rules but according to their own free will and pleasure. They rose out of their beds when they thought good ; they did eat, drink, labour, sleep, when they had a mind to it, and were disposed for it. None did awake them, none did offer to constrain them to eat, drink, nor to do any other thing. In all their rule, and strictest tie of their order, there was but this one clause to be observed. DO WHAT THOU WILT. Because men that are free, well-born, well-bred, and conversant in honest companies, have naturally an instinct and spur that prompteth them unto virtuous actions.”[1]

Good working conditions and wages have been won in the past by those who have, from their talent or industry, shown themselves suitable for them. The system now being substituted will reserve for the weak and lazy the jobs which they are least well equipped to hold, and the normal will be expected to carry on in the more arduous and unprofitable tasks until they too succumb to what in this era of neologisms may be termed “ sociosomatic disease.”

THE CLINICAL PROBLEM

This subject first presented itself to me during service with the Armed Forces in the late war ; but there can be few who practise medicine nowadays who have not been faced with the blackmail of gastritis, fibrositis, blackouts, dizzy turns, or like diagnoses, some with names from the *Nomenclature of Diseases* and others either picturesque ideas of the patient, or the Latin or Greek equivalent for the symptom which the patient has presented.

Any attempt to analyse these symptoms releases vivid descriptions—“ unbearable,” “ like a knife being driven in,” “ like blows from a hammer.” Two actual but more elaborate descriptions recently heard are “ like broken glass in my stomach ” and “as if the top of my head was open and someone was pouring cold water into it.” They differ much from the story of the patient with unequivocal disease, for he usually says that, never having had anything like his symptoms before, he cannot describe them. He generally notes either pain or an indescribable abnormality.

In describing psychogenic headache Walshe[2] writes :

> They are described in a wealth of metaphor, and by a lavish use of superlatives. Thus, they are “ terrible,” “ agonising,” “ frightful,” they are like corkscrews, knives, needles, &c., piercing the head. When questions as to their locality and quality are pressed, the patients' answers become ever more florid and vague, and “ pains ” are suddenly found to have become sensations of weight, pressure, or constriction and not real pain at all. . . . It is not information that these patients wish to convey but an impression that they wish to create.

No-one will deny that gastritis or blackouts do exist as accompaniments of demonstrable disease, such as peptic ulcer and alcoholism, or cerebral tumour and idiopathic epilepsy ; but often there are no findings to suggest such conditions. If, for example, the sufferer from blackouts is fully investigated, a detailed history provides a vague changing account of the attacks, with a retreat from “ passing out ” to dizziness and giddiness. These last two are then explained as “ everything goes black so that I fall down.” When the patient is asked why he adds to his troubles by falling instead of

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1. Rabelais, F. Gargantua and Pantagruel. London: Dent's Everyman's Library. 1532 ; vol I, p. 129.
2. Walshe, F. M. R. Diseases of the Nervous System. Edinburgh, 1949 ; p. 65.

standing still until he is better, he may state that after all he doesn't "really remember what happens." Without difficulty it is elicited that adverse stress such as conscription, change of job, or an amatory setback (often precipitated by seeing a romantic cinema programme) was followed either at once or in a few days by spells of lost memory or consciousness, with falling and dramatic episodes of fighting and weeping. In the past perhaps such symptoms have caused release from other difficulties. The patient claims as proof of his organic disability: "I was released from the pits through these attacks and the doctor said it was my nerves." Yet he may admit to having earned, since then, an agreeable number of pounds a week as a driver, welder, stoker, or circular-saw operator. Personal details may show a bad family and educational background, with a lack of general and unselfish interests and hobbies, and an avoidance of organised games.

General examination in detail is negative for structural disease, though poor physical and mental development are often but not always found. Further tests—more specialised, expensive, and elaborate—are done so that no reasonable doubt is left in the exclusion of gross disease. The carotid sinus is compressed. The blood Wassermann reaction and sugar levels, fasting or after glucose administration, are requested. The cerebrospinal fluid may be tested. The skull is X-rayed and an otologist's examination carried out. If possible an electro-encephalogram is also done. Negative results are obtained throughout. A diagnosis of hysteria, syncope, or anxiety state may be made. It is rare to have available an authoritative opinion that no medical disability can be found, for most of these patients do not reach such high levels, and again it is not always possible to have the careful investigations I have mentioned. Malingering does cross the mind; but, by common consent, as being incapable of proof and from a feeling that some "psychosomatic dysfunction" may be neglected, it is dismissed.

Symptoms referable to the cardiovascular, respiratory, locomotor, and alimentary systems may be similarly studied with all possible care at the expense of much time, money, and frank annoyance. "Tired" and "weak" hearts, "gastritis," "gastric stomachs," "fibrositis," "bronchial trouble," and "nerves" are commonly encountered. The patients circulate from department to department, from the cardiologist to the neurologist, from the orthopædic clinic to the psychiatric, from the gastro-enterologist to the gynæcologist. They may change in secrecy from one competent hospital to another where the whole process is started again. This sort of patient has a high nuisance value which weighs upon his examiner even before he enters the room. He will claim that he has made an appointment by telephone but none of the staff can recall the conversation and he does not know to whom he spoke. A large set of notes in which the relevant details are deeply embedded may precede him, or he will say that he has no idea of the nature and results of investigations carried out elsewhere. He will agitate if kept waiting, will smoke beneath a "No Smoking" notice, and have such an attitude of grievance and "the world owes me a living" that the doctor quails before him, seeking not a diagnosis but a means of getting rid of him. We think up a remedy he may not have tried, or another investigation which might with decency be done and promise to see him in a month's time or write to his doctor. In all the practice of medicine, self-seeking is the rarest of diagnoses. Not infrequently a patient, being dissatisfied with one, two, or even three clinics in London seeks fresh advice at a fourth. X-ray and laboratory tests are done each time, as often as not; for what gastro-enterologist will rely on the X-ray findings of a general physician, and what neuroradiologist will accept the plates of an orthopædic department?

Eventually labels—which today are essential [illegible] "documentation," medical registers, disease indexes, and especially for certificates—are attached to the patients by the methods I have described, and decisions or recommendations are made about employment, discipline, change of locality or diet, preferential housing conditions, or other comforts in respect of which someone else necessarily goes short.

For example, a corporal in the R.A.S.C., seen during the war, stated that he vomited the food supplied at his unit. He had been given a home service category for chronic gastritis (though he had been shown to have no disease of the stomach after two separate periods in hospital with two X-ray examinations, including screening and barium meal), so that he could live at home, on civilian rations with his wife to cook for him. In these circumstances he was willing to do a day's work, but should his unit be moved he was within a few days back in hospital "for investigation and treatment please" because "he vomits everything he eats."

Other glaring examples from Service conditions have been provided by some men at the time of their release. Early in his army career a man may have been downgraded for a disability such as flat-foot or anxiety state. He may thus have avoided marching, guard duties, and physical training or overseas service. On demobilisation he plans to become a policeman, or a civilian government official abroad, with better living conditions than he has been used to in the United Kingdom. He therefore asks to be upgraded, because his disability "no longer causes me any bother and might be awkward when applying for this job I want."

In the Services during war it was essential to [illegible] any who were liable to break down and impair the [illegible] of their unit. In all those conditions for which [illegible] physical basis had been found, it became the [illegible] for the psychiatrists' department to dispose [illegible] patient, and special powers were given them for [illegible] so. Invaluable work was thus done; but there [illegible] corresponding disposal now that the war is over; [illegible] even if there were, there are not enough psychiatrists to undertake it. The necessary duty of discharging [illegible] fits and nuisances from the Forces was often done, not because the psychiatrist thought the man in any [illegible] ill, but because he felt that he would be more trouble [illegible] the Service than he was worth. In peace-time the short-term policy forced on the fighting units will not be satisfactory, and more doctors will have to be their own psychiatrists—as many have been for years—instead of referring their tiresome patients to the nearest psychiatric centre.

Nowadays for many doctors the war-time problems have fallen into the background, but there are still [illegible] numbers of patients to whom Service medicine pointed the way to skilful employment of symptoms in [illegible] life. The discharge as medically unfit was a temporary measure of expedience, and solved few long-term problems. Commonly such a discharge carried with it a pension, or a grudge for the failure to get one. [illegible] the first case there is a natural inclination to keep [illegible] any disability which brings in money. In the second there is a lifelong indisposition, often accompanied by a most expensive, laborious, and repetitious [illegible] tion of "justice," "rights," and "fair play" which [illegible] shared at one time or another by the majority of [illegible] tioners both inside and out of hospital, in addition to various welfare organisations which include legal [illegible] and often expect free medical pronouncements in their clients' favour.

The purely civilian counterpart is that intractable ailment the "compensation neurosis." We must [illegible] forget too, how often medical opinions are invoked in the law-courts to excuse antisocial activities. Murder, theft, and financial default are attributed to brain-storms or alleged to occur during a loss of memory often conflicting evidence of psychiatrist and rologist causes much public mistrust and uncertainty.

he situation is difficult and complicated; nor is it ·d by the recent advances in social welfare in so far ,hey are not accompanied by a recognition that the rovements involve responsibilities for those who)y them—negatively, not to abuse the new privileges, positively, to offer a personal contribution, by urance and industry, to the maintenance of good ıdards.

, is reasonable to use the working model of the :es medical services for observing the benefits and ; of a comprehensive health service, because many ciples are common to both. But our National Health ·ice is, firstly, far larger than its model and therefore ; far more slowly. Small but important abuses will efore be noted less quickly and clearly. Secondly, e is no "discharge as medically unfit" from civilian until:

"Thou thy worldly task hast done,
Home art gone, and ta'en thy wages;"

THE SOCIAL PROBLEM

ı any attempt at "treatment and disposal" it is ntial to discover the causes of the disability. They divided between patient and doctor.

he largest single factor in the patient is derived from inborn and acquired defects of human equipment, ·ate and public, over which a man may have little ·trol and for which he is largely blameless. He may of a family which has a poor mental and physical ord, and may have been constitutionally at a dis-antage from his earliest days. We must acknow-e also, besides these hereditary factors, defective cation and inadequate social opportunity, from erty or unemployment. Yet more vital as factors he present moment are the effects of lack of proper sing. Many patients seek medical advice for symp-ıs which are due to failure to secure privacy, quiet, uty, or comfort in their homes. A headache is a son, indefinitely extendable, for a note to the housing hority. But all these are social and eugenic problems do not directly belong to the practising physician or geon in his daily work. It is not possible for the lical profession to act on behalf of each patient in se matters: it can do no more than advise general nciples in those vitally important aspects of civilisa-ı. We all are aware that dirt and poverty, ignorance l slums, contribute grossly to disease; but we cannot ke each patient who enters an outpatient department ın, rich, educated at a public school, and housed in a vice flat.

'or the patient, something for nothing has always 'n an attractive proposition, and the successful ımples of others in ameliorating their public and vate circumstances by the manipulation of symptoms ve been easy to copy. Their small suspected or agined defects are magnified by advertisements which lect fear from every paper and poster. No town-eller travels to his job without visible insinuation that has a vitamin deficiency, that he is certain to have a d, that he must expect headache, and that his hair 'alling out. He is a prey to the spectres of mortality, aster, and enfeeblement which urge him to insure nself and his estate. Minor disabilities which should ve passed unnoticed are enlarged upon. It is but a ort step to their elaboration into an oppressive symptom mplex which can be used to gain relief from the cessity to struggle for existence.

The faults of the doctor are perhaps equal to those of e patient; for the patient is, after all, playing him his own game. They result mostly from failure to make ı exact diagnosis. The usual reasons given for inability to give a diagnosis are lack of time and lack of facilities for investigation. The first reason is only partly valid, for a clear statement of the lack of discoverable disease and an undertaking to review the case after a suitable interval, so that nothing shall be missed, takes less time and energy than the repeated periods spent listening to a story which neither doctor nor patient fully believes, as each new social emergency arises. In answer to the second reason we know that accessory means to diagnosis are now widely available. The type of patient now under consideration has usually been investigated more, not less, than is necessary.

A further obstacle to a confident statement of normality is the risk of being caught out by rarities, such as the carcinoma in the twenties or one of the new syndromes from the medical journals. One may be obliged to assess imponderables such as the proportion of organic damage to neurosis after head injury—and we are ever prey to our own prejudices and to the value-judgments of our own social standards. These hazards, and the fear of criticism, litigation, and failure, are always in the mind, weakening our attempts to separate the ill from the feigning ill. The weapon of the socially sick is the phrase "I am not satisfied," and it is wielded mercilessly and without consideration of the potential danger to its wielder. Most doctors are trained in the belief that satisfaction, which amounts to a panacea for all the strains of daily existence for the patient, is in their power to select or devise and then administer. This belief is untrue and misleading. It betrays a foolish pride. However anxious we are to do our best, we should not be satisfied to think our remedy consists in providing for all and sundry an escape which each time drains still more the reservoirs of social security.

MANAGEMENT OF SOCIAL SYMPTOMS

The solution of the problem lies in assessing the validity of symptoms and in not permitting symptoms to go uncriticised; and this will be a long, slow and laborious process. To find it we must be well aware of the dangers, expense, and annoyance of false diagnosis. There must be a careful assessment of each patient as a whole, with special reference to past conduct, family pattern, and social habits. This must be followed by a complete examination and all relevant investigations required to exclude active disease. At the end of these it should be possible to know whether structural disease or a psychopathological process underlies the symptoms. For each there is an appropriate line of treatment. Should the honest conclusion be that neither of these exists, it is our duty to say so, however unpleasant or inconvenient it may be. We may point out social causes for symptoms, explain where the remedy lies, and offer a real sympathy; but we may not shoulder those particular burdens, nor accept responsibility for them. Though most doctors are genuinely distressed by altercations and scenes with their patients and wish to avoid them, it is useless to get the patient out of the consulting-room by giving him a bottle of medicine or the promise of an X-ray examination instead of a candid statement that nothing wrong has been found and that the required certificate or desired recommendation therefore cannot honestly be given on medical grounds. Once a nuisance concession or medical pronouncement on symptoms of social origin is made it can hardly be rescinded.

CONCLUSION

Symptoms are being used by some patients as reasons to persuade members of the medical profession to interfere in social matters.

In so far as we fail, after proper deliberation, to state firmly our disbelief in any symptoms which we do not consider primarily due to a disease process, we weaken our authority, decrease our personal honesty, and sow the seeds of much difficulty and unpleasantness, the fruits of which must one day be gathered.

Symptoms should be used as aids to diagnosis of disease and not as final reasons for medical judgment.

A more robust and critical approach, based on sound diagnostic methods, is required to meet the problems of patients in our present social structure.

I am most grateful to Dr. F. M. R. Walshe, F.R.S., for his kind criticism and advice in the presentation of this paper.

Disabilities

45. CROHN'S DISEASE

I AM now 26 and have suffered from Crohn's disease since early adolescence. The symptoms suddenly became severe 7 years ago and a palpable mass was discovered in the right iliac fossa. The lesion was confirmed at operation and a one-stage right hemicolectomy was performed. For 2 years after this I enjoyed the luxury of an unprotesting digestive tract, and was a "clinical cure." Alas, I now belong to the small group of cases which recur after surgical treatment. Symptoms and signs, indicating a partial obstruction proximal to the anastomosis between ileum and transverse colon, returned insidiously over a period of 9 months. I was readmitted to hospital and for several months underwent extensive investigation and observation. It was eventually decided that the disease was no longer progressing and could be controlled without further surgical treatment. In Crohn's disease there is always a chance of eventual recovery if the pathological process can be kept in check. Such is my hope for the future.

* * *

My outstanding symptom has been pain, of two distinct types. The more frequent type is hard to describe. It consists of more or less continuous abdominal discomfort, not localised to any particular quadrant, and often passing through to the back. This is a dull constant pain, never severe enough to be totally incapacitating. Sometimes the abdominal muscles are tender and the abdomen visibly distended, making it difficult to fasten the top trousers-button. This pain is relieved by firm manual pressure, and though it does not prevent me from continuing with my work it lessens efficiency and tries the temper, so that at times my patients, friends, or relations probably think I'd be better dead or certified! Excessive smoking makes this symptom worse, perhaps by some effect of the constituents of tobacco or perhaps because of the concomitant swallowing of air.

The second pain is quite different. It is violent while it lasts, completely disabling, and obviously a true colic, cycles of pain occurring in a crescendo-diminuendo fashion every few minutes. The pain is usually felt centrally in the abdomen. Each attack lasts from 2 to 12 hours and is accompanied by vomiting and an intense agony of mind. Erection of the bowel can be felt with each cycle of pain and at times there is visible peristalsis. Warning of an attack is given by the bowels not opening at their usual 4–6 hourly intervals, especially if this "constipation" is accompanied by turbulent borborygmi. The cessation of an attack is always heralded by severe diarrhœa.

Rightly or wrongly, I have interpreted the two pain patterns as being due to different mechanisms, and have planned treatment accordingly. That this plan has been sound is shown by the fact that five years ago, when my recurrence began, I looked like developing into a chronic invalid, being persistently troubled with the first variety of pain and having attacks of the second as often as twice a week, whereas now I can do active medical work with virtually no disability.

The first, less severe type of pain, I look on as a result of impaired digestion of all major food constituents. Failure to absorb fats is a well-known feature of Crohn's disease. I think that in my case the digestion of carbohydrate and protein is also impaired and that this pain arises from distension of the small bowel by gaseous products of the consequent fermentation and putrefaction. That steatorrhœa was not the sole factor was shown by the observation that exclusion of fats from the diet did not eliminate this pain, though complete starvation definitely abolished it. I try to compensate for the impaired digestion by taking two or three compound 'Taka-Diastase,' pepsin, and pancreatin tablets with each meal. The effect has been most gratifying, and I am now little troubled by this pain. I never wear tight belts or bands round my waist, because they aggravate the discomfort of any distension which occurs.

I interpret the second type of pain as a symptom of temporary obstruction at the site of recurrence of the disease. The attacks almost invariably follow a dietary indiscretion. Over the years I have compiled a mental list of foods that I can safely eat. Anything that leaves much residue and might therefore cause obstruction is excluded. This means no green vegetables, fresh or dried fruit, or in fact any foods with pips, skins, or coarse fibres. I never even take purées. My diet consists mainly of meat, fish, and stale bread, garnished with eggs, cheese, and milk, and I have frequent small meals. Such a diet, besides being low in residue, reduces gas formation to a minimum.

The rigid exclusion of foods which I particularly like but which I know by experience will upset me has shown me the full significance of the story of Adam and Eve and the Forbidden Fruit. For three years I have eaten neither fresh fruit nor green vegetable, except when my will-power has broken down, and then I have invariably *paid the penalty*. I *do*, of course, reinforce this rigid diet with ample vitamin and mineral supplements. Food now holds little pleasure for me, and I eat only the minimum necessary to keep my weight at 9 st. 6 lb. —rather low for my age and height. Several times I have noted signs of a mild vitamin deficiency, such as sore tongue, angular stomatitis, and on *one occasion* skin petechiæ, which have disappeared with ample amounts of the required vitamin. I am firmly convinced that this peculiar diet has been *the most* important single factor in my improvement.

I can walk as quickly as most of my colleagues without any shortness of breath. But vigorous exercise soon fatigues me and I never participate in it. I was very fond of all sports, and as a schoolboy was as proficient at games as any of my school-friends, but now I take my recreation as a spectator only. When people accuse me of laziness for this, I take it as a compliment that my disability is so well concealed.

When I get a severe attack of colic—and I have had only one in the past year—I always adopt the same treatment: bed; a hot-water bottle applied to the most painful part; and a dose of an antispasmodic such as 'Trasentin' or pethidine, repeated 3-hourly if required. Food, apart from fluids, is excluded until the attack is over. With the cessation of the pain appetite soon returns, but for two or three days I am more than usually cautious and continue to take only fluids and semi-solids.

As is common in Crohn's disease, I normally have diarrhœa, with 4–6 loose stools daily. This is, paradoxically, of great importance to me, for if the bowels do not open for longer than 6 hours I get some abdominal discomfort. When I have taken remedies to stop the diarrhœa I have always regretted it. The abdominal discomfort increases as the stools became solid, and finally, if the bowels remain closed for 24 hours or so an attack of colic starts. Many years of diarrhœa have caused me no noticeable ill effects. I often feel thirsty and always try to compensate for the extra fluid lo lrinking as soon as I feel the slightest thirst. My y intake of fluid is at least five pints, of which virtually e is alcoholic. I also take extra salt by mouth in effort to avoid chloride depletion. My experience been, therefore, that while the diarrhœa is no doubt iological it constitutes an indispensable safety valve. motional upsets undoubtedly have an aggravating :t on my ailment. As a medical student, my symptoms were invariably worse before exams, and since I ified the ordeal of interviewing committees has had same effect. I always feel best when working hard, so have learnt to dislike holidays. Perhaps what me good is having my mind occupied with problems e interesting than my illness.

nere is nothing in my history which suggests a cause this disease. I was perfectly healthy from birth l early adolescence. It may be significant that until age I seemed likely to be tall, but from the time n my first symptoms appeared I stopped growing erhaps defective intestinal absorption explains this. re is no family history of tuberculosis, my chest ograph has always been normal, and tubercle bacilli e not been demonstrated by any routine test on ls, &c. The only environmental factor worth recording nat for several years in childhood I drank raw cows' . So the ætiological agent remains obscure, but one is clear—that the measures adopted have transned a serious disability into one of trivial dimensions.

Medicine and the Law

Claim of Official Privilege

HE inquest on Squadron Sergeant-Major J. E. Pettitt, d 37, who dropped dead during a drill course at the ırds' depot at Caterham, was resumed on Feb. 1. the previous hearing[1] the court had been adjourned order to obtain the evidence of the Army doctor who l examined the deceased before he left Germany for erham.

his witness said that he examined Pettitt on Dec. 30; titt told him that he had been playing rugby football ularly until two years ago and had been a champion ight-lifter. The examination showed Pettitt's bloodssure to be normal; there was no hardening of the eries and no clinical evidence of cardiac enlargement. ecropsy had shown that the heart weighed over 24 oz. more than twice the normal weight for a man with e physique of the deceased.) The witness agreed that e Army instructions for the Caterham course required personnel to bring a medical certificate stating that ey were fit to undergo it. His certificate had not ferred to fitness, only to freedom from infection; was the deceased's responsibility to see that he had certificate of fitness. Asked if he would have signed certificate of fitness, the witness replied in the negative; ettitt told him that for two years he had been doing fice work in connection with German civilian-labour nits. Pettitt had said he was going on a senior N.C.O.'s ourse; if the witness had known that it was a strenuous rill course, he would have advised a period of training y way of a "tune-up." The witness added that he imself had not seen Pettitt's medical-history sheet.

When the coroner called for this document, which had ot been produced at the previous hearing, counsel ho appeared on behalf of the War Office declined to nake it available; it was a document, he said, for which rivilege was always claimed on behalf of the Crown; e produced a certificate, signed by the Secretary of State for War, claiming privilege on the grounds of ublic interest. The coroner, recording a verdict that leath was due to natural causes, said he was obliged to accept the War Office's refusal, but it operated harshly against the family of the deceased, who had very good reasons for knowing his medical history. Since the last hearing, added the coroner, he had received many letters from relatives of other soldiers where access to medical records had been denied.

The medical profession knows best the type of privilege which, based on the confidential relationship between doctors and patients, is maintained in the interests of the patient to protect him from disclosure. The "public interest," on behalf of which the War Office has claimed privilege, might presumably be based on the requirements of national security, not here in issue. It could also be based on the responsibility to administer the military forces free from external supervision, or on the favoured position of the Crown as litigant when a subject attempts to bring a civil action in the law-courts. The Crown Proceedings Act of 1947 did much to assimilate the position of the Crown to that of an ordinary litigant. Section 10, to be sure, contained an important exception for the Armed Forces; the War Office was not going to risk exposure to an action for damages for negligence because "someone had blundered" in a future charge of the Light Brigade. Section 28, it is true, allowed the High Court and the county courts to order the Crown to make what lawyers call "discovery" of relevant documents and to produce them for inspection; but a significant proviso saved "any rule of law which authorises or requires the withholding of any document" on the ground that disclosure would be "injurious to the public interest." At Caterham the coroner described the position, not without reason, as "unsatisfactory." When Parliament reassembles, the Secretary of State for War may be invited to elucidate it at question time.

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[1] See *Lancet*, Jan. 28, p. 186.

Public Health

Control of Narcotics

IN its latest report, the Permanent Central Opium Board[1] observes that, if the figures so far supplied are taken at their face value, the world licit production of opium in 1948 amounted to 739 tons. The world total for the manufacture of morphine in 1948 is given provisionally as 55·5 tons—equalling the highest on record. The quantities of morphine remaining available for use as such have dropped not only relatively but absolutely—from an average of 8·5 tons in each of the years 1934–37 to 5·5 tons in 1948. This downward trend is attributed both to increasing use of morphine derivatives and also to the introduction of synthetic narcotics.

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[1] Permanent Central Opium Board. Report to the Economic and Social Council on Statistics of Narcotics for 1948 and the Work of the Board in 1949. United Nations, Geneva.

Infectious Diseases in England and Wales

—	Week ended January			
	7	14	21	28*
Diphtheria	75	81	74	88
Dysentery	199	154	177	149
Encephalitis:				
Infective	3	3	2	2
Postinfectious	1	2	2	2
Food-poisoning	49	55	35	15
Measles, excluding rubella	2337	2318	2337	2532
Meningococcal infection	39	41	45	35
Ophthalmia neonatorum	46	27	50	44
Paratyphoid fever	3	..	1	6
Pneumonia, primary or influenzal	1124	991	890	902
Poliomyelitis:				
Paralytic	38	40	38	45
Non-paralytic	16	10	13	15
Puerperal pyrexia and fever	97	70	88	93
Scarlet fever	1802	1758	2023	1966
Smallpox	..	..	..	..
Typhoid fever	28	8	5	7
Whooping-cough	1379	1535	1753	1764

* Not including late returns.

In England Now

A Running Commentary by Peripatetic Correspondents

IT has happened—in America, of course. The proceedings at a medical meeting have been broadcast so that doctors can listen in their own homes and offices with the least expenditure of time and energy. Dr. Benjamin P. Watson, president of the New York Academy of Medicine, in inaugurating the Academy's transmissions of its scientific sessions over the local radio station, hoped that "hearing the voice of the lecturer and noting his emphasis on certain parts of his presentation may convey more clearly his thoughts and conclusions than would the reading of his words in cold print." Since all Americans are born broadcasters this may well be so. I feel that if many of us were to read our papers over the wireless they would be even more inaudible and incomprehensible than when we read them at meetings. But the audience could switch off, instead of having to move silently about on their seats, with "watching how the chairman takes it" as the only diversion. Clearly, until television can be allied to sound recordings of meetings—which is probably only a matter of time—lecturers will be deprived of some happy compensations they now enjoy. No longer can they say: "May I have the next slide please?—Oh, I'm sorry, I should have shown you this one before I went on to the present case." And, wedded to the microphone, they will not be able to wander about with the pointer. The old-time medical joke will go, too, but that has been doomed ever since women were admitted to all medical schools.

The New York Academy is asking practitioners when they would like the broadcasts and what they should be about. The first broadcast was a recording of a discussion on 'Cortisone' and A.C.T.H. Perhaps one day we shall be having similar broadcasts over here, for the B.B.C. is experimenting with frequency modulation, which is the system of very-short-wave local transmission used by Station WNYC in New York. It is true that lay people as well as doctors will be able to listen to the broadcasts; but this is no contra-indication, for they will not understand much and will probably give up listening after the novelty has worn off. My chief regret is that I shall no longer be able to indicate that the meeting has gone on long enough by walking stealthily out.

* * *

There is a peculiar malaise which follows the taking of sulphonamides, as we all know. Presumably this is a toxic effect, but what part of the brain mechanism is particularly affected by the circulating poison? For the feeling is real enough, as I can now testify. A friend of mine, who has a high administrative post and is a well-known writer as well, wrote to me of the dejection the drugs produced in him, leading to thoughts of suicide; and our vicar, a man of strong character and much learning, told me that he had had to beg his doctor to stop the tablets, for he could not bear the depression any longer. But it was the cat that moved me most. It is no use saying that depression comes because it is expected, or that only people with constitutional predisposition get it. "Depression" may not be the right word, but whatever it is my cat had it, and no-one had whispered into his black velvet ear that the tablets he was made to swallow would make him feel like death; nor is he temperamentally melancholic. The infection was checked, but each morning he crawled out of his basket to the sunniest spot on the lawn under a cypress hedge and lay as if waiting for death all day. He took food and drink when it was put under his nose, but he would not move towards it, and in the evening we had to pick up his limp body and carry him back to his basket. He made a good recovery in time, and today is the most vigorous and playful cat imaginable, but he was a sad sight then.

My own turn came lately, and I was quite placid about it, for I was to have the newest and least toxic of the drugs, and I have no tendency to extremes of mood—I expected, in fact, nothing but good. Yet, as the treatment continued, I began to feel curiously and horribly weak. On the last day I was told I could get up for tea, but after an hour, when I had enjoyed both Christmas cake and the radio—there was no mental depression in my case—I felt for bed as no doubt the cat did [illegible] the cypress hedge, and I crawled back. The fever had gone, my pulse was strong and normal, head clear and appetite returning, yet the life had gone out of me. It was as if the springs of action had run down. I l[illegible] inert, as the cat had done. When the time came in the evening for the last dose, something obscure but powerful in me rebelled; I meant to take it but couldn't. I don't suppose it mattered, but I feel guilty about it and shall sympathise in future (though secretly) with the patients who throw their tablets out of the window when [illegible] is looking.

* * *

The Membership is a very useful qualifying examination, and with it one can usually rely on getting a [illegible] junior house-job in one of the less frequented sidewalks of medicine, such as pseudosurgical psychiatry or dialectical venereology, if one has pull and an ingratiating smile. But my *chief tells me that one* must have something more imposing if one is to aspire to the higher planes of mid-stream medicine. I rather fancy a [illegible] myself—it sounds impressively austere, and with it [illegible] could always become a rural dean if the worst expectations of the N.H.S. became fact. What to choose for one's thesis, therein lies the problem; perhaps the *incidence of wing scapula among* the lesser British [illegible] would fill the bill?

* * *

My son's spelling is not his strong point, and I was relieved when he was accepted by my old school in Edinburgh. Three weeks ago he started his first term as a boarder, and his weekly letters are eagerly awaited by his mother. Being a fairly normal little boy he made the expected request for some addition to his diet, and in due course he was sent a parcel containing apples and a Swiss roll, among other items. The following letter has just been received.

"Dier Mum I hop you are verey well. that pasel [illegible] sent had a mous in it. he had eeten half the swis role [illegible] of the apels. luv from John.

I wonder. Did a mouse travel all the way to Edinburgh from Bristol in a parcel or are the Edinburgh mice very quick off the mark?

* * *

At a West of England agricultural show a while ago a Friesian cow was exhibited (and ignominiously placed second in its class) which had throughout the month of May produced, on average, 20 gallons of milk a day—enough to fill 160 pint milk bottles. More recently the New Zealand press informed us of a cow from Hamilton, New Zealand, which, in its 15 years of life, had given 122,000 lb. of milk, equalling 150 times its own weight.

How far is this selective interference with an old friend to be allowed to go? Already the victims walk with *difficulty; the veins coursing along* their bellies are big enough for venipuncture to be performed on them with a cannulated crowbar; and decompression, in the form of milking, must be done every six hours to prevent them bursting.

On, on till all non-essentials have been outbred and the goal is finally gained—an oval protoplasmic mass lying in a white-tiled byre, sans eyes, sans ears, sans horns, sans teeth, sans legs, sans everything but at one end a stoma, into which is shovelled at appropriate intervals a standard quantity of predigested, hydr[illegible] fortified, vitaminised, non-residue extract of grass, and amidships an imperceptible transformation into udder ending posteriorly in teats, arrayed like organ-stops, cascading milk into the moving churns beneath; the whole observed disinterestedly by an official, a representative, two spokesmen, and a delegate.

And the tail—hardly a non-essential? Then stick it on top, to wave like the tentacles of the delicate sea anemone, dispelling the hungry hornet and bidding a sad farewell to the gentle cow we used to know. Good cause had she to ruminate.

* * *

LINES AFTER VISITING THE CIRCUS

In Achondroplasia
  The disproportioned limbs amasia,
But Pituitary dworphs
  Are true anthropomorphs.

Letters to the Editor

THE CHEST PHYSICIAN

:,—*The disastrous plight of the tuberculous* has been y quoted in your journal, in the *Times*, and in other and weekly papers.

ring the past week we have openly heard of the d positive action taken by the Ministry of Health, July 5, 1948, in the realm of tuberculosis. Firstly, . arrived with a flourish of trumpets, but presently hed in the mysterious darkness of a night. Now ear that consultant chest physicians are to have a on of their salary paid at a rate considerably lower that offered to consultant medical staff. This on is in respect of the preventive and aftercare ts of the work undertaken by these physicians.

e we really living in the era of preventive medicine? the Ministry, whose very existence is based on entive medicine, really consider that prevention e divorced from clinical medicine, and that it should inked as of lesser import? This action has been 1 at the behest of local authorities, who have powers, r section 28 of the National Health Service Act, to ide aftercare. Considerable lip-service is paid to after- at every tuberculosis conference, but in how many s are there adequate facilities? Not *one* local ority in Britain is administering its proper quota of c almoners, night sanatoria, sheltered workshops, rehabilitation centres. Yet these are the authorities hom the Ministry has yielded!

ave been urged to ventilate this matter for two main ons. It is agreed that in the past the average quality est-clinic staff was poor. Little consideration has given to the circumstances. A tuberculosis officer d obtain adequate promotion almost solely by seeking ation to the post of medical officer of health. The lts are evident throughout the land today. They not inspiring. For this reason few men of ability sidered this service as a career. In the N.H.S. a portion of chest-clinic physicians have been freely pted by their colleagues as consultants, and vacancies his grade have been widely advertised.

umbers of those in senior posts will be retiring in 15 years. It is absolutely essential that the chest- ic service should attract young postgraduates with d experience and ability. This is now occurring, and ruitment has been revolutionised. Regional boards e the opportunity of building an efficient organisation grapple with the present serious problem.

he editor of the *Economist* made some apt comments a recent broadcast[1]:

> " . . . if we are to succeed in restoring our efficiency, we re going to have to do some very difficult and unpleasant hings. We are going to have to show in ourselves a willing- ess to change, which is something that no human being ikes to do. We shall have to allow the more efficient method of doing things to supersede the less efficient, and the more efficient man to supersede the less efficient man. In fact the resuscitation of efficiency involves two of the things that human beings find hardest in the world to achieve, that is constant mental effort, and a continuous disturbance of settled habits. I do not believe that you can get that sort of thing by exhortation alone. You have got to make it worth people's while."

If the recent edict on salaries is allowed to remain, l chance of improving the service will immediately fade potential applicants turn to less exacting, but more munerative, posts. The real loser will be not the resent chest-clinic physician but the community.

Secondly, these instructions from the Ministry will ead to the involuntary, but compulsory, cancellation y regional hospital boards of some existing contracts. Legal advice has been sought and an opinion has been expressed *that the contracts issued to the profession have no legal validity.* I suggest that all members of the profession take notice of the manner in which they can be treated.

The proposals relating to chest-clinic physicians were formulated in secret, and none were allowed to express an opinion. In disputes affecting industry the workers are at least permitted to state their case.

Willesden Chest Clinic,
London, N.W.10.

C. H. C. TOUSSAINT.

INFLUENZAL MENINGITIS

SIR,—Dr. Ounsted's preliminary communication on *Hæmophilus influenzæ* meningitis in your issue of Jan. 28 reminded me of a very similar problem which arose early in the 1914–18 war when I was working with the late Dr. Creswell Shearer. There occurred an epidemic of meningococcal meningitis; and we eventually concluded that phagocytosis was the deciding factor and that this depended on the site from which the meningococcus was isolated. The following is the summary from our paper on the subject[1]:

> "As the result of the foregoing experiments we think we have obtained good evidence for thinking that under certain conditions the meningococcus can be taken up by the leucocytes but not killed by them. In the case of freshly isolated strains we have seen that the leucocytes will not take them up at first. With old laboratory cultures, on the other hand, ingestion on the part of the phagocytes takes place with great rapidity. In a short time the germs are killed and completely digested by the leucocytes. This happens also with the majority of the nasal strains we have examined from chronic 'carriers' although they show great individual differences.
>
> "In the intermediate stage between the fresh spinal condition and the naso-pharyngeal state, it can be shown experimentally that they are taken up, but not killed, by the leucocytes. They can be recovered from them after a period of 24 or 48, or even 60 hours, and grown on artificial media. If we can believe they behave similarly within the body, then we can understand how they might be carried into the spinal canal and there set up infection.
>
> "It might also explain why direct infection (apart from the 'carriers') seldom, if ever, takes place in cerebro-spinal fever; that is from patient to patient, attendant, or physician, etc., the phagocytes refusing to take up the germs in their virulent condition. In the 'carrier,' on the other hand, in the majority of instances, the germs have lost their virulence so completely that they are taken up and immediately killed and digested.
>
> "In conclusion: if the method of infection is by leucocytic conveyance, then the reason why direct infection is so uncommon is clear. The virulent organism is unsusceptible of being attacked by the phagocytes. The longer the germs grow in the 'carrier' throat, the more easily will they be ingested until a time is reached when, on ingestion, they are also destroyed. Somewhere between these two extremes, infection may produce the disease. The organism is sufficiently weakened to give in to the leucocytic attack, but not to lose its life in the battle. Should infection occur at this point, the leucocytes will pick them up from the mucous membrane of the naso-pharynx, and in the course of their wanderings will sometimes carry them into the spinal canal. There the liberated organisms will set up the disease, at the same time re-acquiring the power of resisting the attacks of the leucocytes in the presence of normal serum."

We also thought that our hypothesis was supported by the appearance of the phagocytes in the cerebrospinal fluid. These were often seen to be bursting with meningococci, which must have multiplied in the bodies of the leucocytes. The answer in influenzal meningitis, then, may well be the same as in meningococcal meningitis with the addition of the variation in immunity at the different ages.

The sibling pattern described by Dr. Ounsted would fit in with the closer contact between the children in a family of more than one or two, together with the low bactericidal power of the blood at the susceptible age.

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[1] Crowther, G. *Listener*, 1950, 43, 184.

[1] *Proc. roy. Soc.* B. 1917, 89, 422.

On this hypothesis we need not make the unlikely assumption of the evolution by "passage" of a special strain of the *H. influenzæ* organism which could pass the meningeal barrier.

London, W.1. H. WARREN CROWE.

CURARE AND THE PREGNANT UTERUS

SIR,—In view of recent correspondence,[1] [2] we feel that it might be of interest to mention preliminary findings of the action of *d*-tubocurarine (10–15 mg.) on the human uterus early in pregnancy.

Using internal balloons, records of uterine movements were made in six pregnancies which ranged from 52 days to 22 weeks. All cases but one were under cyclopropane anæsthesia.

The outstanding feature was that in no case did *d*-tubocurarine produce marked increase in tone or contractions of the uterus. The results were variable, some cases showing increase and some decrease of tone and contractions. All changes were slight and negligible when compared with those produced by oxytocin or vasopressin.

Whilst we realise that these findings may not necessarily apply to the uterus at term, they do not support the contention that the great increase in uterine tone in Dr. Rollason's case [1] was due to *d*-tubocurarine.

R. J. FITZPATRICK
W. C. W. NIXON
SHILA RANSOM
H. O. SCHILD.

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PROLAPSED INTERVERTEBRAL DISC

SIR,—The article published on Jan. 28 in your Disabilities series, puts surgery in a rather unfavourable light and therefore invites comment.

Surgery in this case appears on the same empirical level as any manipulative or osteopathic procedure, and many patients with two years of postoperative relief from sciatica may be wondering what their chance of relapse may be. It would seem to me that your contributor has been deprived of the benefits of surgery through three, or even four, errors of surgical judgment.

The first error was to explore the lumbar discs in the hope of finding a protrusion in a case of lumbago. It is still only presumptive that disc protrusion is the cause of lumbago. It is probable, though not proved, that lumbago is caused by the stretching of the annulus fibrosus before a discrete protrusion has formed, though it is open to question whether curettage of the disc is the correct treatment at this stage; the experience in this case suggests that it is not. In lumbago the side of the protrusion has not yet declared itself, as it does in sciatica, and the surgeon has thus very little preoperative information when embarking on exploration.

The second error was to omit to perform the correct orthopædic operation for chronic lumbago. If lumbago in an active young person is chronic enough, and the attacks are severe enough, to warrant surgery (as it undoubtedly seemed to be in this case) the soundest operation is that of lumbosacral fusion performed without exploration of the spinal canal. Though ordinary lumbago is exceedingly common, the cases which qualify for this operation are rare. The results of lumbosacral fusion are gratifying and permanent.

The third error—understandable in the circumstances—was not to operate when the disc protrusion declared itself by producing sciatica. There can be no doubt that this patient still has a large protrusion and may still have further attacks of sciatica, and that his six months of conservative treatment may still be futile.

The possibility of a fourth error is only a guess. At the operation for lumbago the disc may have been wrongly identified. This is not a beginner's mistake as I found out on my (approximately) ninetieth and my hundredth cases. It seems possible, through local anatomical variations, to mistake the lamina of the 5th lumbar vertebra for the upper limit of the sacrum, even though a large area of the sacrum has been exposed, unless the surgeon is aware of this obvious source of error. This means that what is taken to be the lowest lumbar disc is in reality only the 4th disc. For this reason I feel that the spinous processes should be identified by some radiological technique before or during operation, even by the most skilled operator.

In disc sciatica causing the amount of disability which your contributor describes, the operative removal of a disc protrusion is one of the most gratifying procedures in surgery and is fit to hold a place among any of the greatest achievements of modern science; it is important to reaffirm this opinion when experiences are recounted which appear to cloud the issue.

Manchester Royal Infirmary. JOHN CHARNLEY

THE EPILEPTIC'S DIFFICULTIES

SIR,—*Others find it hard to understand* the epileptic's difficulties. As a sufferer from grand mal I have found that broadly these are threefold.

First, nobody is entirely "master of his fate," but the normally healthy person can both think and behave as if he were. For the epileptic this is impossible. The feeling that at any moment, with no chance of escape, he can have his life blacked out, his whole pattern of living interrupted, can be at times—and particularly just after an attack—quite terrifying. Even if he can overcome this feeling he has to behave as though nothing which he does or plans is certain. It is so easy to come to regard life as a mere matter of existing, and little more.

Secondly, there is the feeling of resentment. I say *that this is a feature of most long-term* afflictions, yet I believe that it must affect epileptics more than most. Just because, between attacks, there is no outward sign, just because one's disability is what one might call an "invisible wooden leg," it is almost impossible to get other people to accept one's limitations at their true value. It is bad enough to think of all the things that might have been but cannot be, in the matter of [illegible] and other activities, without feeling that one must [illegible] still more because an employer, or one's own sense of fairness, decides to play safe.

Thirdly, there is the attitude of others to epilepsy as a disease. It is not so much the fact that by its nature it discourages sympathy except in those who come in close contact with it. It is the quite positive attitude among those who are ill-informed—and how many they are—that epilepsy is a "little bit queer" and faintly repulsive.

These are the difficulties. How can they be countered? I think that within his limitations the epileptic must try to live a life sufficiently active, and *varied*, to be able *to tell himself: "Even if I were not epileptic* I could *not make my life any fuller than it is;* if there are things I cannot do, I could not in any case do them except by forgoing something which I now do; besides which I can already do some things which other people, better off than I am, cannot do." That sounds pompous, but I can say from experience that it does work, and the ability to out-do normal people in normal activities becomes a matter of pride.

Secondly, it is a great help if one *knows* what to expect. Knowing such things as the danger-times of the day, how often the *attacks are likely to come*, and so on, helps to bring the problem down to its proper proportions. This probably sounds obvious, yet it was several years before I really knew what I was up against. I feel that a comprehensive, matter-of-fact description by the doctor could do a lot.

Thirdly, once the *epileptic* knows what he can expect, relations and friends should be very wary of offering unsought protection. If he is to live at all fully, he is bound to expose himself to risks which would not normally ified. He is probably far more aware of these ıan his "protectors" seem to think, and is almost ly taking them quite deliberately in his attempt a normal life. He is not likely to forget his ities, but he should never be chained to them.

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[1] Rollason, W. M. *Lancet*, 1949, ii, 963, 1157.

[2] Nosworthy, M. D. *Ibid*, p. 1015. Mills, W. G. *Ibid*, p. 1103. Corbett, H. V. *Ibid*, Jan. 7, p. 17.

ANON.

INCESS TSAHAI MEMORIAL HOSPITAL

—I shall be grateful if you will allow me to appeal ıations to buy the surgical instruments required nplete the equipment of the main operating- of the Princess Tsahai Memorial Hospital in Ababa. The sum required for this purpose is it would carry the hospital a substantial stage d towards the opening, which it is now hoped will lace at an early date.

Neville Goodman,[1] late director of field services of orld Health Organisation, has testified to the need of the hospital for the treatment of patients, articularly as a training-centre for nurses. The atic training of fully qualified hospital nurses has be initiated in Ethiopia. By praiseworthy efforts the years which have elapsed since the country berated with British aid in 1941, the Ethiopian ion department has prepared a number of young for hospital training. Funds for this are in sight, he hospital is open.

ques, and postal orders should be drawn in favour Princess Tsahai Memorial Hospital, and addressed hon. treasurers (Lord Horder and Lord Amulree), essrs. Gould and Prideaux, the hon. chartered ıtants, 88, Bishopsgate, London, E.C.2.

WINSTER
Chairman.

EATMENT OF RHEUMATOID ARTHRITIS

,—Dr. Landsberg's letter of Jan. 21 on the treatment eumatoid arthritis with various steroid hormones scorbic acid prompts me to describe two cases of ıatoid arthritis treated in Johannesburg in 1948 methyl testosterone, administered orally.

h patients were European males with a long history ıd 5 years respectively) of generalised joint-pains and nities, worse in the smaller joints, and associated with tion in the range of movements, ulnar deviation of the , and pronounced increase of the erythrocyte-sedimenta- ate. In each case the facies and unusually large hands eet suggested acromegaly, this being supported by radio- ıl evidence of thickening of the skull bones, widening e jaw-angle, enlargement of frontal sinuses, lateral and oposterior enlargement of vertebral bodies[2] tufting of nal phalanges, and broadening of the anterior ends of ibs. The pituitary fossa was normal in size, but there an obvious "bec acromegalique"[3] in one case. Both nts had an impaired glucose-tolerance and glycosuria, raised blood uric-acid content with a normal blood-urea.

ıe possibility of an eosinophil adenoma of the anterior itary was considered, since joint-pains and "arth- " are not infrequent in acromegaly.[4] In an attempt epress anterior-pituitary activity, methyl testosterone given by mouth, 30 mg. thrice daily for a week, ıout keeping the patients in hospital.

ı the first case there was remarkable relief from t-pains and an obvious increase in the mobility of joints within four days of the first dose. Dosage reduced to 10 mg. twice daily for three weeks, and ı to 10 mg. on alternate days for a month. During time pain was absent and the striking improvement he patient's clinical condition was maintained, while his weight increased from 130 to 150 lb. (ten years previously it had been 230 lb.). The second patient had a severe exacerbation of the symptoms (headaches and joint-pains) during a week's treatment, but after this was stopped he was so much improved subjectively that he asked for more tablets.

Follow-up was prevented by my departure from South Africa, but the promising initial response justifies a more comprehensive investigation of methyl testosterone in rheumatoid arthritis, with or without associated acromegaly. No clear indication arose as to which type of case might react favourably and which might, at least initially, be aggravated; but it may be significant that the former result occurred in a severely emaciated patient, and the latter in one who had lost little weight. This accords well with the claim of Fox[5] that only emaciated patients with rheumatoid arthritis respond favourably to the combined treatment with deoxycortone acetate and ascorbic acid, while the symptoms are often worsened in those who have had no loss of weight.

Department of Pharmacology,
University of Oxford.

D. H. P. STREETEN.

POSTOPERATIVE PARALYSIS IN THE UPPER EXTREMITY

SIR,—May I congratulate Mr. Ewing and Dr. Kiloh on their excellent articles of Jan. 21 on brachial-plexus lesions following operation.

Mr. Ewing lays great emphasis on the use of curare and the placing of the patient in the Trendelenburg position as causes of the brachial palsy, but I do not agree with him entirely on this. Some years ago, before curare was introduced, I had a case which developed a postoperative brachial-nerve palsy, and at the time I was at a loss to know why this had developed.

The lesion occurred in a man who had undergone cholecystectomy. He was not placed in the Trendelenburg position, but his arms were kept hyperabducted and hyperextended and everted throughout the operation. This position was maintained by keeping both wrists tied to the top of the table by means of a cuff bandage and cotton-wool. After the operation the patient developed a brachial palsy on the right side. With the aid of physiotherapy, the arm recovered full function within a few months, but nevertheless the patient (whom I saw on many subsequent occasions) continued to complain bitterly of aching pain in the right upper limb and was unable to resume work for a considerable time after his operation.

I notice that Dr. Kiloh mentions post-fixation of the brachial plexus as a possible predisposing cause of plexus lesions. I consider this the prime factor, for the following reason. When the plexus is post-fixed (arising from the 6th, 7th, and 8th cervical and the 1st and 2nd thoracic segments instead of the 5th, 6th, 7th, and 8th cervical and the 1st thoracic segments) it certainly has a longer course to run and can be more easily stretched when the limb is in a position of abduction and eversion. I do not know what is the percentage of people who have a post-fixation plexus. Despite the large number of patients who are operated on in the Trendelenburg position and who have curare as an adjunct to their anæsthesia, the development of the brachial-palsy syndrome is rare. Is it not possible to assume that it occurs only in those patients who have a post-fixation brachial plexus and who have their arms kept in abduction during an operation (not necessarily in the Trendelenburg position)?

Having seen one case develop, I no longer have my patients' arms hyperabducted and tied to the top of the table. In my opinion, the ideal position is that in which the arms are crossed over the chest and tucked away under the patient's shirt or nightgown. If the arm has to be abducted for the anæsthetic, it is advisable to see

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Lancet, 1949, ii, 1243.

Erdheim, J. *Virchows Arch.* 1931, 281, 197.

Puech, P., Stuhl, L. *Pr. méd.* 1934, 42, 1131.

Zondek, H. Diseases of the Endocrine Glands. London, 1944.

Mussio-Fournier, J. C., Porzecanski, B. *Bull. Acad. Méd. Paris*, 1933, 110, 235.

[5] Fox, W. W. *Lancet* Jan. 21 p. 135.

that the abduction be less than 90°, and in addition the forearm should be kept pronated. This is an ideal position, for then the intravenous administration can be given into a vein which runs just above the lower end of the radius on its dorsal aspect; this vein is constant in this position. I am not in favour of administering intravenous fluids into the leg. There is not only a risk of thrombosis of the veins of the leg, but in my experience the incision in the ankle region easily becomes septic. Even when healed, the scar may remain tender for a long time, and I have seen patients who even after many years complain of this tenderness persisting. Recently a patient in my hospital developed lymphangitis following exposure of a vein in the ankle region for intravenous administration, there being no phlebitis present.

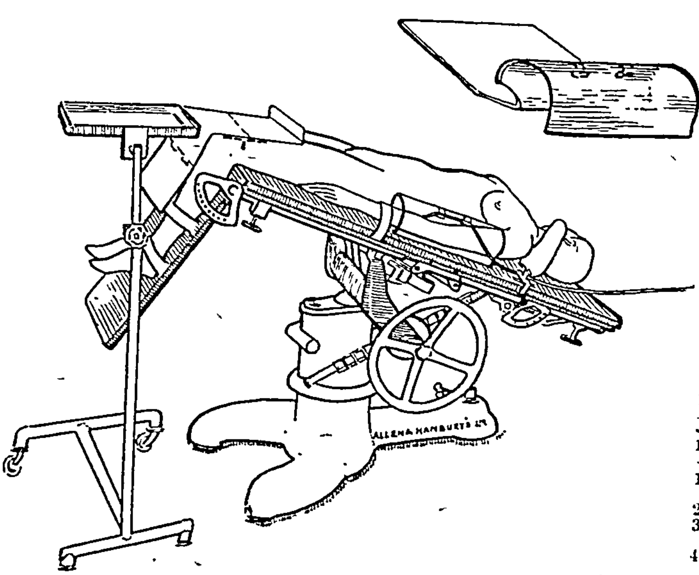
Lastly, I should like to mention one more position which I consider to be pernicious—namely, that in which the patient is made to sit with the hands under the buttocks. In this position the weight of the patient on his hands interferes with the blood-supply to the digits, as is evident from the blanching which can be observed after operation. I have heard from a reliable source of one such case in which gangrene of a digit developed.

London, W.1. MAURICE LEE.

SIR,—Mr. Ewing's article of Jan. 21 leads us to describe a simple but effective arm-splint, designed because of two cases of brachial-plexus injury following gynæcological operation. Both cases occurred after having the arm abducted during operation with the table in fairly steep Trendelenburg position. In one case the abduction was for the purpose of blood-pressure recordings, in the other for a drip transfusion. The anæsthesia was different in each case; the first received thiopentone, *d*-tubocurarine chloride, and cyclopropane, and the second a spinal anæsthetic, using light 'Nupercaine,' intermittent doses of thiopentone, and nitrous oxide and oxygen.

The splint, illustrated here, was designed to be used during the operation. It was constructed by Mr. E. Simmons, senior technician of the department of obstetrics and gynæcology. It consists of a sheet of 'Perspex' glass, one-third of which is curved to form a tunnel. The ends of the inner wall of the tunnel are cut away to avoid pressure on the upper arm. Accordingly the splint can be used for either arm.

To place the splint in position, the patient is lifted bodily off the table and the flat portion is adjusted beneath her, the arm being eased into the tunnel to be alongside the body. Needless to say, the intravenous needle is in position before this manœuvre is carried Care is taken to avoid any pressure-points, and the is controlled by a towel passing under the patient. T important points must be borne in mind:



1. The needle must be fixed into a satisfactory ve firmly held in place with strapping.
2. The splint must be arranged in position before the of the operation.
3. An extension to the rubber tubing of the intra giving-set is necessary. We have extra lengths of pres tubing, about 20 in. long, fitted with suitable adapt sterilised in readiness. Pressure-tubing is essential to a kinking.

We have found this device very satisfactory i continuous intravenous therapy has been m throughout the operation.

J. C. McCLURE BR
HILDA ROBERTS.

Department of Obstetrics and Gynæcology,
Postgraduate Medical School of London, W.12.

MYSTERIOUS MARRIAGE

SIR,—The last paragraph of Dr. Howe's l Jan. 28 calls for some comment.

One of the outstanding characteristics of the o sional neurotic is the inner-compulsion for exa and precision, quite regardless of its external ne but before arriving at such a diagnosis the "observer" must be aware of the real problem which confronts "observed," the rationale in dealing with it, and issues at-stake. Otherwise he may form an er opinion that the "observed" is making a lot of about nothing. To put anything right, the more w learn about its function and the way it works, the likely are we to be successful; so in analysis the m know of mental mechanisms, the more cert therapy to succeed. The study of psychop largely involves Dr. Howe's imponderables, but h we to perfect our technique if we follow his sugges of keeping our fairies at the bottom of the garden!

Analysis is no more detrimental to the enjoyment art and things of the imagination than, say, a tec knowledge of how films are produced is to the enjoy of a good film seen at the cinema.

Bishops Stortford, Herts. D. N. HARDCASTLE

TETRAETHYLAMMONIUM BROMIDE IN RHEUMATOID ARTHRITIS

SIR,—If Dr. Howell's conception (Feb. 4, p. 20 the mechanism by which tetraethylammonium bro relieves pain in an acute exacerbation of rheum arthritis is the correct one, there is a marked discrep- with the results of cervicothoracic sympathectomy.

It was precisely in that type of case where Dr. H failed to relieve pain that Rowntree and Adson[1] Adson [2] claimed success by cervicothoracic sy thectomy. I refer to the patient with a periart type of arthritis with comparatively little joint in ment. I think I am right in stating that no cla ever been made that the pain endured by a patient the joint surfaces predominantly involved is alle by sympathectomy. On the contrary, White and S wick [3] consider that it is logical to recommend pathectomy "only if superimposed vasomo sudomotor disturbances are a cause of serious dis

I should be interested to know the grounds for the ment which Dr. Howell quotes: "the nerve supply of joints and ligaments is derived from the symp nervous system."[4] This repudiation of the view expr

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1. Rowntree, L. G., Adson, A. W. *J. Amer. med. Ass.* 192 694.
2. Adson, A. W. *Ann. intern. Med.* 1933, 6, 1011.
3. White, J. C., Smithwick, R. H. The Autonomic N System. New York, 1941.
4. Mennell, J. B. The Science and Art of Joint Manipu London, 1939; vol. I.

ton that movable joints are innervated by the nerves
ply to the muscles which act on them, must, if
ntiated, alter entirely our conception of the
nism of rest and pain.

ould suggest that any benefit that has accrued from
hibition of tetraethylammonium bromide has been
the abolition of one of the generally accepted actions
sympathetic nervous system, and not to the
iption of impulses mediating pain travelling along
thetical course from the joints to the cord. Possibly
nefit experienced was due to vasodilatation in the
d area. This would bring the results of therapy
etraethylammonium bromide in line with those of
eat therapy in its various forms.

rtment of Anatomy,
ersity of Cambridge.

DAVID WOOLLAM.

DIPHTHERIA IMMUNISATION

—I would like to congratulate Miss Barr, Mr.
y, and Dr. Randall on their excellent piece of
ch published in your issue of Jan. 7. I do rather
exception, however, to the assertion contained in
t the Schick test should never be used in funda-
l work designed to throw light on methods of
nisation, &c.

uite agree that, in such an investigation as they have
described, blood-antitoxin titrations are essential
fundamental facts are to be understood. Yet,
accepts the production of the Schick-negative state,
al months after inoculation, as the criterion of a
actory basal immunity (as I am bound to conclude
many years' work, that it nearly always is), there
nany lines of investigation which can profitably
ursued, using the Schick test as the yard-measure.
ık my belief is justified by an experience over many
, of Schick-negative subjects, in enormous numbers,
have been exposed to infection, with only one (?)
due to diphtheria during that time. I, personally,
learnt an immense amount with the aid of the
and many people have acted on my findings. I
, and believe, that I have led no-one astray.

ay I mischievously remind these writers why
come diphtheria P.T.A.P., contains 10 mg. of alumi-
phosphate per ml.? This optimum figure was
rmined by me for Holt, when he was perfecting his
inal P.T.A.P., solely by intelligent use of the Schick
I do not fear any challenge to this deduction,
pt that larger amounts of aluminium phosphate
to 15 mg. per ml.) have a slight advantage when
intended to undertake single-injection prophylaxis.

do not propose to set forth in detail other numerous
inal observations in which the Schick test has been
ally, and can only say that I feel sure that your
tributors (and my old friends at Beckenham) did not
lly mean to be quite so sweeping in their assertions.

ublic Health Laboratory Service,
134, Denmark Hill, London, S.E.5.

GUY BOUSFIELD.

ROMBOANGIITIS OBLITERANS TREATED BY HYPOGLYCÆMIA

SIR,—I have just learned that the treatment of
omboangiitis obliterans with large doses of insulin
ich I discussed in an article last November[1] is being
d as a routine procedure at Wroclaw, Poland.

This method of treatment was introduced in 1946 at
School of Medicine Hospital of Wroclaw University,
Dr. J. Kaniak. Since it has proved successful, patients
ffering from thromboangiitis obliterans have been
ferred from all over the country to Wroclaw, where a
ntre for treatment of vascular diseases has been
ened. So far about 200 cases have been treated
ccessfully by insulin injections.

Dr. Kaniak has published an article on the subject[2]; and I understand that shortly he is going to publish his observations on the modus operandi. His findings from a large number of cases show that in advanced cases of thromboangiitis obliterans treatment by hypoglycæmia is of value.

Penley Hall Hospital, near Wrexham,
Denbighshire.

H. MAZANEK.

INSULIN AND JAUNDICE

SIR,—The use of insulin in jaundice, and particularly in infective hepatitis, does not appear to be well known. I have long had the impression that this treatment is very helpful. The effect seems to be an increase in the glycogen content of the liver, thus increasing its function and resistance.

The insulin is always given with glucose: about 20 units of insulin to 30 g. of glucose per day is what I have always used, but there has been some difference of opinion about dosage, and Henschen suggests 1 unit of insulin to 2 g. of sugar. In cases of cirrhosis, syphilis, or carcinoma, less sugar is required; with greatly impaired liver function there is danger of hyperglycæmic coma.

Patients treated with insulin and glucose nearly always feel better; their appetities improve, and their tongues become more moist and clean. The period of convalescence is greatly shortened. There have been several accounts of this treatment.[3]

London, S.W.4.

J. E. O'LOGHLEN.

PNEUMOCONIOSIS AFTER EXPOSURE TO SULPHUR DIOXIDE FUMES AND DUST FROM COKE FIRES

SIR,—Dr. Fisher (Jan. 14) rightly defines the implications of our paper, provided that the conclusions therein are valid. Purposely, we stated that they were tentative. It was our aim to draw attention to the occurrence—not to speculate on the possible incidence—of pneumoconiosis in boiler-stokers and others. Dr. Fisher over-estimates its potential frequency. In an industrial city of 300,000 population we encountered, on average, 1 case each year over nine years. In the country as a whole (population 50,000,000), if it were industrialised equally to Hull—which it is not—one might expect, on such a basis, the discovery of 170 cases each year.

His objection that the "ten cases are hardly evidence" we accept, not because of the small number but, as was made clear in the discussion, because post-mortem proof has not yet been obtained. Tuberculosis was excluded on the grounds stated, by the subsequent course of the illness in those who are still under observation, and because none of the workers has been later notified as tuberculous. Moreover, the X-ray picture did not resemble that of fibroid tubercle. The sample of dust was a "pooled" sample collected by three stokers from hearth, bench, window-sill, &c., in the course of a day's work. Analysis was done of that fraction of dust measuring about 2 μ—i.e., of most active and pathogenic size. (The statement in our paper that the sample was obtained by one stoker is wrong—a fact only discovered later.)

We did not consider it necessary, nor did we have the opportunity, to inspect the working conditions of all the men. Of those we saw, some were good, others bad. In a large gas-works no risk of inhaling dust or sulphur dioxide seemed to us to be present. There we also visited the blacksmith's shop, where dust was present but was not conspicuous in the air. The work environment of three boiler-stokers was far from good. Poor conditions were alleged to exist in a small gas-works which was not open to inspection by us.

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[1] *Lancet*, 1949, ii, 935.

[2] *Przegl. lek.* 1948, 4. 272.

[3] Lepehne, G. *Munch. med. Wschr.* 1928, 75, 1171. Hegler, C. *Dtsch. med. Wschr.* 1934, 60, 475. Krauss, F. *Ibid*, 1936, 62, 1335.

The experience of Dr. Fisher in the medical supervision of those in a large number of works (presumably gas-works) has been that cases similar to ours have not been brought to light. He does not state whether chest radiography was used, without which the detection of chest disease and the elucidation of its cause are, in our submission, uncertain.

Since our paper was published, Dr. A. G. Heppleston has kindly brought to our notice his paper on the pathology of pneumoconiosis in Welsh coal-workers.[1] He found comparable changes—focal dust-lesions and focal emphysema—in the lungs of certain coke-workers. In a recent personal communication he states that these workers came from the local gas-works. They had died from conditions other than pneumoconiosis.

We believe that much industrial chest disease remains undiscovered. Trades in which there is already proof of the occurrence of disease among workers sufficient to cause partial or even total disablement have not been included, up to now, in the "schedule" of trades carrying rights of compensation. Routine chest radiography should be done in those working in bad conditions where there is dust, irrespective of its type. Even where work conditions are poor, most workers will doubtless be found to have healthy lungs.

That his workers are apparently immune does not entitle Dr. Fisher to infer that there is freedom from this type of chest disability wherever similar trades are conducted.

Tuberculosis Dispensary,
Hull.

LASAR DUNNER
R. HARDY
D. J. T. BAGNALL.

TITRE OF BLOOD-GROUP ANTIBODIES

SIR,—The activity of an antibody in vitro, which may or may not parallel its activity in vivo, is usually expressed as "titre."

The blood-grouping serologists reckon the titre of an antiserum as the highest dilution in saline which will still produce agglutination, not taking into account (as the bacteriologists do) the further dilution—usually another twice—in cell-suspending fluid when the agglutination reaction is set up. This is surely a convention which may mislead workers outside this special field, for it makes the titre appear lower than it actually is.

When doubling dilutions are used, the accuracy of the method depends largely upon the skill with which the antibody is diluted. An error in the first tube will be multiplied in each succeeding tube if this or any other geometrical method of dilution is used which involves a carry-over of ever-more-dilute serum from one tube to the next. An arithmetical method of dilution is not liable to so great an error. A good plan is to use a geometrical doubling dilution to obtain an approximate result, and if the titre is high to follow with an arithmetical method to get a more exact figure. It seems accurate enough to express the titre of a weak antibody as "between 1/2 and 1/4," but to say a strong one is "between 1/1024 and 1/2048" leaves a big gap to be covered. Such an antibody could next be tested at 1/1100, 1/1200, 1/1300, and so on up to 1/2000, in order to get a more exact end-point. Unless some such system is used the titres of strong antibodies are difficult to compare, for if we assume that a weak serum of titre 1/4 contains x units of antibody per unit volume (p.u.v.), a gain of another x units will produce a "one-tube rise" in titre to 1/8, whereas with a strong antibody of titre, say, 1/1024, containing 256 x units p.u.v., a gain of x, or 10 x, or even 100 x will not produce the "one-tube rise," which demands 256 x before the titre, as conventionally expressed in geometrical increments, any increase.

Again, the practice of calling the titre "1/1024" "1/8192" is surely absurd. While the accuracy of method may allow one to say "1/2" or "1 diluting technique is not accurate to one part in a thousand, which this convention implies is so. It seem less pretentious to call the dilutions 2^{-1}, 2^{-2}, and so forth.

National Blood Transfusion Association,
52, Lower Leeson Street, Dublin.

EARLE HACKETT

D.P.H. LONDON 1929-39

SIR,—We are most anxious to get into touch all old students of the London School of Hygiene Tropical Medicine who attended the D.P.H. classes between 1929 and 1939. We have already sent a letter to those whose addresses we could find, but there are many we have been unable to trace. We should be most grateful if all old students, whether they are at home or abroad, who took the D.P.H. courses between 1929 and 1939 and who have not yet received our letter would write to Dr. Windle Taylor, 51, Woodside Avenue, London, N.10, giving their addresses.

A. H. GALE
G. E. GODBER
E. PEREIRA
T. STANDRING
E. WINDLE TAYLOR
ANN MOWER WHITE
S. L. WRIGHT.

ACUTE DIVERTICULITIS OF THE CÆCUM AND ASCENDING COLON

SIR,—I read the article by Mr. Shaw and Dr. (Jan. 21) and the letter by Dr. Tasker (Jan. great interest and some sorrow: with interest because two very typical and well-known features were described; with sorrow, because neither Mr. Shaw Dr. Tasker conveyed the impression that he was with the fundamental work done on this condition his old school, Leeds.

W. H. Maxwell Telling embodied the results of own extensive investigations and those of numerous colleagues—notably Berkeley Moynihan, Gruner, [illegible]wood, and M. J. Stewart—from the Leeds General Infirmary, and reviewed the world literature in a series of papers of which the first, in 1908,[1] and the last, 1917,[2] were the most important; these are still classics in British medical literature.

While it is true that in recent years more instances of inflammation of solitary diverticula of the cæcum ascending colon have been found and reported abdominal surgeons, their occurrence has always well recognised and yet these cases remain uncommon numerically when contrasted with sigmoid diverticulitis. In 324 case-records Telling found that 6·25% of patients with diverticulitis presented with right-sided symptoms and he emphasised that when acute these symptoms practically indistinguishable from those of appendicitis. Telling and Gruner also dwelt at length on the mimicry by diverticulitis not only of carcinoma but also of hyperplastic tuberculosis. Dr. Tasker's case-report justifies their comment on the frequency with which extensive resections had been done under the mistaken impression of malignancy.

As a physician, I do not presume to discuss the [illegible] surgical treatment, but I do feel that every physician and surgeon should be thoroughly conversant with the diverse features of this condition, and that before embarking on extensive resections surgeons should always be ready to review unexpected findings in the abdomen with diverticulitis in mind.

Leeds. O. H. J. MAXWELL TELLING.

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[1] *J. Path. Bact.* 1947, 59, 453.

[1] Telling, W. H. M. *Lancet*, 1908, i, 843, 928

[2] Telling, W. H. M., Gruner, O. C. *Brit. J. Surg.* 1917, 4, 46

HOSPITAL BEDS

–One of the greatest obstacles to the full imple- ion of the National Health Service Act is the e of hospital accommodation. It is, therefore, tive, in the absence of any immediate prospect ling new hospitals, or extending the present ones, e best use should be made of the existing beds.

leading article last week lays stress on the percentage bed occupancy, which was 83% ig London hospitals in the early 1930s. Although ld aim at the highest figure possible, clearly the ls with a reputed 100% occupancy are con- adding a large number of extra beds for emer- ases. In practice there are many contingencies nevitably lower the percentage occupied during The number of patients during the Christmas s is often reduced by a third. The average er is also very loth to be admitted off the waiting- before Easter, Whitsun, or the August holidays. r wards have to be closed from time to time for ation and cleaning. You urge that the Minister investigate this matter. I am sure that there are uitful lines of inquiry which could reduce "bed e" in these days of "bed famine."

average stay of patients in similar hospitals greatly. It is well known that this figure is at its in the teaching hospitals with their adequate staff cilities. Many of the smaller hospitals, or those d some distance away from the big centres, depend equent consultant visits. Junior hospital staff tend y a "*clinical decision*" *until the patient has been* the responsible physician or surgeon. The loss, in of patient-days, by inadequate consultant staffing, very substantial.

ital beds are still used extensively for patients ng investigation. This is particularly true in ls where the outpatient department is not ade- y staffed or equipped. The cost to the State of gating a patient as an outpatient is much less than providing him with a hospital bed. An increase in stic facilities would release a large number of beds ly required for the patients needing treatment n only be provided in a hospital.

best and the maximum use should be made existing hospital beds. The disturbing factor of g shortage may prevent a substantial increase of modation even in the future.

iff. DAVID G. MORGAN.

THEMA EXUDATIVUM MULTIFORME AND EUMONIA TREATED WITH AUREOMYCIN

,—In view of Dr. Bettley's account (Jan. 14) of a of pemphigus benefited by 'Aureomycin,' and of t reports from the U.S.A. of its trial in some cases rmatitis herpetiformis and disseminated herpes ex, I would like to record the following case.

nan, aged 69, was admitted to St. Helier Hospital under re of Dr. Prosser Thomas on Oct. 4, 1949, suffering from ute bullous eruption with severe constitutional reaction. ad been taking phenobarbitone gr. $^1/_2$ twice daily on and nce June, 1948; and this was regarded as a possible

admission, his temperature was 101·4°F, pulse-rate r min., respirations 22 per min. The tongue was heavily and there was severe stomatitis with submucosal rrhage. The orbits were œdematous and discharging whole face was swollen and red and later exuded, leaving s round the eyes, mouth, and nose. The anogenital area similarly affected. On the limbs, and to a lesser extent trunk, were large patches of erythema or purpuric ery- a with thin blisters of varying size. The appearances typical of severe erythema bullosum or so-called ens-Johnson syndrome.

n examination a few crepitations were heard at the base ach lung. In the abdomen, the central nervous system, and the cardiovascular system, no abnormality was detected blood-pressure 120/80 mm. Hg. The blood-count was within normal limits, and blood-culture was negative; blood-urea 49 mg. per 100 ml. The urine contained a trace of protein with a moderate number of cellular, granular, and hyaline casts; culture contained *Bact. coli*. Radiography of chest showed an unfolded aorta.

The patient was treated at first with penicillin intramuscularly, 250,000 units four-hourly, 'Phenergan,' 25 mg. twice daily, and locally with saline compresses and calamine lotion or liniment with 0·5% crystal violet. His condition, however, rapidly deteriorated and by Oct. 7 was regarded as hopeless. He had become semicomatose and was very toxic and cyanosed. There were signs of consolidation at the base of the right lung and to a lesser extent at the left base; radiographs showed multiple small patches of bronchopneumonia throughout both lungs.

On the suggestion of Dr. C. P. Petch, the patient was given aureomycin in 1 g. doses every six hours for four days. The response was dramatic. In twelve hours the temperature became normal and it remained so. The patient soon became rational and the eruption rapidly regressed.

He made an uninterrupted recovery and was discharged to convalescence on Nov. 7, when radiography showed the lungs to be completely clear. He is now quite fit again and back at work.

St. Helier Hospital,
Carshalton, Surrey. W. E. CHURCH.

THE FIRST MEDICAL EXAMINATION

SIR,—Mr. Hentschel, in his letter of Jan. 28, says: "There is no doubt that the same standard is maintained for the external and internal examinations for London 1st M.B." It must, however, be extremely difficult to ensure a uniform standard even if, as he says, it is the practice for the same outside examiners to act in both examinations. I suggest that it would be fairer to all candidates if identical papers were set for the external and internal examinations, with a uniform system of marking: internal students at some colleges already take the same papers as external students, and there is no apparent reason why the remaining colleges should not fall into line. This suggestion also applies to the 2nd M.B., where again many medical schools have their own papers, so that the examination may well be easier at some schools than at others, and for internal students than for external (or vice versa). In the final M.B. examination there are common papers for all students.

London, W.2. F. WHITWAM JONES.

SIR,—In her letter of Jan. 21, Dr. Johnson expresses doubt whether the training, especially in schools, is really inadequate. May I be permitted to tell my experience of training from a student's viewpoint?

I was at school during the late war, and because of evacuation and other causes my education was badly interrupted. The final result was that although for higher school certificate I could study biology, there were no facilities or tutor for chemistry and, I think, also no teacher in physics. Hence, after National Service, when I found it difficult to gain entry to a medical school for 1st M.B., I decided to take intermediate B.SC. externally for an exemption.

In September, 1947, there were just over 20 students in my class taking the intermediate B.SC. course at a London technical college. The students' ages varied between 18 and 26 years. All studied physics, some 15 chemistry, but only 8 of us botany and zoology. The majority were aiming for an engineering qualification, and the rest for such varied ones as pharmaceutical (2), veterinary (1), pure chemistry (2), agricultural (1), and medical (2). The course lasted until July, 1948, when the examinations took place.

The students agreed that the lectures in physics were of good standard and adequate. However, the lecturer found himself obliged to use the calculus notation quite frequently, and this proved a handicap to the biologists. In chemistry the teacher was proficient in his subject but designed his lectures to cover only the main parts of the syllabus. For both zoology and botany, however, there was only one tutor and he was incompetent. Nine-tenths of his lectures were copied word for word from our own textbooks (which he borrowed) and then were read lifelessly to us. Frequently he misled us, and when corrected would admit his mistakes with deep regret. The Principal regretted that he was powerless to remedy the situation owing to the acute shortage of biology teachers. We were told that the previous year the biology students had studied without a teacher; but they had all failed, including a brilliant student working for medicine. He is now lost to the medical profession.

Eventually the biologists organised their own lectures and discussions in zoology, botany, and organic chemistry. The effectiveness of the various classes is well illustrated by the examination results. No biology student passed intermediate B.SC. Of the 4 (20%) who passed, all had studied physics and 2 chemistry.

Dr. Johnson asks[1]: "Is the syllabus too wide or too difficult?" From a student's point of view, in a course lasting one year it is difficult to learn everything in the syllabus thoroughly, and simultaneously to develop scientific reasoning and criticism. Hence it is easy to concentrate upon the mastery of facts alone. Time, rather than a difficult syllabus, seems to be the dominant factor. I understand that some lecturers maintain that such a course as I have described should run for two years; but I believe that the Ministry of Education—which awards grants to some students—holds that the duration of the course should not exceed one year.

Whilst my account supports Mr. Hentschel's[2] belief in the deficiency of training, I should not like to suggest that my experience is typical of conditions generally—but it may be.

Worthing. B. J. LEWIS.

INFLUENCE OF HEART-RATE ON CARDIAC OUTPUT

SIR,—The letter in your last issue from Professor McMichael and Dr. Bayliss, so far from clarifying the issue, obscures it further. The Fick formula of 1880 remained for thirty years an intelligent guess, not amenable to experimental verification, in spite of the efforts of men like Gréhant, Quinquaud, Zuntz, Hagemann, Loewy, von Schroetter, Wolfberg, and Nussbaum. It was not until I devised the method of determining the gas content of the blood in the right heart, by analysing the respiratory gases (the sack method), that it became possible to measure the quantities occurring in the formula—in particular such features as the heart output per beat and per minute, the work of the heart, and the rate of circulation. Since in all such measurements it is essential to standardise conditions and use the most precise methods possible, I do not understand why Professor McMichael lets the patient breathe "oxygen-enriched" air and why he uses a spirometer for the analysis instead of the more accurate type of apparatus designed for respiratory analysis, the errors of which are certainly less than + 10%. The use of small blood samples which can absorb only a few tenths of a millilitre of gas makes it imperative to use apparatus of the highest precision.

Moreover, since Professor McMichael's method involves in any case the shaking of blood samples with air, he might as well use the expired air contained in the sack after using my sack method, and so determine the individual dissociation curve[3] instead of relying on the more or less schematic dissociation curve as given by Bohr and Hasselbalch.

It is indeed well known that tachycardia may be of emotional origin; and for this reason I had assumed that the subjects of Kelly and Bayliss's experiments had come to "complete rest"—physically and mentally. If this precaution was not observed, then there is no cause to wonder at minute-volumes ranging from 2 to 12 litres per minute. The origin of my misgivings this wide range of variation was that it was to have been obtained *under the same experi conditions.*

I fail to see any justification for Professor McMi equating lack of subjective sensation with insensi We know that many organs, such as the gut or the which are anæsthetic, react to insults in their specific way. I would like to know on what evide can be stated that the heart—of all organs! to work "without the slightest disturbance of contr function" in the presence of a catheter.

My principal objection to the methods of Prof. McMichael[4] is that in his important investiga does not use precise research techniques, but co himself with clinical methods, which may indeed highly informative but can hardly claim a great sc value.

If at this stage Professor McMichael is still una grasp the fundamental difference between the "p and "performance" of the heart, I cannot but merely point out that so far from being quibble," it is a matter of elementary physics.

London, W.1. J. PLES

THE SOCIAL ADAPTATION OF INSTITUTIO CHILDREN

SIR,—I can assure Dr. Comfort, who wrote last that very great trouble was taken to secure infor about the social history of the social-institution and about the controls.

As far as the institution children were co careful research was made in the files of the assistance and other relevant committees of the authority which had committed the children tional care; and the data recorded were based records of action taken by the local authority of the relatives of these children. In the case of control group, the homes of the children were visited experienced psychiatric social workers, who took a full social history and who would have been awa any tendency to soften the family history.

In order to match our groups in intelligence we a school in an industrial area where the parents' occ tions were chiefly those of labourers or at the semi-skilled.

Bristol. FRANK BODM

INFANTILE PYLORIC STENOSIS

SIR,—As Mr. Ward-McQuaid and Dr. Porritt p out last week in their excellent review of this di adequate preoperative and postoperative proc are essential if satisfactory results are to be obta In particular, I would like to emphasise with the necessity for the complete correction of dehydration to operation. In the past the importance of this has always been fully appreciated. Even with the surgical skill the operative risks for a dehydrated are very high, and it is quite unjustifiable to sub patient to these extra risks. Experience has taught if on admission to hospital the clinical condition infant is so serious as to necessitate parenteral th but chlorides are present in the urine, a sodium solution of one-fifth the strength of normal adequate to maintain salt requirements. With solutions œdema is very liable to develop.

In the postoperative management, whilst feeding to be adjusted according to the weight and condition of the infant, only small quantities at or two-hourly intervals should be permitted for first 24–48 hours.

Early discharge from hospital is another impor measure in order to minimise the risks of cross-infe

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1. Johnson, M. L. *Lancet*, 1949, ii, 136
2. Hentschel, C. C. *Ibid*, p. 1155; *Ibid*, Jan. 28, p. 181.
3. Plesch, J. Bestimmung des Herzschlagvolumens beim lebenden Menschen, *Dtsch. med. Wschr.* 1919, no. 51.

1. Plesch, J. *Brit. med. J.* 1949, i, 592.

o promote continuation of breast-feeding. In owded industrial areas, however. this practice always desirable or practicable, and under these istances in particular, accommodation for nursing rs, the provision of cubicles for the babies, and a trict nursing technique are essential.

e the cases dealt with by the writers in their cover a period of ten years, the over-all results, y state, do not indicate what is now being achieved : ieir last 59 operations with only 1 death gives a more accurate index.

the Birmingham Children's Hospital during the hree years, 292 infants were submitted to istedt's operation for pyloric stenosis with only ths (a mortality-rate of 1·7%). This is much the figure estimated by Aird and compares very ably with those reported by others. With earlier sis and modern methods of treatment, care, and gement, there is no reason why the mortality should reduced to under 1%.

tment of Pædiatrics and Child Health. J. M. SMELLIE.
University of Birmingham.

THE WRONG DRUG

—Last year you drew attention to the danger stakes when using local anæsthetics.[1]

ne twelve years ago I was on duty as an intern emergency service, Lisbon. A patient, aged about ad complete urinary retention from prostatic trophy. I asked the nurse to fill a syringe with olution of 'Novocain,' and injected some 7 ml. the urethra, blocking the meatus. In less than inutes, the patient developed fibrillary contractions e face. I immediately let the anæsthetic flow rd, but the patient developed cyanosis and conns and died in about five minutes. I found that lution was one of 10% cocaine for ocular instillation. s tragedy was useful to me. May it be so to others.

on. J. CID DOS SANTOS.

HÆMOLYTIC EFFECTS OF MYANESIN

,—I very much regret that my suggestion (that the vo occurrence of hæmolysis should be confirmed roscopically) has caused Dr. Clendon and Dr. old so much annoyance. Those interested may wish fer to my letter (*Lancet*, 1949, ii, 1110) and to the le by Mallinson (*Proc. R. Soc. Med.* 1948, 41, 593 493]). They can then form a dispassionate opinion the validity of Dr. Clendon and Dr. Penfold's ments.

wcastle upon Tyne. M. H. ARMSTRONG DAVISON.

R,—In our original article (*Lancet*, 1947, ii, 387) we ed that after the injection of 'Myanesin' into a wrist and withdrawal of a sample of blood from the cubital fossa, "there was obvious naked-eye hæmo- with myanesin, and this was confirmed by the troscope, which showed oxyhæmoglobin present." s should answer your correspondents' query.

arely, however, the vital question concerning anesin is whether, in view of possible damage to blood kidneys, it is a safe adjunct to anæsthesia. Dr. nstrong Davison is asking for conclusive proof of terious effects before he stops using it. Many anæs- ists have drawn their conclusions from published ounts of fatalities following its use, and have aban- ed it because of strong evidence of toxicity. It is ic indeed to find reports of fatalities in spite of this lence (the last appearing in January, 1949), and to lise that myanesin still finds a use in some anæsthetic partments.

n experienced hands, relaxation can be safely and edily produced with such agents as *d*-tubocurarine d 'Flaxedil': and it would be prudent to limit the use of so dangerous a drug as myanesin to such dangerous diseases as tetanus and strychnine poisoning in which it appears to have a more beneficial effect than the others.

G. E. HALE ENDERBY
London, W.1. J. I. PUGH.

VITAMIN E

SIR,—It would seem from the letters in your issue of Jan. 7 that the controversial subject of the effects of vitamin-E therapy is being still further confused by inaccurate quotation and interpretation of scientific papers. May I suggest that the introduction of a minimum degree of accuracy would be in order ?

In the letter from the Shute brothers [1] it is stated that I am secretary of the Ontario College of Physicians and Surgeons and released a wholesale condemnation of the use of vitamin E in cardiovascular disease to the press, radio, and *Modern Medicine in Canada* in November, 1946. This unfortunately is not so. It happens that the only condemnation of the Shutes' work on vitamin E with which I have been associated was in 1939,[2] when certain experiments were recorded which in no way supported their findings that vitamin-E deficiency disturbed the hormone balance in the body and resulted in an excess of œstrogen. The registrar of the Ontario College of Physicians and Surgeons is my father, Dr. Robert T. Noble.

Department of Physiology, University of Western Ontario, London, Ontario. R. L. NOBLE.

FLATULENCE IN INFANCY

SIR,—Dr. Tanner, according to her letter last week, would have mothers "instructed to bring up *all* the baby's wind during the course of each feed, and not only at the end," and presumably she finds this practicable with her own infant. But many mothers discover that their infants, perhaps more high-spirited, perhaps greedier, or perhaps having more capacious stomachs, unmistakably resent this ritual interruption of their feeds and in their resentment swallow even more air, whereas at the end of the feed they are prepared to coöperate—if coöperate is the right word to describe the passive stolidity with which they await the belch (*N.B.*, English for "burp").

Is the perambulator in part responsible for windy colic in the horizontally resting baby ? In this connection it would be interesting to know if the Red Indian papoose carried vertically on its mother's back ever suffers from wind. It might be hard work for the mother, but it would save about two hours' back-rubbing a day.

St. Mary's Hospital Medical School, London, W.2. J. P. M. TIZARD.

THE FUTURE OF COMMUNITY CARE

SIR,—We were interested in your leading article last week, and welcome its emphasis on the importance of the work of psychiatric social workers.

You suggest that the local authorities may experience difficulty in providing a service of aftercare for ex-mental-hospital patients, as patients "will not bring their intimate personal troubles to a statutory body." This has not been our experience in Leeds. Following receipt of the notice of discharge of a health-service patient, our psychiatric social worker (or mental-health worker) calls on him at home to explain the aftercare service provided and ascertain whether or not the patient wishes to utilise it ; of 356 patients offered assistance in this way during 1949, only 8 rejected it. The acceptance of the service gladly, without suspicion, and without notice of the fact that the social worker is an employee of the local authority may be assisted by the following circumstances :

1. The social worker is in many cases known to the patient and/or his family because a previous visit may have been made

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1. *Lancet*, 1949, i, 229.

1. Shute, W. E., Shute, E. V. *Lancet*, Jan. 7, p. 46.
2. Drummond, J. C., Noble, R. L., Wright, M. D. *J. Endocrinol.* 1939, 1, 275.

to provide the report for the psychiatrist on the patient's admission to hospital.

2. Accommodation has been provided in the city which is entirely "unlabelled" by any reference to the health department or its mental-health division—which has other separate offices.

The aftercare service includes club activities, library-quiet-room, and games room, and handicraft instruction—all in the accommodation mentioned.

JAMES W. AFFLECK
City of Leeds Mental Health Services. I. G. DAVIES.

Appointments

ANDERSON, C. S., M.D. Lpool: consultant pathologist, County Laboratory, Maidstone.
ANDERSON, D. E. W., M.R.C.S., D.P.M.: consultant psychiatrist, Royal Earlswood Hospital, Redhill, Surrey.
DONALDSON, C. A. P., M.B. Edin., F.R.C.S.: ear, nose, and throat surgeon, Ayr county area.
DURAN-JORDA, F. M.D. Barcelona: consultant pathologist, Manchester children's hospitals group.
GARMANY, GERALD, M.B., B.SC. Manc., M.R.C.P., D.P.M.: consultant psychiatrist, Belmont Hospital, Sutton, Surrey.
GOODHEW, D. J. H., M.R.C.S., D.A.: anæsthetist, Sunderland hospital group.
GRAF, K. A., M.D. Vienna, D.P.M.: asst. physician, Brentwood Mental Hospital.
KRZYWIEC, J. E., M.B., D.P.H.: asst. M.O.H. and school M.O., Bristol.
LEAMING, H. L., M.R.C.S., D.A.: anæsthetist, Tees-side hospital group.
LEHMANN, HERMANN, M.D. Basle, PH.D. Camb.: consultant pathologist, District Hospital, Tunbridge Wells.
MARSHALL, J. K., D.M. Oxfd, D.P.M.: consultant psychiatrist, Banstead Hospital, Sutton, Surrey.
MATHESON, J. G., M.B. Aberd., D.A.: anæsthetist, North-west Durham hospital group.
ORME, C. R. L'E., T.D., M.A., M.B. Camb., M.R.C.P., D.PHYS.MED.: consulting physician in physical medicine, Bournemouth and East Dorset area.
SIMPSON, JOHN, M.D. Durh., M.R.C.P.: physician, West Cumberland hospital group.
STALKER, RANDAL, M.B. Edin.: medical director, mass miniature radiography unit, Preston and Blackburn area.
WALKER, HARRY, L.R.C.P.E., D.A.: anæsthetist, Tees-side hospital group.
WARREN, R. M., B.A. Camb., M.B. Edin., D.P.H.: director, venereal-disease services, western area of South West Metropolitan area.

London County Council Public Health Department:

Asst. M.O.:

- CASEY, GERALDINE, M.B. N.U.I., D.OBST. R.C.O.G.
- CHAPPLE, ELSIE, M.B. Lond., D.P.H.
- CONNELL, HELEN, M.D. Lond., D.C.H.
- GARLAND, ANDERSON, M.D. Lond., M.R.C.P., D.P.H.
- HARLING, MARIANNE, B.M. Oxfd.
- WALSH, NANNIE, M.B. N.U.I., D.C.H.

Births, Marriages, and Deaths

BIRTHS

ALLARDICE.—On Jan. 31, the wife of Dr. A. R. Allardice—a son.
*BUCHANAN.—On Jan. 21, in Edinburgh, the wife of Dr. J. W. Buchanan—a daughter.
CAMPBELL.—On Jan. 25, at Norwich, the wife of Dr. James Campbell—a daughter.
DUTTON.—On Jan. 26, the wife of Dr. Geoffrey Dutton—a son.
HAMILTON.—On Jan. 26, at Oxford, the wife of Dr. W. S. Hamilton—a daughter.
HART.—On Feb. 1, in London, the wife of Dr. R. D. C. Hart—a son.
MILLER.—On Jan. 28, at Newcastle upon Tyne, to Dr. Sheila Miller (née Franklin), wife of Dr. F. J. W. Miller—a son.
WAKELIN.—On Jan. 31, in London, the wife of Mr. John Wakelin, F.R.C.S.—a daughter.

* Amended notice.

MARRIAGES

DUNN—YOUNG.—On Feb. 1, in Valletta, Malta, John Frederick Dunn, surgeon lieutenant, R.N., to Joan Young.
KNUDSEN—DAVIES.—On Jan. 28, at High Beech, Anthony Knudsen, M.D., to Mary Enid Davies.
WALSH—WATSON.—On Jan. 28, at Kings Sutton, Geoffrey Walsh, M.R.C.P., to Penelope Watson, S.R.N.

DEATHS

ALKAN.—On Feb. 3, Reinhold Alkan, M.D. Wurzburg.
BADCOCK.—On Jan. 29, at Haywards Heath, Charles Halford Badcock, B.A. Camb., M.R.C.S., aged 77.
BAILEY.—On Feb. 4, at Midhurst, Bernard Edward Granville Bailey, M.R.C.S., aged 76.
GANGE.—On Jan. 28, at Faversham, Frederick Whitechurch Gange, M.D. Brux.
HEALEY.—On Feb. 3, at Rhos-on-Sea, John Healey, M.B. Manc., aged 80.
HORSBURGH.—On Jan. 30, Percy Gilbert Horsburgh, G.M., M.R.C.S., D.P.H., aged 57.
MANSFIELD.—On Feb. 1, at Sevenoaks, Perceval Aubertin Mansfield, B.M. Oxfd, aged 71.

Notes and News

TEACHING POSTS IN BAGDAD

THE Royal College of Medicine of Iraq was founded in [illegible] and last August was granted contingent recognition [illegible] English Conjoint Board after a visit by Lord Moran [illegible] present buildings have been erected since 1930 in the [illegible] of the Royal Hospital in Bagdad (650 beds), and [illegible] instruction is given both there and in the [illegible] Hospital (100 beds). The government of Iraq are [illegible] maintain and improve the standard of teaching in the [illegible] for on its students will depend the quality of [illegible] services. They have therefore asked the British [illegible] to help them to find British doctors to fill the new [illegible] of public health, pathology, pharmacology, anatomy, radiology, and the lectureship in chemistry and [illegible] These teaching posts offer opportunities for research, and clinical material is large and varied. The terms offered [illegible] a basic salary of up to £3600 per annum for the [illegible] and £2400 per annum for the lectureship, for a three-[illegible] contract, which is renewable. Application forms may be [illegible] from the Crown Agents for the Colonies, 4, Millbank, S.W.1; but inquiries about the nature and functions of the [illegible] about conditions in Iraq, should be addressed to the [illegible] East Secretariat, Foreign Office, who will be glad to [illegible] interested candidates.

HOME CARE OF HOSPITAL PATIENTS

WE have already described proposals made by [illegible] Cambridge University Medical School for establishing [illegible] home-care and nursing service.[2] With the consent of [illegible] United Cambridge Hospitals this came into active ope[illegible] last August, with a full-time director accommodated [illegible] Addenbrooke's Hospital. In the ensuing three [illegible] patients were recommended for home care, and 5[illegible] were accepted—38 from surgical wards, 5 from [illegible] wards, 10 from medical wards, and 1 from the radio[illegible] centre. The service has not been limited to the [illegible] Cambridge, but has included the districts of [illegible] Cambridgeshire, Essex, the Isle of Ely, and West [illegible] General practitioners and local health authorities [illegible] coöperated well. In particular, the district nurses [illegible] welcomed the scheme and say that the nursing of [illegible] cases adds interest in their work. The reaction of the p[illegible] has likewise been very favourable and there has been [illegible] evidence of anxiety at being sent home. This succ[illegible] attributed to the completeness of the arrangements and to [illegible] fact that the more sensitive type of patient finds the [illegible] atmosphere quieter and more congenial than that of a hos[illegible] ward among other ill people. The initial difficulties of [illegible] home-care and nursing service have not proved as great [illegible] were expected, and it is hoped to extend it to the [illegible] Cambridge hospitals in the near future.

DEOXYCORTONE ACETATE AND ASCORBIC AC[illegible] IN ARTHRITIS

STIMULATED by the preliminary communication of L[illegible] and Wassén[3] on the treatment of rheumatoid arthritis [illegible] deoxycortone acetate and ascorbic acid Morelli and Pus[illegible] in Naples, have tried this therapy in 5 cases of chronic rh[illegible]toid arthritis, 2 cases of acute rheumatoid arthritis, 1 [illegible] chronic lumbar arthritis, and 2 cases of arthritis def[illegible] They gave deoxycortone acetate 5–10 mg. intramus[illegible] taking care to avoid injection into fatty tissue, and [illegible] acid 0·5–1·0 g. intravenously three minutes later. Im[illegible]ment was noted in all the cases except those of [illegible] deformans, and 1 case of acute rheumatoid arthritis wa[illegible] In 2 acute cases and 4 chronic cases of rheumatoid [illegible] the pain began to decrease 15–30 minutes after the inj[illegible] After one or two hours the mobility of the joints [illegible] and returned to normal where anatomical changes [illegible] prevent it. The patient with chronic lumbar arthritis [illegible] for years had not been able to bend his back, lost his pa[illegible] regained freedom of movement soon after the inj[illegible] The beneficial effect in these cases usually lasted ten [illegible] In one case of acute rheumatoid arthritis pain disapp[illegible] for several days.

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1. See *Lancet*, 1949, ii, 475.
2. *Ibid*, i, 618.
3. Lewin, E., Wassén, E. *Ibid*, ii, 993.
4. Morelli, A., Pusateri, G. *Rif. med.* 1949, 63, 1233.

REABLEMENT IN AUSTRIA

first conference on a medical or sociological subject held in Austria since the war took place in Vienna from 3 to 26, under the auspices of the Austrian ministry of affairs. It was presided over by Prof. Philipp Erlacher, of the Vienna Orthopædic Hospital, and by Dr. Fuchs Austrian ministry, and was attended by over 300 tes, including physicians, surgeons, welfare officers, overnment officials. Speakers from other countries ed Dr. Howard Rusk, adviser on rehabilitation to the l Nations; Dr. Harold Balme, consultant adviser to nistry of Health; Dr. Harold Nilsonne and Miss Höjer, ckholm; Miss Meyer, secretary of the Swiss "Pro is" movement; and Dr. Braun, head of the Institute ileptics, Zürich. Papers were read on such subjects as n developments in the rehabilitation and care of the ally handicapped in Great Britain; the psychological of rehabilitation; the organisation of welfare work in a, and in Sweden; the rehabilitation and training of tics, spastics, the blind, and deaf-mutes; the rehabilita-nd care of war victims, and of industrial injuries; the are of tuberculous bone and joint cases; the provision ificial limbs; the "Pro Infirmis" movement; and ence in the use of advice bureaux and work agencies e handicapped. In delivering the opening address, alme said that the real genius of modern rehabilitation, ll as of all true welfare work, consists not in what we le to do for the handicapped or disabled man or woman what we succeed in enabling them to do for themselves. ere is a growing interest in Austria in the reablement esettlement of the disabled, largely arising from Professor r's famous clinic in Vienna. A property has been acquired de Graz for developing a reablement and vocational ng-centre for 200 patients, including a special paraplegic This property was formerly a spa, with hot springs and advantages, and it should be ideal for such work. Plans been approved for building dormitories, a gymnasium, ered-in swimming-pool, and workshops of all types.

MEDICAL FILMS

o medical films, of very different types, have lately completed by the Wellcome Film Unit. In each the ography is of a very high order. The first, on insulin, tended primarily for doctors and pharmacists, and ts clearly each stage in manufacture and testing. The ucers have plainly had the usual difficulty in deciding group they are seeking to address. The introductory ages, dealing with physiology, are perhaps oversimple medical audience: not so the production sequence.

is film is in 16 mm. black-and-white, with spoken com-ary; running-time 22 minutes.

e second film, on the hydrodynamics of blood-flow in basilar artery, is the first of a series of research subjects e illustrated in conjunction with the physiology depart-t of St. Bartholomew's Hospital Medical College. It ws, by injection of a blue dye into one axillary artery of the oit, that the blood from each vertebral artery remains on same side in the basilar artery when this is formed by the on of the two vertebral arteries; and at the termination he basilar artery it enters only the homolateral posterior bral artery. When, however, the contralateral axillary ry is obliterated, the blood from the two vertebral arteries es in the basilar artery.

his film is in 16 mm. colour; running-time 8 minutes.

Application for copies should be made to the Wellcome m Unit, 183, Euston Road, London, N.W.1.

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iversity of Cambridge

On Jan. 28 the following degrees were conferred:

M.A.—A. L. Banks.

M.D.—D. G. Abrahams, Owen Clarke, J. P. D. Mounsey, P. H. sh, R. A. M. Scott.

M.B., B.Chir.—*A. G. Ackerley, *M. J. Ball, *J. L. R. Barlow, G. Beard, *G. H. Bond, *D. B. Cathcart, *M. B. S. Cooper, M. C. Corfield, S. J. Crews, G. H. J. Dickinson, D. S. Eastwood, E. Eban, *J. W. H. Elder, *J. G. Elliott, *Peter Elliott, *G. R. C. her, *R. C. H. Garrod, *A. C. Gibson, *T. M. D. Gimlette, M. P. odson, *G. F. Hargreaves, J. D. J. Havard, *Don Hilson, *G. C. ffman, *M. J. Hunter, *G. F. Jolly, *A. K. Knowles, *D. D. La uche, A. S. Law, *J. P. Lester, *J. P. Lythgoe, K. M. McFadyean, gus McGregor, *Merlin Marshall, *J. G. B. Myles, *D. H. xseaman, *D. J. D. Perrins, *J. C. A. Raison, *L. Montague ayne, D. F. Richards, *K. F. Robinson, *P. J. Roffey, *I. H. ppelt, *J. O. Seville, *R. C. Shepherd, *M. J. Smith, *V. H. Smith, . W. Sole, *J. T. B. Stewart, *P. D. S. Thomas, *Olwyn K. homas, *P. R. Thompson, *J. D. W. Tomlinson, *J. F. Trunchion, J. C. Turner, *Harold Wainstead, *R. H. R. White, E. J. C. Wynne.

* By proxy.

University of London

Prof. Jerzy Neyman, director of the statistical laboratory of the University of California, is to give three lectures on Statistical Problems connected with Medical Diagnosis. The lectures will be held on Feb. 27 and March 6 and 13, at 5.30 P.M., at University College, Gower Street, W.C.1.

University of Manchester

The title of Dr. W. F. Gaisford will in future be "professor of child health and pædiatrics and director of the department of child health."

The following appointments have been made: honorary special lecturer in pathology, Dr. James Davson; lecturer in neurosurgery, Mr. G. K. Tutton; lecturer in venereal diseases, Dr. Robert Lees; clinical lecturer in prosthetics, Mr. Harry McIntyre, M.B.; assistant lecturer in radiology, Dr. G. B. Locke; and assistant lecturer in gynæcological pathology, Dr. A. S. Woodcock.

The following promotions have been made: reader in rheumatic disease and clinical director of the chronic rheumatism research centre, Dr. J. H. Kellgren; reader in obstetrics and gynæcology, Mr. C. Scott Russell; lecturer in surgery, Mr. R. P. Jepson; and assistant lecturer in orthopædic surgery, Dr. J. K. Wright.

Royal College of Physicians of Ireland

On Feb. 3 the following were admitted to the membership of the college: D. C. R. Burrows, J. G. Kidney, Denis McCarthy, W. H. McDaniel, R. M. Pritchard, W. M. O. Purcell, W. J. S. Wilson.

Royal College of Obstetricians and Gynæcologists

At a meeting of the council held on Jan. 28, with Prof. Hilda Lloyd, the president, in the chair, William Wellesley Wilson of Hobart, Tasmania, was admitted to the fellowship.

The following were elected to the membership:

J. A. Bentham, D. W. Briggs, H. M. Carey, Florence J. G. Chouler, Robert Crawford, Reginald Cutts, Thomas Dean, M. S. Ellensweig, H. J. Fisher, Elizabeth M. Harper, W. F. Harper, J. S. Hesketh, Pullat Kalyanikutty, Sarah Macaskill, A. S. Majury, A. T. Marshall, J. D. Martin, J. G. Napier, F. P. Pigott, J. H. M. Pinkerton, C. C. Pretorius, Sangarapillai Rajanayagam, T. M. Roulston, S. A. Scorer, Abdel Himmat Abou Shabanah, Aroon Chandra Sinha, W. A. Souter, Alexander Starritt, George Winchester.

British Tuberculosis Association

The annual conference of the association will be held this year at Christ Church, Oxford, on March 22 and 23. Dr. William Stobie will give the opening address, and other speakers will include Dr. S. Leitner, Dr. F. H Kemp, Dr. E. P. Abraham, Dr. E. Nassau, Dr. J. V. Hurford, Dr. T. A. W. Edwards, Mr. K. S. Mullard, Mr. E. Torning, Dr. H. M. Sinclair, Dr. L. H. A. Hoefnagels, Dr. Carrol E. Palmer, Dr. I. C. Yuan, and Dr. A. Q. Wells.

Teaching Hospital Governors

The Minister of Health has appointed the following doctors to the boards of governors of teaching hospitals:

Royal National Ear, Nose and Throat Hospital.—Dr. Adam Gray.
Middlesex Hospital.—Mr. F. W. Roques.

Arthur Sims Commonwealth Travelling Professor

Sir Reginald Watson-Jones is leaving this week for the first of the three parts of his tour as Sims Commonwealth travelling professor.

In Montreal he will make presentations from the Royal College of Surgeons of England to the Royal College of Physicians and Surgeons of Canada, including a presidential gavel carved by Sir Henry Souttar from a piece of teak rescued from the Hunterian museum after the fire-blitz of 1941. In the University of Toronto Sir Reginald will be guest professor for a week and will give a public address on the Progress of a Half-Century in the Treatment of Fractures. He will work in the recently established medical school of the University of British Columbia, Vancouver, and will speak to the Vancouver Medical Society on the New World of Surgery. Invitations have been accepted to deliver eighteen different addresses on surgical subjects, and the Commonwealth professor will visit the University of Manitoba, Winnipeg; the University of Edmonton; Queen's University, Kingston; the University of Western Ontario, London; Dalhousie University, Halifax; and the medical schools of Montreal, Ottawa, and Quebec.

The second part of the tour, in April and May, will include Singapore, New Zealand, and Australia, with the annual meetings of the Royal Australasian College of Surgeons and the Australian Orthopædic Association. The third part, in the late autumn, will include the Central African colonies, Rhodesia, and the Union of South Africa.

Nuffield Dental Fellowships

One of the aims of these fellowships is to enable graduates in medicine and science to receive training that will qualify them to undertake teaching and fundamental research on dental health and disease. The annual value of a fellowship is between £500 and £800 a year. Further particulars will be found in our advertisement columns.

N.H.S. Prescriptions

After March 1, only prescriptions written on the appropriate official form will be accepted for dispensing under the National Health Service Act; and after April 1 prescriptions on other forms will not be accepted by the pricing offices. *Hitherto unofficial forms have been accepted by pharmacists, who have been credited with the value of these prescriptions.*

Mycological Reference Laboratory

Dr. R. W. Riddell has succeeded Dr. J. T. Duncan as director of this laboratory, which is part of the Public Health Laboratory Service of the Medical Research Council. Specimens for examination for pathogenic fungi should be addressed to the director, Mycological Reference Laboratory, London School of Hygiene, Keppel Street, W.C.1.

The World's Food and Britain's Needs

Lord Boyd-Orr, F.R.S., *will preside at the conference on* this subject which the Association of Scientific Workers is holding at St. Pancras Town Hall on March 4 and 5. Speakers will include Mr. Julian Huxley, F.R.S., Sir George Stapledon, F.R.S., Mr. G. A. Reay, PH.D., Mr. S. A. Barnett, Mr. Ritchie Calder, and Mr. F. Le Gros Clark.

National Foot Health Week

From June 12 to 17 the Foot Health Educational Bureau is holding a foot health week. Sir Wilson Jameson will open an exhibition at the Central Hall, Westminster, S.W.1, on the 12th, and there will also be lectures on foot care and demonstrations of shoe-fitting for children. Further particulars may be had from the bureau, 121, Ebury Street, S.W.1.

Association of Psychiatrists in South West Metropolitan Region

A general meeting of this association will be held at 5 P.M. on Wednesday, Feb. 22, at B.M.A. House, Tavistock Square, London, W.1, to elect council and officers, and to discuss the formation of a psychiatric advisory group. All psychiatrists in the region, whether members of the association or not, are invited to attend.

Surgery on Television

Sir Heneage Ogilvie, with his colleagues, will demonstrate on the B.B.C.'s television programme on the evening of Feb. 20 how an appendectomy is performed. The programme is produced by Andrew Miller Jones and will include a film sequence. A hospital ward and operating-theatre will be set up in the studio.

World Health Organisation

The executive board of W.H.O., *which concluded its fifth* session on Feb. 2, has decided that the results of three technical programmes shall be submitted to the third World Health Assembly next May. These are: (1) thirty-nine international standards for biological preparations; (2) the *International Pharmacopœia*; and (3) the new draft international regulation governing health measures in international trade and travel, which, when adopted, will replace the international sanitary conventions now in use.

Because 12 of the 68 countries which joined the W.H.O. are in arrears with their contributions for 1948 or 1949, or both, the executive board has decided to reduce expenditure *in the present year to* $6,300,000. The second World Health Assembly had set the level at $7,500,000; and this may be restored if the financial position improves sufficiently.

Dr. Raymond Gautier is resigning from the post of assistant director-general of the organisation. In March he will take up an appointment as research director for the International Children's Centre. This is a new foundation of the French government, having as its objective, "the promotion, in the different countries of the world, of the study of problems pertaining to infancy, the propagation of knowledge on hygiene and child welfare, and the technical training of specialised personnel."

Journées Medicales de Broussais, 1950

A course will be held at the Hôpital Broussais, [illegible] Didot, Paris, XIV, on May 19 and 20. Further parti[illegible] may be had from Prof. Jean Hamburger, 29, Boulevard [illegible] Courcelles, Paris, VIII.

Tata Memorial Trust

The trustees of the Lady Tata Memorial Fund [illegible] applications for grants and scholarships for research [illegible] diseases of the blood, with special reference to [illegible] in the academic year beginning on Oct. 1.

Grants of variable amount are made for research expenses [illegible] to provide scientific assistants for senior workers. S[illegible] are awarded as personal remuneration, and are intended [illegible] *for junior investigators working* under suitable direction [illegible] normal value has been £400. Applications must be [illegible] before March 31. The grants and scholarships are open to [illegible] any nationality, and in any country in which it will be [illegible] to make payments in the coming academic year. Further [illegible] and forms of application may be had from the secretary [illegible] scientific advisory committee, c/o Medical Research Council [illegible] Queen Street, London, S.W.1.

Dr. Phyllis Edwards has been granted leave of absence [illegible] the North West Metropolitan regional hospital board [illegible] her duties as consultant anæsthetist to West [illegible] Hospital to spend six months as adviser in anæs[illegible] Copenhagen. She will also visit Aarhus and other [illegible] provincial hospital centres.

Diary of the Week

FEB. 12 TO 18

Monday, 13th

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Prof. John McMichael, Mr. J. H. Milnes [illegible] Chronic Hepatitis.

NATIONAL HOSPITAL, Queen Square, W.C.1
5 P.M. Dr. Helgi Tómasson (Iceland): Reactions of the [illegible] Nervous System to Weather and *Climate* in [illegible] *Cold and* Temperate Zones.

Tuesday, 14th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall, S.W.1
5 P.M. Sir Weldon Dalrymple-Champneys: Und[illegible] —a Neglected Problem. (First Milroy lecture)

UNIVERSITY OF LONDON
5 P.M. (St. Mary's Hospital Medical School, W.2.) Pr[illegible] Bacq (Liége): Metabolism of Adrenaline.

CHADWICK LECTURE
2.30 [illegible] Place, W.1.) Dr. C. [illegible] nation Between the [illegible] e Enterprise in Holland.

ROYAL [illegible] Princes Gate, S.W.7
7 P.M. [illegible] Watson, F.S.R.: Medical [illegible]

INSTITU[illegible] sle Street, W.C.2
5 P.M. [illegible] hology of the Skin.

CHELSEA CLINICAL SOCIETY
7.30 P.M. (South Kensington Hotel, 47, Queen's Gate Ter[illegible] S.W.7.) Superintendent Cuthbert, C.I.D.: Medi[illegible] Aspects of Some Recent Cases.

Wednesday, 15th

INSTITUTE OF PSYCHIATRY, Maudsley Hospital, S.E.5
1.30 P.M. Dr. E. Stengel: Lecture-demonstration.

INSTITUTE OF DERMATOLOGY
5 P.M. Dr. C. W. McKenny: X-ray Technique.

Thursday, 16th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Sir Weldon Dalrymple-Champneys: Undulant [illegible] —a Neglected Problem. (Last Milroy lecture.)

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. J. E. A. O'Connell: Review of 500 Surgically Tr[illegible] Cases of Lumbar Intervertebral Disc Prot[illegible] (Hunterian lecture.)

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, Po[illegible] Place, W.1
7.30 P.M. Dr. Joseph E. Smadel: Chloramphenicol and Tr[illegible] Medicine.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Denis Williams: Neurology lecture-demonst[illegible]

MIDDLESEX COUNTY MEDICAL SOCIETY
2.30 P.M. (Central Middlesex Hospital.) Dr. F. Avery [illegible] Integration of Hospital and Domiciliary Servic[illegible] Sick. Dr. B. Beasley: The Mental Defective at [illegible]

ROYAL MEDICAL SOCIETY, 7, Melbourne Place, Edinburgh
8 P.M. *Prof.* Walter Mercer: Manipulative Surgery.

Friday, 17th

UNIVERSITY OF LONDON
5 P.M. Professor Bacq: Substances which Increase the Sensi[illegible] of Tissues to Potassium Ions.

MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. M. Greaves: Demonstration of Neuropsych[illegible] Cases.

EUGENICS SOCIETY
5 P.M. (26, Portland Place, W.1.) Mr. A. S. Parkes, SC.D., F.[illegible] The Primrose Path—Some Aspects of the Popul[illegible] Problem. (Galton lecture.)

THE CONCEPT OF GENETOTROPHIC DISEASE

: J. WILLIAMS
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.Sc. Columbia
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he Biochemical Institute and the Chemistry Department University of Texas and the Clayton Foundation for Research, Austin, U.S.A.

:D essentially upon recent findings in genetics ochemistry which have not yet been incorporated aedical thought, the concept of genetotrophic : may, we believe, lead to an understanding of diseases whose ætiology is at present obscure.

mical ability to apply the knowledge and skills command is at a high level ; but, as Himsworth has pointed out, " the history of modern know- s concerned in no small degree with man's attempt ıpe from his previous concepts."

ew concept which is fundamental to the one under eration is derived from genetics—i.e., partial : blocks (Mitchell and Houlahan 1946, 1947). , such a block involves a heritable trait charac- by diminution (though not complete failure) of to carry out some specific enzymatic transforma- Since a functional deficiency of this kind may :e the need of the body for some specific nutritional or factors, the existence of such partial blocks can ı why different species of animals require different ties of nutrients. Thus, both rats and dogs can t tryptophane into nicotinic acid, but in dogs nversion is so inefficient that nicotinic acid has ecently been regarded as a separate and distinct onal requirement for them. Whether this particular ıvolves a partial genetic block or not is not known, indicates the type of phenomena which may be ned in this way.

h the advent of our newer knowledge of genetics, ion must be given, in the study of disease, not only external agent causing the affliction but also to ubstrate—the afflicted individual. The concept has entered prominently into medical thinking— of " man " as a highly standardised piece of inery—must be recast to include the realisation deviations from the normal are not infrequent minor but universal and often very important . Williams 1946, 1947a).

th this background we may define a genetotrophic e as one in which the genetic pattern of the ed individual calls for an augmented supply of rticular nutrient (or nutrients), for which there ops, as a result, a nutritional deficiency. Partial ic blocks somewhere in the metabolic machinery are ıbly commonplace in the inheritance of individuals explain to a considerable degree why each person sses a characteristic and distinctive metabolic pat- as revealed by urinary and salivary analyses, &c. mpson and Kirby 1949, Williams et al. 1949a, d c).

APPETITE FOR ALCOHOL

this laboratory alcoholism has been studied in ion to the probable importance of individual meta- traits. The working assumption was made that the ing for alcohol which develops in certain people has ıysiological and genetic basis not entirely different ı that of other special appetites which are under siological control (Williams 1947b).

A study of the appetites of rats and mice for alcohol (Williams et al. 1949c) led to the concept of genetotrophic disease as herein described. This study demonstrated, without serious doubt, that the consumption of alcohol by laboratory animals is a genetotrophic phenomenon.

When given a choice between 10% alcohol and water, individual animals of an ordinary laboratory colony subsisting on ordinary diets exhibit a variety of drinking patterns which are analogous to those of human beings. Some of the animals appear constitutionally to be teetotallers, others moderate steady drinkers, others spasmodic drinkers, others drinkers with mounting appetites, and others again drinkers with a relatively strong appetite even at the start. On the basis of the study of different strains, highly inbred and otherwise, it seems certain that these patterns are genetically controlled.

The drinking patterns of the animals when kept on a stock diet appear to be wholly under genetic control. When the experiment was varied to include changes in the diets, however, it was found that the drinking patterns could be shifted by nutritional means from one extreme to the other. On marginal diets *all* of the rats will eventually consume relatively large amounts of alcohol, but when abundantly adequate diets are used *none* of the animals consumes more than a very small amount. When animals have developed an appetite and are consuming relatively large amounts of alcohol, the supplementation of their diets with abundant amounts of various nutritional factors leads to a prompt abolition of their consumption of alcohol. It is manifest that the nutritional factors necessary to cure " alcoholism " in rats vary from rat to rat and from strain to strain.

These observations are completely in line with the genetotrophic concept. Each animal in an ordinary colony possesses a distinctive metabolic pattern based upon its own characteristic partial genetic blocks and consequent augmented requirements for specific vitamins, amino-acids, or minerals. The individual requirements may cover a wide range of values. One animal (or man) may presumably need for maximum efficiency certain nutritional elements in amounts many times in excess of those needed by others. Since such amounts are seldom encountered in ordinary diets, deficiencies develop. As a consequence of these various specific deficiencies, the " perverted " appetite for alcohol arises. Our knowledge of the physiological nature of appetites is at present nebulous, but there are several ways in which the metabolism of alcohol is linked with the utilisation of vitamins. Prominent among these are the known sparing effect of alcohol on thiamine (Westerfeld and Doisy 1945), the mobilisation by alcohol of vitamin A in the body (Clausen et el. 1941), and the increased urinary excretion of nicotinic-acid metabolites and thiamine when alcohol is substituted isocalorically for carbohydrate in the diet (Butler and Sarett 1948).

On the basis of our studies with rats it seems likely that the basic ætiological factor in human alcoholism is genetotrophic, and that the sociological and psychological factors so generally considered fundamental do no more than precipitate the development of the clinical syndrome. Clinical trials on the treatment of compulsive drinkers are now under way.

ÆTIOLOGY RECONSIDERED

From our observations and on the basis of the genetotrophic concept, the current pessimism concerning the treatment of genetic disease is unwarranted. Further, it seems that not only can a single ætiological factor be manifest in diverse ways according to the individual's genetic constitution, but also various ætiological factors may in different people give rise to what is commonly designated as a single clinical syndrome.

A survey of the list of common diseases of obscure ætiology shows that many have aspects suggesting a genetotrophic origin. Let us consider, for example, some of the facts known about cancer, diabetes, rheumatoid arthritis, disseminated sclerosis, and mental disease.

CANCER

Few people would deny that hereditary factors are involved in the ætiology of cancer. The information available on susceptible and spontaneous tumour-developing strains of mice is convincing evidence of this (Heston 1948). Extreme differences in the incidence of cancer among the various racial groups testify further to this fact (Ackerman and Del Regata 1947): thus cancer of the cervix is rare among Jewish women and has a high incidence among Negro women (Bab 1948). Penile cancer, which is very rare among Jews, accounts for 1·5% of all cancer cases in England, and nearly 19% among the Mongols (Ngai 1933). Many reports of a high familial incidence of cancer are available also; Bateman (1949) reports 8 cases of gastric carcinoma in three generations descending from one person.

Though numerous attempts at nutritional therapy of cancer have been made (Greenstein 1947), there is as yet little genuine evidence of an underlying nutritional defect. But there has never been an attempt to provide simultaneously every nutritional requirement in sufficient amounts to meet the requirements that might arise if genetotrophic needs are several times above those considered normal. Moreover, some evidence strongly suggestive of a nutritional defect does exist. Scott (1949) has shown, for example, that addition of B vitamins to the normal diet of rats increases their resistance to the growth of Jensen's rat sarcoma. Other work has shown that a high riboflavine content in rat liver tends to reduce the chance of development of a tumour (Boyland 1948). It is often if not always true that in a highly metabolically active tumour there is a low level of B vitamins (Pollack et al. 1942) and of the derived enzyme systems—e.g., riboflavine (Shack 1943), nicotinic acid (Kensler et al. 1940), and vitamin B_6 (Cohen 1945). Finally, the wide variety of factors that can induce cancer suggests that they operate through the production of some common effect that induces neoplastic growth. It should therefore be pointed out that, even if the primary factors active in carcinogenesis are very different from a genetotrophic one—e.g., involving a metabolic derangement or an infective agent—treatment based upon the genetotrophic concept might nevertheless be effective.

DIABETES MELLITUS

Diabetes mellitus similarly presents many aspects suggesting a genetotrophic origin. There remains little doubt of a hereditary basis for this affliction, and Harris (1949) has presented evidence that older patients having the milder insulin-insensitive type are heterozygous for the abnormal gene, while younger patients are homozygous. Some 30–50% of all diabetics have a familial history of diabetes, and when one uniovular twin has diabetes, the other invariably develops it. This is not true for binovular twins (Pincus and White 1933). Himsworth (1949) has pointed out that "predisposition to diabetes, hereditary or constitutional, is widespread, and that it is the presence of the environmental factor of diet which is disclosing its prevalence." He further points out the positive correlation of diabetic mortality (in patients over the age of 45) with fat consumption and states that this "does not necessarily mean that fat itself is deleterious, for the consumption of fat may merely indicate other, more important, contingent variables." Various other considerations similarly suggest an important rôle of nutrition in diabetes—the possible rôle of inositol being at present a topic particularly worthy of speculation (Lane and Williams 1948). Dietotherapy in many cases is known to have be effects, moreover, not entirely compatible with present understanding of the diabetes syndrome.

RHEUMATOID ARTHRITIS

Though the evidence for a genetic basis for rheum arthritis is not conclusive, there is a definite incidence. The recent spectacular announcement of results obtained by treatment with 'Cortisone' (pound E) shows that a rather specific biochemical is involved (Hench et al. 1949). The cause of the im- ment of the normal synthesis or function of this sub in the body is unknown at present, but the general tance of the B vitamins in sterol metabolism the possibility of an impairment as the result of tional deficiency (Sweat and Samuels 1948). In certain metabolic interrelations between vitamin B the adrenal cortex are already well known. As in cases, the large number of earlier attempts at nutr therapy have been quite inadequate in the light of present concept of the wide divergence in requirements.

DISSEMINATED SCLEROSIS

Certainly among the most perplexing and most medical problems confronting us today is the of disseminated sclerosis. There can be little that a genetic factor is involved (Arasa 1946, D 1946, McAlpine 1946), that multiple sclerosis invol "biochemical or enzyme abnormality" (McAlpine or perhaps a "toxi-defective process," and that factors may be instrumental in precipitating disse sclerosis and directing its course. There was a incidence of disseminated sclerosis in 8 of (McAlpine 1946); in siblings in 6 cases, in the 1, and in the mother in 1. Other studies have similar incidence. Moreover, vitamin therapy benefit too often for a nutritional ætiological be disregarded. Of McAlpine's (1946) patients run down before the illness; and, though most patients appeared healthy, a minority were in sub health and had experienced malnutrition or weight. It has further been suggested that obesity to have a protective effect, and pregnancy, a conducive to nutritional strain, is known to be a fre precipitating factor.

Demyelination.—Fundamental to disseminated scl is demyelination, which may be duplicated experi- tally in various ways (Hurst 1944). Though lit known about the biochemistry of synthesis and de tion of myelin, it is obvious that a deficiency of one of several nutritional factors would interfere the metabolism of myelin. Experimental demyel has been achieved by interfering with oxidation with cyanide or low oxygen tension. The occ presence of anæmia (Campbell et al. 1947), and the prognostic significance of achlorhydria in dissem sclerosis bring to mind another, albeit very di degeneration of the central nervous system—the bined degeneration of the spinal cord that accom pernicious anæmia, and responds to vitamin B_{12}

Cobalt.—The efficacy of cobalt-containing vita *in combined degeneration in pernicious* anæmia in view of recent observations, a possible asso copper and disseminated sclerosis.

Campbell et al. (1947) reported on a group of were studying swayback in lambs. Swayback is a d ating disease associated with a low blood-copper level pregnant ewe, despite the presence of apparently a copper in the pasturage. (It differs from a similar dis lambs, enzootic ataxia, in which there is inadequate copper.) Of the 7 scientific workers studying the developed a neurological syndrome indistinguishable disseminated sclerosis. Though this fact might seem to the theory of an infection it may equally indicate a nutritional abnormality of the region involved. De sful more recent attempts of Mandelbrote et al. to associate copper metabolism specifically with nation, it still seems worth while to point out that alt-containing vitamin B_{12} is effective in pernicious , where there is similarly no evidence of a nutritional cy of cobalt.

knowledge of the rôle of copper in metabolism is lete. The present recognition of its rôle in the lism of tyrosine, and the impairment of the lism of tyrosine in certain forms of mental disease, r, suggests that copper has special functions in biochemistry. The recent report of the use of rome C, folic acid, and thiamine in the treatment minated sclerosis further suggests the importance itional factors and an impaired oxidative meta- in this syndrome (Roizin et al. 1949). Certainly this nebulous area of association there remains amount of research to be done on disseminated s in the light of the genetotrophic concept.

MENTAL DISEASE

lly, there is such a prodigious amount of data to e combined genetic and nutritional influences in forms of mental disease that an entire volume be written on this topic alone. For many forms nity a genetic basis has long been recognised. ann's (1946) survey shows clearly that schizophrenia genetic basis. Nutritional therapy is an acknow- important concomitant in the treatment of nervous in general, but the genetotrophic concept which e developed has not been applied.

mental symptoms associated with many vitamin cies are impressive arguments for further inquiry: amatic effect of nicotinic acid on the dementia ted with pellagra is a classical example. There ast scattered (and highly inadequate) literature emonstrates the presence of numerous metabolic nalities in mental patients (Hoskins 1946, Bellak but these conditions have generally been regarded chogenic. Such an assumption is hardly tenable light of the intense metabolic activity of the l nervous system and the large proportion of the body metabolism for which it accounts. It is dy to be expected that any nutritional deficiency be readily made manifest in a derangement of the us tissue and reflected in gross distortions of the olism. Brain tissue has been shown to cling ously to its available supplies of vitamins (Salcedo 1948), thus showing the critical need for these olic catalysts. The demonstration by Pincus et al. of deranged adrenal function in schizophrenia, he known existence of interrelations between the al cortex and the B vitamins further testify to the tance of this concept in research in mental disease.

CONCLUSIONS

vould be unwarranted to propose at this time that ne of the afflictions discussed here has a purely otrophic origin. In every case, however, there is lerable reason to suspect that genetotrophic factors t work. In most cases in which metabolism is ged in nature, a partial enzymatic block is involved. ite of this block may often be determined by genetic rs. The activation of this block may be either y genetic or occasioned by infective or other sses. A genetotrophic factor need not thus be the ætiological agent, but it may constitute the basic n for the pathological condition. When such a al genetic block occurs, it stands between the tional elements and other metabolites essential for al biological function.

ich an impediment may be overcome in two ways— supplying the products of the blocked reaction, or ncreasing the nutritional precursors to a concentra- that will deliver adequate amounts of product across the inefficient metabolic step. The former possibility is generally impracticable because of the complexity of the metabolic products; it would theoretically be necessary only in the event of a complete enzymatic block, and such a condition would probably prove too rapidly fatal for its presence to be recognised. The augmentation of the precursors in a partial enzymatic block seems to be the practical answer, if the rationale for this massive type of therapy is recognised. Biological variability, as now understood, makes it inevitable that derangements of the type described often arise. The laws of probability in themselves make it clear that such factors must account for numerous pathological conditions. It seems certain that research along these lines must lead to material progress in the understanding and treatment of diseases which are now little understood.

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"... The start of our present difficulty was the usage of the term *general surgery* to describe *that range of operative surgery that is spanned by the technical competence of an individual who calls himself a general surgeon*. ... As long as the range encompassed two or more regions (always including the belly), it was called general surgery. But this division of surgery on the basis of what operations a surgeon performs no longer makes sense. ... It might all be straightened out for the next generation if the word *general* could be torn loose from its subjective roots. ... All technical considerations peculiar to an anatomico-topographic region, including the abdomen, would then become specialty surgery. General surgery for example, would deal with considerations common to all wounds; specialty surgery with wounds of the abdomen, wounds of the chest or of the extremities. But all specialty surgery would be dependent on general surgery. What then would become of the general surgeon? Like the comedian who pulls a long rope across the stage and disappears into the wings only to reappear immediately from the opposite wings pulling on the other end of the same rope, there would be a renascence of the general surgeon, but in the full vigor of youth."—EDWARD D. CHURCHILL, *Ann. Surg.* 1950, 131, 127.

A survey of the list of common diseases of obscure ætiology shows that many have aspects suggesting a genetotrophic origin. Let us consider, for example, some of the facts known about cancer, diabetes, rheumatoid arthritis, disseminated sclerosis, and mental disease.

CANCER

Few people would deny that hereditary factors are involved in the ætiology of cancer. The information available on susceptible and spontaneous tumour-developing strains of mice is convincing evidence of this (Heston 1948). Extreme differences in the incidence of cancer among the various *racial groups testify further* to this fact (Ackerman and Del Regata 1947): thus cancer of the cervix is rare among Jewish women and has a high incidence among Negro women (Bab 1948). *Penile cancer*, which is very rare among Jews, accounts for 1·5% of all cancer cases in England, and nearly 19% among the Mongols (Ngai 1933). Many reports of a high familial incidence of cancer are available also; Bateman (1949) reports 8 cases of gastric carcinoma in three generations descending from one person.

Though numerous attempts at nutritional therapy of cancer have been made (Greenstein 1947), there is as yet little genuine evidence of an underlying nutritional defect. But there has never been an attempt to provide simultaneously every nutritional requirement in sufficient amounts to meet the requirements that might arise if genetotrophic needs are several times above those considered normal. Moreover, some evidence strongly suggestive of a nutritional defect does exist. Scott (1949) has shown, for example, *that addition of B vitamins to* the normal diet of rats increases their resistance to the growth of Jensen's rat sarcoma. Other work has shown that a high riboflavine content in rat liver tends to reduce the chance of development of a tumour (Boyland 1948). It is often if not always true that in a highly metabolically active tumour there is a low level of B vitamins (Pollack et al. 1942) and of the derived enzyme systems—e.g., riboflavine (Shack 1943), nicotinic acid (Kensler et al. 1940), and vitamin B_6 (Cohen 1945). Finally, the wide variety of factors that can induce cancer suggests that they operate through the production of some common effect that induces neoplastic growth. *It should therefore be pointed out that, even if the* primary factors active in carcinogenesis are very different from a genetotrophic one—e.g., involving a metabolic derangement or an infective agent—treatment based upon the genetotrophic concept might nevertheless be effective.

DIABETES MELLITUS

Diabetes mellitus similarly presents many aspects suggesting a genetotrophic origin. There remains little doubt of a hereditary basis for this affliction, and Harris (1949) has presented evidence that older patients having the milder insulin-insensitive type are heterozygous for the abnormal gene, while younger patients are homozygous. Some 30–50% of all diabetics have a familial history of diabetes, and when one uniovular twin has diabetes, the other invariably develops it. This is not true for binovular twins (Pincus and White 1933). Himsworth (1949) has pointed out that "predisposition to diabetes, hereditary or constitutional, is widespread, and that it is the presence of the environmental factor of diet which is disclosing its prevalence." He further points out the positive correlation of diabetic mortality (in patients over the age of 45) with fat consumption and states that this "does not necessarily mean that fat *itself is deleterious*, for the consumption of fat may merely indicate other, more important, contingent variables." Various other considerations similarly suggest an important rôle of nutrition in diabetes—the possible rôle of inositol being at present a topic particularly worthy of speculation (Lane and Williams 1948). Dietotherapy in many cases is known to have b effects, moreover, not entirely compatible wi present understanding of the diabetes syndrome

RHEUMATOID ARTHRITIS

Though the evidence for a genetic basis for rheum *arthritis is not conclusive, there is a definite* f incidence. The recent spectacular announcement results obtained by treatment with 'Cortisone' pound E) shows that a rather specific biochemical is involved (Hench et al. 1949). The cause of the ment of the normal synthesis or function of this in the body is unknown at present, but the general tance of the B vitamins in sterol metabolism the possibility of an impairment as the result of tional deficiency (Sweat and Samuels 1948). *certain metabolic interrelations* between vitamin B the adrenal cortex are already well known. As in cases, the large number of earlier attempts at nutr therapy have been quite inadequate in the light of present concept of the wide divergence in requirements.

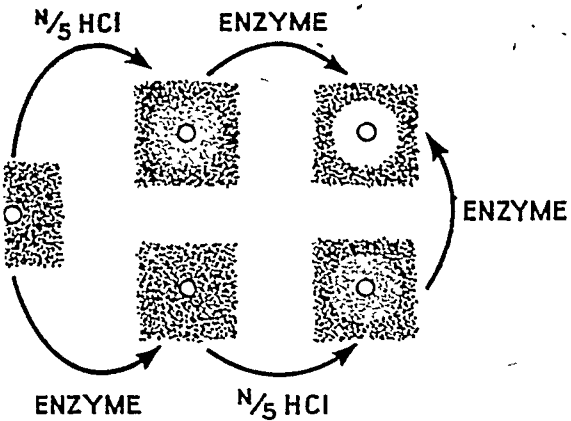
DISSEMINATED SCLEROSIS

Certainly among the most perplexing and mo medical problems confronting us today is the of disseminated sclerosis. There can be little that a genetic factor is involved (Arasa 1946, D 1946, McAlpine 1946), that multiple sclerosis ma "biochemical or enzyme abnormality" (McAlp or perhaps a "*toxi-defective* process," and th factors may be instrumental in precipitating diss *sclerosis and directing its course*. There was a incidence of disseminated sclerosis in 8 of (McAlpine 1946); in siblings in 6 cases, in the 1, and in the mother in 1. Other studies hav similar incidence. Moreover, vitamin therap benefit too often for a nutritional ætiolog be disregarded. Of McAlpine's (1946) patient run down before the illness; and, though mo patients appeared healthy, a minority were in health and had experienced malnutrition or weight. It has further been suggested that obesity to have a protective effect, and pregnancy, a conducive to nutritional strain, is known to be a fr precipitating *factor*.

Demyelination.—Fundamental to disseminated s is demyelination, which may be duplicated exper tally in various ways (Hurst 1944). Though lit known about the biochemistry of synthesis and de tion of myelin, it is obvious that a deficiency of one of several nutritional factors would interfere the metabolism of myelin. Experimental demye has been achieved by interfering with oxidation with cyanide or low oxygen tension. The occ presence of anæmia (Campbell et al. 1947), and the prognostic significance of achlorhydria in diss sclerosis bring to mind another, albeit very di degeneration of the central nervous system—the bined degeneration of the spinal cord that accom pernicious anæmia, and responds to vitamin B_{12}

Cobalt.—The efficacy of cobalt-containing vita in combined degeneration in pernicious anæmia in view of recent observations, a possible asso copper and disseminated sclerosis.

Campbell et al. (1947) reported *on a group of* w were studying swayback in lambs. Swayback is a d ating disease associated with a low blood-copper level pregnant ewe, despite the presence of apparently copper in the pasturage. (It differs from a similar d lambs, enzootic ataxia, in *which there is inadequate* copper.) Of the 7 scientific workers studying the developed a neurological syndrome indistinguishable disseminated sclerosis. Though this fact might seem to the theory of an infection it may equally indicate a nutritional abnormality of the *region involved*. De



-Action of acid and enzymes on dentine powder suspended in agar gel.

between 0·15 and 0·38 mg. per ml. for those of elchii A.

sts were also made with broth cultures of various idia. In all, 26 different strains were used: 5 of elchii A, 5 of *Cl. histolyticum*, 3 of *Cl. septicum*, *Cl. œdematiens*, 2 of *Cl. tetani*, 3 of *Cl. bifermentans*, *Cl. sporogenes*, and 1 of *Cl. butyricum*. The amount zyme produced in an 18–20 hour rabbit liver broth re was estimated by pipetting about 0·1 ml. of re into cups in decalcified dentine agar plates and uring the diameter of the zone of clearing after ours' incubation. Cultures of all the *Cl. histolyticum* ns produced clear wide zones with an average eter of 30 mm. Cultures of all the *Cl. welchii* A ns were also active but were not so potent as those of *istolyticum*; the zones of clearing were from 10 to 20 in diameter. Cultures of *Cl. sporogenes* and *Cl. bifermentans* also contained disintegrating enzymes but gave, 4 hours, only partial clearing in zones not greater 10 mm. in diameter, and after a further 24 hours zones were only slightly more distinct. No enzyme demonstrable with cultures of *Cl. septicum*, *Cl. natiens*, *Cl. tetani*, and *Cl. butyricum*.

bes

robic organisms were also tested for enzyme production. Some of these organisms were chosen because eir gelatin-liquefying properties and others because eir reported presence in carious material. Strains of following, taken from the laboratory stock of cultures, used: *Staph. aureus*, *Ps. pyocyanea*, *Proteus vulgaris*, *p. pyogenes*, *Strep. fæcalis*, *Strep. viridans*, *B. subtilis*, *nycoides*, *B. megatherium*, *B. cereus*, *B. brevis*, and *nthracis*. One strain of *Strep. mutans* (Clarke 1924) one of *Lactobacillus odontolyticus* (McIntosh et al. 2), each from the National Collection of Type Culs, were also included in the tests. The strains were n in nutrient broth or Hartley's broth for 24 or ours, and then tested for enzyme activity by the -plate method. Cultures of strains in the bacillus p were the only ones to produce disintegration of lcified dentine, and gave clear well-defined zones, er greater than 12 mm. in diameter, in which the ticles had undergone complete dissolution. These ve strains were also tested by culturing on nutrient r plates containing decalcified dentine powder. After hours the colonies were sometimes surrounded by a row zone of clearing. Often, however, no zone was ble and this may have been because the rate of ease in colony size during growth was greater than the of diffusion of enzyme through the agar gel, for, n the colonies were washed off the surface of the lium, patches of complete clearing were visible in the as where growth had occurred.

Similar tests are to be made with a larger number of strains of aerobic organisms, especially those in the bacillus group.

ACTION OF ENZYME ON DENTINE

Since *Cl. histolyticum* was found to be the most active producer of enzyme disintegrating decalcified dentine, it was decided to use in tests with dentine a potent ammonium sulphate precipitate from the filtrate of a broth culture of this organism. The precipitate used was one with an average minimal concentration showing enzyme activity (m.e.d.) of 0·008 mg. per ml.

Cups were cut in dentine agar plates and falling dilutions of enzyme solution were pipetted into them. The most concentrated dilution contained 50 m.e.d. per ml. Control cups containing no enzyme were also made and the plates incubated at 37°C. No visible change was observed around the cups containing enzyme, and this was to be expected, for even if disintegration of the organic component had occurred, it might have been masked by the high concentration of inorganic component.

To determine whether enzyme had been active, each cup was filled with $N/5$ HCl. Within 10 minutes a zone of clearing was apparent around each cup and the zones rapidly increased in size, so that in 2 hours they were 20–25 mm. in diameter. The zones were however not completely clear but contained finely divided unaffected particles. No difference could be detected between the density of these particles in the zones around the cups which had contained enzyme and those around the control cups. The unaffected particles in the decalcified zones were shown to be susceptible to the action of enzyme. The whole agar plate was washed in running water to remove the acid and then dried. Enzyme solution containing 50 m.e.d. per ml. was pipetted into each cup and the plate incubated at 37°C. In 3 hours complete dissolution of the particles had occurred within the decalcified zones (fig. 2). This result was confirmed by placing 6 mm. discs of agar, containing dentine particles cut from a dentine agar plate, into a saline solution of enzyme containing 50 m.e.d. per ml. and incubating the solution at 37°C. After 24 hours the agar discs were washed with water and placed in $N/5$ HCl. The particles in the discs were rapidly decalcified but the discs did not become entirely clear because they still contained particles. These particles were found to be susceptible to enzyme action, for, when the discs were washed free from acid and incubated in enzyme solution, complete dissolution of the particles took place.

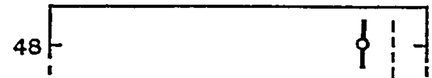


Fig. 3—Relationship between pH and time taken for complete decalcification of dentine particles.

These experiments suggested that *Cl. histolyticum* enzyme could disintegrate the organic component of dentine after it had been released from the inorganic component by decalcification, but not when present in normal calcified dentine.

DECALCIFICATION OF DENTINE IN RELATION TO pH

Though it appeared that *Cl. histolyticum* enzyme could disintegrate dentine only after decalcification, the

DISINTEGRATION OF HUMAN DENTINE BY BACTERIAL ENZYMES

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The production by *Cl. welchii* type A of an enzyme which can break down muscle by attacking the collagen of the reticulin scaffolding has been investigated by Macfarlane and MacLennan (1945), Evans (1945, 1947a and b), Oakley et al. (1946, 1948), and Bidwell and van Heyningen (1948). The enzyme has been called collagenase and in-vitro methods have been devised to demonstrate its action and determine its potency. The collagenase was found to be antigenic and immunologically distinct from the other known antigens of *Cl. welchii* A. Recently Oakley and Warrack (1950) have demonstrated that *Cl. histolyticum* also elaborates a collagenase which is antigenic and immunologically distinct from the other known antigens of this organism.

No investigations have so far been reported showing that bacteria produce enzymes capable of attacking the collagen-like matrix of the human tooth, though it has often been suggested that such enzymes play a part in the process of dental caries. In the light of the recent work on bacterial collagenases, it was thought that it might be possible to demonstrate a similar disintegrating effect using as substrate the collagen-like framework of human tooth dentine. In the investigation reported here broth cultures and toxic filtrates of a number of bacterial species were tested for their power to attack both dentine and decalcified dentine. The preliminary results would serve as a basis for investigating the possible rôle of bacterial enzymes in the breakdown of dentine during the carious process in human teeth.

PREPARATION OF DENTINE AND DECALCIFIED DENTINE SUBSTRATES

It was decided to use, as substrates, dentine and decalcified dentine in a finely divided form.

The initial stage of the preparation followed the method used by Atkinson and Matthews (1949). Freshly extracted sound teeth were well washed and dried over calcium chloride for 24 hours, the cementum ground away, the crowns split off and discarded, the root dentine split into small pieces, and the dry pulp removed with dissecting needles.

The dentine was then broken up as finely as possible with pliers, washed thoroughly in water, dried over P_2O_5, and ground for a long time in a ball-mill at a low temperature. The ball-mill used (Mudd et al. 1937) was designed originally for the liberation of labile cellular products of bacteria. It consisted essentially of a metal grinding-chamber containing two stainless-steel balls whose curvature approximated to that of the inner surface of the grinding-chamber. The grinding-chamber rotated at 70 r.p.m. in a freezing bath of solid carbon dioxide and alcohol (−80°C). Chipped dentine in 4–5 g. amounts was ground in the ball-mill at −80°C for 4 hours, by which time the dentine had the consistency of talcum powder. Quantities greater than 5 g. were not so effectively powdered. Water (100 ml.) was then poured into the grinding-chamber and the grinding continued at room-temperature for an hour. The suspension of powdered dentine was then removed from the grinding-chamber, centrifuged, and the deposit dried. This deposit was used as substrate in the tests with dentine powder.

For the preparation of decalcified dentine powder, 4–5 g. of powdered dentine was suspended in 500 ml. of *N*/5 HCl, and the acid suspension was agitated for 4 hours by means of a mechanical stirrer, after which it was centrifuged at 5000 r.p.m. for 15 minutes. The deposit was then resuspended in 500 ml. of water, centrifuged, resuspended in 50 ml. of water, and the final trace of acid removed by dialysis. The sup[illegible] was finally dried from the frozen state and stored in a[illegible] sealed in vacuo. Drying by this method gave a prep[illegible] which could readily be suspended in water. It was [illegible] that the average weight of decalcified dentine was [illegible] that of the dentine and the great bulk of the particles [illegible] about 50 × 50 μ.

For the tests, dentine powder or decalcified [illegible] powder was suspended in an agar gel of neutral pH [illegible] adding 1 ml. of a saline suspension of powder to [illegible] of 4% melted agar in saline. The mixtures were p[illegible] into petri dishes, so that the particles were uni[illegible] distributed, and allowed to set. The concentrat[illegible] dentine was 0·4 g. per 100 ml. of agar and of dec[illegible] dentine 0·1 g. per 100 ml.

DISINTEGRATION OF DECALCIFIED DENTINE BY BACTERIAL ENZYMES

A number of bacterial species were tested for [illegible] ability to produce enzymes which disintegrated dec[illegible] dentine.

Cups of 6 mm. diameter were cut in decalcified d[illegible] plates with a cork-borer, and into each cup about [illegible] broth culture or toxic filtrate was pipetted. The p[illegible] incubated at 37°C. After 24 hours, cultures or filt[illegible] taining disintegrating enzymes gave around the cup a c[illegible] concentric zone completely free from decalcified [illegible] particles, and on incubating for a further 24 hours th[illegible] increased in size (fig. 1). Final readings were made [illegible] after filling the cups. The amount of enzyme pr[illegible] estimated either by titrating falling dilutions or by [illegible] the size of the zone of reaction around the cup.

Clostridia

Dry concentrated preparations of ammonium [illegible] precipitates from toxic filtrates of various or[illegible] the clostridium group were tested. In all, [illegible] toxic preparations were used: 5 from *Cl.* [illegible] from *Cl. histolyticum*, 2 from *Cl. œdemati*[illegible] *Cl. septicum*, 2 from *Cl. tetani*, and 1 from *Cl.* [illegible] None of the preparations from *Cl. œdematiens*, *Cl.* [illegible]*cum*, *Cl. tetani*, and *Cl. sordellii* contained enzyme [illegible] disintegrated decalcified dentine; with each tox[illegible] solution of 40 mg. in 1 ml. of saline gave no cle[illegible] around the cup. Each of the toxin precipitate[illegible] *Cl. welchii* A and *Cl. histolyticum* were active and [illegible] gave clear wide zones in which the decalcified de[illegible] particles had been completely dissolved. These [illegible] were distinctly visible with the concentrated dil[illegible] as early as 2 hours after the cups had been filled, [illegible] at 24 hours the diameter of the zone was someti[illegible] great as 20 mm. and at 48 hours had increased to [illegible] The values for the average minimal concentration [illegible] enzyme activity (m.e.d.) lay between 0·008 and [illegible] mg. per ml. for the toxin precipitates of *Cl. histol*[illegible]

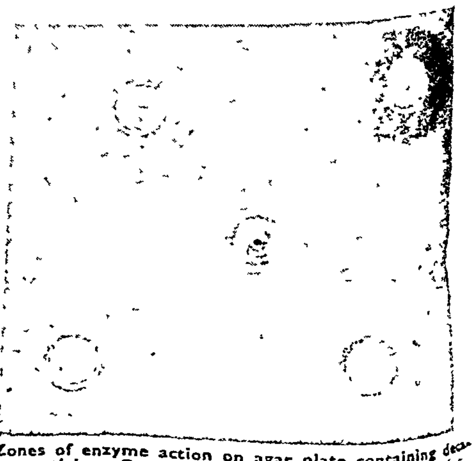

Fig. 1—Zones of enzyme action on agar plate containing dec[illegible] dentine particles. Centre cup contained a culture prod[illegible] enzyme. (Natural size.)

ion at pH 6·4 was completely clear. Those discs at pH nd 6·8 were almost clear at 24 hours and on incubation further 48 hours became completely clear. The discs H 4·0–5·6 were decalcified only, and after 72 hours they contained particles of organic component while those at pH 7·0–8·0 remained unchanged.

CONCLUSIONS AND DISCUSSION

me species of clostridium and bacillus elaborate, ng growth, enzymes which can disintegrate the luble organic component of tooth dentine prepared lecalcification. From the results of tests made with tent enzyme preparation from *Cl. histolyticum* it ears that the organic component when present in nal dentine before decalcification is not susceptible nzyme attack.

ne possibility was considered that the organic comnt might be degraded in some way during decalcifin so as to make it susceptible to disintegration by me. It was found, however, that dentine decalcified ild acid treatment which was unlikely to bring about adation is attacked by enzyme, and thus it is reasonto suggest that the organic component after decalciion is affected by enzyme because the removal of inorganic component has exposed it to enzyme ck. It was also shown that dentine may be simuleously decalcified and its organic component disgrated by enzyme when the pH conditions for lcification are within the range in which enzyme is ve.

has often been suggested that in the process of tal caries bacteria play an important rôle in the kdown of the organic component of the tooth (Pincus 7, 1944, 1947, Frisbie et al. 1944, Frisbie 1945, tlieb 1947, Atkinson and Matthews 1949). Hitherto, ever, there have been no reports of conclusive tests ving that bacteria possess the property of elaborating mes capable of attacking the organic component. as now been shown that some species of bacteria can luce such enzymes, but whether bacteria with similar erties play an important part in dental caries is not wn. This question is to be investigated by culturing ous material on nutrient agar plates containing decald dentine powder. By this method it may be possible isolate organisms producing enzymes which attack organic component.

f proteolytic enzymes are involved in dental caries, if they are of a similar type to the enzyme of *Cl. histocum*, then it seems from our observations that to be ctive their action on dentine must be preceded by or at st simultaneous with the process of decalcification. The alcification process therefore appears to be of primary ortance. Our experiments have shown that solutions ow hydrogen-ion concentration can effect decalcifica, and it is thus possible that many bacterial species h the property of fermenting carbohydrates may y a part in the decalcification of dentine, even though y may not possess the property, shown by *Lactoillus odontolyticus*, of producing high acid concentrans. The possibility that reactions other than bacterial mentation of carbohydrates may be able to effect alcification also needs to be explored. During our estigations we have isolated from dentine a soluble tein which is susceptible to attack by the enzymes ich disintegrate the insoluble protein component, and possibility that the products of enzyme hydrolysis this soluble protein may effect decalcification is being estigated.

SUMMARY

Finely divided dentine powder was prepared from man teeth by the low-temperature grinding of dentine.

ecalcified dentine powder was prepared from dentine wder by treatment with $N/5$ HCl.

An investigation was made of the ability of a number bacterial species to produce enzymes which would disintegrate decalcified dentine powder suspended in an agar gel.

Of the clostridia tested, *Cl. histolyticum* was the most active producer of enzyme, *Cl. welchii* A was less active, and *Cl. sporogenes* and *Cl. bifermentans* were only slightly active.

Of the aerobic species tested, *B. subtilis*, *B. cereus*, *B. megatherium*, *B. brevis*, *B. mycoides*, and *B. anthracis* could produce enzyme, though not in high concentration.

Tests with *Cl. histolyticum* enzyme showed that it was unable to attack the organic component of dentine before decalcification.

Dentine decalcified by mild acid action at pH 6·2 was as susceptible to attack by *Cl. histolyticum* enzyme as dentine decalcified by strong acid solutions.

Dentine was simultaneously decalcified and its organic component disintegrated by solutions of *Cl. histolyticum* enzyme at pH 6·2–6·8.

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CLINICAL TRIAL OF OCCLUSIVE PLASTIC DRESSINGS

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MANY industrial workers who sustain minor injuries are exposed to oil, dirt, and other contaminants which are not excluded from the wound by the ordinary type of first-aid dressing. To overcome this difficulty, waterproof and other occlusive dressings are now widely used in industrial first-aid stations. In certain industries a waterproof dressing is statutorily required by regulation, and an adhesive wound dressing may be substituted for small and medium-sized sterilised dressings in first-aid boxes.

The advantage of the waterproof or occlusive dressing in preventing contamination of wounds is offset by its ill effects on the wound and the underlying skin. The edges of the wound tend to gape and the underlying skin becomes sodden and macerated, thus delaying healing and sometimes encouraging the patient himself to remove the dressing to " let the air in."

Bull, Squire, and Topley,[1] in 1948, described a new type of occlusive dressing with a 'Nylon' derivative film. Theoretically this overcame the disadvantage of the ordinary type of waterproof covering. Laboratory tests showed that the film is an effective barrier against micro-organisms, but that its permeability to water vapour is sufficient to prevent the skin from becoming sodden. Furthermore, the window in the dressing made it possible to see the progress of healing without disturbing the aseptic barrier. A preliminary clinical trial by Bull question arose whether the concentration of acid used not only released the organic component but in doing so also brought about its degradation so as to make it susceptible to enzyme attack. This question was investigated by testing the action of enzyme on dentine decalcified by solutions of low hydrogen-ion concentration.

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[1] Bull, J. P., Squire, J. R., Topley, E. *Lancet*, 1948, ii, 213.

To obtain suitable conditions for these tests, it was first necessary to examine the decalcification time at different pH levels. This was done by placing into 10 ml. of each of a number of citric-acid-phosphate buffer solutions (McIlvaine), ranging from pH 3·0 to 8·0, a 6 mm. disc of agar cut from a dentine agar plate. As a control a similar disc was placed in 10 ml. of $N/5$ HCl. After suitable intervals the discs were examined to ascertain the degree of decalcification. It was not possible to decide with certainty, by examining the discs as they remained in the solutions, whether decalcification had occurred, for even with complete decalcification the discs still appeared cloudy because they contained particles of organic component unaffected by acid.

A closer examination was therefore necessary, and this was most conveniently done by removing the discs from the solutions, drying them on filter-paper, and replacing them in the cups in the agar dentine plate from which they had been cut. In this way there was no difficulty in deciding in which discs decalcification had occurred, for the density of the treated discs was compared with that of a background of dentine particles and also with that of the control disc which had been completely decalcified.

The results of this experiment, showing the time taken for complete decalcification in relation to pH, are given in fig. 3. No decalcification occurred at pH 7·0. At pH 6·8 the time taken was 72 hours, and as the pH fell the time of decalcification decreased rapidly until pH 5·5 was reached when on further decrease of pH the time slowly approached zero.

The decalcification time at any fixed pH below 7·0 will obviously depend on the size of the dentine particles. As the particles get larger the time of decalcification will increase and the curve will take on new positions as indicated by the dotted curves in fig. 3. Thus, in making similar experiments with larger dentine particles, the decalcification time at pH values greater than, say, 5·0 may be such that there is no perceptible change in the particles, and this result may give rise to the erroneous impression that decalcification does not occur above this pH.

ACTION OF ENZYME ON DENTINE DECALCIFIED BY MILD ACID

Since the pH conditions for decalcification were now known, it was possible to test the action of *Cl. histolyticum* enzyme on dentine decalcified by mild acid treatment.

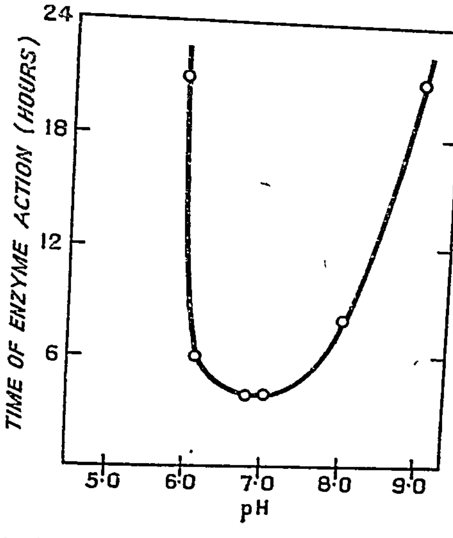


Fig. 4—Relationship between pH and time taken for enzyme to completely dissolve decalcified dentine particles.

Ten discs cut from a dentine agar plate were left in contact with 50 ml. of buffer solution at pH 6·2 for 24 hours, when complete decalcification had taken place. The discs were then washed in water and placed in tubes containing falling dilutions of enzyme in saline. As control, a similar series of enzyme dilutions containing discs cut from a decalcified dentine agar plate was used. Both test and controls were incubated at 37°C for 24 hours, when the discs [illegible] examined. It was found that enzyme had been equally [illegible] in both test and control series, for the minimal [illegible] concentration which showed complete clearing was [illegible] per ml. in each case.

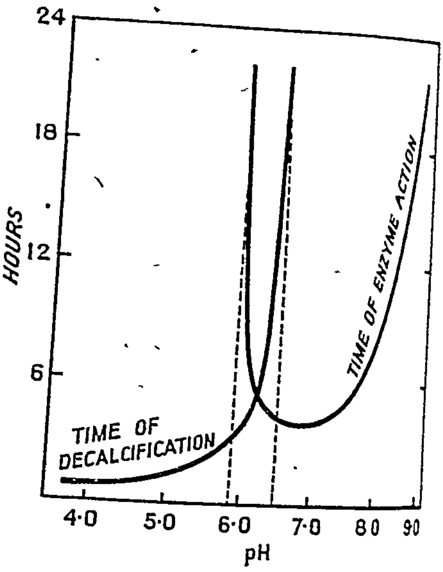


Fig. 5—Curves in figs. 3 and 4 superimposed.

It was evident from this experiment that [illegible] decalcified by mild acid treatment was suscep[illegible] attack by enzyme. It was unlikely that such [illegible] process of decalcification would bring about a [illegible] of the organic component so as to make it [illegible] to enzyme attack, and it was therefore [illegible] suggest that the organic component was [illegible] enzyme because it was exposed by removal [illegible] inorganic component.

ENZYME ACTION IN RELATION TO pH

The question next to be considered was whether [illegible] action and decalcification could occur simultaneo[illegible] It was first necessary to determine the pH range [illegible] which the *Cl. histolyticum* enzyme was active.

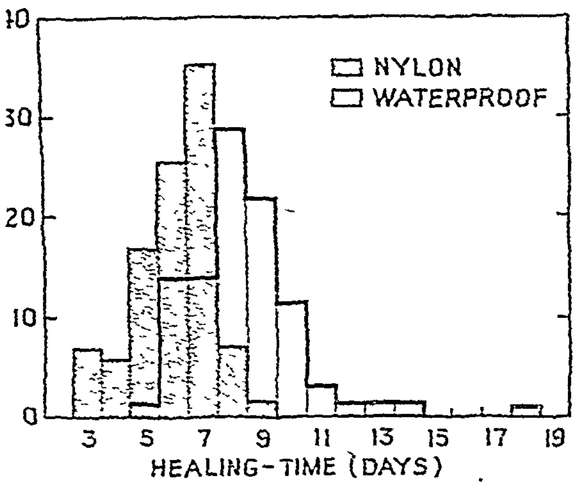
Buffered solutions of enzyme were prepared from pH [illegible] to 10·0 so that each solution contained 50 m.e.d. per [illegible] enzyme. Citric-acid-phosphate buffer (McIlvaine) was [illegible] for pH 3·0–7·6 and borate buffer (Clarke and Lubs) for 7·8–10·0. Into 5 ml. of each solution a 6 mm. agar di[illegible] decalcified dentine was placed and the solutions were incu[illegible] at 37°C. Examination of the discs at suitable intervals [illegible] that enzyme action occurred first at pH 6·8 and 7·0 and [illegible] ceeded more slowly at pH levels on either side. After 24 [illegible] incubation it was found that enzyme had been active [illegible] pH range of 5·6–8·9 but not outside this range.

The results of this experiment, showing the [illegible] taken for enzyme to bring about complete dis[illegible] of the particles in the discs in relation to pH, are [illegible] in fig. 4.

SIMULTANEOUS DECALCIFICATION AND ENZYME AC[illegible]

It was now possible to test whether decalci[illegible] and enzyme action could occur simultaneously. T[illegible] curves in figs. 3 and 4 are plotted together in fig. [illegible] the relationship between the two curves sugge[illegible] the most favourable conditions for simultaneous [illegible] cification and enzyme action lay between pH 5·9 and 6[illegible] To test whether this was possible, the follo[illegible] experiment was made.

A series of buffered solutions of enzyme was prepared [illegible] pH 4·0 to 8·0, so that each solution contained 50 m.e.d. [illegible] ml. Into each solution an agar disc, cut from a dentine [illegible] plate, was placed and the solutions were incubated at 3[illegible] Both enzyme action and decalcification occurred bet[illegible] pH 6·0 and 6·8. At 24 hours it was found that the disc[illegible]



1—Distribution of healing-times in 70 cases of wounds treated with ıylon dressing and 69 with a waterproof dressing. The vertical ıle shows the percentage of wounds which became healed each day.

ince the injuries of fingers and hands did not differ ıny respect other than site for either type of dressing, y have been considered together, and in view of the ıll number remaining (18 from the nylon group and rom the waterproof group) other injuries have been luded from the final analysis.

The injuries to fingers and hands which the sister ided were healed on Monday were kept separate, ause healing could have taken place at any time the previous Saturday or Sunday, while the patient not at work. Table III shows these cases :

TABLE III—CASES HEALED ON MONDAY

	Nylon	*Waterproof*
Finger	41	23
Hand	10	0
Total	51	23

DETAILED ANALYSIS

Further analyses, unless otherwise stated, relate to remaining injuries to fingers and hands (see table IV) ıich were pronounced healed on working days other ın Mondays.

BLE IV—CASES HEALED ON DAYS OTHER THAN MONDAYS

	Nylon	*Waterproof*
Finger	59	63
Hand	11	6
Total	70	69

The age-distribution of the cases was much the same both groups. The length of wound, contamination, ıd position in relation to joints also did not differ ıpreciably between the two groups (table V) :

BLE V—COMPARISON OF INJURIES IN THE TWO GROUPS

ngth of Wound (inch) :		*Nylon*		*Waterproof*
0–$^1/_2$		44 (63%)		47 (68%)
$^1/_2$–1		26 (37%)		22 (32%)
>1		0 (0%)		0 (0%)
		70		69
ntamination of Wound :				
Apparently none		19 (27%)		18 (26%)
Contaminated—				
Oil	31		30	
Grease	6		6	
Rust	3		6	
Metal filings	2		6	
Other causes	9		3	
		51 (73%)		51 (74%)
osition :				
Near joint		25 (36%)		27 (39%)

Healing-times.—The average healing-times were :

Nylon	6 04 ± 0 16 days
Waterproof	8 39 ± 0·25 days

This difference is statistically highly significant ($P < 0{\cdot}0001$). The distribution curves of these healing-times are shown in fig. 3. For those cases which healed over the weekend, average healing-times were: for the nylon group 6·45 days, and for the waterproof group 9·65 days ($P < 0{\cdot}0001$). These longer healing-times were to be expected.

The period of the experiment covered eight weeks, and the healing-times over the separate weeks were compared to see if early enthusiasm for the trial was likely to bias the result. The significant difference between nylon and waterproof healing-times still exists, and the differences in nylon healing-times between periods are not significant. But there is a significant difference between the healing-times of the waterproof dressings in the five-day periods. The figure for the last five-day period is high because there were 4 cases with unusually long healing-times. As the healing-times for the *first half* and *the latter half of the investigation* show no appreciable difference it seems that there was no obvious bias caused by enthusiasm for a novel dressing. The average healing-times in days (with the number of cases in parentheses) are given in table VI :

TABLE VI—AVERAGE HEALING-TIMES IN DAYS FOR DIFFERENT PERIODS OF THE TRIAL

Period of Attendance (days) :	*Nylon*	*Waterproof*
1st five	5·21 (14)	8·26 (19)
2nd five	6·23 (26)	8·30 (20)
3rd five	6·11 (19)	7·39 (18)
4th five	6·55* (11)	10·25 (12)
1st ten	5·88 (40)	8·28 (39)
2nd ten	6·27† (30)	8·53 (30)

* 4 days only; † 9 days only.

Effect of contamination, site of injury, and maintenance of seal.—Strangely enough the wounds contaminated with oil appeared to have a shorter healing-time than the apparently clean wounds. As was to be expected, both injuries near the *joint* and those in which the dressing seal was not maintained took, on the average, longer to heal, but none of these factors affected healing-times significantly. Table VII shows the averages for healing-times in days (with the number of cases in parentheses) :

TABLE VII—AVERAGE HEALING-TIMES IN DAYS

	Nylon	*Waterproof*
Wound apparently clean	6·26 (19)	9 06 (18)
Wound contaminated with oil	5·87 (31)	8·07 (30)
Injury near joint	6·12 (25)	8·70 (27)
Injury not near joint	6·00 (45)	8·19 (42)
Seal maintained	5·96 (57)	8·00 (30)
Seal not maintained	6·38 (13)	8·69 (39)

Industrial workers are often heavily exposed to oil and suds and other liquids which tend to get under the adhesive surface of dressings and break the seal. This occurred with the nylon dressings, but their adhesive properties and ability to withstand contaminants compared favourably with the waterproof dressings.

For all finger and hand injuries, including those healing over the weekend, the seal was maintained in 78% of the nylon dressings and 40% of the waterproof dressings (see table VIII). Protective bandages were applied more frequently over nylon dressings, because they were not changed unless the seal was broken and were thus more liable to get dirty ; but when this was taken into account the nylon coverings still showed better adhesive properties.

TABLE VIII—MAINTENANCE OF SEAL

	Nylon	*Waterproof*
Total no. of cases	121	92
Seal maintained	94 (78%)	37 (40%)
Protective bandage applied	96	31
Seal maintained	79 (83%)	15 (48%)
Protective bandage not applied	25	51
Seal maintained	15 (60%)	22 (43%)

Laboratory investigations by Bull (personal communication) showed that a thin film of an oil-resisting synthetic and C. N. D. Cruickshank (unpublished) showed that the dressing was practicable and that wounds under it remained dry and healed well.

Before recommending this dressing for general use it was necessary to make a further clinical trial and to ensure that it could be mass-produced. The type of dressing used in this trial was machine-made, the nylon being coated with adhesive, leaving a clear window to cover the wound (figs. 1 and 2).

The trial was carried out in an engineering works near Manchester, at the invitation of the Medical Research Council's Industrial Medicine Research Unit. The works employs 800 people, mostly fitters, turners, and labourers, who are exposed to contaminants such as oil, grease, rust, metal filings, wood dust, and dirty water. It has a modern treatment-room in the charge of an experienced State-registered nurse, who treated all the cases included in the trial.

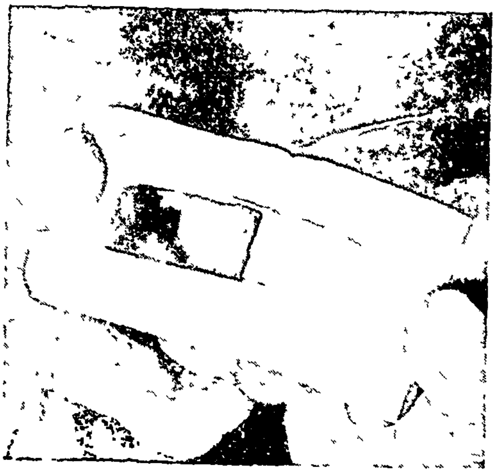


Fig. 1—The nylon dressing.

The trial was planned to assess: (1) the effect on the rate of wound healing; (2) the feasibility of this dressing for minor wounds occurring in an engineering works; and (3) the effect on wound infection assessed clinically but not bacteriologically.

METHOD

Selection of cases.—Assessment was made by comparing the results in approximately equal numbers of wounds treated with (*a*) the nylon-derivative dressing, and (*b*) a waterproof polyvinyl plastic dressing commonly used in industry and approved by the Chief Inspector of Factories (called in this report "the waterproof dressing"). The cases selected were those of all workers with full-thickness lacerations, puncture-wounds, or abrasions, not severe enough to be referred to hospital, who reported for treatment on the day of injury. Injuries to web-spaces and finger-tips were excluded because they cannot be covered satisfactorily with the ordinary type of nylon dressing.

Allocation of cases to groups.—Cases were allocated to the nylon and waterproof dressing groups on alternate days. The use of this method of sampling rather than that of allocating alternate cases to groups made it easier for the sister, who changed the method of treatment daily instead of for each new case. Numbers in each group, though not equal, were of the same order.

Application of dressings.—All wounds were cleaned with cetrimide and the surrounding skin with methylated ether. A no-touch technique was used for all wounds; this was not a theatre technique, but comprised the exclusive use of sterile instruments and dressing swabs. Dressings were applied without further medication and were covered with a bandage where there was risk of contamination, in order to keep the dressing clean. The nylon dressing was left in situ until healing took place. If it became loose or torn, a fresh nylon dressing was applied. The waterproof dressing was replaced after three days, and then daily until healing occurred.

Healing-time.—It was obviously difficult to achieve a reliable and uniform estimate of when healing had taken place. Healing implies a sound cover of the wound sufficiently strong to withstand ordinary strains. The sister recorded each wound as healed only when she was satisfied that the worker could continue his job without a dressing. To some extent the possibility of bias by the sister in favour of one type of dressing was reduced since she had to accept the responsibility of sending her cases back to work without dressings. It was thought that perhaps a different standard of healing would be applied on Friday with a free weekend ahead of the patient, but examination of the numbers regarded as healed on different days of the week showed that no fewer cases were discharged on Fridays than on any other day of the week, and that the nylon cases were not favoured on Fridays.

RESULTS

The total number of injuries treated was 145 for nylon dressings on 19 days, and 129 with waterproof dressings on 20 days. Of these, 6 nylon and 29 waterproof cases were rejected for the reasons shown in table I:

TABLE I—REJECTED CASES

	Nylon	*Waterproof*
Patient did not continue reporting ..	3	3
Dressing came off and another type applied	2	2
Patient changed shift and sister not available	1	3
Patient applied own dressing in middle of treatment	0	20
Wound accidentally hit and reopened ..	0	1
Total	6 (4%)	29 ([illegible])

It is significant that none who had nylon dressings, but 20 with waterproof dressings, applied their own dressing in the middle of the treatment. The latter probably did this to satisfy their curiosity about the progress of their wounds, or because the dressing had come off during the weekend. There was no evidence that these 20 cases were the minor injuries, or that their exclusion was likely to bias the final result. The mean healing-time of finger and hand injuries in this group (9·4 days) was slightly higher than that of the others in the waterproof group (8·4 days).

Table II gives the final figures, classified according to site of injury:

TABLE II—INJURIES BY SITES

	Nylon	*Waterproof*
Finger	100 (72%) ..	86 (86%)
Hand	21 (15%) .	6 (6%)
Forearm	13 (9%) ..	2 (2%)
Leg	4 (3%) ..	0 (0%)
Scalp	1 (1%) ..	
Total .. .	139	100

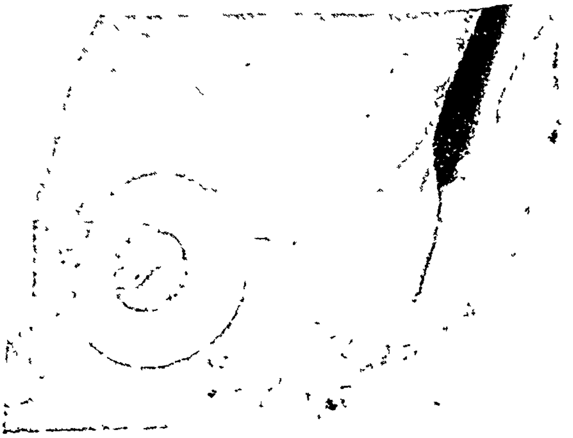
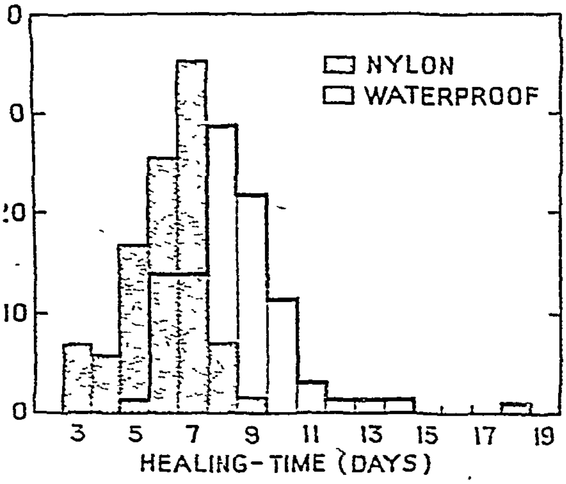


Fig. 2—Nylon dressing in position.



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Near joint		25 (*36%*)		27 (*39%*)

Healing-times.—The average healing-times were:

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This difference is statistically highly significant ($P < 0{\cdot}0001$). The distribution curves of these healing-times are shown in fig. 3. For those cases which healed over the weekend, average healing-times were: for the nylon group 6·45 days, and for the waterproof group 9·65 days ($P < 0{\cdot}0001$). These longer healing-times were to be expected.

The period of the experiment covered eight weeks, and the healing-times over the separate weeks were compared to see if early enthusiasm for the trial was likely to bias the result. The significant difference between nylon and waterproof healing-times still exists, and the differences in nylon healing-times between periods are not significant. But there is a significant difference between the healing-times of the waterproof dressings in the five-day periods. The figure for the last five-day period is high because there were 4 cases with unusually long healing-times. As the healing-times for the first half and the latter half of the investigation show no appreciable difference it seems that there was no obvious bias caused by enthusiasm for a novel dressing. The average healing-times in days (with the number of cases in parentheses) are given in table VI:

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* 4 days only; † 9 days only.

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Industrial workers are often heavily exposed to oil and suds and other liquids which tend to get under the adhesive surface of dressings and break the seal. This occurred with the nylon dressings, but their adhesive properties and ability to withstand contaminants compared favourably with the waterproof dressings.

For all finger and hand injuries, including those healing over the weekend, the seal was maintained in 78% of the nylon dressings and 40% of the waterproof dressings (see table VIII). Protective bandages were applied more frequently over nylon dressings, because they were not changed unless the seal was broken and were thus more liable to get dirty; but when this was taken into account the nylon coverings still showed better adhesive properties.

TABLE VIII—MAINTENANCE OF SEAL

	Nylon	*Waterproof*
Total no. of cases	121	92
Seal maintained	94 (*78%*)	37 (*40%*)
Protective bandage applied ..	96	31
Seal maintained	79 (*82%*)	15 (*48%*)
Protective bandage not applied	25	51
Seal maintained	15 (*60%*)	22 (*43%*)

Laboratory investigations by Bull (personal communication) showed that a thin film of an oil-resisting synthetic rubber solution applied to the edge of the nylon dressing effectively resisted heavy contamination with oil and maintained the seal. This method has been tried on a small number of industrial workers since the completion of the trial, and has proved to be very effective.

Time saved.—The time saved by using nylon dressings was assessed, taking into account quicker healing and less frequent changes of dressing. The times taken for different dressing operations were:

	Minutes
1. First dressing for both types of covering, including wound cleaning	6½
2. Subsequent change of dressings for both types ..	3
3. Removing protective bandage	½
4. Replacing protective bandage	½
5. Inspecting wound through uncovered nylon dressing	¼

TABLE IX—COMPARISON OF TIME TAKEN IN ATTENDING TO EACH 100 INJURIES WHEN COVERED WITH NYLON DRESSINGS AND WHEN COVERED WITH WATERPROOF DRESSINGS

	Dressing	
	Nylon	*Waterproof*
Protective bandage applied:		
No. of cases	80	34
Average no. of subsequent attendances ..	3·7	5·0
Time taken per case (min.)..	7 + (3·7 × 1) = 10·7	7 + (5·0 × 4) = 27·0
Aggregate of time (min.)	(80 × 10·7) + (18 × 3) = 910*	34 × 27·0 = 918
No protective bandage applied:		
No. of cases	20	66
Time taken per case (min.)..	6½ + (3·7 × ¼) = 7·425	6½ + (5·0 × 3) = 21·5
Aggregate of time (min.)	(20 × 7·425) + (8 × 3) = 172·5†	66 × 21·5 = 1419
Total time (min.) ..	1082·5	2337

* Seal is not maintained in 22% of cases—i.e., 18—and in each of these cases one re-dressing will take an additional 3 min.

† Seal not maintained in 40% of cases—i.e., 8.

Table IX compares the expenditure of time using the two different dressings, and it will be seen that for every 100 wounds dressed the time saved in the treatment-room using nylon instead of waterproof dressings, was approximately 20 hours. Moreover, production time, including time taken in getting to and from the treatment-room, is saved by less frequent attendance for re-dressings. For the purpose of this trial more time than is usual was taken for treating wounds, but the above figures will give some indication of the production time that can be saved by using a dressing which gives quicker healing and allows inspection of the wound without removing the dressing.

Effect on Wound Infection.—Wound infection was assessed clinically and not bacteriologically. All cases in the trial were first treated on the day of injury, and in the great majority treatment was continued until healing had taken place; so it was expected that the number of septic cases would be small. There was in fact only one septic case—a leg wound in the nylon series. The conditions of selection and the use of a no-touch technique by an experienced nurse virtually eliminated the complication of sepsis, and thus the effect of the nylon dressing on wound infection could not be assessed.

PATIENTS' OPINIONS

An attempt was made to get a rough idea of the workmen's opinion of the dressings by questioning all the men (32) treated with nylon dressings in the last fourteen days of the trial. The following questions were asked verbally by the factory welfare officer, who had had no previous interest in the trial and was independent of the factory's medical department: What do you think of the nylon dressing? Has it any disadvantages or advantages over other dressings?

The worker's answers, in his own words, were written down at the time. Answers were unobtainable from 3 men. Of the remaining 29, 17 unequivocally preferred the nylon dressing, 7 were indifferent, and 5 preferred the waterproof dressing. These questions were asked before the synthetic rubber solution had been used to help maintain the seal, and it is worth noting that among the 12 men who expressed indifference or preferred the waterproof dressing, 9 maintained that it did not satisfactorily withstand exposure to oil. Observation of the cases by the sister showed that the nylon covering did withstand oil as well as the waterproof covering. The men's opinions may well have been an expression of their disappointment in a new dressing which, to them, showed the same faults as other adhesive dressings.

THE SISTER'S OPINION

The findings discussed here were generally supported by the sister doing the dressings. She particularly underlined the importance of the time saved. The time spent on treatment is all-important. Prolonged waiting discourages attendances for dressings and thus causes a rise in the incidence of sepsis.

Patients do not like a small cut which at first looks healthy to become white and soggy after it has been covered for a day with the ordinary waterproof dressing. This encourages patients to renew their own dressings in order to allow their wounds to dry, and increases the risk of wound infection. Thus the nylon dressing has a definite clinical value in that it allows both the nurse and the patient to see the condition and progress of the wound.

SUMMARY

A controlled clinical trial of the treatment of minor industrial wounds with a nylon-derivative dressing is described.

The healing-times of wounds so treated was significantly shortened by comparison with similar wounds treated with a waterproof wound dressing commonly used in industry.

The nylon dressing maintained its seal more satisfactorily, particularly when a film of synthetic rubber solution was applied to the edges of the dressing. It was generally preferred by the patients because of the quicker healing and good condition of the underlying skin.

The transparency of the film has great clinical value. The saving of production time by using a dressing which promotes quicker healing and allows a rapid inspection without a re-dressing is considerable.

We are indebted to Dr. J. P. Bull, assistant director, Medical Research Council Industrial Medicine and Burns Research Unit, Birmingham Accident Hospital, for his advice and encouragement in planning and executing the trial; for supplying the nylon dressings; to the plastics division of Imperial Chemical Industries Ltd., Messrs. T. J. Smith & Nephew Ltd., and Messrs. Herts Pharmaceuticals Ltd. for assisting in the development of the nylon dressing; to Dr. Clare Sykes for helpful criticism; to Miss H. N. Mercer for doing the questionnaire; and to the management and employees of the Henry Simon Engineering Works Ltd., whose coöperation made this trial possible.

> "... Wisdom is the result of experience in a man who can profit by it because he has cultivated the ability to use his mind well. Unfortunately for the future, the medical student is a tender plant more often watered with a jet of 'scientific method' than with the gentle rain of culture; so knowledge grows while judgment withers."—HENRY J. L. MARRIOTT, *New Engl. J. Med.* 1949, 241, 968.

.OGESTERONE IN THE TREATMENT OF RHEUMATOID ARTHRITIS

A CLINICAL TRIAL IN 5 CASES

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ich et al. (1949) reported dramatic remissions of ;oms in rheumatoid arthritis following the adminis- n of ‘ Cortisone ’ in large doses. In view of the ical difficulties and high cost of production of this one it seemed justifiable to attempt an assessment possible therapeutic value of progesterone, a steroid a close structural relationship to cortisone, in a series of cases in the active phase of rheumatoid itis.

ere is evidence of a great increase in progesterone iction during pregnancy (Venning and Browne Browne et al. 1937, Venning et al. 1937), and frequent occurrence of remissions of rheumatoid itis in patients becoming pregnant (Hench 1938) ed to provide additional justification for this

uw and Kuipers (1938) reported encouraging results cases of rheumatoid arthritis treated with com- iively small doses of progesterone. In a larger series, 1 (1949) injected 12 male and 9 female patients with g. of progesterone daily for thirty days. Clinical ovement of various degrees was observed in 15 cases.

CLINICAL MATERIAL AND METHOD

e patients chosen for a trial of progesterone in high ge were 4 women and 1 man. The female patients selected from among those who had passed the opause to avoid the possibility of excessive menstrual ling on withdrawal of the hormone.

ie diagnosis was based on the presence of a poly- ritis of typical distribution, and radiological evidence n arthritis of the rheumatoid type. All were in an ve phase of the disease as indicated by persistent t pain and swelling and mild or moderate hypo- mic anæmia. With the exception of case 2, all had aised erythrocyte-sedimentation rate (E.S.R.) on ated estimation. All were inpatients in the umatic Unit throughout the control and treatment ods.

linical assessment was made by one observer R. M. A.). Detailed charts of subjective symptoms and objective changes were kept, and the hæmoglobin percentage and E.S.R. were recorded weekly or more frequently. From the time of admission the patients were put on a basic régime of treatment, the essentials of which were rest in bed, physiotherapy, and the application of rest splints to the painful joints. An ample well-balanced diet was supplemented with extra milk and vitamin concentrates except in case 4, where an 800-calorie diet was prescribed because of obesity. Patients remained on this régime for control periods of one to five weeks (see table) before injections were begun.

Most cases of rheumatoid arthritis will improve initially in these circumstances, and the control period was thought to be essential to avoid the response to rest and physical treatment being attributed to progesterone. In the present 5 cases, signs of activity, as defined above, persisted and it was considered that an adequate base-line had been established in each case before progesterone was given.

Preparation and Dosage.—Progesterone in oil (B.D.H., 25 mg. per ml.) was administered intramuscularly in the doses indicated in the table. No toxic effects were noted, but in case 1 the affected joints became more painful and swollen during the administration of progesterone.

RESULTS

In no case was there any striking improvement during or after the administration of progesterone. The condition of the joints improved in all cases, but not more so than would be expected from the non-specific measures used throughout. In 4 cases the E.S.R. remained rapid throughout the control period and during the period on progesterone. In case 2 the E.S.R. was normal on admission in spite of considerable pain and limitation of movement in many joints; during the administration of progesterone it increased, returning to normal before the patient's discharge. In the 4 patients who were underweight initially there was no significant gain in weight during or after treatment.

In view of the fall in circulating eosinophils following the injection of adrenocorticotropic hormone (Thorn et al. 1948) and of cortisone (Thorn and Bayles 1949), eosinophils were counted hourly in case 1 after the injection of 100 mg. of progesterone. No fall had occurred at four hours, whereas an injection of 25 mg. of adrenocorticotropic hormone in this case produced a 90% fall. In 5 cases of rheumatoid arthritis not included in this series an injection of 100 mg. of progesterone produced no fall in 4 cases and a 37% fall in 1.

DISCUSSION

Spies and Stone (1949) found that steroids which had no effect on the circulating eosinophils did not produce an amelioration in rheumatoid arthritis comparable to

SUMMARY OF CASES

e .	Sex	Age (yr.)	Duration of disease (yr.)	Control period (weeks)	Progesterone			E.S.R. (mm./hr.)					Hb %				
					Daily dose (mg.)	Duration of dosage (days)	Total dose (g.)	On admission	At start of progesterone dosage	During progesterone dosage	At end of progesterone dosage	On discharge	On admission	At start of progesterone dosage	During progesterone dosage	At end of progesterone dosage	On discharge
	F	56	6	5	100 100	29 14	2·9 1·4	67 ..	54 68	90 58	68 80	.. 50	66 ..	74 78	78 74	82 78	.. 76
	F	58	14	2½	200	14	2 8	10	12	30	25	12	82	84	84	88	95
	M	59	3	5	100	14	1·4	100	98	104	110	(96)	80	80	81	72	(82)
	F	39	1½	5	200	14	2 8	104	70	50	50	64	70	72	72	84	78
	F	50	½	1	100	14	1·4	64	64	70	56	56	78	78	80	80	88

Case 1 received two courses of progesterone.
Figures in parentheses indicate estimations carried out four weeks after end of treatment with progesterone.
E.S.R. estimated in Westergren tube with oxalated venous blood (Wintrobe's mixture).
Hæmoglobin estimated on oxalated venous blood with photo-electric colorimeter (100% ≡ 14·8 g. of Hb per 100 ml.).

that reported with adrenocorticotropic hormone. Our experience with progesterone confirms this.

Venning (1946) reported a considerable rise in excretion of corticoids in pregnancy. In the light of recent reports on the beneficial effect of cortisone it therefore seems likely that remissions of rheumatoid arthritis occurring during pregnancy are due to increased production not of progesterone but of steroids with a cortisone-like action. It is of interest, however, to note that the metabolism of progesterone in rheumatoid arthritis appears to be abnormal. After the injection of progesterone the quantity of pregnanediol recoverable from the urine is greater in patients with rheumatoid arthritis than in normal persons (Sommerville et al. 1950).

SUMMARY

Large doses of progesterone were administered to 5 patients with rheumatoid arthritis.

No evidence of therapeutic benefit was obtained.

No fall in the number of circulating eosinophils was noted after the injection of 100 mg. of progesterone.

It is suggested that the remissions of rheumatoid arthritis which occur during pregnancy are not due to progesterone but may be attributable to increased production of other steroids by the adrenal cortex.

We are indebted to Prof. L. S. P. Davidson for his helpful criticism and advice in the preparation of this report.

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EFFECTS OF SULPHONAMIDES ON SERUM-PROTEIN, PLASMA VISCOSITY, AND ERYTHROCYTE-SEDIMENTATION RATE

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THE effects of ordinary therapeutic doses of sulphanilamide and sulphapyridine on the serum-protein levels, plasma viscosity, and erythrocyte-sedimentation rate (E.S.R.) have been investigated in normal persons.

MATERIAL AND METHODS

The subjects of the experiments were apparently normal men, aged 20–63, but they were not physically examined. Their lives were restricted to a routine of work, exercise, food, sleep, &c., so as to reduce other physiological stimuli to a minimum and to allow the successive blood samples to be removed under almost identical conditions. To reduce the emotional stimuli, the men were not told on which days blood would be removed, and they were not likely to be mentally disturbed by taking tablets.

Six men were given 2 g. of sulphanilamide by mouth, followed in 4 hours by another 2 g., and thereafter by 1 g. 4-hourly until a total of 20 g. had been administered. With another six men the same procedure was car out with sulphapyridine.

Venous blood was drawn, with minimal stasis, f the fasting men at the same hour of the day. Part the blood was allowed to clot to produce serum, wh was later separated by centrifuging; and part was u to make an accurate 4 : 1 mixture with 3·8% sodi citrate solution.

Clinical pathological estimations were made of serum total protein, by the falling-drop specific-grav technique of Barbour and Hamilton (1926); (2) plas viscosity by the technique of Houston et al. (19 (3) serum viscosity by the same technique; (4) pack cell-volume (P.C.V.) by centrifuging citrated blood capillary hæmatocrit tubes for 1 hour at 3000 r.p. and (5) maximal corrected E.S.R. by the meth described by Houston et al. (1945).

RESULTS

The effects of sulphanilamide and sulphapyri were identical, so only the sulphanilamide results a presented. Figs. 1 and 2 show these results in graph form.

The serum-protein, plasma viscosity, serum visco and E.S.R. had all increased within 48 hours of th administration of the sulphanilamide. (The sulph pyridine tests were done at different time intervals, an the increases were evident within 24 hours of giving that drug.) That these increases are not due to hæmoconcentration can be ascertained from the P.C.V. values, in which the variation is smaller and inconstant, and by making allowance for this variation in calculating the changes in these other values (as has been done for the serum-protein only in fig. 1).

No work has previously been published on the daily variations in the plasma and serum viscosities in response to ordinary physiological stimuli, but my experience indicates that such variations should be less than 1% of the original value. The changes

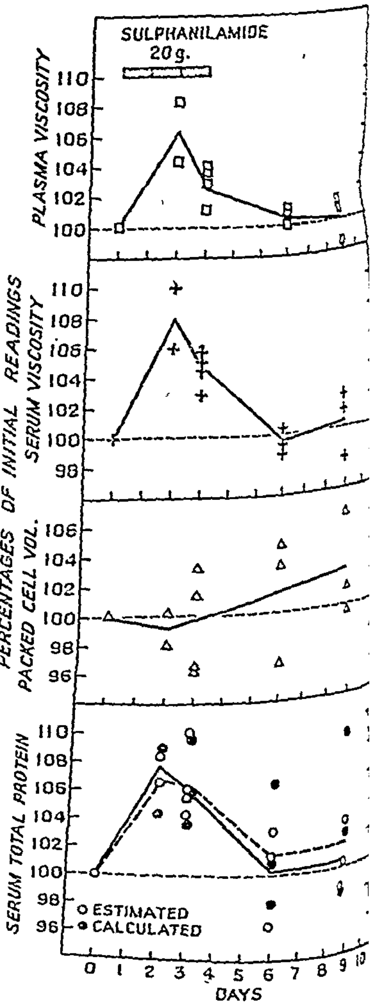
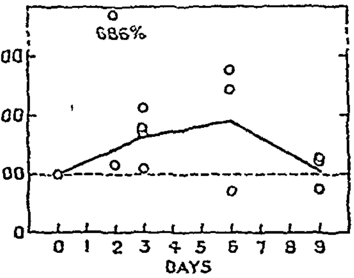


Fig. 1—Variations in plasma viscosity, serum cosity, packed cell volume, and serum-pro on exhibition of sulphanilamide. Results expressed as percentages of values be administration of sulphanilamide. The lines the means of the experimental results.

ery instance in this series were greater than 1%; n several instances the change was sufficiently great .ise the plasma viscosity out of the range usually ibed as normal into the range which one associ- with the reaction to organic changes in the body.

DISCUSSION

.e present series of 12 tests is small, but I not had any further opportunity for experiments with these drugs on suitable subjects under suitable basal conditions. The results are offered to draw attention to an effect of the sulphonamides which has not previously been described but seems worthy of further investigation. The .ngs can be discussed from two aspects.



—Variation in erythrocyte-sedimentation ɜ on exhibition of sulphanilamide. Results expressed as percentages of value before ninistration of sulphanilamide. The line ıs the means of the experimental results.

Effects of Sulphonamides on Plasma and Serum

.he interaction of the sulphonamides with the blood- -ein has been described by Davis (1942), but there has ı no mention of any action exerted by them on the unt of the proteins. The increase in *serum-protein* be detected within 24 hours of giving sulphonamides disappears within 3 days of stopping them. From 1 it seems that the effect on *the second day* was ter than on the *third* day—i.e., the protein was nning to fall though sulphanilamide was still being n. This opinion is supported by previous work rkness, unpublished) in which the sulphanilamide administered in similar doses to ten normal persons 10 days and the E.S.R. (Westergren) increased slightly then *returned to normal* while the drug was still ıg exhibited; no such changes occurred when the e routine was *carried* through without giving ɔhanilamide.

.he effect on the protein must be regarded as the mary change in the blood constituents, of which plasma viscosity, the serum viscosity, and the .R. are but reflections. The relationship of the cosity to the protein has been discussed elsewhere ouston et al. 1945, Harkness et al. 1946, Harkness and hittington 1947), as also has the relationship of the .R. and protein (Bendien and Snapper 1931, Fraser d Rennie 1941).

Further metabolic studies should show whether the otein increase is due to increased protein formation decreased utilisation.

) *Significance of Clinical Pathological Tests*

These results also indicate that there is a danger in cepting the changes in the laboratory tests during an ness as being due entirely to changes in the disease ıce sulphonamides alone can produce significant terations in plasma viscosity, serum viscosity, and S.R. Thus, in a case of pyrexia of unknown origin eated empirically with sulphonamides (admittedly ıd therapeutics) the findings after 24 hours might lead a long search for an organic lesion. Furthermore, ıe fall in these values after the second or third day, hether the sulphonamides were stopped or continued ould be interpreted as an improvement in a non-existent isease.

Similarly there has been a division of opinion over the ction of salicylates in rheumatic diseases. While some workers—e.g., Reid (1948)—claim that the E.S.R. is so reliable a test that they are willing to use it as the criterion of amelioration in the rheumatic process, others claim that the salicylates have a direct depressing action on the E.S.R., but no mechanism for effecting the depression has yet been demonstrated.

Before the results of clinical pathological tests can be used for ascribing certain actions to drugs in disease, the effect of the drugs on these tests should be fully studied in normal persons. Nevertheless, there is no guarantee that, in the presence of a disease for which the drug is given, reactions identical with the "normal" ones will be educed.

SUMMARY

The exhibition of sulphanilamide and sulphapyridine to normal persons increased the serum total protein, the plasma viscosity, the serum viscosity, and the E.S.R.

This effect requires further study, but it should be taken into consideration in assessing the significance of changes in these tests in patients under treatment with sulphonamides.

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THE MALE FROG (Rana esculenta) PREGNANCY TEST AND ITS CLINICAL APPLICATION

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THERE is a considerable difference of opinion about the value of the male frog, *Rana esculenta*, in the Galli Mainini (1948) test. Hinglais and Hinglais (1948). Biernacka and Pigoń (1948), Fotin et al. (1948), Hernandez Andueza (1948), Aznar Ferreres (1948), and Bach et al. (1949) viewed it enthusiastically, whereas Schockaert et al. (1948), and Hinglais and Hinglais (1949) thought poorly of it.

To assess its value 312 tests were made between December, 1948, and March, 1949—200 with pregnancy urine (114 from normal pregnancies, and 86 from abnormal pregnancies) and 112 controls with urine from non-pregnant persons, all patients in our obstetrics and gynæcology clinic. The pregnancy tests were classified into (1) those done in early (first sixteen weeks) normal pregnancy; (2) those done in advanced normal pregnancy; (3) those done in early (first sixteen weeks) abnormal pregnancy; and those done in advanced abnormal pregnancy.

In this way we could compare results in our groups not only with one another (to see whether they were influenced by the duration of pregnancy or by its abnormal character) but also with those of other workers, who had almost all worked with urine from cases of early normal pregnancy, when the need for a laboratory diagnosis is most imperative.

METHOD

We followed Galli Mainini's (1948) usual technique, except that an amount of urine equal to a twentieth of the frog's body-weight was found sufficient. In this way positive results of varied intensity were obtained, which could be estimated by an approximate count of the spermatozoa in a *droplet* of cloacal urine under

RESULTS OF PREGNANCY TESTS IN *R. esculenta*

Duration of pregnancy (weeks)	Normal pregnancy						Abnormal pregnancy					
	True positives				False negatives	Total	True positives				False negatives	To[illegible]
	++++	+++	++	+			++++	+++	++	+		
4	1	0	2	0	0	3	0	0	0	2	0	[illegible]
8	13	9	8	2	3	35	2	3	7	4	2	[illegible]
12	7	13	5	5	1	31	4	6	8	10	7	[illegible]
16	3	8	7	4	1	23	1	1	2	4	1	[illegible]
Total in first 16 weeks	24	30	22	11	5	92	7	10	17	20	10 (62)	[illegible]
20	0	1	1	6	3	11	3	1	1	2	3	[illegible]
24	0	2	1	0	1	4	1	3	2	0	0	[illegible]
28	1	0	1	1	2	5	2	2	0	1	1	[illegible]
32	0	0	0	2	0	2	0	0	0	0	0	[illegible]
Total in second half of pregnancy ..	1	3	3	9	6	22	6	6	3	3	4	[illegible]
Total ..	..	..	..	..	11	114	..	..	..	..	14	[illegible]

low-power magnification (×100). When the whole microscopical field was closely packed with spermatozoa, and the frog's urine, normally clear, became macroscopically turbid and milky, the result was read as ++++; a similar microscopical picture but with macroscopically transparent urine was read as +++; a density of 20–60 spermatozoa per field was read as ++; and a density of only a few spermatozoa per field as +.

Fluctuations in the reactivity of the frogs have been considered unimportant by all previous workers, though 3–5 frogs have been used for each test to avoid individual differences in reactivity. On the assumption that these fluctuations have a fundamental bearing on the value of *R. esculenta* male frogs in the pregnancy test, we strictly controlled every anomalous result so as to find out the cause of the anomaly. All negative results were subjected to a double control, by injecting the urine under test into 3–5 other frogs, as other workers do, and in addition by injecting pregnancy urine with a known high gonadotropic titre into the frog which had given the negative result. The testes of all frogs which had given false negative results were investigated histologically to discover the cause of non-reactivity. This led to a better understanding of (1) the physiology of spermatogenesis in frogs, (2) the influence of the injections of chorionic gonadotropin on the seminiferous epithelium, and (3) decreased reactivity after repeated injections (see below).

RESULTS

In 156 tests during the first sixteen weeks of pregnancy (normal and abnormal) no false positive and 15 (9·6%) false negative results were obtained. In 92 tests during normal pregnancy at this early period there were only 5 (5·4%) false negative results. Strong positive results in normal pregnancy became less intense between the twelfth and sixteenth weeks, often changing to false negative later. In abnormal pregnancy weak positive or even false negative results were found often in the early period but the results were strongly positive in advanced abnormal pregnancy.

The results are given in detail in the accompanying table. The effects of stage of pregnancy and abnormality of pregnancy are best assessed from the totals obtained in the first sixteen weeks and in the second half of pregnancy in normal and in abnormal pregnancy. It must, however, be remembered that a third factor comes into play—the reactivity of the male frog; this is subject to large fluctuations which are responsible for the weak positive and false negative results in the first sixteen weeks of normal pregnancy.

The number of negative results in the first six weeks of abnormal pregnancy is much greater than [illegible] in the table; there were 52 true negative results in [illegible] of *missed or incomplete* abortion. These 52 [illegible] could not be classed as false negative, because no [illegible] ovum was found in the womb. The total [illegible] of negative results was *thus* 62 in early [illegible] pregnancy.

No pregnancy tests were carried out in the last [illegible] of pregnancy.

DISCUSSION OF RESULTS

Stage of Pregnancy

The observed influence of the duration of [illegible] on the results of the pregnancy tests is expla[illegible] fall in the output of gonadotropin, which is a ph[illegible] phenomenon between the twelfth and sixteen[illegible] of pregnancy (Zondek 1928, Siegler and Fein [illegible] Browne et al. 1939). In abnormal pregnancy—[illegible] abortion and extra-uterine pregnancy—*the fall in o*[illegible] of gonadotropin is a consequence of a [illegible] process separating the ovum from its connections [illegible] the maternal circulation, or decreasing its [illegible] (Zondek 1928, Zondek et al. 1948, Rakoff 1940).

A statistical analysis of the results shows that [illegible] difference between the proportions of false [illegible] results in early normal pregnancy (5 in 92 tests=5·4[illegible] and in advanced normal pregnancy (6 in 22 tests=27·3[illegible] is 27·3−5·4=21·9. Since these groups do not [illegible] belong to the same universe, the standard error of [illegible] difference between the two proportions is shown by

$$\sqrt{\frac{p_1 \times q_1}{n_1} + \frac{p_2 \times q_2}{n_2}}$$

where p is the percentage in the sample in one cat[illegible] and q the percentage in the other category, and n_1, n_2 are the numbers of results in the two samples.

$$S_r = \sqrt{\frac{5{\cdot}4 \times 94{\cdot}6}{92} + \frac{27{\cdot}3 \times 72{\cdot}7}{22}} = \sqrt{95{\cdot}7} = 9{\cdot}7$$

$$\frac{\text{The difference between the proportions}}{\text{The standard error of the difference}} = \frac{21{\cdot}9}{9{\cdot}7} = 2{\cdot}3$$

The difference is more than twice the standard error.

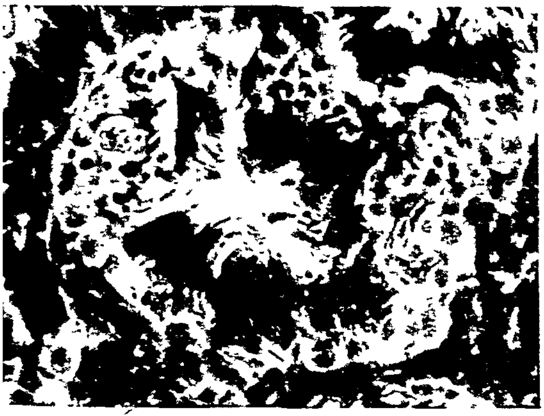
Abnormal Pregnancy

Similarly the difference between the proportions of false negative results in normal pregnancy and abnormal pregnancy is more than twice the standard error of the difference between the two proportions. Statistical principles show that such differences are greater than are likely to arise merely by chance; there is a sufficient experimental basis for the conclusions on the influence of the stage of pregnancy f abnormalities of pregnancy on the intensity and nity of the results of the pregnancy tests.

CLINICAL APPLICATIONS OF TEST

normal pregnancy, where the viability of the ovum ngered, the intensity of the result falls, tending ely to change from a positive result into a negative ble). Therefore the male *R. esculenta* can be used gnosis in abortions and to diagnose death of the A weakly positive result between the fourth and weeks of pregnancy, when normally a strong e result is expected, suggests that some danger ns the ovum. A falling intensity of the results is prognostic significance, and the appearance of anent negative result after such a fall indicates f the fœtus. The prompt response to small changes output of gonadotropin enables one to follow the the ovum at the very time when its viability ging.

xtra-uterine pregnancy positive results may be ed in uncomplicated cases only, but cases coming clinical observation are usually complicated, with or less advanced separation of the ovum from al tissue; consequently the results of the preg- test are negative. The value of the test in agnosis of extra-uterine pregnancy is therefore ionable, since a negative result does not exclude -uterine pregnancy.



Seminiferous tubule from normal testis of *Rana esculenta*, showing atozoa clustered round Sertoli cells. (Hæmatoxylin and eosin, .)

increase in the intensity of a positive result in ancy after the sixteenth week, when normally a ase is observed, may be a sign of some complication as hydatidiform mole, chorionepithelioma, preg- intoxication, or pre-eclampsia, which are usually panied by the production of much gonadotropin.

REACTIVITY OF FROG

statement of Schockaert et al. (1948) that the nating male *R. esculenta* cannot be used for the test. se spermatogenesis is dormant in winter, is not med. Even in winter I have seen mature sperma- clustered upon the Sertoli cells and ready to be sed by an injection of pregnancy urine. The reac- of the hibernating frog may be a little decreased et al. 1949), but this is of no serious importance in al pregnancy before the sixteenth week, when the ntration of gonadotropin in the urine is great gh to cause a good reaction in the frog even in r.

nglais and Hinglais (1949), after reporting favour- (1948) on *R. esculenta*, found the same species isfactory and explained their change of opinion as due to the infestation of the frog's testes with itic protozoa from the rectum. These protozoa, however, live in the alimentary tract and do not invade the genito-urinary tract. In a series of histological preparations I found no protozoa in the testes, though they were present in great numbers in the rectum. Further, the presence of protozoa in cloacal urine never caused the result of the test to be negative.

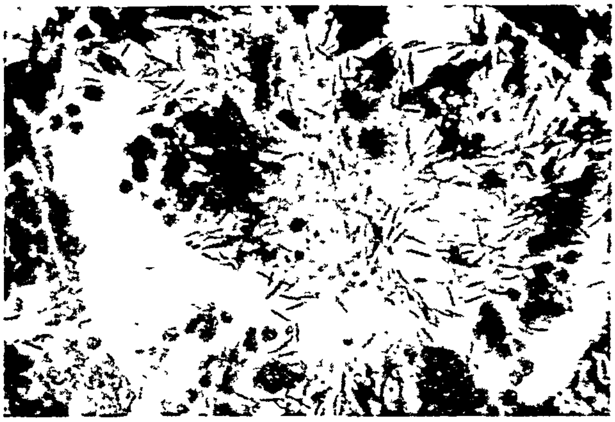


Fig. 2—Seminiferous tubule after a single injection of pregnancy urine, showing mature spermatozoa liberated into the lumen, and developmental forms of seminiferous epithelium also partly liberated. (Hæmatoxylin and eosin, × 375.)

The unfavourable view taken of the use of *R. esculenta* male frogs in pregnancy tests by these workers is probably due to fluctuations in reactivity to chorionic gonadotropin after repeated injections of pregnancy urine, especially with a small stock of frogs or after the breeding season. These facts are explained in the following way.

Rugh (1937) observed that the injection of hibernating male *R. pipiens* with anterior pituitary extract released all mature spermatozoa from the Sertoli cells. De Robertis et al. (1946) found the same with *Bufo arenarum* Hensel. This observation formed the basis for the Galli Mainini (1947, 1948) pregnancy test.

Using *R. esculenta* male frogs for pregnancy tests it was noticed that, besides mature spermatozoa, many different developmental forms—spermatogonia, spermatocytes, spermatids, and atypical immature spermatozoa —were to be seen in the frog's cloacal urine after an injection of female pregnancy urine into its dorsal lymphatic sac. It was observed too that the frequent use of the same frog at short intervals for pregnancy tests diminished its reactivity, until finally it became refractory to chorionic gonadotropin, no spermatozoa being released, whereas fresh frogs behaved normally after injection with the same urine. A slight decrease in

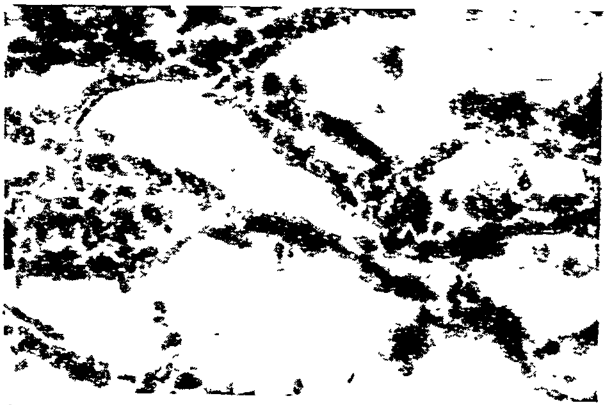


Fig. 3—Seminiferous tubule almost empty after repeated injections of pregnancy urine at short intervals, showing a layer of only 1 or 2 cells on the thin wall. (Hæmatoxylin and eosin, × 375.)

RESULTS OF PREGNANCY TESTS IN *R. esculenta*

Duration of pregnancy (weeks)	Normal pregnancy						Abnormal pregnancy					
	True positives				False negatives	Total	True positives				False negatives	T
	+ + + +	+ + +	+ +	+			+ + + +	+ + +	+ +	+		
4	1	0	2	0	0	3	0	0	0	2	0	[illegible]
8	13	9	8	2	3	35	2	3	7	4	2	[illegible]
12	7	13	5	5	1	31	4	6	8	10	7	[illegible]
16	3	8	7	4	1	23	1	1	2	4	1	[illegible]
Total in first 16 weeks	24	30	22	11	5	92	7	10	17	20	10 (62)	[illegible]
20	0	1	1	6	3	11	3	1	1	2	3	[illegible]
24	0	2	1	0	1	4	1	3	2	0	0	[illegible]
28	1	0	1	1	2	5	2	2	0	1	1	[illegible]
32	0	0	0	2	0	2	0	0	0	0	0	[illegible]
Total in second half of pregnancy ..	1	3	3	9	6	22	6	6	3	3	4	[illegible]
Total ..	..	..	..	..	11	114	..	..	..	..	14	[illegible]

low-power magnification (×100). When the whole microscopical field was closely packed with spermatozoa, and the frog's urine, normally clear, became macroscopically turbid and milky, the result was read as + + + + ; a similar microscopical picture but with macroscopically transparent urine was read as + + + ; a density of 20–60 spermatozoa per field was read as + +; and a density of only a few spermatozoa per field as +.

Fluctuations in the reactivity of the frogs have been considered unimportant by all previous workers, though 3–5 frogs have been used for each test to avoid individual differences in reactivity. On the assumption that these fluctuations have a fundamental bearing on the value of *R. esculenta* male frogs in the pregnancy test, we strictly controlled every anomalous result so as to find out the cause of the anomaly. All negative results were subjected to a double control, by injecting the urine under test into 3–5 other frogs, as other workers do, and in addition by injecting pregnancy urine with a known high gonadotropic titre into the frog which had given the negative result. The testes of all frogs which had given false negative results were investigated histologically to discover the cause of non-reactivity. This led to a better understanding of (1) the physiology of spermatogenesis in frogs, (2) the influence of the injections of chorionic gonadotropin on the seminiferous epithelium, and (3) decreased reactivity after repeated injections (see below).

RESULTS

In 156 tests during the first sixteen weeks of pregnancy (normal and abnormal) no false positive and 15 (9·6%) false negative results were obtained. In 92 tests during normal pregnancy at this early period there were only 5 (5·4%) false negative results. Strong positive results in normal pregnancy became less intense between the twelfth and sixteenth weeks, often changing to false negative later. In abnormal pregnancy weak positive or even false negative results were found often in the early period but the results were strongly positive in advanced abnormal pregnancy.

The results are given in detail in the accompanying table. The effects of stage of pregnancy and abnormality of pregnancy are best assessed from the totals obtained in the first sixteen weeks and in the second half of pregnancy in normal and in abnormal pregnancy. It must, however, be remembered that a third factor comes into play—the reactivity of the male frog; this is subject to large fluctuations which are responsible for the weak positive and false negative results in the first sixteen weeks of normal pregnancy.

The number of negative results in the first six[illegible] weeks of abnormal pregnancy is much greater than [illegible] in the table ; there were 52 true negative results in [illegible] of missed or incomplete abortion. These 52 re[illegible] could not be classed as false negative, because no [illegible] ovum was found in the womb. The total num[illegible] of negative results was thus 62 in early abnor[illegible] pregnancy.

No pregnancy tests were carried out in the last [illegible] of pregnancy.

DISCUSSION OF RESULTS

Stage of Pregnancy

The observed influence of the duration of [illegible] on the results of the pregnancy tests is expla[illegible] fall in the output of gonadotropin, which is a ph[illegible] phenomenon between the twelfth and sixteenth [illegible] of pregnancy (Zondek 1928, Siegler and Fe[illegible] Browne et al. 1939). In abnormal pregnancy—[illegible] abortion and extra-uterine pregnancy—the fall in [illegible] of gonadotropin is a consequence of a [illegible] process separating the ovum from its connections [illegible] the maternal circulation, or decreasing its viabi[illegible] (Zondek 1928, Zondek et al. 1948, Rakoff 1940).

A statistical analysis of the results shows that [illegible] difference between the proportions of false neg[illegible] results in early normal pregnancy (5 in 92 tests=5·4[illegible] and in advanced normal pregnancy (6 in 22 tests=27·3[illegible] is 27·3−5·4=21·9. Since these groups do not ex[illegible] belong to the same universe, the standard error of [illegible] difference between the two proportions is shown by

$$\sqrt{\frac{p_1 \times q_1}{n_1} + \frac{p_2 \times q_2}{n_2}}$$

where p is the percentage in the sample in one cat[illegible] and q the percentage in the other category, and n_1, n_2 are the numbers of results in the two samples.

$$S_r = \sqrt{\frac{5\cdot4 \times 94\cdot6}{92} + \frac{27\cdot3 \times 72\cdot7}{22}} = \sqrt{95\cdot7} = 9\cdot7$$

$$\frac{\text{The difference between the proportions}}{\text{The standard error of the difference}} = \frac{21\cdot9}{9\cdot7} = 2\text{[illegible]}$$

The difference is more than twice the standard error.

Abnormal Pregnancy

Similarly the difference between the proportion[illegible] false negative results in normal pregnancy and [illegible] abnormal pregnancy is more than twice the standar[illegible] error of the difference between the two proportions. Statistical principles show that such differences [illegible] greater than are likely to arise merely by chance; [illegible] there is a sufficient experimental basis for the conclusions on the influence of the stage of pregnanc[illegible] ems justifiable, however, to attempt direct laryngo- in all such cases where the respiratory embarrass- cannot otherwise be relieved, and tracheotomy d be done only when this manœuvre fails.

e sedation of these patients, who are extremely ss and of necessity using their accessory muscles spiration, requires care. Respiratory depressants, as morphine, must not be used, at least until an uate airway has been established. Hewer[3] points he very real dangers of intravenous barbiturates in ratory obstruction, and emphasises the necessity n adequate local application of cocaine or other ce analgesic before instrumentation is attempted.

SUMMARY

hæmophilic man with severe respiratory obstruction ting from a pharyngeal hæmatoma recovered after t laryngoscopy and intubation.

n attempt is made to justify intubation in preference racheotomy for such cases.

am indebted to Dr. A. E. Clark-Kennedy, F.R.C.P., Mr. A. Bowen-Davies, F.R.C.S., for permission to publish case.

KIDNEY EXPOSURE THROUGH THE TWELFTH RIB

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HE *indications for exposing the kidney by the retro-* toneal approach through the loin are well established, the details of the operation are by no means standard- —the incisions used vary from the nearly vertical Iayo to the more oblique of Morris.

ll these loin incisions have in common certain short- ings, which are eliminated by exposure of the kidney ough the bed of the last rib. This approach has so ny advantages that it is surprising it has not received er recognition. Though practised by a few British logical surgeons it is not described in any standard tish work on operative surgery or urology. The t account of it in English was by Hess (1939), and it s later described by Digby (1941). Robinson (1947), a presidential address at the Royal Society of Medicine, oke of fourteen years' experience with this kidney proach, and he cited Von Lichtenberg as having actised it. A comparable approach was described Hertz (1927) for exposing the suprarenal gland and s been used latterly by many surgeons for operations the splanchnic sympathetic. Egon Wildbolz (personal mmunication) states that he and his father, the late of. Hans Wildbolz, have used this approach to the lney for more than thirty years, but neither they r Von Lichtenberg have ever written about it.

THE OPERATION

The patient is placed in the customary kidney position, th a rigid support beneath the lower ribs, which facilitates e exposure. The length of the patient's last rib is checked diographically, for when this is unduly short care is needed avoid mistaking the 11th rib for the 12th.

The incision is made over the last rib, starting an inch medial the lateral border of the erector spinæ and continuing in the me line beyond the tip of the rib to a point depending on e length of the last rib; an extension of $2^{1}/_{2}$–3 in. beyond is usually suffices with a rib of average length and a kidney normal size. The wound is deepened through the latissimus orsi and serratus posterior inferior muscles down to the b; it is advisable to nick a few of the outermost fibres of the ector spinæ. The exposed portion of the rib is resected bperiosteally; freeing of the extreme tip from the attached

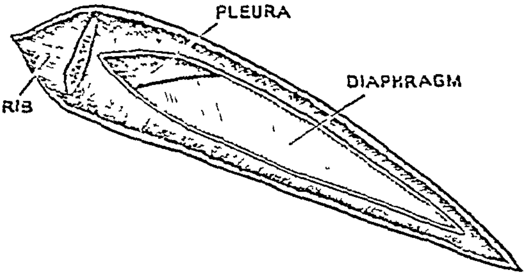

Fig. 1—Relation of pleura to 12th rib bed after incision of posterior periosteum of rib.

muscles and periosteum requires a little patience. The periosteum *of the rib bed is then incised, with special care at* its medial part where the horizontal fold of the pleura is sought and found. The pleura, occupying the inner and upper angle of the rib bed (fig. 1), is deliberately but easily dissected free and displaced from the line of further incision. The lowest fibres of the diaphragm are then incised in the same line and the extrarenal fat and fascia immediately become visible. The incision through the external oblique, internal oblique, and transversalis muscles is extended outwards from the outermost part of the rib bed for a variable distance—usually $2^{1}/_{2}$–3 in. This extension must be in strict line with the continuation of the rib; if it tails downwards at all, the subcostal nerve or some of its branches may be endangered. Once the perinephric plane is found, this outward extension through the muscles is facilitated by cutting down on to two fingers of the left hand placed inside the wound. In the outer angle care must be taken not to damage the reflected fold of the peritoneum, which must be stripped away as required. The perinephric fascia (Zuckerkandl) is incised, and the kidney freed from its perinephric fat.

ADVANTAGES

Access

This approach is anatomically sound. The last rib is one of the normal posterior relations of the kidney, and *on the left side closely approximates to the hilum* (fig. 2); not uncommonly the kidney occupies an even higher position. It is more rational to come down directly on to the organ than to approach it from below. With the more classical incisions great difficulty is often experienced in freeing the kidney from the perinephric fat, owing to the dense strands of fibro-fatty tissue which anchor the upper pole. Because of poor exposure, attempts are made to mobilise the last rib by dividing the lumbocostal ligament (not the external arcuate ligament as is suggested in some textbooks of operative surgery). Forceful retraction is then employed, and often resection of the rib is finally resorted to. It has also been recommended that the outermost fibres of the quadratus lumborum be nicked in the upper angle of the wound. It is during these additional manœuvres that the pleura and subcostal nerve may be damaged, and troublesome hæmorrhage may ensue.

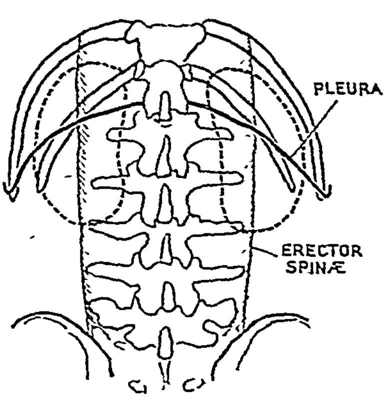

Fig. 2—Relation of pleura and edges of erector spinæ muscle to kidney and 12th rib.

With exposure through the rib bed the kidney can be handled with ease, and nephrolithotomy or other procedures can be performed without delivering the kidney reactivity was also observed in May and July after the breeding-season.

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[3] Hewer, C. L. Recent Advances in Anæsthesia and Analgesia. London, 1948.

Frogs' testes were examined histologically after single injections of pregnancy urine and after multiple injections given at short intervals. Some of the findings are shown in figs. 1–3. After a single injection of pregnancy urine mature spermatozoa were released (fig. 1), as stated by Rugh (1937) and De Robertis et al. (1946), but sometimes spermatocytes and spermatids were also liberated (fig. 2). After repeated injections of pregnancy urine at short intervals almost all the seminiferous epithelium was shed from the tubules, leaving only one or two layers of thin cells.

These observations explained both the appearance of developmental forms of the seminiferous epithelium in the cloacal urine and the fluctuations in reactivity. A testis exhausted either experimentally by repeated injections of pregnancy urine or physiologically by the breeding-season cannot react normally to the injection of chorionic gonadotropin unless time is allowed for the regeneration of the seminiferous epithelium. Consequently all negative results of the pregnancy test must be strictly controlled when *R. esculenta* male frogs are being used, especially when only a small stock of frogs is available and after the breeding-season. The need for such controls, however, can be avoided by allowing an interval of at least two weeks between tests on the same frog. The best way of working is with a large supply of fresh frogs, of which 3–5 are used for each test to compensate for possible individual fluctuations in reactivity.

PREGNANCY URINE AND PARASITES OF FROG

Interesting observations were made, during these investigations, on the influence of chorionic gonadotropin on the reproductive cycle of certain parasitic protozoa living in the frog's rectum. After a frog had been given an injection of pregnancy urine, the asexual multiplication of the protozoa by fission changed to sexual reproduction with the appearance of encysted forms. This change is similar to that which takes place during the frog's breeding-season, when it is probably caused by the frog's pituitary gonadotropin. It is an example of a biological action exerted by a hormone of vertebrates on invertebrates.

SUMMARY

The *Rana esculenta* male-frog pregnancy test is simple, quick, reliable, cheap, and easily read, provided that all negative results are strictly controlled.

The adverse opinions of some workers are due to fluctuations in the reactivity of the frogs to chorionic gonadotropin.

Some clinical applications of the test for diagnostic and prognostic purposes are pointed out.

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RESPIRATORY OBSTRUCTION IN HÆMOPHILIA

RECOVERY AFTER INTUBATION

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SPONTANEOUS submucosal hæmatomas in the pharynx and larynx are uncommon in hæmophilia; but, if they develop, respiratory obstruction may constitute a very grave emergency. Davidson et al.[1] in a clinical study of 40 cases of hæmophilia, report a death from the rapid development of submucosal pharyngeal and laryngeal hæmatomas which blocked the airway before treatment could be given. Baird and Fox[2] collected 7 instances of this complication; 4 of the patients recovered without tracheotomy, and 3 died after it. In their own case tracheotomy within five hours of the onset saved the patient.

The onset may be characterised by sore throat and loss of voice, and a hæmatoma may be seen as an obvious swelling on the posterior pharyngeal wall, though more commonly it can only be seen on direct laryngoscopy.

Though in most instances pharyngeal hæmatomas seem to be spontaneous, Baird and Fox[2] point out that over-vigorous use of the voice may predispose to them and suggest that hæmophilics should be warned of this possibility.

CASE-RECORD

A known hæmophilic man, aged 57, was admitted to the London Hospital with severe respiratory obstruction. His wife, who accompanied him, could throw no light on the cause of his present condition; she enumerated [illegible] hæmophilic crises which he had had in the past, but these did not include subpharyngeal hæmorrhage.

On admission the patient was cyanosed and semiconscious, and his greatest respiratory efforts only permitted minimal tidal air exchange. There was extensive swelling on the right side of his neck.

Treatment.—Oxygen was administered through a B.L.B. mask, and great difficulty was experienced in setting up a blood-transfusion owing to the patient's violent struggling. In spite of a pharyngeal airway and oxygen he remained cyanosed and showed little, if any, improvement. It was decided that direct laryngoscopy should be attempted, both to ascertain the extent of the swelling and to ensure an adequate airway through a large endotracheal tube. The mouth was sprayed with 10% cocaine solution, and the fauces, tongue, and piriform fossæ were painted with the same solution by means of Krause forceps. An attempt was next made to introduce a Magill laryngoscope, but owing to the patient's restlessness it was thought that the risk of injuring the pharyngeal wall with the blade and thus causing hæmorrhage was greater than the acknowledged risk of giving soluble thiopentone in the presence of respiratory obstruction. Accordingly, after soluble thiopentone 0·3 [illegible] had been injected by a colleague, a no. 10 Magill oral tube lubricated with 2% 'Nupercaine' ointment was passed under direct vision. Respiration at once became quiet, and the cyanosis disappeared. The tube was left in place for thirty-six hours, by which time the hæmatoma had partly resolved and the tidal air volume was satisfactory. Further convalescence was uneventful, and the patient was discharged from hospital in three weeks.

DISCUSSION

Tracheotomy has been done in a few cases of pharyngeal and laryngeal hæmatomas complicating hæmophilia, but the results, even with blood-transfusion, have been unsatisfactory.[2] Laryngoscopy also is not without risk, and the chances of injuring the already swollen and distorted mucosæ over the hæmatomas are considerable.

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1. Davidson, C. S., Epstein, R. D., Miller, G. F., Taylor, F. H. L. *Blood*, 1949, 4, 97.
2. Baird, K. H., Fox, M. S. *J. Pediat.* 1943, 23, 90.

was adjusted with acetic acid to between as then concentrated so as to bring down r 50 ml. In ten cases this was done at by placing the urine in a large, shallow nder a powerful fan; this process was in less than 48 hours. In two cases, the s done by vacuum-distillation at 40°C; ver, was found to be no less time-consuming. urine was then enclosed in a 'Cellophane' against distilled water until it was free from volume of the concentrated dialysed urine up to exactly 50 ml.

a 24-hour specimen of urine from a normal s collected simultaneously under toluene, and ated and dialysed in exactly the same way. of this urine was also made up to precisely 50 ml.

ntidiuretic potency.—The method employed for e was that recommended by Burn.[12] Groups of albino rats, each weighing 120–150 g., were used t. To each animal 5 ml. of water per 100 g. body- as administered by stomach-tube; a no. 3 size theter, dipped in glycerin, was used for this purpose. was held vertically by an assistant and a small wooden h a central hole was inserted across its mouth. The as then gently passed down into the stomach, using rce. A 10 ml. syringe was fitted to the distal end of be and an exactly measured volume of water (5 ml. 0 g. body-weight of the animal) was injected down the The tube was then withdrawn and 1 ml. of the ssed" urine per 100 g. body-weight was injected aneously into the animal—the patient's urine for the nimals and the normal urine for the controls. The l and test groups (each of four animals) were then to two separate cages. These cages were provided with loors of large mesh and had a wide funnel attached bottom, to conduct the urine to a measuring cylinder below.

time at which the rats received water and were injected corded. The time at which excretion of urine from each as noticed was also recorded. The volume of urine collected from each cage was recorded every 15 minutes for about 4 hours.

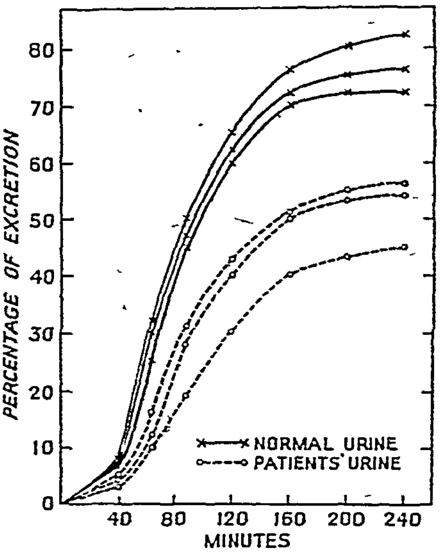
After the lapse of 48 hours, the groups were interchanged and the test was repeated; this was to avoid possible errors due to differences in the sensitiveness of the animals.

Experiment no.	Control			Test		
	Vol. water-ingested (ml.)	Excretion in 4 hours		Vol. water ingested (ml.)	Excretion in 4 hours	
		Vol. (ml.)	Proportion of ingested vol. (%)		Vol. (ml.)	Proportion of ingested vol. (%)
1	29·4	22	74·8	27·5	14	50·9
2	28·2	20	70·9	28·4	14	49·3
3	29·3	24	81·9	29	16·5	56·9
4	28·8	22	76·4	28·2	16	56·7
5	28·4	23	88	28	19	67·9
6	28·6	20·5	82·2	29·2	18·5	63·4
7	28·4	19	66·9	29	15	51·7
8	29·2	20·5	70·2	28·8	14·2	49·3
9	28·9	21	77·2	28·2	18	63·8
10	28	19	67·8	28·4	16·8	59·2
11	29·2	20	68·5	28·5	11	38·6
12	28	20·4	72·9	29·4	11	37·4
13	27·9	19·5	69·9	28	15	53·6
14	28·2	21	74·5	27·8	13·4	48·2
15	29·6	22	74·3	27·6	13·5	48·9
16	26	19	73·1	28·8	13·4	46·5
17	27·6	19·5	70·7	28·4	8·9	31·4
18	29	20	69	27·2	8·5	31·3
19	25·1	18	71·7	27·6	12	43·5
20	28·2	20	70·9	26·4	10·8	40·9
21	26·1	19	72·8	23·6	10·5	44·5
22	24	16·8	70	26·8	11	41·1
23	28·7	17·8	62	29·2	10·2	34·9
24	28·2	18·2	64·5	28·8	9·5	33

e results were treated by the "t" test, and the differences e percentage of excretion between the control and test groups found to be significant.

RESULTS AND DISCUSSION

It was observed that while rats injected with normal urine excreted on average 72·5% of the ingested water in 4 hours, those injected with urine from cases of nutritional œdema excreted on average only 47·6% of the ingested water during this period. The results are set out in the accompanying table and figure.



Thus in the non-dialysable fraction of the urine from cases of nutritional œdema there is obviously some factor which promotes anti-diuresis and water-retention. The actual nature of this antidiuretic substance is a subject for further investigation. Robinson and Farr[13] demonstrated an antidiuretic substance in the urine of patients with premenstrual œdema. On the other hand, Ralli et al.[11] demonstrated increased urinary excretion of an anti-diuretic factor in cases of hepatic cirrhosis with ascites; this was attributed to failure of the damaged liver to destroy a 'Pitressin'-like factor. Drill and Frame[14] have confirmed this observation. Leslie and Ralli[15] showed that rats given a low-protein high-fat diet for two or three weeks also excreted in the urine increasing quantities of the antidiuretic factor. This was observed long before such diets produced hepatic cirrhosis, and was attributed to impairment of liver function by fatty infiltration. That starvation and protein depletion damage the liver has been shown by several workers.[16–19] It is possible that such damage may not always be clinically detectable. Like the pitressin-like factor demonstrated by Ralli et al.[11] in cases of hepatic cirrhosis, this substance was active at a pH range of 4–5.

Several workers have shown that the antidiuretic effect of posterior-pituitary extracts is associated with increased excretion of chlorides.[20–23] Preliminary observations indicate that in the cases recorded here the antidiuresis is not associated with such increased chloride excretion. Ralli et al.[11] have, however, pointed out that the chloruretic effect of pitressin is lost after dialysis.

It has been suggested that dehydration might cause the appearance of antidiuretic substance in the urine.[23]

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from the wound. However, if delivery is required it is facilitated by the adequate exposure and it will be still easier if an assistant presses on the abdomen; this manœuvre tends to squeeze the kidney upwards and outwards through the wound, whereas with the other loin incisions it usually forces the kidney still further under the overhanging last rib.

Kidney exposure is usually difficult in patients with a reduced iliocostal gap, whether this is a result of scoliosis, an unduly long 12th rib, or a general squat stature. Exposure through the last rib bed overcomes all such difficulties, for even in the very fat or muscular patient the final wound seems to be less deep than it would be with the more classical approach.

The Pleura

In surgery it is axiomatic that when damage to an important structure is feared, that structure should be clearly visualised and then avoided. The relation of the fold of the pleura to the 12th rib bed is illustrated in fig. 1; minor variations are found (Melnikoff 1923), but these are of no practical importance provided that the pleura is sought for and carefully pushed away by delicate dissection. With other loin incisions, damage to the pleura usually results from efforts to improve an inadequate exposure. Hess (1939) makes no attempt to excise the rib subperiosteally and advised "tearing the transversalis fascia with the fingers" so as not to endanger the pleura—surely a most unsound procedure.

The Subcostal Nerve

The course of the subcostal nerve varies in obliquity, and consequently it is endangered in the classical loin operations. By many surgeons it is boldly severed and the consequent muscle weakness and anæsthesia are disregarded. Some accept an area of anæsthesia "the size of the palm of the hand" as a regular accompaniment of kidney operations. When the kidney is approached through the rib bed, the line of incision is essentially segmental between the 11th and 12th myotomes; the subcostal nerve always lies at a more distal level and is out of danger whatever its variations. The approach thus protects the nerves from damage, and it also appreciably reduces the amount of bleeding.

WOUND CLOSURE AND HEALING

Hernia is by no means rare as a complication of kidney operations. This is not surprising in view of the extensive muscle cutting involved, and an additional factor is probably the difficulty of suturing in the lower angle of the wound because of the excessive retraction of the transversalis muscle beneath the internal oblique. In the operation here recommended the muscle cutting is reduced, and much of the wound in the rib bed is repaired by fibrous tissue. The diaphragm and the posterior and anterior periostea are sutured as one layer; healing is sound and no postoperative herniæ have occurred.

INDICATIONS

This incision should be used always, except when the middle or lower parts of the ureter are to be exposed.

Latterly the incision has been used in the removal of tuberculous kidneys. After the vascular pedicle has been divided, the ureter is stripped as far down as possible. The kidney is delivered and allowed to hang outside the wound, attached only by its ureter, while the wound is closed around it. The lower end of the ureter is then divided extraperitoneally through a midline infra-umbilical incision, and the kidney and ureter are withdrawn from the upper wound.

A large kidney mass is no contra-indication since the incision can be prolonged in the same line, even to the lateral border of the rectus sheath.

This operative approach has been in constant use on the surgical unit of St. Mary's Hospital for the past three years; and the improved exposure, ease of performance, and freedom from complicati [illegible] established its superiority over the other app [illegible]

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Preliminary Communication

ANTIDIURETIC FACTOR IN THE U[illegible] PATIENTS WITH NUTRITIONAL [illegible]

THE pathogenesis of nutritional œde[illegible] still a[illegible] elucidation. It is, however, becoming increasingly [illegible] that this condition cannot be satisfactorily explained [illegible] the basis of Starling's classical concept of œdema formation. The hypothesis that the œde[illegible] is the re[illegible] decreased colloidal osmotic-pressure, consequent on [illegible] in the serum-albumin level, has been contradicted [illegible] several observations.[1–8] Youmans, Wells, et al.[2] emphasised the factor of tissue-pressure, but their calculations as to the magnitude of this pressure have been rejected.[illegible] It seems probable, therefore, that in the development [illegible] nutritional œdema factors other than those considered in Starling's hypothesis may be concerned.

In the present investigation it has been shown th[illegible] the urine of patients with nutritional œdema contain[illegible] antidiuretic substance which promotes water-rete[illegible]

CLINICAL MATERIAL

Twelve patients with nutritional œdema were inve[illegible] gated. Nine of these were destitutes, and the other thr[illegible] belonged to the poorest section of the community. A[illegible] were men between the ages of 25 and 50 years. In [illegible] cases a detailed dietetic history was natur[illegible] obtainable, but it was obvious that all the pa[illegible] subsisted on grossly inadequate diets for several [illegible] before they developed symptoms.

All the subjects suffered from obvious œdema, wh[illegible] pitted on pressure. The œdema was maximal in t[illegible] dependent parts; and in all cases the feet, ankles, and legs, and the hands and forearms were swollen. In the severe cases the œdema was more extensive, involving even the face. All non-nutritional causes of œdema, were including cardiovascular and renal conditions, were carefully excluded. The urine was free from albu[illegible] and granular casts. Clinical signs of wet beriberi were sought and were absent. In three typical cases lar[illegible] doses of *thiamine* given parenterally did not relieve the œdema; and in three other cases screening reveal[illegible] that the heart-shadow was either normal or smaller th[illegible] normal. Contrary to the observation of some worke[illegible] who reported polyuria in cases of nutritional œdema,[illegible] all cases here showed pronounced oliguria, the 24 h[illegible] urinary output in several cases being less than 750 [illegible] even though fluid-intake was not restricted.

EXPERIMENTAL PROCEDURE

Collection, concentration, and dialysis of urine.—The p[illegible] cedure adopted here was generally similar to that employ[illegible] by Ralli et al.[11] The urine from each patient was colle[illegible] under toluene for exactly 24 hours; care was taken to [illegible] that all the urine passed during this period was colle[illegible] ts mid-portion, was partially necrotic with a thick erent fibrinous membrane. It was subsequently ıd that the girl had been in the habit of sucking hthalene moth-balls. The case was one of true ;alocytic anæmia, resulting from deficiency of ıopoietic principle, due to chronic naphthalene ɔrption.

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* Wet beriberi is not included.

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mears from effusions.—Dr. A. I. Spriggs (Oxford) :ribed the technique of thin, quick-drying smears ı pleural or peritoneal effusions. Mucus secretion been demonstrated in malignant cells of carcino- ous ascites by staining with the periodic acid (Schiff) ınique; of 30 malignant effusions, 20 contained ıgnisable malignant cells—this from a total of 255 ls examined.

inc-sulphate and thymol tests.—Prof. N. F. Maclagan Miss Barbara Lunnon gave an account of their ılts with the zinc-sulphate turbidity test, which been correlated with the serum-globulin level and ı other flocculation tests in a series of 100 cases re clinically the diagnosis was reasonably certain. y found a less close correlation with serum-globulin ı that described by Kunkel, but a very close correla- with the serum colloidal-gold test. The zinc- ›hate test was roughly correlated with the thymol but it was more likely to give positive results ɔn-hepatic conditions. The thymol test appeared more sensitive in acute hepatitis and gave occasional positive results in cases of lipæmia. While the sulphate and thymol tests were frequently in ement, useful information was sometimes obtained by one of these tests. Thus for diagnostic purposes best results would be obtained by combining the tests.

lloidal-gold test.—Dr. M. A. Bundock and Dr. J. N. ɪɴɢs compared three methods of performing the ;e colloidal-gold test on cerebrospinal fluid (C.S.F.) arious diseases, with special reference to neuro- ilis. The techniques used were: (*a*) the standard te gold method with saline dilutions of C.S.F.; Iaclagan's six-tube method with buffered dilutions S.F.; and (*c*) Lange's method of 1939, in which gum ti is used to stop the reaction of a citrate gold with ered dilutions of C.S.F., and in which specially pre- d standards are used for colour-matching. Reason- good agreement between all three methods was onstrated in normal fluids and in those fluids showing minimal chemical abnormalities. Method (*a*) was vn to give a few midzone curves but these gave rise o difficulty in interpretation when considered with other findings. Method (*a*) was shown to parallel clinical findings in general paralysis and tabes er than method (*c*), and both methods (*a*) and (*c*) er than method (*b*). Method (*c*) was technically ıer difficult, and although useful for a laboratory ling with many C.S.F.s, it was not recommended for tine use in an ordinary clinical laboratory. Method (*a*) ıe standard technique—which gave most help to the ician and was reasonably accurate and relatively ple to perform, was recommended.

aper-partition chromatography.—Dr. C. Dent :ribed the technique and scope of paper-partition ɔmatography. Amino-acids could be demonstrated this technique and provisional identification made n the position they had taken along the strip. More ırate identification could be obtained if large squares in. by 22 in.) of filter-paper were used, two solvents ıg successively soaked along the paper at right- les to each other. He then described a rapid "mass- duction" method, using smaller squares, which ıld be more suitable for use in pathological labora- y practice. He also described the technique used him for the study of metabolism of radioactive terials; the presence of these on the paper chromato- ms could be revealed by pressing the paper against X-ray plate. Dr. Dent remarked that many other ɔstances, such as the steroids, would soon come within scope of the method; it was only a matter of time ore most laboratories would find it necessary to use per chromatography. Dr. Dent went on to discuss investigation of patients with Fanconi syndrome. four cases fully investigated there was severe aminoaciduria with normal amino-acid pattern in the blood, suggesting a low renal threshold for amino-acids. In these patients the blood-urea was normal and the inorganic phosphorus low—the opposite of findings in renal rickets. He had also studied seven cases of cystinuria by paper chromatography; and he had found, contrary to general opinion, no evidence that this was anything more than "renal cystinuria."

Adrenal cortical function.—Dr. F. T. G. Prunty discussed laboratory aids in the assessment of adrenal cortical function. The steroids encountered in the body as a result of adrenal cortical activity could be classified, partly on a chemical and partly on a functional basis, into three groups: (1) 11-oxygenated, (2) deoxycortone-like C_{21}, and (3) C_{19} steroids. Assessment of endogenous levels of these steroids depended on measuring secondary metabolic alterations and tissue responses in the body, or else on measuring urinary excretory products. These methods could be used under "resting conditions" for evaluating the spontaneous activity of the cortex. By stimulating the system with adrenaline or A.C.T.H., the capacity of the adrenal and of the pituitary to respond could be evaluated. This was particularly valuable in differentiating primary from secondary adrenal cortical failure, and in studying the capacity of the adrenal to respond to continued stimulation by A.C.T.H.—as, for instance, in recent problems connected with the therapeutic use of A.C.T.H. in collagen diseases. The influence of A.C.T.H. on the normal individual in lowering the blood lymphocytes and eosinophils was maximal four hours after the injection; the rise observed in polymorphonuclears was thought to be a less specific effect. The effect on eosinophils could be reproduced in patients with Addison's disease and normal individuals with 11, 17-hydroxycorticosterone.

Hypertension.—Prof. Dorothy Russell demonstrated in benign hypertension the arteriolar changes, which were non-fibrinoid, and the concentric fatty changes, which could be demonstrated in the arterioles by frozen-section techniques. She showed, in malignant hypertension, the typical medial hypertrophy, the reduplication of elastic tissue (elastosis), and the severe fibrinoid changes, and suggested that these changes could be very well seen in other organs such as the pancreas and the pons. She described the explosive necrotising arteritis, and the escape of fibrinoid material into the perivascular spaces and the resulting endarteritis fibrosa which is typical of malignant hypertension. Many cases were of mixed ætiology, malignant hypertension being superimposed on the benign form.

Embolism due to amniotic fluid.—Dr. C. W. Taylor (Birmingham) demonstrated the findings in a case of fatal maternal embolism due to amniotic fluid. It was important to examine the lungs of patients dying apparently from obstetric shock during, or soon after, delivery. The emboli were only seen on microscopy, and consisted of plugs of epithelial squames similar to those seen in the alveoli of infants who have attempted to breathe in utero.

A discussion on the ætiology of malignant hypertension was opened by Prof. G. W. Pickering. Dr. N. H. Ashton reviewed new methods for research and routine examination of the eye. Dr. K. S. Thompson (Birmingham) spoke on "adamantinoma," or squamous-cell carcinoma of long bones. Dr. G. R. Osborn (Derby) described his experience of the *Papanicolaou* method of cytodiagnosis as applied to the female genital tract. The last session was occupied by a symposium on the reconstruction of human remains, in which the speakers were Prof. J. D. Boyd, Dr. C. Keith Simpson, Dr. R. D. Teare, Dr. F. D. M. Hocking (Truro), and Dr. D. E. Price (Leeds).

". . . in London, the bare cost of living for a married manual worker, on a reasonable nutritional diet, lies between £6 5*s*. and £6 10*s*. a week—quite apart from such things as hire purchase commitments—and . . . for a 'white-collar' worker, even if he be favourably placed in respect to rent, the net income required to maintain his sort of life at the minimum lies between £9 and £11. . . ."—Aylmer Vallance, *New Statesman and Nation*, Feb. 11, 1950.

There was no reason to suppose that this factor operated in the cases reported here.

It is significant that the cases here suffered from oliguria, the diminution in urinary output paralleling the severity of the œdema. The present investigation suggests that this low urine-volume may be the cause rather than the result of water-retention.

SUMMARY

An antidiuretic substance has been found in the concentrated, non-dialysable fraction of urine from cases of nutritional œdema.

I am grateful to Prof. A. S. Ramachandra Iyer, of Madras Medical College; the Principal, of the college; and the physicians of the Government General Hospital, Madras, for the facilities extended to me. I also thank Dr. V. N. Patwardhan, director of the Nutrition Research Laboratories, Coonoor, for his helpful interest in the work.

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FOLD IN THE POSTERIOR VAGINAL WALL

IF two fingers are passed along the posterior vaginal wall, a loose transverse fold is sometimes found above the level of the upper edge of the levator muscles. At the level of this fold the rectovaginal is relatively patulous. The slackness of the vaginal in the fold is taken up when the bowel becomes distended with fæces; and the purpose of the fold may be to the vagina to stretch when the rectum becomes distended. The fold may not be present in multiparæ who have experienced extensive perineal lacerations, and it is invariably present in nulliparæ.

The fold does not seem to be mentioned in any of the medical literature with which we are acquainted. may have functions other than the one already mentioned and it seems strange that the fold is not invariably present in nulliparæ.

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Medical Societies

ASSOCIATION OF CLINICAL PATHOLOGISTS

THIS association's 43rd scientific meeting was held at Brighton, under the presidency of Dr. NORAH SCHUSTER, on Jan. 26–28.

Penicillin in exudates.—Dr. J. UNGAR (Greenford) compared the levels of penicillin in blood and inflamed tissues, and showed that after a single intramuscular injection penicillin could be detected in the tissue exudates for considerably longer periods than in blood. He regarded this selective accumulation of penicillin in exudates as one of the most important factors responsible for the therapeutic effects of single massive doses.

Antibiotics.—Prof. ROBERT CRUICKSHANK made a strong plea against the use of multiple "blunderbuss" therapy, and suggested that intelligent coöperation with the bacteriologist would nearly always show which drug should be used. With resistant staphylococci, the resistance might be only relative; larger doses would still be effective in many such infections. With chloramphenicol the laboratory tests were easy; but 'Aureomycin' presented difficulties as it was unstable, and no satisfactory method was yet available for routine work. In dealing with typhoid, drugs should be continued for at least fourteen days; the bacteria were inaccessible in the bile and their excretion could be maintained despite therapy. He spoke of the complications of vitamin-B deficiency following chloramphenicol therapy.

Toxoplasmosis.—Dr. A. MACDONALD (Liverpool) spoke of the value of the various laboratory procedures used in the diagnosis of toxoplasmosis, and said that the complement-fixation test was probably the most convenient for the ordinary laboratory. Sabin and Feldman's test for cytoplasm-modifying antibody was extremely sensitive but required the use of living parasites. The soluble egg antigen used for complement-fixation tests maintained its potency if kept frozen. In Liverpool they had found good general agreement between the results of different types of test. Examination of maternal and cord blood showed that transference of maternal antibody occurred, so in very young infants serological tests had to be interpreted with caution. While infection with toxoplasma was not so rare as had been thought, it was as well to remember that toxoplasmosis was only one of a number of conditions which could produce very similar clinical manifestations.

Pulmonary tuberculosis as a necropsy hazard.—Dr. STEWART SMITH (Exeter) drew attention to pulmonary tuberculosis as a necropsy hazard. There was much evidence that fresh post-mortem tissue was a ready source of tubercle bacilli for post-mortem attendants, medical students, and others. Prophylaxis should include routine Mantoux tests and periodic X-ray examinations, careful consideration of the hygiene of the post-mortem room, and limitation of the number of necropsies done on cases of proven tuberculosis. He suggested that this should be scheduled as an industrial disease. Prof. R. J. V. PULVERTAFT proposed that in addition ultraviolet light should be used for bactericidal effect, and that the air should be [illegible] Dr. A. H. T. ROBB-SMITH said that adequate ventilation, free use of 'Lysol,' adequate sterilisers, and the wearing of masks would also help to limit the [illegible]

Dextran and anti-Rh antibodies.—Dr. A. RICHARDSON JONES (Portsmouth) described his experiments with dextran as a potentiator of incomplete anti-Rh antibodies. This substance possessed a potentiating action but the commercial substance was unsatisfactory for routine laboratory use because it caused gross rouleaux formation of the test cells and it failed to potentiate all incomplete antibodies. This failure was thought to be related to dextran's polydisperse constitution. The potentiating property was due to a relatively narrow range of molecular size, and furthermore it seemed as though certain other molecules had an inhibitory effect. In an attempt to relate potentiating power to molecular size, Dr. Richardson Jones had undertaken the acetone fractionation of commercial dextran; and so far he had succeeded in producing a potent fraction which potentiated all incomplete antisera with which it had been tested. It caused no rouleaux and gave antibody titres closely comparable with those obtained by albumin potentiation. He felt that this fraction offered a substitute for bovine albumin in cross-matching for transfusion and in testing the serum of pregnant women for anti-Rh antibodies. Particular advantages of dextran were its chemical stability and its cheapness.

Monocytic leukæmia.—Dr. C. D. ANDERSON and Dr. G. B. ROBERTS (Glasgow) reported a case of monocytic leukæmia in a young girl with a typical leukæmic blood picture and a highly cellular leukæmic marrow. After treatment with urethane she developed staphylococcal pneumonia, which was successfully treated with penicillin; after this no abnormal cells were found in the peripheral blood and the total marrow picture returned to normal. Some weeks later numerous chloromas appeared and the patient died. At necropsy there was no evidence of diffuse leukæmia, but numerous chloromas were found.

Naphthalene poisoning.—Prof. D. F. CAPPELL and Dr. J. R. ANDERSON (Glasgow) presented a case of megalocytic anæmia with hyperplastic marrow of megaloblastic type in a girl of 17, admitted to hospital critically ill with profound anæmia. The early findings were indistinguishable from pernicious anæmia, but the gastric contents contained free hydrochloric acid. Despite treatment the patient died, and at necropsy the ileum showed a severe inflammatory lesion which

THE LANCET

LONDON: SATURDAY, FEB. 18, 1950

The Forgotten Swab

[HE tragic story of the surgical swab is told over 1 over again. year in and year out. before judge 1 coroner. It seems incredible that any highly .ined theatre team should not have a foolproof stem for such elementary book-keeping as "swabs nded out, swabs handed back." and it is high time at this part of the surgical house was put in order. be discarded first is the attitude of "it can't ppen to us." Any surgeon who has worn his gloves ig enough, and has operated in nursing-home eatres with an inferior staff or equipment, can recall her a personal accident of this sort or the removal of abs left by others. (This indeed was the comment a surgeon at an inquest last month.[1]) Though the dominal cavity is the largest. it is not the only nger area: swabs have been overlooked recently ring removal of a lumbar disc, and also in a hip .hroplasty, and vaginal packs are continually being gotten.

The surgeon always feels that he ought not to be ddled with responsibility for checking swabs: he s not the time to count every swab handed by the .ter before or during the operation, and thus he has rely on her word or nod. In Massachusetts. U.S.A.. rgeons are in fact absolved by law from all duty of ersight: but in the rest of the U.S.A. and in this untry responsibility for accidents is assessed by e courts according to the particular circumstances. roadly speaking, judges have held that the surgeon not to be blamed for leaving a swab in the abdominal .vity provided he has organised an efficient system r swab-counting and at the end of the operation is asked the nurse whether the count is complete. f he relies on the nurse to tell him, without being .ked, his defence is less satisfactory.) Provided he ıs made reasonable arrangements and has taken ıe precaution of asking, the court will probably hold m blameless, and the responsibility will shift to ıe nurse. In bringing an action for negligence. ıe patient's solicitor usually casts his net wide. cusing the surgeon, the nurse, and the hospital. the surgeon alone is found negligent. the hospital exonerated; for a hospital is not responsible for ıe professional acts of the duly qualified doctors ho work in it. If, on the other hand, the nurse is ound negligent, the hospital may have to pay, because he is an employee of the hospital, not professionally utonomous in the same way as a doctor. In an accusation of negligence the onus of proving that the surgeon (or other person concerned) has not exercised reasonable care and skill always rests on the plaintiff, unless the court takes the view that *res ipsa loquitur* (the facts speak for themselves), in which case the defendant has to prove that he *did* exercise reasonable care and skill. Where the object left in the abdominal cavity is an instrument rather than a swab, the court is more likely to say that it is for the surgeon to explain why he should not be deemed negligent.

Are there any measures which would make for greater safety? There certainly seem to be a number. Every theatre needs a swab-horse—that is, a numbered rack; to spread swabs on the theatre floor is a dirty habit. The swabs handed to the surgeon should be entered on a blackboard, for all to see. Often the anæsthetist's swabs are a source of confusion in the final count, and it is good practice to provide him with dyed swabs (usually they are green). Time and again the missing swab for which the surgeon. usually in irate mood. turns out the entire abdomen. is found to have been removed with the specimen: no swab should ever be taken out of the theatre during the operation. The layman, seeing a "large" swab for the first time in the coroner's court, will think that only the grossest carelessness could overlook it; but within the coils of the bowel, or tucked into Morison's pouch or the pelvis, it can form an astonishingly small lump. Miscounting of swabs in the original drum packing is another occasional cause of error. It is easy to say that no large swab could be left behind if the surgeon would spend a moment clipping a hæmostat to the attached tape-end; and this is of course the usual practice. But in the fury of a sudden vicious hæmorrhage or other emergency. the surgeon will often grasp the nearest forceps and allow the swab its head to roam. An excellent means of ensuring correct packing and checking is for large swabs to have numbered metal discs attached (say 1–10): on return to the checking nurse these disced swabs are placed on the appropriate numbered hooks. The metal discs are also valuable for X-ray purposes when there is any question of a swab having been left behind. Some surgeons limit themselves to a fixed number of swabs and count these themselves; but this habit distresses some theatre-sisters, and few surgeons care to be thus restricted. Others hold that the employment of gauze rolls is safer, but there is still the danger of cutting these and confusing the count; and each cut should be recorded numerically on the board. Once the abdominal cavity has been opened. no small swab has any place on the operating field; little swabs. like little boys, must not go near deep holes, and they should be presented to the surgeon only on holders. In some fields, however—for example, in cervical sympathectomy—a small-swab packet may have to be inserted for the control of sudden hæmorrhage. To check this—and indeed to check all swabs packed into any cavity—the floor nurse may assist by hanging large red discs on the horse, and removing them as the swabs come out.

Even with these aids, the surgeon must still keep his surgical reflexes in trim; as he starts to close the cavity out must come the words, "Are all swabs correct"? One surgeon, we hear, has had a red light attached to the swab-horse. and this stays on as a

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[1] *Lancet*, Feb. 4, p. 234.

Reviews of Books

Applied Medicine

G. E. BEAUMONT, M.A., D.M., F.R.C.P., physician to the Middlesex and Brompton Hospitals. London: J. & A. Churchill. 1950. Pp. 540. 30*s.*

IN this interesting and exciting book Dr. Beaumont uses a new technique for teaching medicine. The systematic description of disease gives way to the discussion of actual cases. Some are presented with fully documented histories; others are met at the bedside, with the questions and answers of a teaching round. As the findings are gradually revealed, the problems of diagnosis and treatment are tackled, with discussion of the interpretation of physical signs and of the significance of the actual investigations that have been used. The reader can thus follow the "working out" of the case and can also appreciate the problems that await the practising physician. All varieties of cases are presented; some common, others rare; some humorous, others tragic; some easy to diagnose, others very difficult. In a delightful manner, Dr. Beaumont manages to portray the fascination and excitement of medical practice. This is not applied, but living, medicine. The amount of information this volume contains is enormous, but this is no reference book—rather one to be kept by the bedside and read and reread. No student, practitioner, or even consultant could read it without gain and enjoyment. Many teachers of medicine will wish that they could have written such a book, but how few could have done so!

Sight, Light, and Efficiency

H. C. WESTON, director of group for research in occupational optics; secretary of the visions committee, Medical Research Council. London: H. K. Lewis. 1949. Pp. 308. 42*s.*

Mr. Weston is a physicist who has made a study of vision, especially as it concerns lighting and industrial needs, and his book is a useful exposition of the problem of eye fatigue in industry and how it may be overcome. Since it is intended for the industrialist, the opening chapter gives the elementary anatomy of the eye—accurate except that it confuses the posterior and the vitreous chamber. Chapters on the physiology of vision follow, and on the cause and symptoms of "eyestrain," better called "eye fatigue." (We do not speak of its counterparts in other organs as leg strain or brain strain, and so forth; and it is surely better to avoid a word which carries an idea of lasting damage.) In the chapters on lighting Mr. Weston is on his home ground and his exposition is excellent, but the same cannot be said about his section on eye disease produced by injury. It may be academically correct to say that the cornea is covered with conjunctiva, but this becomes confusing when ulcers and foreign bodies in the cornea have to be described as lying in the conjunctiva. Nor is it wise for a physicist to hazard too many opinions on medical prognosis, and not all his conclusions in this section can be accepted. Nevertheless, the book, taken as a whole, is a useful exposition of the subject and shows employers how, by better lighting in factories, they may increase efficiency and therefore production.

Normal Values in Clinical Medicine

F. WILLIAM SUNDERMAN, M.D., PH.D., professor of experimental medicine and clinical pathology, University of Texas postgraduate school of medicine; FREDERICK BOERNER, M.D., late associate professor of clinical bacteriology, graduate school of medicine, University of Pennsylvania. London and Philadelphia: W. B. Saunders. 1949. Pp. 845. 70*s.*

THIS book fills a gap that doctors often notice. The multiplicity of investigations nowadays demands frequent review of the "normal" standards on which conclusions must be based. It is indeed surprising how often the normal not only is difficult to discover in books but is in fact not accurately known. Dr. Sunderman and the late Dr. Boerner have collected data on a very large number of normal findings in almost all branches of clinical investigation. Their book is divided into sections according to the body systems, with a final section of miscellaneous information including food values, doses, and actuarial tables. The largest section, as would be expected, is that covering normal values in blood, extracellular fluids and lymph, though that on the cellular elements of the blood is little less important. The diversity of subjects is enormous, ranging from scalp hair counts in blond and black-haired subjects to normals in electrocardiography, œstrogen determinations, and anatomy.

The value of this book to those who have to assess findings in the sick is obvious. It also emphasises the importance of having accurate figures for the normal range before speaking of the abnormal. Both doctors and students will be grateful for the ready help it can give them.

Bronchologie

Technique endoscopique et pathologie trachéo-bronchique. ANDRÉ SOULAS; P. MONNIER-KUHN. Paris: [illegible] 1949. Pp. 653. Fr. 4000.

IN this massive work the authors have set out to describe in detail the ranges and uses of bronchoscopy. In this they are helped by admirable production (though the cover is of paper) and more than 300 illustrations together with more than 20 excellent colour plates illustrating bronchoscopic appearances and histology. In describing the technique perhaps too much detail is given, since individual variations in instrumentation and anæsthetic are almost too numerous to be mentioned. On some minor points the opinions presented are open to dispute—e.g., the risks of general anæsthesia in bronchoscopy and the condemnation of the cricothyroid route in bronchography. The description of bronchial anatomy and segmental distribution is a full one, with which there will be agreement in general though the terminology used will add further confusion to a nomenclature already well confused. The removal of all types of foreign body through the bronchoscope is described at length; but little favourable is said about the open operation, which also has a place. Possibly the best descriptive chapters are concerned with tracheobronchial tuberculosis and growths. The authors hold the balance fairly between endoscopy and more major surgery, as they do also in dealing with lung abscess.

The book has just stopped short of becoming a comprehensive volume on chest medicine and surgery, for it successfully follows every path that the bronchi [illegible] for exploring a very wide field.

Stedman's Medical Dictionary (17th ed. London: *Baillière, Tindall, and Cox. 1950. Pp. 1361.* 65*s.*)—Dr. N. [illegible] Taylor and Mr. A. E. Taylor have revised this good dictionary, adding new words and diagrammatic chemical formulæ, and cutting out dead wood even to the extent of dropping the word "Practical" from the title. No new trade names have been added, and most of those in the previous edition have been excluded. A new feature is the inclusion of [illegible] biographical sketches. The net result is an addition of seventy pages.

Bridges' Dietetics for the Clinician (5th ed. London: Henry Kimpton. 1949. Pp. 898. 60*s.*).—Americans have taken dietetics to their hearts. This is the third major work on dietetics, published in the United States, which has reached its fifth edition in the last year or two. Edited by Dr. Har[illegible] Johnson, it differs from the other two in that *it is a* symposium, and it has all the advantages and disadvantages of that mode of treatment. It is noteworthy that [illegible] surgeons are interested in the *preoperative* and postoperative diets of their patients—a welcome innovation. The book can be recommended to all concerned with the diet of the sick; it is a mine of *information*. One amusing fact is that the *administration of large* doses (50–100 mg. twice daily) of thiamine makes one distasteful to fleas and mosquitoes; another that poisoning from arsenic, derived from fruit sprays, is not at all uncommon, and that the only foods free from arsenic in New York City are milk and bananas. The section on *the classification* and structure of foods, however, is surprisingly out of date for an American publication. It was not, of course, to be expected that vitamin B_{12} would be noted, but on the subject of phytates the book is ten years behind the times. This may have small practical importance in the U.S.A., but it may matter considerably in [illegible] where the calcium intake is *marginal or too low.*

sists on a thorough grounding in the general sciences fore and during the period of technological training the university laboratories and industrial workops. But the effort to provide true education can arcely be maintained if the Government yield to ose who urge that the universities should expand eir departments rapidly in order to accommodate ainees in technology. Already, the University rants Committee notes,[4] the number of students the departments of applied science has risen from 288 in 1938–39 to 10,916 at the present time. Further, ere are other means by which technological struction can be given. Already there are five ational training colleges—for aeronautics, instruent-making, foundry work, heating and ventilation, nd rubber technology—and compared with the ifficulties of enlarging our older universities without arming them the problem of providing more State echnological colleges seems almost simple. Meanhile, much closer coöperation could be achieved etween the universities and the technical colleges, nd collaboration would be made easier if the senior niversity staff were relieved of some of the burden of outine teaching and administration, and if research nits in the technical colleges of our university towns ere more generously equipped. There is a happy recedent for close liaison in Manchester, where the echnical college constitutes the faculty of technology n the university, and in Glasgow, where staff and tudents in the departments of architecture and of harmacy move freely between university and echnical college.

Yet another approach to technological development s revealed in the publication of a *Handbook of Departnents in the University of Edinburgh related to Industry.*[5] The purpose of this booklet is explained in the preface y Mr. E. P. Hudson, convener of the university's ndustrial liaison committee :

> "There is scope for making better known in industrial circles the names, achievements and particular interests of the many university men and women whose work in teaching and research will, we can be sure, contribute in full measure to the advancement of knowledge and thus have an influence on current and future industrial techniques and practices."

Sir Edward Appleton, F.R.S., principal of the university, in a foreword, urges that those who conduct scientific research "must be free to seek understanding of natural phenomena without having constantly to justify their efforts by utilitarian results." But he goes on : "If a university is to remain a real force in the world it cannot remain aloof from the practical problems which face mankind ; and, in so far as such problems are scientific and industrial, our university workers can often make suggestions for their solution. They can also, with immediate advantage both to Science and to Industry, conduct what may be called objective fundamental research of a basic character." This example of the national genius for compromise, coming from a distinguished scientist, deserves attention from all who guide the destiny of this country or who decide the pattern of our educational system.

Wound Infection in the Factory

Wound infection has long been a major hazard of wars. The experience in 1939–45 confirmed earlier impressions that much of this infection occurs after the patient has reached hospital and is largely due to the accessibility of open wounds to pyogenic bacteria, particularly *Strep. pyogenes*, derived from already infected cases in the wards. The modes of spread and means of control of this type of hospital infection were extensively studied in the late war ; but the no-touch technique, dust control, and other measures advocated achieved little compared with the radical change in the whole picture which followed the general introduction of penicillin.

In peace-time, infection of wounds attracts little attention in hospital practice, though the outpatient surgeon has to deal with the disabilities left as its aftermath. In industry, however, infected injuries are a significant cause of sickness absenteeism leading to the loss of about a million working days every year. In one light-engineering factory, 27% of the injuries that kept men away from work for more than three days were infected wounds, though only 1–2% of the trivial wounds which 6–8% of the employees sustained each day became septic. Most of the septic wounds seen in the hospital casualty department have followed injuries that at first seemed so trivial as not to call for any immediate treatment. These data emerge from an investigation of wound infection by a Medical Research Council unit established in 1942 under the direction of Dr. R. E. O. Williams and Dr. A. A. Miles, at the Birmingham Accident Hospital, where large numbers of industrial wounds can be studied under conditions likely to yield reliable information in the shortest possible time. The report[1] on the first three years' work adds much to our knowledge of the bacteriology of infected wounds, particularly in regard to the frequency, sources, and control of infections with the two commonest pyogenic cocci, *Staph. aureus* and *Strep. pyogenes*. The greater part of the report deals with the results of a study of 2300 small wounds classified in three groups—minor lacerations of the hands and forearms; compound fractures of terminal phalanges of fingers, and small skin wounds treated in factory surgeries—and observed and treated within 6–8 hours of the injury. It was first determined that *Staph. aureus* was present, often in pure culture, in 80–90% and *Strep. pyogenes* in 20–25% of septic wounds. These wounds might have been infected at the time of injury or later, and the infecting organism could have been derived from the patient himself (self-infection) or from an outside source (cross-infection). Earlier findings had indicated that hæmolytic streptococci were usually "added" to the lesion from an exogenous source, but with staphylococci the source seemed most often to be the patient himself. Thus coagulase-positive staphylococci were found in the noses of about half of 1000 normal adults, while the proportion who were carrying the organism on their skin varied from 20 to 50%, according to the area of skin sampled and the cultural methods used. Skin carriage was related to, and dependent on, nose carriage, and it has since been useful reminder; he can then end the operation with the request "red light off." In a few hospitals the theatre-sister keeps a book in which the names of the swab-checking nurses are entered. This does not imply legal responsibility, but it impresses them with the importance of their duties.

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[4] A Note on Technology in Universities. H.M. Stationery Office, 1950. Pp. 7. 4*d.*

[5] Published for the University Industrial Liaison Committee by James Thin, 55, South Bridge, Edinburgh, 1949. Pp. 57.

[1] Infection and Sepsis in Industrial Wounds of the Hands. *Spec Rep. Ser. med. Res. Coun., Lond.* no. 266. H.M. Stationery Office, 1949.

That an instrument such as a forceps should be left within the abdomen seems to the layman almost beyond belief; but with profuse bleeding from a ruptured ectopic gestation this mishap is easily imaginable. The forceps left behind in a case reported a week or two ago[2] was a small one; and small forceps should never be used in a pelvic operation. It must be admitted that in many hospitals the instrument-count receives scant attention: often, because of the shortage of instruments, particularly hæmostats, the sister hands over some of them for re-sterilisation before the operation is finished. Moreover, few hospitals keep a list of the instruments set out in each particular operation. These are hazards to which the attention of the theatre-sister might be drawn.

The mood of the theatre is usually set by the surgeon. If he is casual in his discipline and wayward in his own precautions, then these avoidable tragedies will continue and he must bear part at least of the responsibility. Nobody knows better than the surgeon that "he is most safe from danger who, even when safe, is on his guard"—*caret periculo, qui etiam tutus cavet*. Perhaps this is a slogan worth putting on the swab-horse. Another is "It may happen to me!"

The Universities and Industry

BY and large our universities have little to fear from the most searching scrutiny, and there is no lack of spokesmen to justify the academic way of life. Sir JOHN ANDERSON[3] lately referred to the functions of a university as "Clinging tenaciously to what is vital—the conservation of knowledge, its interpretation, a vigorous and sustained effort to enlarge its boundaries, and the training of those who will carry aloft the torch of learning as generation succeeds generation." Thus the universities should above all be the guardians of the spirit of man, the spirit that lived in the heart of GOETHE, PASCAL, and SHAKESPEARE. This duty implies that whatever other concessions they make to expediency they must defend the ideals and standards of personal and intellectual freedom which belong to our English heritage. But MILTON spurned "the fugitive and cloistered virtue, unexercised and unbreathed, that never sallies out and sees her adversary"; and neither high principle nor the pursuit of knowledge for its own sake can justify a policy of reaction and of indifference to the unprecedented perils which now beset mankind. The accepted distinction between thinkers and dreamers on the one hand and men of action on the other does not imply that they are necessarily antagonists. In a vital nation there must be a heterogeneous pattern of interests and behaviour. Science, no less than philosophy and religion, has its eternal verities, and, however spectacular may be the superstructure built on these foundations, to neglect them is to invite chaos.

Pure and applied science owe an enormous debt t one another. But there will always be those who te the basic sciences without the slightest regard f utility, and rightly so. Is anything to be gained (lost) by their living cheek by jowl with others wh pursue applied science as it concerns the industrial the shopkeeper, and the housewife? This questi raises important issues, even apart from geograph or architectural considerations. Boys and girls school are inclined to regard the universities as insti tions which provide degrees and diplomas entitling th holders to "good jobs." Furthermore, recent correspondence in the *Times* has revealed a weight of opinion in favour of placing on the universities resp sibility for technological training. Admittedly, th can be no doubt about the need for developing o technological resources: the Barlow report, wh emphasised the urgent need for more technicians a scientists, has received corroboration from many o our most eminent directors of scientific resea "We need first-rate technologists most desperately i order to regain our prosperity," said Sir LAWRE BRAGG, F.R.S., at the Annual Conference of th Universities of Great Britain and Ireland; and Lo CHERWELL wrote in the *Times* of Dec. 9: "Un people in Britain can be . . . brought to appreciate th value of technical education in the broadest se there is little hope of our recapturing the indus leadership on which our primacy in the nineteenth century was founded." Nobody will deny th prompt and vigorous action is required to these alarming deficiencies, and it is nat industrialists and others should look first to th universities for the development of high-grade techno-logy. But there are serious objections to any pl which might eventually convert our universities in gigantic technical institutions of the types that alread exist in the U.S.A. and on the Continent. It is o thing to take a university course in the humaniti or in general science as a preliminary to specialisat in technology; it is quite another to go to th university for a highly specialised technological cour as a preparation for a routine job in industry or in scientific research department. Such a plan wo inevitably swamp our universities with students o technology and would eventually relegate the ancie faculties to some dim annexe of the university facto

What then is the true function of a university the report of the University Grants Committee 1935–47 (p. 60) we read:

> ". . . a University would in our view fail of essential purpose if it did not, by some means or oth contrive to combine its vocational functions with t provision of a broad humanistic culture and a suit tough intellectual discipline. Nearly all the Gov ment Reports . . . have emphasised the point that special kinds of professional or technological tra with which they are concerned should include as t basis the study of broad underlying principles this should be the distinguishing mark of a univ

In the training of a doctor this objective has bee achieved to some extent—though by no mea adequately. The study of biology, chemistry, phy anatomy, physiology, biochemistry, and pharmaco-logy should, in theory, provide ample opportunity fo instilling general principles before strictly vocation training in the practice of medicine begins in the thir or fourth year. Similarly the faculty of engineerin ure that it can be properly done only by someone h medical training, his remuneration should be nparable to that of any colleague of similar skill and niority elsewhere in the medical service? In our xiety to see that the clinician did not find himself bservient to the medical administrator, may we not ve allowed the pendulum to swing too far, with the ult that senior administrative posts in the hospital d public-health service, many of them filled by men considerable clinical experience, are now the least well id of all? It is possible that current negotiations may nedy this; though the refusal of the Treasury last ek to agree to the salary increases proposed for vernment medical officers does not encourage optimism. Clearly, until this happens, any decision to pay the est physician partly as a clinician and partly as an ministrator must reduce the attractiveness of the ecialty and make it harder to recruit to the service e men of foresight and ability needed if this foremost disabling diseases is to be brought, and kept, under ntrol.

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[2] Ranson, E. T., Blumenfeld, M. *Ibid*, Jan. 28, p. 159.
[3] *Times*, Nov. 26, 1949, p. 2.

ON WASHING THE DISHES

THERE are few of us who are not now adepts at the tchen sink; we have not even the privilege of grand- ther's butler who condescended to deal only with the ss, silverware, and cutlery, sending the greasy plates the kitchen for some lesser minion to cleanse. Today ost of us are prepared not only to wash the plates and plements from the dining-room table but to furbish pots and pans and the roasting tin as well. We have n learned the correct technique whereby glassware, er, side-plates, pudding plates, cutlery, and meat tes follow in due order lest the grease from the last-med contaminates the lustre of the first. The work is t arduous; the company of a congenial dryer makes it asant enough, though it wastes a lot of time. Never-less we have become a population at risk, for sink-rk has hazards that lurk in the sodium carbonate or her detergent which so many of us splash all too vishly into the washing-up water.

Dermatitis of the hands due to sensitisation to deter- nt solutions is one form of "housewife's dermatitis." ost dermatologists agree that this malady is now more ten seen in outpatient departments and in private actice than before the war; but they are uncertain hether the increase is more apparent than real—hether, in fact, they are seeing more cases only because any more of the population are now at risk, while the orbidity-rate really is about the same. They speak of he hazards of "green labour," which is an unflattering ethod of referring to those whose delicate skins have ot been inured by experience to the risks to which hey are exposed. The more erudite have been heard to iscuss the effect of a low-protein and low-fat diet on the efence mechanisms of the body.

Be this as it may, certain matters undoubtedly deserve ttention. The first is that all household detergents tend o remove the natural greases from the surface of the skin; and, as these are necessary for the integrity of the horny layer, frequent exposure to them—particularly f they are used in unnecessarily high concentrations—may easily make the epidermis vulnerable so that sensitisation can occur. Accordingly the concentration of detergent in the water should be minimal. As to the nature of the detergent used, it would be invidious for us to recommend one we believe to be the safest. Let each try for himself; he can soon discover which detergents leave the hands dry, uncomfortable, and chapped, and those which perform their function adequately yet with little harm. In addition a good deal may be done to protect the hands. Rubber gloves of the usual household variety are seldom satisfactory, for not only are they easily punctured, so that the solution seeps into the interior and forms a poultice, thus enhancing the wearer's risk, but the skin becomes sodden with sweat, while the breakage rate of the crockery rises. Probably it is better to keep a tube of lanolin at the sink and apply this before and after washing up; being made of mammalian sebum it helps considerably to reinforce the natural defences of the skin. Recently a barrier cream of the invisible glove type, which presumably has a sodium alginate base, has become available to the public; it has many advocates. To do its work properly, a barrier cream must be applied carefully, particularly to the vulnerable areas, the backs of the webs and the backs and sides of the fingers, before the hands are immersed. Less efficacious, but none the less satisfactory, is a suitable cold cream kept at the bedside and applied last thing at night. A good one with an old-fashioned formula is made by emulsifying beeswax (8%), spermaceti (16%), and almond oil (56%), with borax (1%) in rose water.

If, despite these precautions, dermatitis develops, it is inadvisable immediately to presume that washing up is the cause of the trouble. A list of all the hazards to which one is exposed should be made, not forgetting that the antiseptics and even the spirit used in our profession are all sensitisers. By avoiding exposure to all irritants, and by using the usual remedies such as calamine lotion during the acute stage, with zinc cream or zinc and castor-oil ointment later, the average attack of dermatitis may be mastered in about three weeks. Then comes the time to make tests. The full routine of patch-testing may be employed, but it is usually less troublesome to immerse a little finger in a warm solution of the suspected detergent for one minute: if one is sensitised, a recurrence of the eruption is likely to follow within 24 hours. Thereafter one has only to avoid that detergent, or any other which has chemical affinities with it, and all will be well; but it is worth remembering that if one's skin becomes allergic to any detergent, polyvalent sensitivities to many similar hazards may readily be acquired; and for a while it will be best to confine one's domestic activities to the less hazardous job of drying.

THE PRESENT STATUS OF AUREOMYCIN

IN the eighteen months since 'Aureomycin' was introduced by Duggar in the U.S.A. about a hundred papers on it have been published. It is unfortunate that lack of dollars is limiting supplies in this country, though the shortage at least ensures that the drug is used only in carefully planned trials or for the established indications. The American experience suggests that aureomycin will be one of the most valuable antibiotics in general medicine. Its range of activity is wider than that of any other antibiotic; it is effective against many gram-positive and gram-negative bacteria, and also against rickettsias, spirochætes, and even some viruses; it can be given by mouth; and it has been judged practically free from side-effects, the only troublesome ones reported being nausea and vomiting, sometimes with epigastric distress and a burning feeling in the rectum. However, Harris[1] reports rapidly developing mucous-membrane changes in many female patients, attributed to vitamin-B deficiency through destruction of intestinal bacteria—a complication also associated with administration of chloramphenicol. As a rule patients who cannot tolerate aureomycin by mouth experience no unpleasant effects when it is given intravenously. Owing to its bacteriostatic action on the bacteria of the gut, one peculiar effect of the drug is to produce soft and almost odourless stools. When given by mouth aureomycin is absorbed into the general circulation and is only slowly excreted: a dose of 0·5–1 g. will maintain an effective blood-level for about six hours. From the blood the drug is distributed to all the body-fluids and tissues, including the urine, cerebrospinal fluid, pleural fluid, and bile, and it also reaches the fœtus in utero via the placenta.

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1. Harris, H. J. *J. Amer. med. Ass.* 1950, 142, 161.

shown that elimination of staphylococci from the nose is often followed by disappearance of the organism from the skin.[2] *Strep. pyogenes* was found in an average of 11·7% of outpatients' throats (the seasonal rate fluctuated considerably over 2½ years) and on the skin of only 0·4% (6 out of 1630). The opportunity for self-infection should therefore be much greater with staphylococci than with streptococci, and in fact it was found that whereas 20% of wounds yielded *Staph. aureus* within 6–8 hours of the accident, the proportion was 26·6–53·2% in patients who were skin carriers of the organism but only 6·9–14·8% in those who were not. The proportion of wounds contaminated with staphylococci was as high in the first hour after the injury as in each of the successive 5 hours, and the staphylococcus found in the wound was often of the same phage-type as that on the skin. There was very little likelihood of the wound being contaminated from machinery and the like. Some three-quarters of all the wounds healed without any clinical signs of infection. *Staph. aureus* was isolated from a third of these healthy-looking wounds, whereas pyogenic cocci were absent from nearly half of the wounds that looked inflamed, from a quarter of the ones classed as mildly septic, and from 5% of the grossly septic wounds. In this last group there was evidence again that 50–60% of the staphylococcal infections were derived from staphylococci present on the patient's skin at the time of injury, but this conclusion does not invalidate the recent evidence that staphylococcal cross-infection is common in hospital wards. Very few of the streptococcal infections were derived from the patient. Clinically and bacteriologically clean wounds had a mean healing-time of 16·1 days, obviously septic wounds healed in 31·5 days, and wounds which were bacteriologically but not clinically infected healed rather more slowly than the first group, partly because some of them became infected during the delayed healing.

Prevention of wound infection may be tackled in a variety of ways. Improvement in dressing technique, particularly when accompanied by improvements in the design of the dressing-station, has strikingly reduced the streptococcal infections, which are most often exogenous, and probably also reduces staphylococcal infections to some extent. Thorough cleansing of the wound with a detergent like cetrimide was found to reduce the infection-rate in the Birmingham study, and repeated applications of sulphathiazole-proflavine powder did the same, whereas a single application of penicillin powder was ineffective. The use of occlusive waterproof dressings did not prevent staphylococcal infection or accelerate healing. On the other hand, in this issue Dr. **Schilling** and his colleagues report encouraging results with the 'Nylon' dressing recommended by **Bull** and others.[3] The advantages of this over the ordinary occlusive dressing are that its permeability to water vapour prevents the skin from becoming sodden, the "window" allows healing to be watched by both patient and nurse, and infrequent changing of the dressing saves time. However, **Williams** and **Miles** have shown that wounds may be potentially infected before any dressing is applied and that only a small proportion of septic wounds receive medical attention before the sepsis develops. Prophylactic measures should include efforts to prevent the minor injuries from metallic filings and the like (swarf) now common in engineering factories, and attempts to prevent skin carriage of staphylococci in workpeople by attacking the nasal reservoir or the skin itself with a suitable antiseptic ointment.

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[2] Moss, B., Squire, J. R., Topley, E., Johnston, C. M. *Lancet*, 1948, i, 320.

[3] Bull, J. P., Squire, J. R., Topley, E. *Ibid*, ii, 213.

Annotations

THE CHEST PHYSICIAN

Commenting a few weeks ago on the correspondence about control of tuberculosis, we suggested[1] that the fight against this disease should be given a larger share of medical resources than it is now getting. We said that:

> "Anyone coming to this problem with fresh eyes and an unperverted sense of proportion would certainly demand that priority for tuberculosis should be raised, that waiting-lists should be abolished at once by admitting patients to infectious-diseases and general hospitals, and that the complementary domiciliary service should be developed and used for its proper purpose—as a means of giving efficient and economical care to patients who have been made non-infective."

Such a policy clearly requires a cadre of first-class clinicians in control of the chest clinics, to ensure early diagnosis, wise care before the admission to hospital, and the best use of the domiciliary services when the patient returns home.

Before the National Health Service was introduced, the work of the tuberculosis officer, despite its importance, was generally unattractive both in status and remuneration. The transfer of the chest clinics to the regional boards and their incorporation in the hospital service raised the hope that in future this work would compete on equal terms with other branches of medicine, and this hope seemed to approach fulfilment when many of the experienced men in charge of the clinics were graded as consultants. But evidently the rejoicing was premature; for the Ministry of Health has now decided that a chest physician can be recognised and paid as a consultant only during the hours he is working for the regional hospital board: for the portion of his work concerned with prevention and aftercare he rates as an assistant to the medical officer of health, and must be paid a commensurately lower salary. This decision drew an indignant letter from Dr. Toussaint in our last issue and he is supported this week.

It is both difficult and unprofitable to draw a dividing line between the preventive and curative parts of any clinician's work: always the one merges into and supplements the other. In no specialty is this truer than in tuberculosis, where the preventive and the therapeutic sides cannot be separated. Neither is more important than the other; neither can be effective alone; each demands high clinical ability; and neither could be undertaken except by a doctor, and one well grounded in the specialty. Yet it is now suggested that for an empirically determined portion of his time the chest physician shall be paid at a cut rate. It is true that for the better conduct of his duties in prevention and aftercare he needs the cooperation of social workers, and that the Act leaves the responsibility for organising and conducting this section of the service with the local health authority. But even though the physician is one of the servants of the local authority for this moiety of his duties, he is none the less a clinician and should be regarded as such, and not as an administrative officer of lower grade.

Should we not in fact go further, and say that whenever a doctor is doing administrative work of such a nature that it can be properly done only by someone with medical training, his remuneration should be comparable to that of any colleague of similar skill and seniority elsewhere in the medical service? In our anxiety to see that the clinician did not find himself subservient to the medical administrator, may we not have allowed the pendulum to swing too far, with the result that senior administrative posts in the hospital and public-health service, many of them filled by men of considerable clinical experience, are now the least well paid of all? It is possible that current negotiations may remedy this; though the refusal of the Treasury last week to agree to the salary increases proposed for Government medical officers does not encourage optimism.

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[1] *Lancet*, 1949, ii, 1225.

Clearly, until this happens, any decision to pay the chest physician partly as a clinician and partly as an administrator must reduce the attractiveness of the specialty and make it harder to recruit to the service the men of foresight and ability needed if this foremost of disabling diseases is to be brought, and kept, under control.

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Dermatitis of the hands due to sensitisation to detergent solutions is one form of "housewife's dermatitis." Most dermatologists agree that this malady is now more often seen in outpatient departments and in private practice than before the war; but they are uncertain whether the increase is more apparent than real—whether, in fact, they are seeing more cases only because many more of the population are now at risk, while the morbidity-rate really is about the same. They speak of the hazards of "green labour," which is an unflattering method of referring to those whose delicate skins have not been inured by experience to the risks to which they are exposed. The more erudite have been heard to discuss the effect of a low-protein and low-fat diet on the defence mechanisms of the body.

Be this as it may, certain matters undoubtedly deserve attention. The first is that all household detergents tend to remove the natural greases from the surface of the skin; and, as these are necessary for the integrity of the horny layer, frequent exposure to them—particularly if they are used in unnecessarily high concentrations—may easily make the epidermis vulnerable so that sensitisation can occur. Accordingly the concentration of detergent in the water should be minimal. As to the nature of the detergent used, it would be invidious for us to recommend one we believe to be the safest. Let each try for himself; he can soon discover which detergents leave the hands dry, uncomfortable, and chapped, and those which perform their function adequately yet with little harm. In addition a good deal may be done to protect the hands. Rubber gloves of the usual household variety are seldom satisfactory, for not only are they easily punctured, so that the solution seeps into the interior and forms a poultice, thus enhancing the wearer's risk, but the skin becomes sodden with sweat, while the breakage rate of the crockery rises. Probably it is better to keep a tube of lanolin at the sink and apply this before and after washing up; being made of mammalian sebum it helps considerably to reinforce the natural defences of the skin. Recently a barrier cream of the invisible glove type, which presumably has a sodium alginate base, has become available to the public; it has many advocates. To do its work properly, a barrier cream must be applied carefully, particularly to the vulnerable areas, the backs of the webs and the backs and sides of the fingers, before the hands are immersed. Less efficacious, but none the less satisfactory, is a suitable cold cream kept at the bedside and applied last thing at night. A good one with an old-fashioned formula is made by emulsifying beeswax (8%), spermaceti (16%), and almond oil (56%), with borax (1%) in rose water.

If, despite these precautions, dermatitis develops, it is inadvisable immediately to presume that washing up is the cause of the trouble. A list of all the hazards to which one is exposed should be made, not forgetting that the antiseptics and even the spirit used in our profession are all sensitisers. By avoiding exposure to all irritants, and by using the usual remedies such as calamine lotion during the acute stage, with zinc cream or zinc and castor-oil ointment later, the average attack of dermatitis may be mastered in about three weeks. Then comes the time to make tests. The full routine of patch-testing may be employed, but it is usually less troublesome to immerse a little finger in a warm solution of the suspected detergent for one minute: if one is sensitised, a recurrence of the eruption is likely to follow within 24 hours. Thereafter one has only to avoid that detergent, or any other which has chemical affinities with it, and all will be well; but it is worth remembering that if one's skin becomes allergic to any detergent, polyvalent sensitivities to many similar hazards may readily be acquired; and for a while it will be best to confine one's domestic activities to the less hazardous job of drying.

THE PRESENT STATUS OF AUREOMYCIN

IN the eighteen months since 'Aureomycin' was introduced by Duggar in the U.S.A. about a hundred papers on it have been published. It is unfortunate that lack of dollars is limiting supplies in this country, though the shortage at least ensures that the drug is used only in carefully planned trials or for the established indications. The American experience suggests that aureomycin will be one of the most valuable antibiotics in general medicine. Its range of activity is wider than that of any other antibiotic; it is effective against many gram-positive and gram-negative bacteria, and also against rickettsias, spirochætes, and even some viruses; it can be given by mouth; and it has been judged practically free from side-effects, the only troublesome ones reported being nausea and vomiting, sometimes with epigastric distress and a burning feeling in the rectum. However, Harris [1] reports rapidly developing mucous-membrane changes in many female patients, attributed to vitamin-B deficiency through destruction of intestinal bacteria—a complication also associated with administration of chloramphenicol. As a rule patients who cannot tolerate aureomycin by mouth experience no unpleasant effects when it is given intravenously. Owing to its bacteriostatic action on the bacteria of the gut, one peculiar effect of the drug is to produce soft and almost odourless stools. When given by mouth aureomycin is absorbed into the general circulation and is only slowly excreted: a dose of 0·5–1 g. will maintain an effective blood-level for about six hours. From the blood the drug is distributed to all the body-fluids and tissues, including the urine, cerebrospinal fluid, pleural fluid, and bile, and it also reaches the fœtus in utero via the placenta.

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[1] Harris, H. J. *J. Amer. med. Ass.* 1950, 142, 161.

Many gram-positive bacterial infections have responded favourably to aureomycin even where the strains were resistant to penicillin and streptomycin. So far there is no evidence that aureomycin-sensitive organisms can become resistant. The drug has proved effective in bacterial pneumonias, including those due to pneumococci, staphylococci, streptococci, and *H. influenzæ*, and in meningococcal infections. Superficial staphylococcal infections, staphylococcal bacteræmia, osteomyelitis, and infections complicating leukæmia and other blood dyscrasias have been successfully treated. Experimental studies show that aureomycin is active against β-hæmolytic streptococci and also against *Strep. fæcalis*: in subacute bacterial endocarditis due to *Strep. fæcalis* or streptococci of the viridans group it is particularly useful when penicillin or streptomycin have been ineffective. Gonorrhœa responds to aureomycin, but the drug of choice in this infection is still penicillin. Like chloramphenicol, aureomycin seems to cut short the acute stage of whooping-cough, and if this is confirmed we shall have a choice of two remedies, both effective by mouth, and these may control the disease more surely and conveniently than prophylactic vaccination: time will show. Typhoid and other salmonella infections have not responded dramatically to aureomycin, but it is highly effective against *Bact. coli* and the clostridia, and so is valuable in general peritonitis following appendicitis or perforated ulcer. It looks like having a definite place in the treatment of urinary infections due to *Bact. coli*, *Strep. fæcalis*, *Bact. ærogenes*, and staphylococci, and it is most effective in acid urine. *Proteus vulgaris* and *Ps. pyocyanea* are resistant. Non-specific urethritis responds to the drug, the pleuropneumonia organisms disappearing rapidly from the urethral discharge; and the other bacterial infections that respond include tularæmia, brucellosis, anthrax, and bacteroides infections. Because of its greater activity by mouth, aureomycin may supplant penicillin in the prophylaxis of rheumatic fever. It also has a place with penicillin in the preoperative management of patients with organic heart lesions, for the prevention of bacterial endocarditis.

The value of aureomycin in some virus and rickettsial infections is beyond dispute. It produces rapid improvement in lymphogranuloma inguinale; and so far, after six months or so, no relapses have been observed.[2] In primary atypical (viral) pneumonia clinical improvement often occurs within 24 hours and fever subsides in 12–48 hours. Acute bronchiolitis or pneumonitis of infants, which is also probably a viral infection, responds to aureomycin better than to any other antibiotic or chemotherapeutic agent. Since aureomycin is effective n the treatment of the bacterial as well as the nonbacterial pneumonias, it is probably the drug of choice whenever a case of pneumonia has to be treated without aboratory facilities. Its first trial in herpes zoster has been dramatically successful.[3] The virus of psittacosis is ensitive to aureomycin, but human cases are so rare hat its effect on the clinical course of the disease is not known. Some cases of infective mononucleosis have shown a favourable response to aureomycin, but the rug is without effect in poliomyelitis, influenza, and the ommon cold. Information on its value in variola and accinia is scanty; but it is not expected to be of value n these and other conditions caused by small viruses. ts action against rickettsial infections has now been learly demonstrated in human Rocky Mountain spotted fever, epidemic typhus, murine typhus, Q fever, and rickettsial pox.

Certain ocular infections appear to respond to aureomycin given locally and by mouth. These include onjunctivitis due to various organisms and inclusion bodies, dendritic ulcers, superficial punctate keratitis, epidemic keratoconjunctivitis, and trachoma. Aureomycin is active against the spirochætes of relapsing fever (*Borrelia novyi*), leptospirosis (*Leptospira icterohæmorrhagiæ*), and syphilis, in which its use is still experimental, although one recent report indicates that in neurosyphilis it may be superior to penicillin.

This list is certainly impressive. With penicillin, streptomycin, and aureomycin at our command, there are now very few infections that cannot be controlled.

INFIRM AND OLD

MANY of our old people, though perhaps a little slower in their movements, are as active as the rest of us and enjoy looking after themselves and an occasional grandchild. Others are unfortunately helpless and bedridden. But between these two fairly clear-cut groups there are many who waver between health and sickness, and who need some help to tide them over the days when they do not feel so well. Like Scott's minstrel, they still enjoy the music but they need a boy to carry the harp. At present their needs are apt to be neglected, for when they are ill the people who look after them under the National Health Service are not the same people as those who help them under the National Assistance Act when they are well. The National Corporation for the Care of Old People[1] have therefore decided next year to pay special attention to the needs of the infirm and old. From the £1 million which the people of South Africa have given this country they have been asked to distribute £170,000, and they are to use this money to establish rest homes. For this purpose £50,000 has already been given to the government of Northern Ireland, and a small home has been opened near Glasgow for whose maintenance the regional hospital board has accepted responsibility; but on the whole the corporation have been disappointed by the apathy of statutory bodies, who tend to be so strict in their stewardship of public money that public needs get overlooked. The corporation also hope to start short-stay homes for elderly people so that the relatives with whom they live may have a chance to have a break. In all these ventures the corporation seek to signpost paths along which voluntary workers and statutory bodies may march together. At present coöperation between the two is apt to be hesitant, but the corporation, while frankly admitting the difficulties, believe that the job of looking after these old people can only be done effectively if it is shared.

ICELAND'S HEALTH

MEDICAL care is provided in Iceland under the National Insurance Act of 1936, which, besides sickness, covers accident, disablement, and old-age insurance. In the towns insurance against loss of health is compulsory, but in rural districts the parish councils have only permissive powers and may only adopt compulsory insurance if a majority is obtained after a general vote. According to the health report for 1945, which has just been published, 52% of the population are insured. There are 47 hospitals in the country, which provide 9 beds per 1000 inhabitants, and during the year the days in hospital amounted to 3·2 per head of the population. Under the Birth Control Act, which has now been in force fifteen years, 45 artificial abortions were undertaken during 1945; in 17 social as well as health reasons were taken into consideration.

DR. E. E. POCHIN will deliver the Oliver-Sharpey lectures at the Royal College of Physicians of London, on Tuesday and Thursday, March 14 and 16, at 5 P.M. He is to speak on Investigation of Thyroid Function and Disease by the Use of Radioactive Iodine.

Hill, L. M., Wright, L. T., Prigot, A., Logan, M. A. *Ibid*, 1949, 141, 1047.

Binder, L. M., Stubbs, L. E. *Ibid*, p. 1050.

[1] Second annual report of the National Corporation for the Care of Old People, 33, Doughty Street, London, W.C.1.

Special Articles

ACCIDENTS IN THE HOME

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THE Registrar-General's figures show that, even in recent years, there have been more deaths from domestic accidents than from accidents on the roads. Yet, apart from burns, the accidents that occur in the privacy of the home receive relatively little attention. The purpose of this article is to indicate the commonest causes of home accidents, and to draw attention to the amount of medical treatment they require and the human suffering for which they are responsible. The investigation on which the article is based forms part of a wider study of domestic accidents made by the Chief Scientific Adviser's Division of the Ministry of Works, assisted by an advisory panel under the chairmanship of Prof. J. M. Mackintosh.

The sample studied comprised all the home accidents treated at the Birmingham Accident Hospital during two months of each quarter of 1946, accidents in gardens being excluded. In all, 2909 cases were studied, and information on the history and subsequent treatment was obtained from their clinical records. In addition 100 patients were interviewed, while they were attending hospital in 1947, to obtain more detail than was given in the records. A similar but less detailed study of home accidents in 1948 showed that 1946 was not an exceptional year, the main findings being the same.

THE PATIENTS

The hospital serves a wide area, and patients either come for treatment directly or are referred by general practitioners from all parts of Birmingham and its environs. Of the 2909 patients, 44% were women and girls over the age of 14, 17% girls aged 14 or under, 18% men and boys over 14, and 21% boys aged 14 or under. That there should be more women patients than men is to be expected since women on the whole spend more of their time in the home.

A more striking fact is the high proportion (38%) of children aged 14 or under. The proportions of adults and children in the population at risk are not precisely known, but the Social Survey inquiry [1] of 1945 provides a useful picture of the population of the Midland Region, a large area including Birmingham. The age and sex distributions of the home accidents are compared with those of this population in table I, the most outstanding feature of which is that 22% of the accidents happened to children under the age of 5 years, though such children constitute only 8% of the total population.

TABLE I—AGE AND SEX DISTRIBUTIONS OF HOME ACCIDENTS COMPARED WITH THOSE OF THE POPULATION OF THE MIDLAND REGION IN 1945

Age (years)	Male (%)		Female (%)		Either sex (%)	
	Acc.	Pop.	Acc.	Pop.	Acc.	Pop.
0–4 ..	12	4	10	4	22	8
5–14 ..	9	7	7	6	16	13
15–64 ..	16	33	36	37	52	70
65 or over..	2	4	8	5	10	9
All ages ..	39	48	61	52	100	100
No. of cases	1139		1770		2909	

The fact that more accidents happened to boys than to men is partly explained by boys spending longer in the home; a similar reason, however, is less likely to explain the large number of accidents to girls. It seems, therefore, that children are more likely to experience home accidents than adults, and that the risk is particularly high in children under 5 years. The risk to girls appears to be very little, if any, less than that to boys.

THE ACCIDENTS

Of the 2909 home accidents, 42% were due to the patient falling, 36% to collision with household objects (fittings, furniture, tools, and equipment), 13% to burns and scalds, and the remaining 9% to miscellaneous causes.

Falls

The 1219 falls were classified as follows:

Type of fall	*No. of cases*
Unspecified	612 (*0*%)
On stairs or fixed steps	276 (*23*%)
Off furniture, out of bed or perambulator ..	123 (*10*%)
From heights	72 (*6*%)
Twisting injuries of ankle	44 (*4*%)
Other falls	92 (*7*%)
Total ..	1219

Of those falls for which details were available, nearly half occurred on stairs or fixed steps within the home. Most of the falls on staircases took place when the patient was coming downstairs. Of 19 patients interviewed, 12 had fallen on stairs, 2 down cellar steps, and 5 on odd steps inside the house or leading to the street or yard.

Both mechanical and human factors seem to have contributed to these accidents. Several falls were attributed to the structure of the stairs; they were steep and winding, or a bedroom door opened directly on to them. In other instances the stairs were dark; they had no natural lighting and very poor artificial lighting—e.g., an electric light in a room at the top of the stairs but not over the stairs themselves. Cellar steps were completely dark, and one flight opened directly off an ill-lighted passage without any door or partition. Some patients claimed that the condition of their footwear probably caused the accident—their shoes were either old and in bad repair, or were too big, or had slippery soles. Of the human factors, illness and physical handicap were the most prominent, and inadequate supervision on the part of the parents was sometimes responsible for accidents to small children.

Falls off furniture and out of bed or perambulator constituted another major group of accidents. Many of these were due to the misuse of the furniture in question; it was often found that patients had been standing on the arms of chairs or on tables to reach curtains or objects at a high level, and that the chair or table had overbalanced.

The accidents to children generally took place when the children were playing—sometimes they were swinging on pieces of furniture or jumping about on their beds—in nearly all cases the accidents were the outcome of high spirits and excitement.

Another fairly common type of fall was from a height—usually from steps, ladders, or window-sills. These accidents happened to men and women equally. The only 4 patients in this category who were interviewed were adults who had fallen off steps, and 3 of them attributed the fall to their own carelessness, either because the steps were not placed firmly on the ground or because they were old and in bad repair.

There were many more injuries arising from falls, of such variety as almost to defy classification. Among adults, particularly women, injuries of the ankle were commonly caused by walking with unduly high heels or on uneven surfaces.

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[1] Social Survey Inquiry 1945. Population and Housing, England and Wales (Civil Defence Region 9—Midlands).

In elderly or infirm patients it was often clear that their physical frailty was largely responsible for the fall; for some of them walking, even in the house, needed a real effort. But many of the patients who had fallen were young and robust, and in these cases, interviews revealed consistently that shoes were to blame. With remarkable regularity it was learnt that new and unfamiliar shoes were being worn and that the accident was the result of a combination of slippery soles, a highly polished floor, and a desire to make haste. Shoes in bad repair or lacking laces or other fasteners were mentioned in a smaller number of cases.

Injuries from Household Objects

In a great variety of home accidents the injury (often a laceration) resulted from collision with an inanimate object. Classification was not always easy, and the designation of the various groups was a problem in itself. The 1054 accidents of this type were as follows:

Type of injury	*No. of cases*
Striking against objects	239 (*23%*)
Injury by cutlery, tools, tin-openers, &c. ..	272 (*26%*)
Injury by glass and windows..	141 (*13%*)
Being struck by moving objects	111 (*10%*)
Tripping over objects	60 (*6%*)
Injury from doors	60 (*6%*)
Injury from domestic machinery	36 (*3%*)
Other injuries	135 (*13%*)
Total ..	1054

Many of the injuries were caused by the patient slipping or stumbling against the object, or striking it with his hand, arm, or leg. The objects most often concerned were bedsteads, chairs, and other furniture; walls and staircases (particularly sharp corners) were often mentioned, and collisions with sinks, gas stoves, fenders, and buckets were also common. Small protruding nails and pieces of metal were among the objects which, though apparently insignificant, caused severe injuries. Injuries from striking against objects formed 8% of the 2909 home accidents of all kinds. They occurred in all age-groups, women being involved far more often than men, but boys more than girls.

A more clearly defined group of accidents were due to knives, razors, needles, and other sharp instruments; these made up 16% of all the injuries from household objects, and the incidence was particularly high among boys of school age. The majority were lacerations from knives, bread-knives or carving-knives being mentioned in roughly a third of the cases.

A further 10% of all injuries from household objects were caused by tools, tin-openers, and other implements of this kind. The tool most frequently involved was the chopper. Cuts from tins were nearly as common, and they usually occurred when a tin was being opened. Injury from tools is the only type of accident for which the risk appeared to be greatest among adults (aged 15–64); it is also the only group with a significantly higher number of men than women.

These last two groups (injuries from cutlery and from tools) consisted largely of accidents which happen at intervals to a high proportion of the population, but of which many are not serious enough to need hospital treatment. Yet, since there were 272 of them in these 2909 home accidents, and since many of them required repeated visits to the hospital, they cannot be dismissed as unimportant.

Glass was another source of many accidents, and for convenience all accidents in which windows were involved are discussed in this category, whether or not the injury was caused by a pane of glass. This group covers 13% of all accidents from household objects; roughly a third of these involved windows and a fifth were caused by broken bottles. Most of the patients who had been injured by windows were women, and a high proportion of the accidents resulted from broken sash-cords—when the patient opened the window it fell and dropped o hands. Other patients had put their hands or el through windows, sometimes while they were cle them.

Other common sources of injury were splinters, f objects, and objects lying on the floor and ca patients to trip. Elderly people were particularly to this last type of accident; they often tripped loose mats and uneven floorboards or linoleum.

Injuries from doors and from domestic mach were quite common, particularly in small children. children injured by a door had usually shut their fi in it, but some had been very close to the door and been injured when someone else opened or shut it. domestic machinery, the greatest cause of accidents the mangle; this seems to be an attraction to small children, and it also caused several injuries to h wives. Sewing machines were mentioned less often.

A boy, aged 2 years, hearing his mother using the m in her kitchen, ran in from the garden and, before she stop him, put his fingers between the wooden rollers she was turning them. When not in use the mangle is c with safety catches to prevent the child from opening it.

Burns and Scalds

Of the 2909 accidents, 13% were burns and sc Many scalds (42%) were caused by the spilling of liquids; the patients were mostly small children, about a fifth of the cases were caused by the c clutching a saucepan handle or the corner of a tablec and thus upsetting the hot liquid over himself.

A boy, aged 1 year, who was alone in a room, jumped a in his perambulator, which moved towards a table. child clutched the overhanging tablecloth and pulled a of tea on to himself.

Many burns and scalds (16%) were caused by patient touching a hot object, such as an electric iron the bars of a grate, or parts of a cooker. A further 1 were the result of the patient falling on to a fire, an about a quarter of these cases his clothing was set ali Other burns were caused by hot coals, naked flames, explosions when gas ovens were being lit.

A boy, aged 1 year, was in the living-room with his fat who was reading. An electric iron, switched on, was stan on the sideboard. The child pulled the lead, which stretched across the room, and the iron fell on to his fac

Many burns and scalds were a direct result of ina quate protection of children from sources of heat.[2]

TABLE II—COMPARISON OF CAUSES OF FATAL AND NON-FA HOME ACCIDENTS

Type of accident	No. fatal*	No. non-fatal
Falls:		
On stairs	711 (*12%*)	276 (*10*
Off steps, ladders, &c.	194 (*3%*)	72 (*2%*
All others	1500 (*25%*)	871 (*30*
Total ..	2405 (*40%*)	1219 (*42*
Injuries by household objects:		
Cutting and piercing instruments..	12	272 (*9%*
All others	0	782 (*27*
Total ..	12	1054 (*36%*
Burns and scalds:		
Fall on fire	74 (*1%*)	31 (*1%*)
Clothing on fire	385 (*6%*)	12
Flames, explosions, &c.	104 (*2%*)	39 (2%)
Scalds	202 (*3%*)	171 (*6%*)
Other burns	273 (*5%*)	119 (*4%*)
Total ..	1038 (*17%*)	375 (*13%*
All other causes	2541 (*43%*)	261 (*9%*)
Grand total ..	5996	2909

* Figures from Registrar-General's returns for 1945.
† Attending Birmingham Accident Hospital in eight months of 194

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2. cf. Colebrook, L., Colebrook, V. *Lancet*, 1949, ii, 181.

AGES AT WHICH RISK OF INJURY IS GREATEST

For nearly all types of accident the risk is greatest to children under the age of 5 years. The following are the only types of accident where the risk seemed greater in some other age-group :

Type of accident	*Age-group with greatest risk (years)*
Injuries by cutlery, razors, &c.	5–14
Injury by choppers, tools, &c.	15–64
Injury from windows	over 65
Injury from tripping over objects	over 65
Splinters	5–14

Types of accident where the risk to children under school age was particularly high were falls out of bed and off furniture, burns and scalds, injuries by domestic machinery, and injuries from doors.

A more detailed study of the actual frequency (as distinct from the relative frequency) of accidents to children under the age of 5 years showed that children aged 2 years had the greatest number of accidents. Unspecified falls were prominent at each age. The most common causes of accidents for each year of age were as follows :

Age (years)	*Commonest type of accident*
0–1	Scald from hot liquid spilt Burn from hot object
1	Fall out of bed or off furniture Scald from hot liquid pulled on to self
2	Fall out of bed or off furniture Fall on stairs
3	Fall out of bed or off furniture Injury by striking against object Fall on stairs
4	Scald from hot liquid spilt Injury by striking against object

Types of accident which had a relatively high incidence among elderly people were falls (particularly on stairs, out of bed, and off furniture), injuries from windows, and from tripping over objects.

SEVERITY OF INJURIES

Of the patients studied, 95% were treated entirely as outpatients. The proportion of patients admitted to the wards ranged from 17% with burns and scalds to 3% with injuries from household objects. Inpatient treatment was received for 4% of the falls, the most serious in this respect being those on stairs and from heights. Well over 10% of the patients with burns or scalds were admitted as inpatients, but with burns from direct contact with fires the proportion admitted was particularly high (50%), and 4 of the 5 deaths in the series were the outcome of burns of this sort.

The seriousness of burns and scalds among domestic accidents is further emphasised by comparing the distributions of fatal and non-fatal home accidents according to type. In table II the Registrar-General's figures for deaths due to home accidents in England and Wales in 1945 are classified in the same way as the 2909 " non-fatal " accidents treated at the Birmingham Accident Hospital, and the distributions expressed as percentages of the total number in each sample. The fact that 5 of the 2909 cases were fatal does not affect the validity of the comparison. It will be seen that the proportion of " falls " in all three subgroups is similar for fatal and non-fatal accidents. " Burns and scalds," however, form a higher percentage of the fatal than of the non-fatal accidents ; this difference is particularly pronounced for burns from clothing on fire, such accidents forming 6% of all fatal accidents but less than 1% of the non-fatal sample. This is an example of the type of accident which is uncommon compared with all other types of home accident but so serious that it causes 6% of all deaths due to accidents in the home.

TABLE III—DURATION OF TREATMENT

Type of accident	Inpatients			Outpatients		All patients
	No. of cases	Median duration (days)		No. of cases	Median duration (days)	Mean duration (days)
		In-patient treatment	Out-patient treatment			
Falls	17	22	21	1172	15	34
Injuries from household objects	27	16	32	1027	8	18
Burns and scalds	62	21	9	313	7	22
Miscellaneous ..	4	25	1	257	4	16
Total ..	140	20	17	2769	9	25

The other side of the picture is shown by comparison of fatal and non-fatal figures for " injuries by household objects " ; here we have a large source of minor injuries which rarely lead to death.

Duration of treatment (number of days from first to last visit to hospital) is another measure of the severity of the cases ; average values for different types of accident are given in table III, which shows median durations for inpatients and outpatients separately, and mean durations for all patients. (The median is the middle value when the durations are arranged in order of magnitude, whereas the mean is the sum of all the durations divided by the number of patients ; the *median* is the better measure since it is not affected by the few patients whose very long treatment times are not a true estimate of their disability.)

Table III shows that for both inpatients and outpatients the period of treatment was longest for falls. The facts that most fractures occurred in this group and that fractures required the longest treatment were probably responsible for this.

The length of treatment required for injuries caused by falls, together with the large number of such accidents (42% of 2909), emphasises the importance of this type of accident from the point of view of the time lost by home accidents. The median of 15 days represents an average of eight visits to hospital and considerable limitation of working hours.

The over-all medians for all types of home accident for inpatients were 20 days in the wards followed by 17 days' outpatient treatment ; and for outpatients 9 days' treatment involving five visits to hospital. The mean duration for all patients was 25 days. Hospital treatment lasting at least a fortnight was required by 40% of the outpatients, and in 15% of the cases the treatment lasted six weeks.

Some idea of the amount of medical treatment required by injuries received in the home is revealed by the total treatment times. The 140 inpatients were in hospital for a total of 4685 days—in other words, throughout the eight months 20 beds were used exclusively for home accidents. The 2769 outpatients made 14,000 visits to hospital, representing visits of 58 patients a day.

INCIDENCE OF HOME ACCIDENTS

The seriousness of home accidents can only be realised when we have some idea of how many people are involved. From the Registrar-General's figures for accidental deaths we learn that, in 1945 and 1946, for every 70 men, women, and children killed in road accidents in England and Wales 100 were killed in accidents in and *around their homes* ; and that domestic accidents accounted for 6000 deaths in England and Wales in each of these years. But we do not know how many more thousands of adults and children were seriously injured, or how many received injuries which, though not serious, nevertheless required treatment, possibly over a long period and at considerable inconvenience to the patient and his family.

That the number of non-fatal home accidents is large is indicated by the fact that 5000 cases were treated in 1946 at the Birmingham Accident Hospital alone; in 1948, this figure rose above 6000. These figures do not give a rate of incidence of home accidents, since many of the accidents occurring in the Birmingham area are treated at other hospitals or by private doctors.

To estimate a rate of incidence a study has been made of a small area round the hospital (Bath Row area) for which it might be supposed that nearly all home accidents requiring treatment would report to the Birmingham Accident Hospital. To establish a rate of incidence of home accidents it was necessary to know both the population of the area and the number of accidents.

During the summer of 1946 the public health department of the Birmingham city council made a housing survey of the whole city, in the course of which the number of inhabitants of each house was obtained. The medical officer of health kindly allowed me to study these population figures and it was therefore possible to obtain, for each street of Bath Row area, the total population in mid-1946.

Examination of the addresses of the 2909 patients considered previously gave the number of home accidents occurring in Bath Row area and reporting to the Accident Hospital in eight months of 1946. Since some cases may have been treated elsewhere, this was a minimum estimate of the number of accidents which happened.

Bath Row area was chosen by inspection of a map on which the addresses of 1000 of the 1946 patients were plotted, and the choice was subsequently supported by consideration of rates of incidence in small areas on either side of its boundary. It covers about a third of a square mile, and every house is within half a mile of the hospital. Since the nature of the area probably influences the number of home accidents, a description of the most prominent local characteristics follows.

Bath Row area consists mainly of court and terraced houses 90–110 years old. Many of them are three-storey houses, some are of the back-to-back type, and very few have gardens. The area includes some scattered industrial property, particularly along the north-west boundary and in the northern corner. The whole area is scheduled for redevelopment; the houses are close to one another, and no stretch of ground is free from buildings. The density of population here is 60 persons per acre, compared with an average of 20 persons per acre for the whole city, and this small area houses nearly as many people as the whole of the county town of Warwick (13,000).

It was found that 350 accidents from this area were treated at the hospital in the period reviewed, giving a rate of 2·7% of the population of 13,000 for eight months of 1946, corresponding to 4% per annum. This means that, in 1946, 4% of the inhabitants of Bath Row area reported to the Birmingham Accident Hospital with accidents sustained in their homes.

The proportion of children under the age of 10 years was 40% among the patients, though only 20% in the population. The high risk to young children is made clear when it is realised that the over-all accident-rate of 4% is made up of 3% of the population aged 10 years or more and 9% of the children under the age of 10 years.

Among the patients from Bath Row area there was a higher proportion of children and fewer elderly people than in the whole sample of 2909 cases, but this was partly because of the high proportion of children in Bath Row area. The cases were, on the whole, less severe than those of the full sample; the proportion of inpatients was 4% compared with 5%, and the distributions according to duration of treatment were as follows.

Duration of treatment (days)	*Percentage of patients*	
	Bath Row (350 cases)	*Full sample (2909 cases)*
1	35	25
2–9	32	25
10–27	23	25
28 and over	10	25
Mean duration	11 days	25 days
Median duration	5 days	9 days

The lower average severity for Bath Row is to be expected; minor accidents which happen at a great distance are unlikely to come to the hospital for treatment. Nevertheless, the 14 inpatients from Bath Row area occupied beds for 266 days in the eight months; so one bed was used throughout the period, and two beds for some of the time, for home accidents from this area alone.

Of the 350 cases, only 8 were of patients who had two accidents during the eight months for which records were used. This suggests that accident proneness was not a major factor, but the period considered was too short to provide conclusive evidence on this point.

COMMENTS

It is disquieting to learn that the home is so often the place where members of the family receive accidental injuries. In this area of 13,000 inhabitants at least 9% of the young children and 3% of older children and adults received hospital treatment for such accidents in a year. Caution is needed in applying these rates to other districts; in less densely populated areas, in modern housing estates, or in better-planned houses, it might be expected that fewer accidents would happen; information on this point would be valuable. But the large number of cases reporting from all parts of Birmingham suggests that the total rate is far from negligible; moreover, districts comparable with Bath Row area exist in both large and medium-sized towns, and the home-accident rate is unlikely to be consistently higher here than elsewhere. The effects of these accidents on the patients and on their families, and the amount of medical attention and treatment which they require, call for immediate efforts for prevention.

In a review of 1000 cases of burns and scalds Colebrook and Colebrook[2] have pointed out that a high proportion of these accidents took place in the home, and that half of these could have been prevented "given reasonable care and foresight on the part of the adult concerned, whether victim or guardian." The present study of a smaller number of patients with burns and scalds, many of whom were treated entirely as outpatients, suggests the same pointers to prevention. Conversation with some patients and parents revealed that they had not realised that gas and electric fires were as great a source of danger as open coal fires, and therefore needed fireguards, particularly in small rooms where members of the household are likely to pass very near to the fire; nor had they always thought of the danger of leaving bowls and pans of hot liquid within reach of children. Education in measures of protection is urgently needed.

Many kinds of fall are equally preventable. If staircases had good artificial lighting which could be switched on at either floor, firm handrails at each side (particularly at the outside where a staircase winds), and a carpet or other covering firmly fixed and without holes or uneven surfaces, the risk of accidents on stairs would be greatly reduced. The continual supervision of toddlers who are at home all day presents a problem to many mothers, and this may be eased and accidents prevented by the provision at *each* end of the staircase of small lightweight gates which can easily be removed when the children are no longer tiny.

Elderly people, too, need special consideration. Sheldon[3] has drawn attention to the "great importance in old people of the effects of falls and accidents, because of the severe injuries that may follow; in some cases a fall may precipitate a general break-up of the old person"; the present study supports his suggestion that old people are particularly liable to trip over small objects and may thus sustain severe injuries.

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[3] Sheldon, J. H. The Social Medicine of Old Age. London, 1948.

There is evidence that odd steps in the home are a hazard; going up or down a staircase one adjusts one's stride to a convenient length, but single steps are more easily ignored or even not noticed. This is a feature which cannot easily be changed in existing houses but could well be avoided in future building.

The importance of footwear as a cause of accidents is appreciated only by those whose shoes have caused them to fall. Unfastened shoes, and shoes which have lost their laces or are otherwise in bad repair may cause their wearer to stumble and fall, and accidents from this cause could often be avoided if the danger were more widely known. The slippery soles of new or newly repaired shoes considerably increase the chances of falling, and the more general provision of soles with a rough surface, possibly comparable to inverted calf, or scratched leather, would prevent many injuries as well as removing the feeling of instability which new shoes promote in elderly people.

A greater awareness of the risks attached to the use of equipment in a bad state of repair would prevent many of the accidents caused by household objects. It is folly to use a pair of steps with a broken strut, or a chopper with a loose head. But not all these accidents are the result of gross carelessness, and much could be done by improving the design and placing of fittings in the home, and by avoiding the use of shelves and cupboards beyond the reach of the housewife; doors which foul, windows which are not easily opened or conveniently cleaned, and, perhaps most of all, overcrowding, which "makes it difficult to keep dangerous things in safe places and to prevent children from interfering with them"—all these factors contribute to the total of home accidents.

SUMMARY

A study of nearly 3000 cases of home accidents treated at Birmingham Accident Hospital in 1946 showed that 42% were falls, 36% injuries from household objects, and 13% burns and scalds. Falls on stairs and fixed steps and injuries from knives and tools and from striking against furniture and fittings were particularly common. Falls off furniture and scalds from the upsetting of hot liquids were nearly as common.

Two measures of severity of the injuries have been used: (1) the proportion of cases receiving inpatient treatment, which was highest for burns and scalds (17% compared with an average of 5% for all types of accident); and (2) the total duration of treatment, which was highest for falls (mean of 34 days, compared with an over-all mean of 25 days).

For nearly all types of accident the risk seems to be greatest for children under the age of 5 years. Of a population of 13,000 living in a small area surrounding the hospital, 9% of those under the age of 10 years and 3% of those over that age were treated for home accidents at the hospital in 1946.

The following factors contributed to the causes of many accidents:

Inadequate lighting and other defects of staircases.
New shoes, and shoes in poor repair.
Misuse of equipment, use of faulty equipment, and inconveniently placed fittings.
Hot liquid left within reach of children.
Lack of guards to gas, electric, and open coal fires.

I am indebted to Mr. W. Gissane, F.R.C.S., clinical director of the Birmingham Accident Hospital, for permission to use the hospital records and to interview patients; the director and members of the Medical Research Council Industrial Medicine Research Unit, Birmingham Accident Hospital, for valuable help at every stage of the work; and the Medical Officer of Health and Mr. D. J. E. Lamb, chief housing inspector of the City of Birmingham public health department, for their cooperation in supplying population figures and other helpful information.

STUDENT HEALTH IN CAMBRIDGE

THE Cambridge University health service, which started work at the beginning of the Michaelmas term, 1948, began as the result of a pilot survey which Sir Lionel Whitby, the regius professor of physic, made in 1947 of the health of the undergraduates of two colleges. This survey showed that minor disabilities are common in the undergraduate population, and that a few cases of serious disease may be found lying latent and possibly acting as source of infection.

The new service was at first part of the department of medicine, but it was transferred to the department of human ecology when it assumed autonomy on the appointment of Dr. A. L. Banks to the chair. Health officers for the service were appointed in the summer of 1948, and Sir Alan Rook, the senior health officer, in his recent report,[1] describes the first year's working.

HEALTH EXAMINATIONS

The service is on a voluntary basis and is limited to preventive measures; treatment, hospitalisation, and specialist services remain in the hands of the local doctors. At first only freshmen and women were eligible to join the service. Circulars describing the aims of the service were sent to all men and women joining the university in the Michaelmas term, and 1858, roughly three-quarters of the total entry, volunteered to join. On each an X-ray examination of the chest, and a short clinical examination was carried out.

Radiography.—Among the 1751 freshmen and women who were X-rayed 3 cases of pulmonary tuberculosis were found who required transfer to a sanatorium for immediate treatment, and 19 cases with lesions requiring observation while they carried on with their studies. Later in the academic year an opportunity was given to senior men and women to have their chests X-rayed. Among 1533 volunteers there were 2 cases of pulmonary tuberculosis requiring immediate treatment and 17 requiring observation.

The X-ray examination of rather less than half of the undergraduates therefore disclosed 41 cases of pulmonary tuberculosis in need of observation or immediate treatment. A number of non-tuberculous conditions were found, the principal ones of interest being 2 cases of sarcoidosis and 1 of neurofibroma.

Clinical examinations.—The time for the clinical examination had to be limited to thirty minutes, which is only long enough to allow a rapid survey of the various systems of the body. To avoid unnecessary delay a history questionnaire was given to everyone coming for radiography. Forms were filled in and were available for perusal before the clinical examination. Among the 1583 men and 144 women who were examined a comparatively large number of minor disabilities were found. To some it was possible to give advice during the interview; others were referred to their own doctors; in emergency, specialist advice was obtained if the student's own doctor did not live in Cambridge.

The value of this part of the examination lies in the opportunity which it gives of having a short private talk with each undergraduate, for it is in this way that the most effective form of health teaching can be given. The number of young people who imagine quite erroneously that something is the matter with them, usually with the heart, is far from inconsiderable. At the other end of the scale were 3 undergraduates who were found to have a previously unsuspected valvular lesion of the heart.

INCIDENCE OF ILLNESS

Dr. Alan McFarlan, the reader in human ecology, has also investigated the illnesses reported by college nurses who, with the sanction of the college tutors, have made weekly returns of the number of undergraduates seen by them during the period of full term. Scrutiny of these returns has provided useful information on the incidence of respiratory infections and the distribution throughout the colleges of intestinal complaints, boils, and injuries. The returns of gastro-enteritis cases are of particular value in assisting to take reasonable precautions to prevent epidemics. During the Easter term 48 cases of "tripos anxiety" were recorded, 25 in men and 23 in women. In future years the university health service, with the coöperation of the colleges, can hope to help in treating and preventing this anxiety.

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[1] *Camb. Univ. Rep.* Jan. 31, p. 707.

RADIOTHERAPY IN THE HEALTH SERVICE

NEW arrangements for the distribution of radioactive substances under the National Health Service are announced by the Ministry of Health in a circular to hospital authorities.

The ownership of radium is to be vested in the Ministry of Supply. Application for supplies will be made to the Ministry of Health by regional boards or (through these boards) by management committees. All new radium issued to hospitals will be provided by the Radiochemical Centre on hire to boards of governors or hospital management committee; and hire charges, on both new and existing stocks, will be payable according to the radium content of containers or appliances at the rate of £225 per g. per annum.

In accordance with professional advice, the comparatively close control formerly exercised by the Radium Commission is to be continued. The Ministry re-emphasises the need for joint planning by regional boards and boards of governors. Hospitals which have had radium on loan from the Radium Commission undertook to make full reports to the commission; and these reports are in future to be submitted to the Ministry of Health.

Hospitals on a list prepared by the Radium Commission may continue to receive radon from the Radiochemical Centre, and the Ministry is prepared to consider applications for additions to the list.

Present arrangement whereby isotopes required for research may be obtained on application to the Medical Research Council remain unaltered. Uranium parts may be hired from the Ministry of Supply.

Under the Radioactive Substances Act, 1948, Ministers are empowered to make regulations to ensure the safe handling of radioactive substances and protection from dangerous radiation. The Ministry of Health will later issue to hospitals advice about protective measures.

The Wider World

MEDICAL SERVICES IN THE U.S.A.*

A. LESLIE BANKS

M.A. Camb., M.D. Lond., F.R.C.P., D.P.H.

BARRISTER-AT-LAW; PROFESSOR OF HUMAN ECOLOGY IN THE UNIVERSITY OF CAMBRIDGE

PERHAPS the first impression that the traveller in the United States gains is that the people are very different from Europeans. To the Britisher in particular the mixture of races is surprising, and he finds it hard to realise that this heterogeneous mixture can have an "American" outlook. He learns speedily that it has. Whatever the country of origin the loyalty is first and foremost to the United States. Thus when a man with a middle European name says that "we were all cowboys a hundred years ago" he is in deadly earnest. The New York taxi-driver born in Bristol, or the negro red-cap at the railway station or airport, are equally sincere when they declare their fervent belief in the American Way of Life.

This emphasis on the American way of life can be intensely irritating to the European and also rather puzzling. It is a compound of a mystical element, which may take the place of tradition in older countries, and of sound business common sense. Americans know the value of money to the last cent and the American way of life means to them the right to work where they please and to sell their services to the highest bidder.

The days of the pioneer are not yet over. The growth of new industries during and since the war has meant that millions of people have travelled to new areas. For example, at least $3^{1}/_{2}$ million, representing the greatest peace-time migration in the history of the world, have travelled to California within the last few years. Developments on the west coast are still proceeding, and these, and the enormous expansion of industry in other areas such as Texas, keep the pioneer spirit alive. Forty per cent. of the population are said to be always "on the move."

Though the outlook is, first and foremost, American, these racial groups present problems with which we in this country are not familiar. Not only may they have sentimental attachments to the country of their origin but they also form social and political pressure groups which may be extremely powerful. It is said that in New York there are more Irishmen than in Dublin, more Scandinavians than in Scandinavia, and more Italians than in Rome. Ten per cent. of the population of the States are negroes, and the proportion is much higher in some areas including the industrial cities of the north. These minority groups may develop an intense interest in one aspect of a legislative programme. For example they might view a proposed Bill from their own particular angle, and if they disliked some part of it they could bring tremendous pressure to bear on State and Federal legislators, together with the powerful machinery of publicity. Thus a Bill introduced for one purpose might at the last moment have a clause introduced at the instigation of a pressure group which would alter its whole character.

SIZE AND ORGANISATION

The next point to strike the visitor is the size and resources of the country. These are breath-taking to the Englishman and it is an extraordinary experience to fly by night from, say, Los Angeles to New York. The distance is about 3170 miles and the journey takes a little over twelve hours. For the whole of that time one is hardly ever out of sight of the twinkling clusters of stars representing towns and cities. A long journey by train is even more illuminating. Pessimists will say that the resources of the country are being used up so fast that they will be exhausted by 1970. It is true that vast areas of forest have been destroyed, that farm lands have been rendered useless by erosion, and that in the west and south-west the problem of inadequate water-supplies is very serious. But these problems are being tackled in herculean style. The T.V.A. scheme is only one of the outstanding examples of this. In other areas irrigation plans involving the diversion of rivers to provide water-supplies for places hundreds of miles away are under consideration.

It takes a long time for the stranger to understand the Constitution and political organisation of the United States. Historically the States came first, and they combined only reluctantly for the purpose of driving out the common enemy. Incidentally, Britishers should remember that, traditionally, they are that enemy. An elderly lawyer told me that he learnt history by being taught to hate the British. Fortunately it is now "ancient" history, but the effect has been that the States retain their sovereignty and are extremely jealous of the growth of Federal powers. Taxation is levied on the individual by the Federal government but there may be, in addition, State, city and municipal taxation. The centre of Federal government is Washington, D.C. Washington is some 3000 miles from California and about 1500 miles from the rapidly expanding south-west. On geographical grounds alone therefore there is justification for the fear of the more remote States that their problems may not be wholly understood in the legislative centre and that money taken from their citizens by Federal taxation may come back "with strings attached to it" which are not applicable to local conditions. There are other reasons for anxiety. The heads of the civil service in the State and Federal service do not have security of tenure. They may change with the Governor or with the President. Again, in a country with a population of 140 million people the incentive to political success is so great that the actions of a politician may be governed by the desire for power. Indeed, part of the intense fear of "Socialism" and "Communism" (terms the meaning of which are little understood in the States) is due to the recognition that it would not be impossible for unscrupulous and ruthless men to seize power.

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* A lecture in a series entitled The Background of Medicine forming part of the postgraduate courses arranged by Cambridge University Medical School. The observations were made during a visit to eighteen university centres in the United States, made possible by the generosity of the Rockefeller and Nuffield Foundations.

Another consideration little understood in this country is the effect of the last war. The American people entered the war with high ideals. They came out of it victorious and feeling that at last peace had been secured for the world. The effect of the continuing cold war has been to engender a sense of frustration and a growing feeling of insecurity. The nation has been thrown into world leadership before it was ready for this. The combination of anxiety about the international situation, concern at the growth of Federal power, and the growing internal demands for social security explain much of the emotional reaction against things like "socialised medicine." No visitor to the United States can be there long without sensing this deep anxiety. Every man and woman in the States is also aware that America came out of the war 230,000 million dollars "in the red" and that the country is going deeper into the red—and this in spite of record prosperity. This money is being spent mainly on armaments and aid to foreign countries including Britain.

MEDICAL CARE : PRIVATE OR PUBLIC ?

It is against this disturbed background that the organisation of medical services must be studied. The practice of clinical medicine in the States is traditionally entirely a private matter between doctor and patient. Organised medical care is provided for veterans, the Indians, and the indigent, and also for patients with mental disorder, tuberculosis, and the infectious diseases. Outside these services the voluntary pattern familiar in this country before 1912 can still be recognised.

Perhaps the best indication of the changes in attitude since that time is given by the reactions of the American Medical Association. In 1912 the *Journal* of the A.M.A. is reported as saying that :

> "The important feature of the British Act (the National Health Insurance Act of 1911) is the recognition that it is the duty of society, as represented by the government, to furnish medical treatment for those who are unable to secure it for themselves. It also means the recognition of the modern physician as a health officer of the state, working for the general good, rather than a private or professional business man."

In 1915 various community sickness surveys showed the inadequacy of medical care in the States, and the social insurance committee of the A.M.A. reported that the logical conclusion was compulsory State insurance both for the benefit of the patient and "of the unfortunate physician facing starvation." In 1916 the committee was saying :

> "Blind opposition, indignant repudiation, bitter denunciation of these laws is worse than useless ; it leads nowhere and it leaves the profession in a position of helplessness if the rising tide of social development sweeps over them."

By 1919 the effect of war prosperity was becoming apparent, and in 1920 the A.M.A. declared its "opposition to the institution of any plan embodying a system of compulsory contributory insurance against illness." By 1922 this had hardened to opposition to all forms of State medicine. By 1924 government insurance had become "socialised medicine," "political medicine," "assembly-line medicine" and "peasant medicine." From then on the story is familiar to everyone. In 1929 government medical insurance was being described by the A.M.A. writers as "Communism," in 1939 as "Naz-ism," and in 1949 again as "Communism." In April of last year the chairman of the A.M.A.'s board of trustees described President Truman's medical insurance programme as "the discredited system of decadent nations who are now living on the bounty of the American people."

VOLUNTARY MEDICAL INSURANCE

On the face of it therefore the issue would appear to be a straight one between the reaction of the A.M.A. and the drive for compulsory health insurance by the President and his advisers. In fact it is nothing of the kind. There has been, over the past twenty years, an enormous extension of voluntary prepaid medical care schemes. For hospital care Blue Cross plans have expanded so rapidly that at least 40 million people are now covered, and a total of 60 million people are said to have some form of hospital coverage through the Blue Cross. The most significant development, however, has been the extension of group practice by the doctors to provide prepaid medical care. Some of these organisations grew out of the old despised contract practice. In spite of early opposition by the A.M.A., which described them as "medical soviets" and refused to give them the seal of recognition, these organisations have flourished exceedingly. Thus one county medical service corporation that I visited now has a 5 million dollar business turnover. Its administrative organisation would be the envy of any bureaucrat in this country, for it employs more than 100 clerks. 700 doctors are employed on a fee-per-service basis to minister to 140,000 people. The control is entirely medical, with full-time medical and assistant directors. The governing body is composed of doctors who decide the fees to be paid to their colleagues, lay down conditions of service, and undertake disciplinary measures. In the words of the assistant director, "the docs police the docs and deal with the chisellers." Any doctor not conforming to the accepted pattern is put on probation and at the end of that time his contract may be terminated.

These organised medical services have disadvantages from the patients' point of view. They are not cheap. The corporation already described now requires a payroll deduction of 10 dollars a month as opposed to 1 dollar a month in 1933, and benefits are only available while the worker is in full employment.

There is no doubt that organisations of this kind are profitable to the doctors but there have also been developments on non-profit-making lines. Thus the Health Insurance Plan for Greater New York provides comprehensive medical care to workers and their families at home, at doctors' offices, at medical group centres, and in hospitals. H.I.P., as it is called, was established in March, 1947, to provide this all-inclusive medical care, without regard to age, for a fixed premium with no surcharges. It is a voluntary non-profit corporation licensed under the insurance laws of New York. This type of development can be seen elsewhere. Thus the *Los Angeles Times*, which would not scruple to bracket "socialised medicine" with Communism, has produced recently a benefit plan to provide insurance against costs of doctors' calls for employees and their dependents, the cost of diagnostic X-ray and hospitalisation including surgery. Incidentally some indication of the care of this organisation for its employees may be gathered from the concluding paragraph of the note to employees: " probably as many questions will come to your mind as came to mine. The Personnel department will answer these and will be open until after midnight Tuesday, Wednesday and Thursday for convenience of those working nights. Your usual fine co-operation will be appreciated."

It is significant that the A.M.A. now recognises group practices with prepaid insurance as the " American way," provided of course that they are approved by the State medical societies.

Another factor has recently entered into the development of medical services, and that is the demands of organised labour. Recently the steel-workers struck. They were not asking for more money but for security. The fact that the strike was settled on the lines of Blue Cross hospital cover is worthy of note. The great trade unions are developing tremendous power. Steel-workers', mine-workers', and teamsters' unions now represent a potent force in demanding prepaid medical care. The international garment-makers' union already has a model health scheme.

COMPULSORY INSURANCE ?

At the other extreme to the A.M.A. is the compulsory health insurance favoured by the President and his advisers led by Mr. Oscar Ewing. This aims to provide medical care by taxation. Opposition to this " socialised medicine," as it is called, is growing and is likely to reach its peak during the presidential election year of 1952. The A.M.A., for example, has now burnt its boats and entered openly the political arena. Dr. Fishbein has been replaced by professional lay organisers. In an article on " the Dogged Retreat of the Doctors " which appeared in *Harper's Magazine* last December the following comment was made on the present methods :

> " Instead of trying to deodorize the A.M.A., the new promoters took it out and buried it. One hundred and forty thousand old family physicians arose in its place, all wearing beards, wing collars, high button shoes, and threadbare frock coats, all keeping an all-night vigil at the bedside of your curly-headed little child and mine. KEEP POLITICS OUT OF THIS PICTURE. 'The Doctor' never was a good painting, even in the Tate Gallery tradition. You may have seen it on your doctor's wall when you were young; it used to be distributed as an advertisement for Petrolagar. It made the doctor feel good. If Whitaker & Baxter [the promoters referred to] are right, it still does."

Although many people, lay and medical, deplore the A.M.A.'s entry into this field, there is widespread support for their opposition. The States are jealous of Federal power, and Big Business naturally fears the growth of Socialism.

What is the attitude of the man in the street ? He is truly perplexed. He has to pay very heavily for medical care at a time when the costs of the necessities of life are rising. Railway and transport fares have recently been increased and food costs are rising, including the price of coffee. In Harlem and The Bronx a three-roomed apartment may cost 40 dollars a month and a visit by a physician 4 dollars with another 3 or 4 dollars for the prescription. This represents nearly £3 per visit at the present rate of exchange. On the west coast charges are higher. The first office call may cost 8 to 10 dollars, with 5 dollars for subsequent visits. X-ray and pathological investigations may cost 20–25 dollars extra. A simple doctor's bill may therefore be 40–50 dollars. Obstetrical costs range from 150–1000 dollars, with extra charges in complicated cases. Some idea of the effects of these charges may be gained from the fact that a hotel booking-clerk with a gross salary of 3000 dollars a year had to pay 400 dollars f[illegible]ife's confinement, 200 dollars for the doctor[illegible] dollars for the hospital fee. An accountant developed tuberculosis, and all his savings, 6000 dollars, went in one year. A university graduate student in history had to pay 100 dollars before his infant daughter could be admitted to hospital to be operated on for acute appendicitis. In another instance a patient, already stripped and prepared for operation, had to sign the cheque for the surgeon before he could be taken to the operating-theatre. These are extreme examples, and it is true that voluntary prepaid medical care would have met these charges; but even so most of these schemes take no account of chronic illness. It is the common experience of the Montefiore Hospital in New York that patients with malignant disease have exhausted all the family savings before seeking the benefits of the hospital's home-care service.

The man in the street is therefore in favour of the principle of compulsory insurance. This was made clear time and time again in discussion with newspaper reporters, radio and television announcers, railway employees and the like. On the other hand there would be full agreement with Mr. Micawber when he said " Annual income twenty pounds, annual expenditure nineteen nineteen six, result happiness. Annual income twenty pounds, annual expenditure twenty pound ought and six, result misery." The American citizen knows full well that the addition of medical insurance to the social-security tax may make just that difference to the family budget.

THREE CHOICES

In conclusion it may be said that there are three alternatives facing the people of the United States in this matter. They are :-

1. *The maintenance of the status quo.*—This is an impossibility because of the constant development of prepaid medical-care schemes on a voluntary basis or compulsorily through the demands of organised labour. Attempts to do this would also disregard the heavy financial burden of chronic illness and above all would take no account of the disastrous economic effects of a business depression or slump.

2. *The introduction of a compulsory health service on the British pattern.*—This would be difficult if not impossible on administrative and geographical grounds. An attempt to enforce it would meet the full weight of opposition by the business men, quite apart from the A.M.A. It is doubtful whether the trade unions would be whole-heartedly in support, for their position vis-à-vis the government is very different to that of trade unions in this country. The people themselves are unlikely to welcome such a revolutionary step. It is significant that Mr. Oscar Ewing is now reported as saying that " the British plan is totally unsuited for the U.S. In England the health service is part of a broad programme to reorganise the basic social and economic structure of the country and eight-ninths of the cost comes out of the revenue. This is utterly foreign to the President's proposal which is strictly an insurance plan on a pay-as-you-go basis."

3. *A compromise between voluntary and compulsory health insurance.*—The analogy that would probably appeal most to the American people at the present time would be to say that the choice lies between a cheap motor-car with 100% government insurance, so that the car can be knocked about, or a better car and make the individual user pay the first £5 insurance. On this principle Federal funds would be allocated on a matching or grant-for-grant basis and used by the States to build and equip new hospitals and to improve existing hospitals. State insurance would cover major illnesses and it would be left to the individual to provide his own cover for minor illness.

Developments along these last lines would satisfy nearly everyone and avert the dread of what are considered in the United States to be the basic weaknesses of the English scheme—namely, steeply rising expenditure on social services without individual incentive to save, and the lay and political control, or " socialisation," of medicine.

In England Now

A Running Commentary by Peripatetic Correspondents

MOST of the contributions to In England Now have pith or point or even both. This is merely a despairing cry. Can any learned reader tell me how to stop thoughtless people ringing our front-door bell to inquire about surgery times. Our surgery hours are listed in full view on the gate-post and again on the surgery door, yet day after day people walk past the plate and ring the bell at our private house to ask what they are. I've now got to the stage of taking them by the elbow, steering them to the gate, and showing them the answer to their question in black and white before their very eyes. Can it be that the national eyesight is as bad as the rush for spectacles suggests, or are we fast becoming unable to help ourselves? We have heard a lot lately about the policeman's Blue Lamp. Perhaps a return to the doctors' Red Lamp would be a good thing. All I know is, no maid or receptionist will stand the perpetual and pointless peeling on the bell. The telephone is nearly as bad, but we have a remedy there; we can have it removed. We stopped the door bell only to find the front-door panels were nearly splintered with knocking. Our cry of despair is not the only one. Every other G.P. we know has the same difficulty. Perhaps the Minister would let us charge a shilling for the recreation of ringing the doctor's bell. I shouldn't mind answering it for that. Or has anyone any other ideas?

* * *

As a mere patient, may I ask whether all psychiatrists "doodle" throughout their consultations? I have had treatment for a year by three separate psychiatrists, one in a provincial town and two in London, and all three scribbled, arranged things in patterns, or just doodled the whole time. A favourite trick is to make a pyramid with everything within reach, starting with a penknife, then a pencil, then a fountain-pen, a syringe, a smaller pencil and forceps, right down to india-rubbers and syringe-needles. While this goes on the head is tilted back, the work admired, one eye opens and closes to see it at all angles, while the patient's patience is strained to screaming-point. Then the whole thing is swept over, and off he starts again, often on the same task or on a slight variation of it. Another tilts his chair back as far as it will go, often balancing it on one leg only. There he sways, eyes often closed, while the patient is kept on edge, wondering just when he is going to tip backwards. He may keep this up for an hour and even longer, unless he is in a doodling mood; then he suddenly leaps forward, grabs a pencil, and starts on a pattern on the blotter. This achieved, back goes the chair again.

Is it because they get fed up with hearing our outpourings, or is this a sign that they are absorbed in the case? Anyway, it has at times needed all my self-control not to say: "For goodness sake *do* stop doodling; it's getting on my nerves." But perhaps this is a new test of self-control, and your psychiatric readers will smile at my ignorance.

* * *

No-one expects the producer of a play or film to be omniscient about details when their actors must pretend to be Pasteur or some other notable technocrat. And though I'm often irritated by what I feel must be the producer's carelessness in these matters, I've learnt not to complain when Mr. Paul Muni-Pasteur doesn't sterilise his loop properly after dipping it in anthrax cultures (it's quite possible Pasteur didn't either), lest the family turn on me for destroying their theatrical illusions by nagging about inessentials. I don't complain even when from the battlements of Elsinore I see high jagged peaks in the Danish hinterland. But I ventured a crack the other night in the third act of *Venus Observed*.

Here was a lordly boudoir-cum-observatory, and (centre, back) a domed roof covering a neat little clock-driven equatorial which we had already seen in expert use, before lunch by that admirable and accomplished amateur, the Duke of Altair, on a full-dress eclipse of the sun. Now night has fallen, and I and the rest of the audience are beglamoursed enough by author and actors to withstand a thousand minor implausibilities. In the gloom a window (back, R) is filled with a blue radiance that casts sharp shadows on the sill. Moonlight? Surely not. Just a poetic exaggeration of starlight. When the Duke opens one side of his observatory dome to show the rings of Saturn to his latest love. I am relieved to see only a velvet night sky in what I deduce from the morning's events to be a south-easterly direction. Then in his zodiacal perambulations the Duke opens the dome to the north-east, and lo! the pair are drenched in a bright vertical beam of indubitable moonlight.

Now this isn't an esoteric blunder like Pasteur-Muni's bacteriology. After all, the elements of astronomy are mastered in the third form. Indeed, in another scene of the play they are nicely observed, for the October sun duly sets R, and later dawns L. But I protest that a moon which twelve hours earlier was obliging the drama by obscuring the sun could not possibly have been more than very very new, and had no business to be flaunting herself in the zenith at midnight. Yet neither of the ardent star-gazers was taken aback by this startling vagary. I don't blame the young lady. She had at the time much on her mind, and in any case was unobservant enough to miss the eclipse that morning as she drove through the countryside. But the Duke ought to have known better.

* * *

News from behind the Iron Curtain is often surprising and sometimes incredible. The following item, which reached me a few weeks ago, was sufficiently surprising; but I can testify to the credibility of my informant.

"Our family," ran her letter, "has increased by one small carp, about the size of a sardine, which we found in the stomach of a fish whose English name I do not know any more, but in German is called *Hecht*. My husband was in Slovakia for three days and my brother-in-law caught the big fish there and sent it to us. The fish was dead all night in the train, but next morning, when my cook opened him, to our greatest surprise we found the live little carp in his stomach. The carp is slightly injured; his skin is torn off one side, but he seems quite happy in our bath and is quite a pet with us after his miraculous survival; but I suppose we had better put him into the river which is his natural habitation."

* * *

Letters from America always give me a thrill, even if they only contain shining multicoloured circulars advertising some new therapeutic agent. But when they carry the name of a well-known hospital on the envelope—that of a Medical Mecca in fact—my hand shakes and my pupils dilate with anticipation. Yesterday just such a one arrived, and excitedly I tore open the envelope. "Dear Dr. ——," it said, "We are very anxious to know the words of the well-known rhyme 'Digging up Father's Grave to Lay a Sewer' which I last heard you sing in Brindisi. We wish to use it at the opening of the new Research Building here." Alas; such is fame. Why do we toil and moil as we do? Blood, sweat, and tears poured out in the cause of suffering humanity, and all I am known for in the New World is a Cockney ditty of very doubtful nature. It is my face I am now turning to the wall.

* * *

The practice of otorhinolaryngology in His Majesty's aircraft-carriers, amid a welter of wax-in-ears and sore throats, has its occasional compensations. In one week there were two of these lighter interludes, both in patients complaining of earache and deafness. On auriscopy the first was found to have an external auditory meatus blocked with red and white material which proved on syringeing to be a toffee-paper. The second, a staid *matelot* whose symptoms had developed suddenly during a cinema performance in the after lift-well, presented through the auriscope the fascinating spectacle of a cockroach lying in the classical fœtal posture against the drum. Its difficult delivery was accompanied by more than a little banter.

* * *

Absently I passed a cigarette to the Head of Colin's school, who had honoured us by his presence at tea. "No thank you," said he; "I don't smoke except *incognito*." "Surely you mean *sub rosa*?" said I. "Or possibly," said Margaret, "*ad nauseam*?"

Letters to the Editor

ATOMIC DEFENCE

SIR,—A leading article on Atomic Defence addressed to the medical profession is timely. I have no quarrel with the substance of your extracts from Park's and other articles, but your winged words in the final paragraph will reach a wider audience, amongst the general population, and seem to me to lack your customary wisdom and prudence.

You ask "Will any defence system be able to do more than rescue those at the fringe of the affected area?" You attempt no answer; but there certainly are measures of defence even for those well within the fringe.

There is no doubt in the minds of those who have studied the whole question intensively, that hitherto published estimates of the casualties to be anticipated in our cities are far too high; those estimates should be very substantially reduced.

You go on to allude to the "politicians" who "speak so glibly" of atomic defence. The outstanding politician who has spoken is the Minister most concerned. His remarks were far from "glib"; they were based, I am told, on a brief deriving from the careful and considered appreciation of the situation by the experts of the Services' and Civil Defence Staffs.

No-one who is conversant with the potentialities of modern weapons of war is likely to underestimate the task they would impose on the medical profession. It will include the maintenance of morale, and that may be seriously impaired by incautious phraseology and still more by a suggestion that the most severely stricken victims will be abandoned to their fate without any planned and practised efforts for their relief.

London, W.1. E. ROCK CARLING.

HOSPITAL BEDS

SIR,—With reference to your leading article of Feb. 4, it may interest you to know what has been done at the London Hospital to decrease the number of unoccupied beds.

Before the war, owing to a rigid "firm" and "full duty" system, I regret to say there was never less than 20% empty beds. During the last six months the average number of empty beds has been 7·7% and—if private wards and maternity and staff beds are not included—under 5%. This has been done by having 10 unallotted beds which are used for accommodating a patient when there is no bed available in the appropriate ward for an emergency. What actually happens is that the emergency patient is admitted to the appropriate ward, and a patient from that ward nearing the time of discharge is accommodated in the unallotted bed. In this way an emergency patient, who in the old days would have been refused, is now admitted; and we have proved that with a total number of 650 beds in this building, 10 unallotted beds are sufficient for this purpose.

H. BRIERLEY
House Governor.

The London Hospital, E.1.

CONTROL OF TUBERCULOSIS

SIR,—In more than twenty years' experience of the preventive and therapeutic aspects of tuberculosis, I cannot recall any time when the plight of the tuberculous subject awaiting treatment has been more desperate. This urgent sociomedical problem confronts every general practitioner and physician, and with even greater acuity, every chest physician.

The current interest in the matter evinced in the lay and medical press indicates that complacency must be replaced by action and that 400 deaths per week, mainly among breadwinners, in England and Wales alone, must no longer be condoned.

The problem must be tackled on a national scale and with ruthless drive. Teaching hospitals and regional boards must combine to organise a scheme comparable with the Emergency Medical Service during the war. This is no longer the time to dispute their respective responsibilities. The Ministry of Health should issue a directive for genuine constructive measures to the boards of regional and teaching hospital alike, who, in turn, should indicate to groups of individual hospitals the nature of their duties to the tuberculous patient. In explanation of the long waiting-lists for hospital accommodation the plea of insufficient beds is invariably proffered, but a greater regard for accuracy reveals that the hospitals of the country contain many unoccupied —because unmanned—beds. The first problem remains, therefore, to increase the nursing and auxiliary staff. With this object in view, it should be made widely known that providing those who nurse the tuberculous subject in suitable wards are Mantoux-positive reactors, the incidence of the disease is not significantly greater than in comparable groups of the general population.

In order to increase nursing staff each hospital group should allocate some of the nurses in training in its area to an institution—whether sanatorium, general hospital, or erstwhile isolation hospital caring for the tuberculous —as part of the general curriculum. Unrestricted use should be made of part-time and assistant nurses, ward orderlies, and even partly trained personnel on the model of the V.A.D. and Red Cross and St. John. Rehabilitated tuberculous patients and ex-patients might also, following vocational guidance, contribute to overcoming the present emergency.

Only in this way lies hope of reducing the waiting-lists —lists that are rarely less than six months and often extend to a year and even eighteen months where surgery is required. Even an acute medical emergency such as hæmoptysis—if it is known by hospital authorities to be due to tuberculosis—may receive little more consideration. Is the victim of this disease, even in 1950, to remain a "social leper"?

The risks of procrastination are threefold: to the patient, whose condition becomes exacerbated; to his family, who are exposed to a serious risk of infection; and to the public health. One has only to compare the facilities open to sufferers from other diseases—and even they are not perfect—with the barriers raised against the admission of tuberculous patients.

If every hospital group were compelled to allocate about 10% of its beds to tuberculosis during the present emergency, the waiting-lists could be controlled and the disease would, within measureable time, cease to be a blot on our social escutcheon.

Finally, a plea for the integration of preventive and therapeutic aspects under one authority, where prevention and rehabilitation also receive due attention, for without such unification all efforts to control the disease will be brought to nought.

PHILIP ELLMAN.

London, W.1.

SIR,—Like Dr. D. G. Morgan, who wrote last week, I was interested in your leading article of Feb. 4. Dr. Morgan, indicated "more fruitful lines of inquiry which could reduce 'bed wastage' in these days of 'bed famine'," and in particular suggested that more clinical investigations could be carried out on outpatients.

With this I am in hearty agreement, and those of us who have been driven to treating and investigating tuberculous patients in their own homes will subscribe to his view that the "increase in diagnostic facilities would release a large number of beds urgently required for the patients needing treatment that can only be provided in a hospital."

In my view, however, a very much more radical attempt should be made to allocate existing hospital beds in a manner proportionate to the importance of the diseases which they are to serve. It is well known that the allocation of beds to tuberculous patients falls far short of the number that they would receive were such a principle acted upon.

The number of patients on the waiting-lists for British sanatoria has increased since 1944 from 4000 to nearly 10,000, whilst at the same time the number of beds available for treatment of this disease has not changed significantly. Notification figures are rising; and as the *Times* stated in a leading article on Jan. 18:

> "Tuberculosis is killing 400 people each week in England and Wales and unhappily the majority are in the productive years of their lives. If a catastrophic epidemic of some other disorder produced comparable figures urgent action would surely be taken. . . . A bold measure—and boldness is required—would be to allot wards for tuberculous patients in the general hospitals. . . . To-day all hospitals are part of the Health Service and as such could be given instructions to take the necessary measures. . . . Action is urgently needed."

It has been shown in a number of general hospitals that, provided wards are set aside for tuberculous patients, there is little danger to the nursing staff or other patients. In fact, as has been stated by Dr. Horace Joules (*Times*, Jan. 25), at the Central Middlesex Hospital the morbidity-rate amongst nurses is lower than in any of the hospitals investigated by the Prophit trust.

This is an example of enlightened and progressive preventive medicine, but it is accepted in by no means all areas. In an adjacent London borough one board of governors controls all the 862 general-hospital beds available for the sick of that area. It is typical of the general attitude to tuberculosis that only 8 of these beds are allocated for the treatment of this disease. Dr. Toussaint (who also wrote last week) draws attention to the perpetuation of the low status of the tuberculosis service; and here is another sign of the apathy towards, or perhaps deliberate disregard of, the major problem facing British medicine by the Ministry responsible for the health of the community. It is time that our National Health Service faced up to its national problems.

Hammersmith Chest Clinic,
Hammersmith Hospital,
London, W.12.

PETER STRADLING
Chest Physician.

TREATMENT OF LEPROSY

SIR,—The leading article in your issue of Jan. 28, which contained my article on diamino-diphenyl sulphone in the treatment of leprosy, is very interesting and informative, but it contains one or two statements which call for comment.

You say: "With a remedy so inexpensive and apparently so effective, leprosy may be the first of the great infectious diseases to be brought under control largely by chemotherapy." Surely this sentence needs some explanation and modification? For another major infectious disease, syphilis, we have long had chemotherapeutic agents which appear more effective than anything we have, or are likely to have, in leprosy. Has syphilis been brought under control? Possibly its incidence, and certainly its severity, have been reduced, but the disease is still common.

I have long been of the opinion that without a reasonably effective remedy, which so far we have not had, leprosy control was in many countries an impossible task. Sulphone treatment is a step in the right direction, and more rapidly effective treatments may be evolved. But the chemotherapy of leprosy, although it may reduce the incidence and the severity of the disease, is never likely to eradicate it.

One further point—this time on chaulmoogra oil. You speak of "the direct antibacterial action" of the oil and say that "intravenous injection of its derivatives is followed by disintegration of leprosy bacilli." Very few experienced workers will accept that statement.

In a previous leading article,[1] you pointed out that the evidence of chaulmoogra preparations being bacteriolytic is not strong, and that their effect may be due to counterirritation and stimulation of tissue response. The administration, by injection or otherwise, of many different medicaments has been reported to cause clinical improvement and changes in the morphology of the bacilli. Apparent changes in morphology can also be produced by many other factors, including variations in staining technique.

It is perhaps worthy of note that sodium hydnocarpate, the preparation reported to produce disintegration of bacilli, has never been widely used or advocated by experienced workers. Rogers and Muir[2] state that "it is considered less beneficial than the oil or its esters": Muir, in his recent book,[3] does not even mention it: and Cochrane[4] mentions it only to say: "It is our belief that these remedies [sodium salts of fatty acids of hydnocarpus (chaulmoogra) oil] are not effective in the treatment of leprosy."

Uzuakoli, Nigeria.

JOHN LOWE.

EXFOLIATIVE DERMATITIS COMPLICATING STREPTOMYCIN THERAPY

SIR,—We thank Dr. Sumner (Feb. 4) for his interest in our article of Jan. 21 and for his pointer to the similarity to his own cases.[5] Frankly, we think that this similarity is very superficial, but it does enable us to compare what we think are two entirely different entities. In our view, these two conditions have in common only one factor—they both arose during the administration of streptomycin.

Dr. Sumner's three cases all occurred after long periods of streptomycin, and the skin lesions were of the types met with in vitamin-B deficiency. We were struck by the constant involvement of the perineum. When the skin elsewhere was involved, the involvement was never generalised; in one case the disorder was described as seborrhœic dermatitis, and in another as a dry scaling eruption over a "glove-and-stocking" distribution. The tongue appears to have been involved in all these cases and the description is of the picture usually seen in vitamin-B deficiency. These features, together with the improvement following the exhibition of vitamin-B complex, leave little doubt as to the factor involved in the syndrome.

Our case, on the other hand, developed early in the course of treatment (9th day). The skin eruption was the condition we primarily described, and we are sure that Dr. Sumner will agree that it was different from the manifestations he noted. The picture was of dermatitis passing through all the recognised phases to exfoliation and finally denudation. More important, although we described a severe stomatitis, at no stage was mention made of the tongue and this did not show the distinctive features seen by Dr. Sumner. Finally, there was the rise in temperature, which we regard as of great significance but which was presumably absent in Dr. Sumner's cases as no mention was made of fever.

We maintain that this is an entirely different picture and is anaphylactic in origin. In case 2 of Dr. Sumner's series, an erythematous rash occurred over the forehead and wrists after 5 days' streptomycin, but this rapidly disappeared. This surely is the rash, in its mildest form, which we have attempted to describe? Dr. Sumner tells of further cases he has had, but states that he does not include the common skin eruptions; and he maintains that these do not even warrant consideration of the advisability of continuing with the drug. It is here that

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1. *Lancet*, 1948, i, 524.
2. Rogers, L., Muir, E. Leprosy. Bristol, 1946.
3. Muir, E. Manual of Leprosy. Edinburgh, 1948.
4. Cochrane, R. G. Practical Handbook of Leprosy. London. 1947.
5. Sumner, J. *Tubercle*, 1949, **30**, 62.

we wish to bring him to task. We think that our case, although a rare one, was sufficiently important to warrant a little consideration for these trivial anaphylactic rashes which appear early in streptomycin therapy.

Colindale Hospital, London, N.W.9. W. C. HARRIS.

TREATMENT OF RHEUMATOID ARTHRITIS

SIR,—For over two years I have been treating cases of rheumatoid arthritis with intravenous injections of procaine. I decided to try also Lewin and Wassén's new method[1] of using ascorbic acid and deoxycortone acetate, with a view to comparing the results.

In each of three cases where the new treatment was given, there was a sense of well-being which continued after the injection for the rest of the day, and a slight decrease of pain. With procaine there is a sense of well-being, pronounced decrease of pain, and an increase in the range of movement of the affected joints. The injections have to be repeated daily at first, but as the condition improves they are gradually cut down to about one every ten days; if treatment is stopped, relapse ensues. Each injection is of 1% procaine (without adrenaline) 5–10 ml. according to the individual's tolerance. I find that this gives far better results, and I have seen no ill effects except for transient light-headedness after the injections.

Kasr-El-Ainy Hospital, Cairo. S. M. TALAAT.

MOTION-SICKNESS AND ANTI-HISTAMINES

SIR,—The *effectiveness* of the antihistaminic drug β-dimethyl-aminoethyl benzohydryl ether 8-chlorotheophyllinate ('Dramamine') in motion-sickness was described by Gay and Carliner[2] and Rust and Fosbery.[3] As this drug is a relatively weak antihistaminic agent[2] and its ether base is known to have relatively little specificity toward histamine, the question arises whether its effect in motion-sickness is due to histamine antagonism or to another factor.

Recently on a voyage across the North Atlantic, on which dramamine was not available, we tried giving daily 0·025–0·05 g. N-dimethylamino-methylethyl-dibenzoparathiazine (3277 R.P.; 'Phenergan') prophylactically as well as for treatment of motion-sickness. This drug is a highly active anti-histamine with long-lasting action.[4] In almost every case we saw good results. One case was especially impressive.

A woman suffering usually from motion-sickness even on land vehicles, and showing no improvement after administration of 0·6 mg. hyoscine, was completely relieved after receiving a combination of 0·6 mg. hyoscine with 0·025 g. phenergan. As phenergan caused considerable drowsiness, we tried combining 0·6 mg. hyoscine with 0·02 g. phenobarbitone, but this combination had no more effect than hyoscine alone. Placebos and occupational therapy were without effect. Prophylactically phenergan was effective alone.

These are, of course, merely a few observations, which might suggest that further, more exact, investigations with several specific antihistaminic drugs should be carried out. As to the mode of action, it should be noted that Rosenthal and Minard[5] and Kwiatkowski[6] have already suggested the action of histamine on sensory nerves, while Ambrus, Ambrus, and Jacob[7] have shown that specific histamine desensitisation (tachyphylaxia) causes analgesia in rats.

JULIAN L. AMBRUS
Philadelphia, U.S.A. CLARA M. AMBRUS.

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1. Lewin, E., Wassen, E. *Lancet*, 1949, ii, 993.
2. Gay, L. N., Carliner, P. E. *Bull. Johns Hopk. Hosp.* 1949, *84*, *470*; *Science*, *1949*, *109*, 359.
3. Rust, S. M., Fosbery, F. W. A. *Brit. med. J.* 1949, ii, 98.
4. Halpern, Ducrot. *C. R. Soc. Biol. Paris*, 1946, 140, 361; *Bull. Soc. Chim. Biol.* 1917, 29, 309.
5. Rosenthal, S. R., Minard, D. *J. exp. Med.* 1939, 70, 4175.
6. Kwiatkowski, H. *J. Physiol.* 1943, 102, 32.
7. In the press.

THE RH HAPTEN

SIR,—In a recent annotation[1] you expressed the hope that those who had been trying to repeat Carter's work on the extraction of the Rh hapten from human erythrocytes would state their findings.

We have followed both Carter's original method and her modified method, using erythrocytes from a single donor and also pooled erythrocytes from a number of donors. In all cases Rh-negative cells were extracted at the same time as Rh-positive ones and used as a control. Particular care was taken to adhere closely to all the details of the technique described.

Extracts had a very slight inhibitory effect on Rh antisera, but extracts from Rh-negative cells proved equally inhibitory and it was concluded that the phenomenon was of a non-specific character. In no case was any specific inhibitory effect observed.

F. STRATTON
Blood Transfusion Service, Manchester. P. H. RENTON.

RESISTANCE TO THE TUBERCLE BACILLUS

SIR,—Dr. Sutherland (Feb. 4) appears to take a somewhat peculiar view. Let us, he seems to say, study the question of immunity and resistance; let us forget (for the moment, at least) the tubercle bacillus.

The relative importance of seed and soil may provide a fascinating ground for discussion, but meanwhile people die daily who need not die.

The Prophit report did indeed say what Dr. Galen said in A.D. 80. In the intervening years it is surprising that so little notice has been taken of his remark. Surely, if it was made extremely difficult for anyone to come into contact with a tuberculous patient, fewer people would contract the disease.

In America they have tackled the problem of bovine tuberculosis on these lines. In 1918 the campaign to destroy all tuberculous cattle was launched. Today the disease is rarely seen. In this country, where doubtless the subject will provide interesting matter for discussion in the years ahead, over 2000 children die and nearly 4000 are crippled yearly by the disease. Mass X-ray examination, good training and hygiene, as at Papworth, adequate provision of beds, and B.C.G. inoculation surely provide major lines of attack on this terrible scourge.

Such effective action would, incidentally, do something to make the present National Health scheme more worthy of its name and less of a salvage and cure service.

Farnham Royal, Bucks. M. E. M. HERFORD.

POSTOPERATIVE PARALYSIS IN THE UPPER EXTREMITY

SIR,—The mechanical difficulties of supporting a patient in the steep Trendelenburg position during prolonged operative procedures have been well illustrated by recent correspondence.

Attention has been focused principally on special supports for more or less prominent anatomical features, such as the shoulders and hips. I would like to draw attention to the effect of friction. The usual covering for operating-tables consists of a 'Sorbo' rubber mattress with a smooth skin of rubber encasing it. The whole is loosely attached in some way or other to the polished metal surface of the table. The total effect is somewhat similar to that of placing a loaded toboggan on the slopes of the Cresta run. If the rubber cushioning can be firmly fixed to the table surface, and its upper surface —i.e., that in contact with the patient—is given some form of non-skid finish, the friction effect produced might well prevent 50% of the patient's weight from falling on whatever other form of support is used. I am assuming, of course, that the skin of the patient's back

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1. *Lancet*, 1949, ii, 1141.

is allowed to come directly in contact with the rubber. It appears to me that a combination of the usual right-angled flexion of the legs with this form of cushioning would do away with the necessity for any dangerous pressure applied to the shoulders or iliac crests.

I am in contact with manufacturers, in order to obtain a rubber mattress of the suggested design.

University College Hospital,
London, W.C.1.

T. B. FITZGERALD
Obstetric Registrar.

MEDICAL TEACHING IN BAGDAD

SIR,—Your note last week (p. 284) refers to the Iraqi government's desire to enlist British doctors to teach in the Royal College of Medicine in Bagdad. As I held the chair of physiology there for five years before the war a word on my experience may be of interest. I entirely enjoyed my stay in Iraq, in both the professional and the social aspects, and it was with regret that I relinquished the appointment for family reasons. The opportunities for research are unrivalled and the college authorities and Directorate of Health gave me every facility I needed for investigation. Moreover the research problems there in parasitology, infectious diseases, and nutrition (to name only three fields) urgently demand solution and one has a splendid chance to contribute to the struggle against human suffering.

I would have no hesitation in recommending any doctor to apply for one of these posts if he accepted one condition. That is that he would be prepared to develop to the full social contacts with the Iraqi people. If he only wishes to mix with other Britons he had better stay at home. Both my wife and I found our many Iraqi friends pleasant hosts and welcome guests. High government officials assured me that they considered British participation in Iraqi social life to be an important contribution to the development of the country. Personally I found it well worth while.

The opportunities for sport are good and the climate is not so trying as some people make out, though the winter is rather cold.

London.

W. P. KENNEDY.

VITAMIN B_{12} AND THYROID FUNCTION

SIR,—The effect of liver extracts on thyroid function is obscure. Wintrobe[1] has suggested that they may have a thyrogenic action because of the not-infrequent development of hyperthyroidism in patients receiving liver therapy for pernicious anæmia.

On the other hand, it has been shown[2] that some of the toxic effects of thyroid extract in rats can be prevented by feeding with liver, and it is also stated that patients receiving thyroid therapy for hypothyroidism require larger doses of thyroid extract if liver therapy for pernicious anæmia is initiated.[3] It is, moreover, suggested that there is in liver extract a component, probably vitamin B_{12} itself, which has a specific antithyroid action.[3]

If the latter statement were to be substantiated, it would obviously be of prime importance, not only to those interested in the possibility of a new drug for the treatment of hyperthyroidism, but also to patients with addisonian anæmia, to whom high doses of vitamin B_{12} will undoubtedly be given now that it is cheap and freely available, and in whom symptoms of hypothyroidism might occur. Such an effect of prolonged administration of vitamin B_{12} has not, as far as we know, been reported yet by workers in this country or in the U.S.A.

We felt, therefore, that it would be of interest to assay the possible antithyroid activity of vitamin B_{12} by the method of Stanley and Astwood,[4] using radioactive iodine—a technique recently used by us to assess the antithyroid activity of *para*-aminobenzoic acid.[5]

Two male patients with normal thyroid function were given 60 µg. and 100 µg. respectively of crystalline vitamin B_{12} ('Cytamen,' Glaxo) at a time when iodine accumulation in the thyroid gland was proceeding at a steady rate. The samples were from a batch which had been proved clinically to be active in pernicious anæmia. The administration of the drug did not have, in either patient, the slightest effect on the straight line of the graph which is obtained when the thyroid-gland activity is plotted against the square-root of the time. If the drug, in the dosage used, had had any antithyroid activity, an immediate effect on iodine retention in the gland would have been shown by a downward deviation of the graph from the straight line. We have no experience of the effect which would be obtained if a drug with definite thyrogenic properties were assayed by this technique. We should, however, expect that an upward deviation of the curve would occur, corresponding to an increased iodine absorption by the gland.

We concluded that in a dosage of 100 µg. or less, vitamin B_{12} has no significant effect on thyroid function.

Department of Pharmacology and
Therapeutics, University of Sheffield,
and the Sheffield National Centre for
Radiotherapy.

E. J. WAYNE
A. G. MACGREGOR
H. MILLER.

THE CHEST PHYSICIAN

SIR,—Young chest physicians like myself will be grateful that Dr. Toussaint has exposed, in his letter last week, the dilemma in which we now find ourselves. Should we clear out of the specialty if it is to have no decent future ?

I became interested in tuberculosis when I began to discover what a wide range of unexplored fields of medicine this disease offers. Tuberculosis occupies a unique position, with ramifications not only into many branches of medicine and surgery, but into aspects of sociology, psychology, business, economics, politics (certainly local politics !), and indeed every aspect of human affairs. I became increasingly fascinated by the possibilities of tuberculosis control and felt impelled to specialise in this branch of medicine. It appeared that no longer were young men like myself to be penalised financially for displaying interest in that one major disease which par excellence is disregarded in teaching hospitals. My interest in tuberculosis is clinical as well as social ; I do not aspire to an administrative appointment divorced from clinical medicine such as used to be a reason for a young man interesting himself in the disease.

And now what ? Has a mistake been made ? Is tuberculosis after all not to recruit its share of the ablest in my generation ? If we are foolish enough to interest ourselves in this work, must we then accept the consequences of a lower income on account of our strange idiosyncrasy ? Is the degradation of the tuberculosis service to be perpetuated ? The situation is ludicrous. Glasgow has a higher mortality from this disease than Hamburg despite conditions there in the last decade ; while Scandinavia can afford to inquire politely why we do not take steps to prevent a preventable disease.

The tragedy of all this is not the personal fate of doctors who happen to be interested in tuberculosis, but the personal fate of the four hundred British men and women who die each week of this disease—which is more preventable than any other great scourge of mankind today.

The taxpayer wants to see his diseases effectively controlled as quickly as possible at minimal expense. Three administrative measures, all supported by those who really understand tuberculosis, could immediately be taken and in ten years would reduce the tuberculosis problem by more than half : (1) recruit the best brains of the profession into the tuberculosis field by offering we wish to bring him to task. We think that our case, although a rare one, was sufficiently important to warrant a little consideration for these trivial anaphylactic rashes which appear early in streptomycin therapy.

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[1] Wintrobe, M. M. Clinical Hæmatology. London, 1946 ; p. 356.
[2] Ershoff, B. H. *Proc. Soc. exp. Biol., N.Y.* 1947, 64, 500.
[3] Annotation, *Amer. J. Digest. Dis.* 1949, 16, 418.
[4] Stanley, M. M., Astwood, E. B. *Endocrinology*, 1947, 41, 66.
[5] Goodwin, J. F., Miller, H., Wayne, E. J. *Lancet*, 1949, ii, 1211.

Colindale Hospital, London, N.W.9. W. C. HARRIS.

TREATMENT OF RHEUMATOID ARTHRITIS

SIR,—For over two years I have been treating cases of rheumatoid arthritis with intravenous injections of procaine. I decided to try also Lewin and Wassén's new method[1] of using ascorbic acid and deoxycortone acetate, with a view to comparing the results.

In each of three cases where the new treatment was given, there was a sense of well-being which continued after the injection for the rest of the day, and a slight decrease of pain. With procaine there is a sense of well-being, pronounced decrease of pain, and an increase in the range of movement of the affected joints. The injections have to be repeated daily at first, but as the condition improves they are gradually cut down to about one every ten days; if treatment is stopped, relapse ensues. Each injection is of 1% procaine (without adrenaline) 5–10 ml. according to the individual's tolerance. I find that this gives far better results, and I have seen no ill effects except for transient light-headedness after the injections.

Kasr-El-Ainy Hospital, Cairo. S. M. TALAAT.

MOTION-SICKNESS AND ANTI-HISTAMINES

SIR,—The effectiveness of the antihistaminic drug β-dimethyl-aminoethyl benzohydryl ether 8-chlorotheophyllinate ('Dramamine') in motion-sickness was described by Gay and Carliner[2] and Rust and Fosbery.[3] As this drug is a relatively weak antihistaminic agent[2] and its ether base is known to have relatively little specificity toward histamine, the question arises whether its effect in motion-sickness is due to histamine antagonism or to another factor.

Recently on a voyage across the North Atlantic, on which dramamine was not available, we tried giving daily 0·025–0·05 g. N-dimethylamino-methylethyl-dibenzoparathiazine (3277 R.P.; 'Phenergan') prophylactically as well as for treatment of motion-sickness. This drug is a highly active anti-histamine with long-lasting action.[4] In almost every case we saw good results. One case was especially impressive.

A woman suffering usually from motion-sickness even on land vehicles, and showing no improvement after administration of 0·6 mg. hyoscine, was completely relieved after receiving a combination of 0·6 mg. hyoscine with 0·025 g. phenergan. As phenergan caused considerable drowsiness, we tried combining 0·6 mg. hyoscine with 0·02 g. phenobarbitone, but this combination had no more effect than hyoscine alone. Placebos and occupational therapy were without effect. Prophylactically phenergan was effective alone.

These are, of course, merely a few observations, which might suggest that further, more exact, investigations with several specific antihistaminic drugs should be carried out. As to the mode of action, it should be noted that Rosenthal and Minard[5] and Kwiatkowski[6] have already suggested the action of histamine on sensory nerves, while Ambrus, Ambrus, and Jacob[7] have shown that specific histamine desensitisation (tachyphylaxia) causes analgesia in rats.

JULIAN L. AMBRUS
CLARA M. AMBRUS.

Philadelphia, U.S.A.

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1. Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.
2. Gay, L. N., Carliner, P. E. *Bull. Johns Hopk. Hosp.* 1949, 84, 470; *Science*, 1949, 109, 359.
3. Rust, S. M., Fosbery, F. W. A. *Brit. med. J.* 1949, ii, 98.
4. Halpern, Ducrot. *C. R. Soc. Biol. Paris*. 1946, 140, 361; *Bull. Soc. Chim. Biol.* 1947, 29, 309.
5. Rosenthal, S. R., Minard, D. *J. exp. Med.* 1939, 70, 4175.
6. Kwiatkowski, H. *J. Physiol.* 1943, 102, 32.
7. In the press.

THE RH HAPTEN

SIR,—In a recent annotation[1] you expressed the hope that those who had been trying to repeat Carter's work on the extraction of the Rh hapten from human erythrocytes would state their findings.

We have followed both Carter's original method and her modified method, using erythrocytes from a single donor and also pooled erythrocytes from a number of donors. In all cases Rh-negative cells were extracted at the same time as Rh-positive ones and used as a control. Particular care was taken to adhere closely to all the details of the technique described.

Extracts had a very slight inhibitory effect on Rh antisera, but extracts from Rh-negative cells proved equally inhibitory and it was concluded that the phenomenon was of a non-specific character. In no case was any specific inhibitory effect observed.

F. STRATTON
Blood Transfusion Service, Manchester. P. H. RENTON.

RESISTANCE TO THE TUBERCLE BACILLUS

SIR,—Dr. Sutherland (Feb. 4) appears to take a somewhat peculiar view. Let us, he seems to say, study the question of immunity and resistance; let us forget (for the moment, at least) the tubercle bacillus.

The relative importance of seed and soil may provide a fascinating ground for discussion, but meanwhile people die daily who need not die.

The Prophit report did indeed say what Dr. Galen said in A.D. 80. In the intervening years it is surprising that so little notice has been taken of his remark. Surely, if it was made extremely difficult for anyone to come into contact with a tuberculous patient, fewer people would contract the disease.

In America they have tackled the problem of bovine tuberculosis on these lines. In 1918 the campaign to destroy all tuberculous cattle was launched. Today the disease is rarely seen. In this country, where doubtless the subject will provide interesting matter for discussion in the years ahead, over 2000 children die and nearly 4000 are crippled yearly by the disease. Mass X-ray examination, good training and hygiene, as at Papworth, adequate provision of beds, and B.C.G. inoculation surely provide major lines of attack on this terrible scourge.

Such effective action would, incidentally, do something to make the present National Health scheme more worthy of its name and less of a salvage and cure service.

Farnham Royal, Bucks. M. E. M. HERFORD.

POSTOPERATIVE PARALYSIS IN THE UPPER EXTREMITY

SIR,—The mechanical difficulties of supporting a patient in the steep Trendelenburg position during prolonged operative procedures have been well illustrated by recent correspondence.

Attention has been focused principally on special supports for more or less prominent anatomical features, such as the shoulders and hips. I would like to draw attention to the effect of friction. The usual covering for operating-tables consists of a 'Sorbo' rubber mattress with a smooth skin of rubber encasing it. The whole is loosely attached in some way or other to the polished metal surface of the table. The total effect is somewhat similar to that of placing a loaded toboggan on the slopes of the Cresta run. If the rubber cushioning can be firmly fixed to the table surface, and its upper surface —i.e., that in contact with the patient—is given some form of non-skid finish, the friction effect produced might well prevent 50% of the patient's weight from falling on whatever other form of support is used. I am assuming, of course, that the skin of the patient's back

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1. *Lancet*, 1949, ii, 1141.

months, as that of the control sample of the same batch which had not been subjected to the process. The remaining two samples—those chloroformed four and five times—showed an appreciable loss of potency compared with the control.

While the purification of vaccine lymph by phenol is certainly very simple and satisfactory, that by the passage of chloroform vapour has the advantage of being much quicker while being equally efficacious and harmless. This process seems to have been first described by Green,[3] who has presented convincing experimental evidence of its suitability; and in India at least three institutes manufacturing vaccine lymph have adopted this method for routine purification.

Vaccine Institute, Belgaum, Bombay. R. SANJIVA RAO.

"IMPROVERS" OF FLOUR

SIR,—The decision of the authorities to discontinue the use of nitrogen trichloride ('Agene') in flour,[4] after the Medical Research Council had recognised its serious and often fatal effects on animals, is to be welcomed.

It is difficult to understand, however, why it should have been necessary to replace this "improver" by another chlorine compound—chlorine dioxide—which is in my opinion unnecessary, and will, furthermore, cost vital dollars since it will have to be obtained from the U.S.A. "Improvers" are *not* necessary to safeguard baking qualities. They are merely artificial means to speed up the natural maturing of flour, at the same time bleaching it and giving a whiter-*looking* loaf.

It is regrettable that in the popular belief whiteness in bread should be synonymous with purity. In fact, the very opposite is the case. To my mind, bread should contain nothing but pure unadulterated wheat flour. In the case of other foodstuffs, such as milk and butter, the addition of chemicals is already forbidden by law. Why not in the case of the "staff of life"—bread?

West Wickham, Cambridgeshire. C. P. ALLINSON.

DEOXYCORTONE ACETATE AND LYMPHADENOPATHIES

SIR,—In connection with the numerous recent articles in your journal on the surprising effects on rheumatoid arthritis of 'Cortisone,' adrenocorticotropic hormone (A.C.T.H.), and deoxycortone acetate together with ascorbic acid, I wish to call attention to one application of the adrenal-cortex steroid hormones in the field of the lymphopathies.

I found that the administration of large doses (20–50 mg. per day) of deoxycortone acetate ('Cortivis' Vister) has a moderate, transient, and inconstant effect on Hodgkin's disease and on lymphatic and myeloid leukæmia.[5] This action is not augmented by the simultaneous administration of ascorbic acid. Similar results have now been reported by Pearson, Eliel, and Talbot using A.C.T.H.[6]

On the other hand, I have observed sensational and permanent relief in a rare disorder—giant follicular lymphadenopathy (Brill-Symmers disease). In hyperplastic lymphopathies of other histological types I have also observed very good results, with complete and permanent disappearance of enlargement of lymph-nodes and spleen. These observations, recorded briefly last year,[5] have lately been described more fully.[7]

Medical Clinic,
University of Palermo, Sicily. G. FRADÁ.

INFANTILE PYLORIC STENOSIS

SIR,—Mr. Ward-McQuaid and Dr. Porritt, in their article of Feb. 4, describe a method of medical treatment which shows a failure-rate of about 40%. (The exact figure cannot be stated as "the numbers treated medically . . . could not be accurately estimated"). With medical treatment such results usually end in the abandonment of the method altogether and operation on all cases from the beginning.

In my opinion better results can be obtained with medical treatment by: (1) selecting suitable cases, (2) four-hourly feeding, (3) gross reduction of feed-volume (1–$1^1/_2$ oz. per feed in the first 24 hours, and increasing slowly up to full feeds), and (4) large doses of atropine methylnitrate from the beginning. The authors give gr. $^1/_{750}$ before each feed, whereas I give gr. $^1/_{100}$ before three feeds in 24 hours, reducing this to two doses at about the 5th day. This large dose can be given conveniently in lamels made by Savory & Moore, in which gr. $^1/_{100}$ is contained in $^1/_4$ sq. cm. As these lamels are cut from sheets marked in squares of 1 sq. cm., care must be taken that only $^1/_4$ of a marked square is used at each dose. In the past five years I have treated 61 selected cases by this method. There were 2 failures (3·3%) and no deaths.

With regard to surgical treatment, Mr. Ward-McQuaid and Dr. Porritt, and also Professor Smellie in his letter of Feb. 11, emphasise the importance of complete preoperative hydration as a means of reducing mortality. There is another side to this argument, and Professor Smellie hints at it when he warns against the danger of overadministration of sodium chloride. Personally I prefer Mr. David Levi's technique for Rammstedt's operation, in which there is no need for preoperative hydration, and which incidentally shortens the period in hospital by about 24 hours. In five years I have thus treated 58 cases with 1 death (1·7%). Combining medical and surgical treatment, there are 119 cases with a mortality-rate of 0·8%.

I would say that nowadays a number of people achieve very low mortality-rates using very different techniques. What seems common to all of them is a full understanding of the disease in general and their own method of treatment in particular.

Tunbridge Wells. N. M. JACOBY.

SIR,—No child has died who has been operated upon for pyloric stenosis at the Westminster Children's Hospital (formerly the Infants' Hospital, Vincent Square) since 1947, when this hospital was reopened. My personal figures have lately been published.[1]

I should like to emphasise the importance of ensuring that these infants are treated by a trained pædiatric team and that they are not operated on by the duty surgeon of the day unless he has had specialised pædiatric experience.

London, W.1. DAVID LEVI.

SIR,—A series of more than 100 cases of congenital pyloric stenosis has been treated by Rammstedt's operation in the Leeds General Infirmary since February, 1947, with a mortality of less than 1%: 96 cases were operated on consecutively without a death.

The pædiatrician makes the diagnosis within a few hours of seeing the infant, and unless there is some associated disease or dehydration he asks for early operation. The anæsthetist is an artist with open ether, shuns ethyl chloride, and is careful that the trickle of oxygen inside the mask does not become a blast to blow up the stomach. The surgeon is merely the craftsman in the team. No special instruments of any kind are used; a rectus-split incision is made high so that the fair terms comparable with other specialties[1]; (2) unify the broken and divided organisation of tuberculosis control by setting up regional joint panels[2]; and (3) open the doors of general hospitals to tuberculous patients.[3]

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[3] Green, A. B. Report of the Medical Officer, Local Government Board, 1900–01, p. 639; *Ibid*, 1901–02, p. 575; *Ibid*, 1902–03, p. 659.

[4] See *Lancet*, Feb. 4, pp. 219, 227.

[5] *Sicilia Med.* 1949, 6, 267.

[6] Cited in leading article, *Lancet*, Jan. 28, p. 169.

[7] Frada, G. *Pr. méd.* 1950, 58, 78.

[1] *Post-grad. med. J.* 1950, 26, 24.

> "For forms of government let fools contest;
> Whate'er is best administered is best:"
> (Pope)

TUBERCULOMEN.

FLATULENCE IN INFANCY

SIR,—May I make some remarks on Dr. Tanner's letter of Feb. 4?

A baby's stomach differs from that of an adult in that when empty of food it does not collapse but contains air. Some babies can get rid of this easily whilst taking a feed. Some babies reach a stage of "block" like Dr. Tanner describes. I think, however, it is a dangerous doctrine to advise *all* mothers to "burp" babies two to three times during the feed. Some do better without any "burp" at all. I have had a mother of a baby who got rid of its air easily and silently, tell me that "She could not get him to break wind though she had been told she had got to." It is also a dangerous doctrine because in some mothers the break in feeding arrests the flow of milk.

Are we sure when mothers consult us about their baby's "wind" that they are all referring to the same thing? In my experience quite 80% of these complaints refer to the "drawing up of the baby's knees" when it cries. As this is a reflex depending on the action of crying, it is not indicative of anything. To attribute it to "wind" is a grandmother's tradition.

York. F. CHARLOTTE NAISH.

SIR,—I should like to endorse the views of Dr. Tanner and also to emphasise a point in your annotation of Feb. 4.

The family kittens, suckling half-upright, seemed conspicuously wind-free, and postprandial percussion on their bulging abdomens produced a dull note.

Having had considerable trouble with the wind of our experimental eldest, his three subsequent controls were always fed upright on my lap. Inclined in the arm, they have complete support, while support all the way up my back, as in the nursing-chairs our grandmothers used, ensured complete comfort to both parties. And the results were remarkable. Burps were automatic, and outwith my control.

I have also fed them in this position when stirring the sauce, herding their seniors, answering the telephone, or proceeding in a fast car round corners, with never a care. It certainly has much to recommend it.

Edinburgh. CONSTANCE KUENSSBERG.

SOCIAL SIGNIFICANCE OF SYMPTOMS

SIR,—I read with interest Dr. Gooddy's article last week. The growing tendency of the socially inadequate to exploit their grievances against society is in itself a symptom of what J. L. Halliday calls a sick society.

In the past, such people could more easily resign themselves to suffering in the present life as they had some religious faith which promised them happiness hereafter; the same beliefs rendered their luckier contemporaries tolerant of the human suffering around them. Nowadays, the "have-nots" want their heaven here and now, and the "haves," whose capacity for rationalisation of their guilt-feelings stops short at humanitarianism, cannot so well withstand their bullying. The fears and frustrations of the modern world intensify these problems.

The Welfare State has been erected as a human substitute for Providence, and the same irrational claims and expectations are therefore directed towards it: it is regarded as an omnipotent ever-loving parent of whom all citizens are the favoured children. Unfortunately, each child wants the lion's share, and as the Welfare State more and more rules out competition by achievement, the method of competition by nuisance-value is correspondingly encouraged.

In the end, inevitably, the Welfare State collapses or becomes, in self-defence, the Totalitarian State: that is, the people in power act repressively in order to prevent the State being as it were devoured from within. Nature, and human nature, know nothing of an equalitarian society.

London, W.1. F. R. C. CASSON.

PURIFICATION OF VACCINE LYMPH

SIR,—McClean[1] has drawn attention to the suitability of phenol as an agent for purifying vaccine lymph. This method of purification has been in use at the vaccine and antitoxin laboratory, Jamaica Plains, Boston, Mass., for several years.

In this institute, trials were made by adding phenol in a concentration of 0·5% to the diluent—a 50% solution of glycerin in water. Even with simple storage of the phenolised vaccine lymph at −11°C, the bacterial count dropped to 8000 per ml. in one month and to 900 per ml. in two months. As a result of the treatment with 0·5% phenol, no deterioration in potency was noticed. Butler's[2] claim that the phenolised virus was more thermostable than the untreated virus could not, however, be confirmed. Purification by the passage of chloroform vapour has stood the test of time and experience in this institute. None of the drawbacks experienced by McClean has ever been encountered. The vaccine lymph is purified by the process in half an hour, the bacterial count usually being reduced to about 1000 per ml. or less.

From experience, satisfactory results by the "chloroform process" appear to depend on the following factors: (1) the dilution of vaccine lymph during the process; (2) the distribution of vaccine lymph during the process; (3) the total amount of chloroform used; (4) the air-pressure employed; and (5) the time taken for the process.

It is well known that purification by this method is effected by the chloroform that actually goes into solution, the best results being obtained when the solution is saturated. When chloroform vapour is bubbled through vaccine lymph, some of it goes into solution while the rest escapes. It is thus clear that saturation-point can be reached much earlier and with a smaller quantity of chloroform when the bulk of vaccine lymph is distributed into several large-size test-tubes connected in series, so that the chloroform escaping from the first test-tube is led through all the remaining test-tubes in succession.

Satisfactory results are obtained in this institute with vaccine lymph distributed in quantities of about 40 ml. in test-tubes measuring 8 in. by $1^{1}/_{4}$ in. The requisite pressure is maintained by a 'Presso-Vac' pump, and about 13 ml. of chloroform is consumed during the whole process, which lasts half an hour. These different factors may have to be adjusted to suit local conditions. With precautions regarding the temperatures during the passage of chloroform vapour and during subsequent aeration for three hours, no adverse effects on the potency have been noted. A batch of vaccine lymph was "chloroformed" five times, a portion being taken out after each exposure. These five sets chloroformed from once up to five times were tested for potency. The potency of three of these samples chloroformed once, twice, and three times remained the same, over a period of six

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[1] Toussaint. C. H. C. *Lancet*, Feb. 11, p. 275.
[2] Heaf, F. R. G. *Tubercle*, 1950, 31, 11.
[3] Joules, H. *Times*, Jan. 25.

[1] McClean, D. *Lancet*, 1949, ii, 176.
[2] Butler, G. G. *J. Hyg., Camb.* 1938, 38, 120.

Births and Deaths Registration Acts, 1874–1926. The traditional common-law test of a live birth is that the baby utters a cry; no evidence on this point is reported in the Oldham case. Under the strict law every live birth, however short the life, must be registered; the obligation to register is of course, imposed upon a series of persons concerned, beginning (in ordinary cases) with the parents, but attaching to anyone present at the birth. The 28-week rule cannot apply to live births. It applies only to the fœtus born with no sign of life; in that case registration is unnecessary. If the fœtus is born dead *after* 28 weeks, it must be registered as a stillbirth.

Obituary

ROBERT PATTON RANKEN LYLE

B.A., M.D. DUBL., M.D., D.CH. DURH., F.R.C.O.G.

Dr. Ranken Lyle, emeritus professor of midwifery in the University of Durham, who died on Feb. 1, had a powerful and attractive personality. Born at Coleraine nearly 80 years ago, he qualified at Trinity College, Dublin, in 1894. He was assistant master at the Rotunda before he was appointed, in 1899, lecturer in midwifery and diseases of women at the medical school of the University of Durham.

[Baron

From his first arrival he was in charge of the Maternity Hospital in Newcastle, but there was no department of gynæcology at that time: the general surgeons and physicians considered that they could supply the needs of the subject. Dr. Lyle, at his own expense, opened the Samaritan Free Dispensary for Women at the very gates of the Royal Victoria Infirmary, where he did many operations and gave free advice. Shortly afterwards he was appointed gynæcologist to the infirmary, and when he retired in 1930 he was appointed consulting gynæcologist. In 1908 he had been appointed to the chair of midwifery and gynæcology in the University of Durham, and he held this post until 1935 when he was appointed emeritus professor. Two years later the honorary degree of doctor of surgery was conferred on him.

The Newcastle Maternity Hospital at the beginning of the century had only 15 beds, which Professor Lyle held to be quite inadequate provision for the area. He therefore equipped a large industrial school as a modern maternity hospital of 90 beds, which was opened by the Princess Royal in 1923 and which is known as the Princess Mary Maternity Hospital. At the same time he bought and equipped a large house as a maternity home for women of moderate means. He backed both projects financially until they were well established and finally self-supporting.

E. F. M. writes: "As an operator Lyle was gentle and simple in his technique. He rarely used an abdominal retractor even during deep pelvic operations. In his teaching he was firmly opposed to the earlier beliefs that retroversion of the uterus caused backache, and ridiculed those operations for fixation or suspension of the uterus which were so commonly done elsewhere. In his clinical teaching he stressed the importance of examining a case from above down, and not from below up—namely, to study the human being before examining her pelvic organs in detail. In all his dealings with his colleagues he was the soul of generosity and good humour. He was popular, indeed loved by his students, and a prize in clinical midwifery is called after him."

For a number of years Professor Lyle was a justice of the peace to the city of Newcastle. His main hobbies were stamp-collecting and shooting. He leaves a widow and one daughter.

WILLIAM DREWETT ARNISON

M.A., M.D. DURH.

Dr. Arnison, who died on Jan. 28 two days after his 85th birthday, was born in Allendale Town, a country village in the south-west corner of Northumberland. His father, grandfather, and great-grandfather had all been surgeons in Allendale, and one of his uncles was professor of surgery in the University of Durham.

He spent his boyhood in his native village, till in 1878 he was sent to Durham School, from which he later went on to the old College of Medicine at Newcastle upon Tyne. Of his early days at the college he has left an interesting account in the *History of the Newcastle School of Medicine*, which he helped to prepare at the time of the school's centenary. Having graduated M.B. in 1886, he came up to London to take the Conjoint qualification, and for a couple of years he acted as house-surgeon to the West Herts Infirmary at Hemel Hempstead, but then returned to the North, where he spent the rest of his professional life. Soon after going into general practice, he became one of the medical officers to the Post Office, an appointment which he held for many years.

His career as an anæsthetist started in 1891, when he was appointed to the staff of the Royal Victoria Infirmary. Here he did sterling work for fifteen strenuous years, during which he was the one recognised specialist in anæsthetics in the town and district. Always an advocate of ether administered with a Clover inhaler, he became expert in the use of that apparatus. In those days an anæsthetist at the Newcastle Infirmary had no light task, for he might be called upon every day for work in the theatre from 9 A.M. till 2 P.M., and there were many long lists at that time; but Arnison was most punctilious in his attendance and in the performance of his duties. He was always interested in the patients and always made an examination as to their fitness before undertaking the anæsthetic. For those days his records were unusually accurate and his large experience was carefully recorded and annotated. A painstaking teacher, he set a high standard in the care of the patient, and his work was amply recognised by his seniors and colleagues. It gave him immense pleasure when a few months ago he was elected a fellow of the Faculty of Anæsthetists of the Royal College of Surgeons.

In 1907, to the surprise of many, he gave up his post as anæsthetist to take charge of what was then called the electrical department at the infirmary. To begin with, there was practically nothing in the department—a room in the basement rather like a cellar and some primitive apparatus represented the whole outfit. But with the devoted help of Dodds, formerly a plumber employed at the infirmary, Arnison built up a department which during the 1914–18 war did an enormous amount of work, both for the infirmary and the large military hospital in the adjacent Armstrong College. When the department was finally handed over to a successor in 1925 it was a well-established going concern.

After retiring from the staff of the infirmary with the title of consultant radiologist he continued as a member of the house-committee and chairman of the drug and instruments committee, bringing mature experience, common sense, and absolute integrity to the problems involved. For years he was also a regular attender at Convocation and he was later appointed a member of the senate of Durham University. It gave him great pleasure when he was awarded the honorary degree of M.A.

Arnison was always a great influence for good in the spheres in which he moved. His sterling characteristics were deeply appreciated by his associates and his ideals were an outstanding example to the juniors with whom he liked to associate. At the infirmary he always leaned to the clinical side of the work, and for years he acted as chairman of the Surgical Aid Society which had been started by his uncle, William Christopher Arnison. A man of culture, he loved books and he had himself a useful library. He was fond of history, especially military history, but poetry was always his first love. He was also much interested in his home county and its history, and he often took part in the excursions arranged by the Antiquarian Society, of which he was an enthusiastic member.

Dr. Arnison, who married rather late in life, is survived by two daughters.

G. G. T.

liver is the only viscus visible when the peritoneum is opened; the hæmostat which is used to lift up the stomach is also used to split the pyloric tumour after the outer layer has been incised. It is considered that interrupted subcutaneous sutures of twisted silk are desirable in the final closure of the wound.

The infants are not segregated; all cases are operated on after associated diseases like otitis media, stomatitis, and umbilical sepsis have been treated. The average stay in hospital is 2–3 days and our aim is to make this period 24 hours: the fatal case had been in hospital 10 days before the diagnosis was made.

All of us treating cases of congenital pyloric stenosis wish to emulate the remarkable series of Ladd et al.[1] (a series anæsthetised by a nurse giving open ether), and until we can give an efficient biochemical study to any ill infant we shall not be able to compete.

Leeds. H. S. SHUCKSMITH.

Medicine and the Law

Electroconvulsive Therapy and Fractured Femur

AT the recent Worcestershire assizes Mr. Justice Hallett dismissed an action in which a patient claimed damages for pain suffered, and incapacity caused, through alleged negligence in his treatment.

It was common ground between the parties that the patient, a man, having been for some time before in a neurotic condition, was advised to undergo electroconvulsive therapy in hospital; that the first treatment took place on April 29, 1947, and the second on May 20; and that he subsequently complained of pain and, under advice, went on June 19 as an inpatient to the hospital, where it was discovered that the neck of the left femur was broken. An operation was performed in an orthopædic hospital. The patient's left leg is now $1^1/_2$ in. shorter than the right and there is limitation of movement.

The plaintiff's case was not that the fracture was due to negligence but that the medical superintendent and another doctor at the hospital were negligent in having been so slow in diagnosing the fracture, and that his two family doctors were negligent in that they never diagnosed it. In his opening speech, plaintiff's counsel stated that it was well known in the medical profession that a fracture was a risk in electroconvulsive therapy, because the treatment caused violent contraction of the muscles, and the powerful muscles of the thigh, in contracting, created greater danger for the femur than for any other bone; the danger increased with the age of the patient; the patient was 59. The surgeon who had performed the osteotomy, called for the plaintiff, said that if the operation had been performed one month earlier, there was no guarantee that it would have had any better result. Fracture of the femur during electroconvulsive therapy was very rare, and in the absence of any history of accident, an impacted fracture was not infrequently missed.

When the defendants' case was opened, the medical superintendent stated in his evidence that he made no clinical examination of the patient's leg, because this was not his patient. A member of the medical staff said he had carried out electroconvulsive therapy between 7000 and 10,000 times and had never before seen it cause a fracture of the femur. The patient's reaction after the treatment on May 20 was normal; he himself received no complaint and therefore made no examination.

Mr. Robert Davies-Colley, consulting surgeon to Guy's Hospital, called on behalf of the defendants, did not agree that it was common knowledge that a fractured femur might occur during this treatment; he thought that he himself might quite easily have failed to detect the fracture; muscular rupture would have been the most likely cause of any pain. Defendants' counsel called five male nurses from the hospital; their evidence was that, after the treatment on May 20, the patient did not complain of pain in his leg.

In delivering judgment, Mr. Justice Hallett found himself unable to rely upon the evidence of the plaintiff, whose mental health had caused trouble for some time. The judge entirely exonerated the defendant doctors. They had not been guilty of negligence. Even if there had been a finding against them in that respect, the plaintiff would have had the greatest difficulty in establishing a right to damages; he would have had to show that the alleged delay in diagnosis caused delay in treating him, whereas it was probable that the surgeon would have delayed the osteotomy until the patient's mental condition had settled down.

The judge dismissed the claim with costs, though it is possible that little of the expense of defending the action will in fact be recovered. Fortunately for themselves, all four of the defendant doctors had safeguarded themselves: they were members of the Medical Protection Society.

Duty to Register Premature Births

The evidence at an inquest held at Oldham on Feb. 1 on the body of a prematurely born child disclosed some uncertainty about the legal obligation to notify such births. There was said to be a hospital rule that the birth of a baby under 28 weeks should not be notified, whether it was born alive or dead. This birth was not in fact notified, the hospital superintendent apparently deeming that there was no sign of life. By some astonishing accident the body, sent to the hospital incinerator, was found five days later on the municipal rubbish-heap. The case was brought to the coroner's notice. It could, of course, have raised suspicion of a criminal concealment of birth. He directed an inquest and, in the evidence summarised below, the jury (in the course of determining the cause of death) found that the child had lived for 24 hours.

Dr. G. B. Manning told the coroner's court that he thought the baby was a 26–29 weeks' child and had lived for at least 6 hours. The nurse who delivered the child in the Boundary Park Hospital at Oldham said it was born alive; she placed it in the oxygen tent and kept it under observation till she went off duty at 8 A.M. It was then alive and its condition was quite good for its size. Resuming duty at 8 P.M., she found it still alive but the condition had deteriorated; she thought it died the next morning. She baptised the child; asked by the coroner why she did so, she replied "because I am a Roman Catholic." She did not fill in any notification form; it was not usual to do so in the case of a child under 28 weeks; that was the rule or custom of the hospital, whether the child was born dead or alive. Dr. John James, doing duty as locum tenens at the hospital, said that he went with a nurse to see the baby; he made some remark about putting its weight on the notification form and was told of the rule that babies under 28 weeks were not notified. He queried the existence of the rule; it was confirmed by the hospital superintendent. The latter, in his evidence at the inquest, testified that he had seen a fœtus without a name; he saw no sign of life or breathing in the ordinary meaning of the word; it was not to be regarded as a live birth; the appearance of breathing might have been given by the high pressure in the oxygen tent.

This case is not unique. The relevant statutes, as was explained in these columns three years ago,[1] are the

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[1] Ladd, W. E., Ware, P. F., Pickett, L. K. *J. Amer. med. Ass.* 1946, 131, 647.

[1] See *Lancet*, 1946, ii, 921; *Ibid*, 1947, i, 116. Ross, J. M. *Ibid*, p. 305.

Royal College of Obstetricians and Gynæcologists

On Tuesday, March 21, at 5 P.M., at the college, 58, Queen Anne Street, London, W.1, Dr. Arthur T. Hertig, professor of pathology at the Boston Lying-in Hospital, will deliver the first John Shields Fairbairn lecture. He is to speak on Hydatidiform Mole and Chorionepithelioma.

British Institute of Radiology

The institute is considering the possibility of reviving or starting new branches in areas of the country not already covered by existing ones. Members are invited to write to the honorary medical secretary at 32, Welbeck Street, London, W.1, expressing any views they may have in this matter.

Institute of Sociology

At a meeting of the institute to be held at Burlington House, Piccadilly, London, W.1, on Tuesday, Feb. 28, at 5.30 P.M., Prof. W. J. Rose will open a discussion on Antagonism to Strangers—Theory and Fact. Further particulars may be had from J. L. Peterson, Esq., University House, Victoria Park Square, E.2.

The Nation's Manufactured Foods

The nutrition panel of the Food Group (Society of Chemical Industry) is holding the fourth of its meetings on this subject on Wednesday, March 22, at 6.15 P.M. at Burlington House, Piccadilly, London, W.1, when the use of jams and other spreads as foods will be discussed.

International Congress of Pædiatrics

The sixth International Congress of Pædiatrics will take place in Zurich at the end of July, under the presidency of Prof. G. Fanconi. Plenary sessions will be held on July 24 and 28. Lectures and exhibitions will also be held from July 21 to July 30. Registration date has been postponed to April 22, and further particulars may be had from the American Express Co.

Mental Health within the Family and the School

Today, Friday, Feb. 17, at 5 P.M., at 1, Wimpole Street, London, W.1, the British standing committee for the World Federation for Mental Health is holding an international symposium on this topic. Prof. J. M. Mackintosh will be in the chair, and the speakers will include Dr. A. Répond (Switzerland), Prof. W. Line (Canada), Prof. H. C. Rumke (Holland), and Dr. J. R. Rees. Tickets may be had from the National Association for Mental Health, 39, Queen Anne Street, W.1.

St. John and Red Cross Hospital Library

An exhibition to show the work of this department is being held in London from Feb. 8 to 18. The exhibits include the first English-made automatic page-turner. So far the 49 automatic page-turners and 15 microfilm projectors lent to British hospitals through the library are American and were given to the Red Cross. The library sends books to 1850 Service and civilian hospitals in England, Wales, and Northern Ireland, and 67 Service hospitals overseas. Over 4000 voluntary workers give their time to it, and last year 98,000 gifts of magazines and 93,000 gifts of books were sent to hospitals from the library's headquarters alone. There is a special loan service for tuberculosis patients, a special request service, and a foreign loan library, in addition to the general service. Volunteers are given instruction in hospital librarianship.

Constitution of N.H.S. Tribunal

The National Health Service (Amendment) Act, 1949, provided for a wider choice of the professional member who serves on the disciplinary tribunal, and the Minister of Health has, after consultation with the organisations representative of the professions concerned, appointed panels from which the practitioner member of the tribunal is to be selected for each case. The members of the panel of medical practitioners are: Dr. H. G. Dain, Dr. A. E. Jenkins, Dr. C. F. R Killick, Dr. A. Talbot Rogers, Dr. A. S. Wilson, and Dr. S. A. Winstanley. The members of the panel dealing with the supplementary ophthalmic services are: Mr. J. S. Arkle, Dr. Dorothy Campbell, Dr. R. R. Garden, Mr. R. Affleck Greeves, Dr. T. G. W. Parry, and Mr. A. McK. Reid. The address of the clerk to the tribunal is 2, John Adam Street, Adelphi, London, W.C.2 (Temple Bar 6055).

Institute of Laryngology and Otology

Nine lectures on pharmacology as applied to otorhinolaryngology will be given by Dr. C. A. Keele at the institute, 330, Gray's Inn Road, London, W.C.1, beginning on Feb. 27. Particulars may be had from the dean.

Nurses in Northern Ireland

The statutory restriction in Northern Ireland on the use of the title "nurse" will come into effect on March 16. After that date nursing agencies must also be duly licensed by the ministry of health and local government.

Royal Appointment

Surgeon Captain A. W. McRorie has been appointed an honorary physician to the King from Nov. 12, 1949, in place of Surgeon Captain J. F. M. Campbell, who has been placed on the retired list.

A Service Reunion

The C.M.F./M.E.F. Physicians reunion dinner will be held on Saturday, April 1, at Simpson's-in-the-Strand. Those interested should apply to Dr. Arthur Willcox, 66, Harley Street, London, W.1.

Claims to Sickness Benefit

In England and Wales new claims under the National Insurance Act during the weeks ended Jan. 3, 10, 17, 24, and 31 were as follows: 150,900, 169,500, 150,600, 142,700, 160,800. During this month the weekly average was 154,900. The weekly averages in the twelve months from January to December, 1949, were as follows: 157,900, 179,800, 185,200, 114,400, 97,700, 83,500, 78,600, 88,800, 100,900, 119,100, 136,200, and 96,700.

Nomenclature of Pest-control Products

The British Standards Institution has appointed a technical committee "to prepare standards for the nomenclature for insecticidal and fungicidal chemicals and other pest control products." This committee, whose chairman is Mr. H. J. Jones, includes representatives of Commonwealth countries, Government departments, scientific societies, and manufacturers' organisations.

Institute of Social Psychiatry

On March 22, at 2 P.M., at Seymour Hall, Seymour Place, London, W.1, the institute is holding a conference on Day Hospitals and Social Rehabilitation. The speakers will include Dr. Noel Harris, Dr. Joshua Bierer, Dr. E. B. Strauss, Dr. Donald Blair, Dr. Doris Odlum, and Dr. Desmond O'Neill. Tickets may be had from the institute, 9, Fellows Road, N.W.3.

Maida Vale Hospital for Nervous Diseases

Some of the war damage to this hospital has now been repaired, and facilities for neurosurgery are once again available. The department of electro-encephalography has also lately been reopened, and the pathological services have been greatly extended. Postgraduate teaching is given at the medical school for candidates preparing for higher examinations, and there are also clinical demonstrations for practitioners in the North West metropolitan region.

Remuneration of Medical Civil Servants

Last year a joint committee formed by the British Medical Association, the Ministry of Health Medical Staff Association, and the Institution of Professional Civil Servants drew up a proposed scale to align medical salaries in the Civil Service with those in the National Health Service (see *Lancet*, Jan. 14, p. 75). At the Ministry of Health the chief medical officer's salary would be increased from £3000 to £5000, and in certain other grades the maximum would be augmented by close on £2000. This claim has now been rejected by the Treasury.

Foreign Scholarships

The British Council has been asked to find candidates among British students for scholarships which are being offered for 1950–51 by the following countries: Belgium, Brazil, Czechoslovakia, Denmark, Finland, France, Germany (Universities of Cologne and Munster), Italy, the Netherlands, Norway, Persia (University of Teheran), Sweden, and Switzerland. The closing date for applications is March 10, and details of the scholarships may be had from the controller, education division, British Council, 3, Hanover Street, London, W.1.

Notes and News

PROTECTION FOR THE MIDWIFE

A RECENT case when heavy damages were awarded against a midwife as a result of bottle burns to a patient, has led the council of the Royal College of Midwives to provide safeguards for all full members of the college by including third-party indemnity as a privilege of membership. The cover provides up to £5000 damages and legal expenses against accidents or injury to mother or baby in the course of the midwife's professional duties whether she is acting as a midwife or maternity nurse, also liability in respect of accidental direct damage to property caused by, or through, the negligence of the midwife. In cases of citation before the Central Midwives Board legal expenses up to £25 are provided.

WEIGHTS IN EARLY CHILDHOOD

LAST year Gore and Palmer[1] pointed out that with infants the use of "average weight for age" as an index of general health had the disadvantage that normally there was a very wide dispersion; and they suggested that a chart might be designed to show the actual mean weights and standard deviations in normal infants. Acting on this suggestion, Glaxo Laboratories Ltd. have produced a chart based on the figures reported by Gore and Palmer for normal London infants in 1947. The chart shows the upper and lower limits of weight for boys and for girls from the age of four weeks up to five years; and means and standard deviations are set out in tabular form at the side. The chart may be obtained on request by public-health departments, hospitals, and other institutions concerned with child welfare.

RESULTS OF LEUCOTOMY

IT is appropriate that the first number of *Anais Portugueses de Psiquiatria,* which began publication last October, should contain a review of the results in 100 cases of leucotomy; for we owe this form of treatment to Egas Moniz, of Lisbon. In the opinion of the authors (Barahona, Polónio, and Sousa) the chief indication for leucotomy is the failure of conservative measures, including insulin therapy and electroconvulsive shock. With the proviso that conservative treatment should be tried first, the earlier leucotomy is done the better are the results. The reason for this delay is that when the results of insulin therapy or of electroconvulsive shock are beneficial they are better than those of leucotomy. These workers have never observed after insulin or electroconvulsions such deterioration of personality as sometimes follows leucotomy. They conclude that leucotomy has no specific action on mental disease and does not alter the association of ideas and the structure of the patient's psychosis, but that it changes the emotional manifestations thereof. They consider that leucotomy weakens the patient's purposiveness, steadiness, foresight, awareness of self and of others, integration of personality, aggressiveness, and mental activity, the patient becoming more of a robot responding to external stimuli.

MEDICAL FEES AND THE POLICE

A Home Office circular to police authorities lays down the following principles for the payment of doctors' fees:

Emergency treatment.—Where a doctor gives emergency treatment, whether or not at the request of the police, to someone injured in a road accident in which a motor vehicle is involved, the doctor is entitled to a fee in accordance with the Road Traffic Act, 1934. In other cases of accident or sudden illness in the street, the doctor may claim a fee from the local executive council; but if the doctor is not in the health service, the police may pay the fee and if possible recover the cost from the patient. These arrangements apply also where a doctor is called to a police station to treat someone who is neither in police custody nor the victim of an offence.

Persons in police custody.—Where a doctor is called to treat, or to examine for police purposes, a person detained in custody, the doctor should be paid out of the police fund.

Victims of an offence.—The police may pay a fee for the examination of such victims, and also for their treatment provided that no fee for emergency treatment has been claimed from the local executive council.

Drunkenness or other offences.—Where a doctor is called by the police to examine someone charged with drunkenness or any other offence, or in cases where such a charge may be made, the doctor is to be paid out of the police fund. If the person being examined wishes to call his own health service doctor, he should be informed that such attendance is not part of this doctor's obligations under the health service and that a fee may thus be payable by him.

Dead bodies.—If a doctor is called to treat a seriously ill person who dies before he arrives, an emergency fee will be payable by the local executive council (unless the person was on the doctor's list). If, however, the doctor is summoned after the person's death, payment will be made out of the police fund.

In a few areas, the local executive council have arranged with the doctors in the National Health Service that no fee shall be claimed for emergency treatment; and the capitation fee is correspondingly higher. The arrangements described above apply also to these doctors, whether or not they claim a specific fee from the executive council. The payments out of the police fund which have been described will not be made to those police medical officers who are engaged at an inclusive salary.

PROFESSIONAL TRENDS

THE *Manchester Guardian* lately sent a questionary to some 1500 medical professors and lecturers throughout the United Kingdom to find out how many read their journal and to obtain other information of interest to advertisers. Almost half replied, and there were only three real dissentients. One sent back a blank form, another a form torn into small pieces, while a third returned the form with the somewhat ambiguous statement "Barmy" scrawled at the foot.

An analysis of the replies showed that 54·4% of the respondents were readers of the *Manchester Guardian* (15·7% regularly, 38·7% occasionally), while 77% bought two or more newspapers daily. "Only 6%" owned a television set, though another 6% intend to buy a set during the coming year ("provided I can persuade my wife" one admits). Many of the negative replies to this question included such heartfelt comments as "God forbid," "Never!", or "I see enough already!" Some 37% read classified advertisements, while 38% consciously read display advertisements. Of the group, 87% owned a car, and 13% had two or more cars. Priority had enabled many of the professors, &c., to buy new cars, and more than 60% had post-war models. One reported ownership of a 1919 model, but pending a sight of this the *Manchester Guardian* statistician suspects a clerical error.

University of Liverpool

At a recent examination for the D.T.M. & H. the following were successful:

A. Deuchars, Muriel M. D'Souza, R. D. Eagland, K. G. Koshi, C. M. Norman-Williams, S. L. H. Smith, W. G. Timmis.

Dr. R. D. Eagland has been recommended for the Milne medal and for the Warrington Yorke medal.

University of Birmingham

The title of reader in obstetrics and gynæcology has been conferred on Dr. H. C. McLaren, lecturer and first assistant in the department of obstetrics and gynæcology. Dr. B. MacMahon has been appointed research fellow in social medicine. Mr. J. M. Small has been appointed clinical lecturer in neurosurgery, and Mr. O. T. Mansfield in plastic surgery.

Royal College of Physicians of Edinburgh

At a meeting of the college held on Feb. 7, with Sir David Henderson, the president, in the chair, the following were elected to the fellowship:

Alexander Brown, Robert A. K. Harper, R. Brockie Hunter.

The following were elected to the membership:

E. R. Gauld, I. R. Gray, W. T. Strauss, E. S. Thodey, J. A. C. Wilson, Jagat Ram, W. P. Small, N. R. Grist, L. G. Leitch, W. R. M. Alexander, J. B. Wilson, P. F. Bartley, W. J. H. Lord, D. B. Nathan, Thomas Joyce, A. A. B. Swan, K. J. Keeley, Jessie E. J. Grainger, C. H. M. Walker.

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty held on Feb. 6, with Dr. W. R. Snodgrass, the president, in the chair, the following were admitted fellows of faculty: John Hewitt *qua* surgeon, and Stuart Ian Alexander Laidlaw *qua* physician.

Royal College of Surgeons of England

At a meeting of the council held on Feb. 9, with Sir Cecil Wakeley, the president, in the chair, the Hallett prize was awarded to Harold Ellis of the University of Oxford. Diplomas of membership and diplomas in public health and in psychological medicine were granted to those named in the report of the comitia of the Royal College of Physicians in our issue of Feb. 4 (p. 237).

On Feb. 7 the council of the college dined with the master, wardens, and court of the Barbers' Company at Tallow Chandlers' Hall, when they received from their colleagues of old time a replica of the silver-gilt grace cup given to the Company of Barber-Surgeons by King Henry VIII in 1540.

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1. Gore, A. T., Palmer, W. T. *Lancet*, 1949, i, 385.

THE BODY-IMAGE IN NEUROLOGY*

MACDONALD CRITCHLEY
M.D. Brist., F.R.C.P.
SENIOR NEUROLOGIST TO KING'S COLLEGE HOSPITAL, LONDON;
PHYSICIAN TO THE NATIONAL HOSPITAL, QUEEN SQUARE;
DEAN OF THE INSTITUTE OF NEUROLOGY

ONLY within the last two decades have neurological phenomena been related to the body-image and its disorders. Even today we perhaps utilise this conception too little. The subject forms a fascinating chapter in neuropsychiatry, conspicuous by the high quality of some of the contributions.

The expression body-image (body-scheme; *image de soi*) refers to the mental idea which an individual possesses as to his own body and its physical and æsthetic attributes. It is often taught that Head and Holmes (1911–12) first drew attention to the idea of a body-image, when they wrote:

> "The final product of the tests for the appreciation of posture or passive movement rises into consciousness as a measured postural change. For this combined standard against which all subsequent changes of posture are measured before they enter consciousness, we propose the word 'schema.' By means of perpetual alterations in position we are always building up a postural model of ourselves which constantly changes. Every new posture or movement is recorded on this plastic schema . . ."

The story can be traced to earlier sources however. As an offset to Janet's conception of "psychic tension or potential," Wernicke and his pupils Foerster (1903) and Storch (1902) were calling attention to the importance of some purely physical components which they termed the "somatopsyche" or the "myopsychic factors." Even earlier French psychiatrists had loosely employed the word "cœnæsthesia" to refer to the sum-total of sensations arising from without and within the body. Disorders of this faculty had been spoken of as *délires cénésthesiques* (Raymond and Janet) or *cénésthesiopathia* (Deny and Camus 1905). Comar (1901) spoke of an "auto-representation of the organism." Most important of these earlier contributors, however, was Bonnier, who from 1893 had been studying various aspects of cœnæsthesia. These found maturity when he applied the term "aschematia" to the disorder by which certain aspects of ourselves cease to function in the notion that we have of our own body" (Bonnier 1905). Other variants of this condition he called "hyposchematia," "hyperschematia," and "paraschematia." Most of Bonnier's clinical examples were cases of vertigo.

Following the attention focused on this subject by Head and Holmes, many papers appeared, most of them dealing with the question of phantom limbs after amputations. In 1923 came Schilder's first contribution to the whole problem. His work *Das Körperschema* was expanded in 1935 to appear as *The Image and Appearance of the Human Body*. This forms a sort of *chef d'œuvre manqué* which just falls short of being one of the great monographs of neurology. The year before, van Bogaert had published his important paper which dealt with the *image de soi* particularly from the anatomical side. Lhermitte's major contribution appeared in 1939, written in an inimitable style, encyclopædic, yet vivid and arresting. Since that date there has been no outstanding review of the subject, though a number of papers dealing with parietal symptomatology, with the agnosias and with phantom limbs, refer more or less to the body-image.

NATURE OF THE BODY-IMAGE

Many factors contribute to the formation of the body-image under normal conditions. Chief among them are visual factors, tactile impulses, and proprioceptive stimuli. Head and Holmes were especially concerned with the last-named, and indeed their term was "a postural model" of the body. Some authors (e.g., Pirisi 1949) have argued that Head and Holmes's postural model is not the same entity as that known nowadays as the body-image; and indeed these two authors went on to describe another schema or model upon which cutaneous stimuli are localised upon the surface of the body. Though all three factors—visual, tactile, postural—play a rôle, none is essential. That is to say, a body-image of a sort exists in the absence of any one of the foregoing factors. Thus, the blind have their own kind of body-image, as also have those where the stream of tactile impulses, or of postural messages, is interrupted.

These three cardinal factors which, operating together, play so important a part in constituting the body-image cannot however be regarded as the only responsible agencies. One can exclude the operation of all three and yet a body-image can remain. Thus a man may lose his arm and be left with a short stump at the shoulder. There is no longer any limb to be seen, and afferent impulses—proprioceptive and exteroceptive—no longer ascend from the periphery. And yet a phantom sensation remains and keeps up the original idea of integrity of the body-image. This phantom limb, present in the vast majority of all amputees, shows how resistant the body-image is to the effects of mutilation. So firmly rooted is it that it may even require a cortical ablation (or an intercurrent hemiparesis) to cause it to disappear.

Visual Factors.—Ordinarily the conception of one's body-image is to some extent made up from the information gained by inspection. This applies particularly to exposed parts of the anatomy—e.g., the hands. Other regions are invisible except in a mirror—e.g., the face and fore parts of the body. Yet other regions are out of sight even with the aid of a single mirror (posterior parts of the head and torso), though interested women may examine themselves by means of a series of reflecting surfaces. But, at the best, a mirrored image affords information which is neither adequate nor exact. There is, to begin with, no right-left reversal. Self-scrutiny in a looking-glass imposes a certain artificiality, and one is apt to lose the natural animation, the mimic play, and even the tic-like grimacing which may be so obvious to others. The optical component of the body-image is therefore a distorted schema in which the hands are predominant, with the face occupying a secondary and subordinate rôle. But we must not make the mistake of identifying the visual component of the body-scheme with the sensory homunculus of the postcentral gyrus.

In the blind, and especially those who have lost their sight early in life, an optical component is in abeyance and is compensated by tactile and postural hypersensitiveness. The major difficulty in the blind, however, lies in an altered relation between what one may term personal space (i.e., the body-image) and extrapersonal space. The latter is much more constricted in the blind, though auditory stimuli have the property of altering immediately the notions of the blinded man as to distance.

How far visual components are concerned in the eventual state of the body-image has been strikingly demonstrated by the well-known experiments of Stratton (1896), Wooster (1923), and Scholl (1926). Stratton covered his left eye and put in front of the right one a system of lenses which turned everything upside down and from one side to the other. This apparatus was worn constantly for eight days. At first Stratton felt nauseated and giddy: everything was topsy-turvy and his voluntary movements were grotesquely incoordinate. Gradually this improved and by the eighth day a marked

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* Based on a lecture given at the National Hospital, Queen Square, December, 1949.

Society of Analytical Psychology

The address of this society is now 25, Park Crescent, London, W.1 (Langham 6108).

Dr. Dagmar Wilson, of Oxford, left early this month for Ceylon, where she will undertake an investigation on the incidence of endemic goitre under the auspices of the World Health Organization, at the request of the Ceylon government.

The Egyptian government has invited Dr. W. R. Aykroyd, director of the nutrition division of the Food and Agriculture Organization, and Dr. F. W. Clements, chief of the W.H.O. nutrition section, to visit Egypt to study their nutrition policy.

CORRIGENDUM: *Medical Films.*—Last week (p. 285) we reviewed a film on the basilar artery produced by the physiology department of St. Bartholomew's Hospital Medical College and the Wellcome Film Unit. We are informed that this does not show the distal end of the basilar artery; and in the experiment which we described the contralateral vertebral artery, and not the contralateral axillary artery, was occluded.

Births, Marriages, and Deaths

BIRTHS

ARMSTRONG.—On Feb. 8, the wife of Dr. T. G. Armstrong—a daughter.

BARRETT.—On Feb. 6, at Bushey, Herts, the wife of Dr. G. M. Barrett—a son.

BOAN.—On Feb. 5, at Tidworth, the wife of Major S. Boan, R.A.M.C.—a son.

BREWERTON.—On Feb. 5, at Watford, the wife of Dr. R. Brewerton—a son.

FLETCHER.—On Feb. 8, in Manchester, the wife of Dr. Frank Fletcher—a son.

HARROLD.—On Feb. 7, in London, the wife of Dr. A. J. Harrold—a son.

HISCOCKS.—On Feb. 7, the wife of Dr. H. F. Hiscocks—a son.

HULME.—On Jan. 19, at Liskeard, the wife of Dr. H. K. Hulme—a daughter.

KOPELMAN.—On Feb. 8, in London, the wife of Dr. Harry Kopelman—a son.

MANN.—On Feb. 3, in London, the wife of Dr. W. N. Mann—a daughter.

MORGAN.—On Feb. 6, at Edenbridge, the wife of Dr. C. R. Morgan—a daughter.

PAGE.—On Feb. 11, in London, the wife of Dr. Francis Page—a daughter.

PLUMMER.—On Feb. 9, at Ilkley, the wife of Dr. T. R. Plummer—a son.

POCOCK.—On Feb. 10, at Clifton, Bristol, the wife of Mr. John A. Pocock, F.R.C.S.—a son.

ROWLATT.—On Feb. 5, at Rochford, the wife of Dr. Basil Rowlatt—a son.

SHEMILT.—On Feb. 9, at Kettering, Northants, the wife of Dr. Peter Shemilt—a son.

n London, the wife of Mr. E. R. Smith, F.R.C.S.

. 8, at Calgary, Alberta, Canada, the wife of
chan—a son.

TAYLOR.—On Jan. 27, in London, the wife of Dr. Stephen Taylor—a son.

WARRACK.—On Feb. 9, at Aldershot, the wife of Lieut.-Colonel A. J. N. Warrack, M.B.E., R.A.M.C.—a son.

MARRIAGES

FAIRLEY—ORR.—On Feb. 11, in London, Barrie Fairley, M.B., to Jean Orr, S.R.N.

FRANKENBERG—COERT VAN TRICHT.—On Feb. 14, in London, John Frankenberg, M.R.C.O.G., to Mieke Coert van Tricht.

GODLOVE—SMYTH.—On Feb. 4, at Lancs,
Leslie Michael Godlove, M.B., to

WILLIAMS—BURDETT.—On Jan. 27, Geoffrey
Williams, M.B., to Elizabeth Bos

DEATHS

CLOUGH.—On Feb. 6, at Whitchurch, Salop, Alfred Hollier Clough, M.R.C.S.

CURTIS.—On Feb. 4, at Naivasha, Kenya, Percy James Curtis, M.R.C.S.

FRAZER-NASH.—On Feb. 8, at Kingston Hill, Surrey, Lilias Frazer-Nash, L.R.C.P.E., aged 90.

HART.—On Feb. 7, at Derby, Arthur Edward Hart, B.A., M.B. Camb., aged 84.

HOSFORD.—On Jan. 28, Thomas Henry Hosford, L.R.C.P.E., aged 82.

JACKSON.—On Feb. 6, at Chadderton, Robert Ashton Jackson, M.B. Manc., D.P.H., aged 63.

PATCH.—On Feb. 4, at Chichester, Burnet Graham Patch, M.R.C.S., lieut.-colonel, R.A.M.C. retd, aged 74.

RODGER.—On Feb. 7, at Dundee, John Rodger, O.B.E., M.C., M.B. Edin., D.T.M. & H., colonel, I.M.S. retd.

STANGER.—On Feb. 8, Geoffrey Stanger, B.A., B.M. Oxfd.

TAUNTON.—On Feb. 8, in London, Richard Eustace Maxwell Taunton, M.B. Edin.

Diary of the Week

FEB. 19 TO 25

Monday, 20th

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Mr. A. Dickson Wright: Surgical Aspects of Hyperpiesia. (First Lettsomian lecture.)

Tuesday, 21st

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. J. E. Piercy: Factors Contributing to Safety in Surgery of the Thyroid. (Hunterian lecture.)

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. R. M. B. MacKenna: Lichen Planus and Lichenoid Eruptions.

Wednesday, 22nd

WESTMI , Horseferry Road, S.W.1
5.30 -theatre.) Clinicopathological
Infection in a Case of Bacterial

NORTH I SOCIETY
8.15 P.M. (Prince of Wales's General Hospital, N.15.) Dr. Harold Waller: Breast-feeding.

Thursday, 23rd

UNIVERSITY OF LONDON
4.45 P.M. (University College, Gower Street, W.C.1.) Mr. Tudor Jones: Peptide Bond in Biochemistry. (First of three lectures.)
5.30 P.M. (King's College of Household and Social Science, Campden Hill, W.8.) Dr. Keith Simpson: Murder.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Sir Paul Mallinson: Psychiatry lecture-demonstration.

Friday, 24th

MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. Anthony Feiling: Neurological demonstration.

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASE
8 P.M. (11, Chandos Street, W.1.) Prof. S. P. Bedson, F.R.S.: Virus Infections and Venereal Disease.

Saturday, 25th

BRITISH ASSOCIATION OF
11.30 A.M. (1, Wimpol
NOON Dr. Vera B. Wa t the
St. Louis Confere lergy.
2 P.M. Prof. R. J. Mc lergy.
2.45 P.M. Dr. Brian Ru rmis.

Appointments

ARTHUR, H. R., M.B. Lond., consultant
ologi ospital.
D.M. , Inverness

amb.: junior registrar (casualty officer), St. Andrew's Hospital, London.

BREMER, CONRAD, M.D. Leeds, M.R.C.P.: consultant physician (assistant), Sunderland hospital group.

BRENNAN, E. B., M.B.E., M.B. Camb., D.M.R.: consultant radiologist, Lincoln, Grantham, and Boston hospitals.

CAMPBELL : asst. administrative
M.O.,

FELL, W. : director of physical
medic bridge (from Sept. 1,

Lond., D.A.: consultant anæsthetist, Grimsby
ral Hospital.

., M.R.C.P., D.C.H.: consultant pædiatrician,
tal group.

JONES, D. H., M.B.E., M.R.C.S., D.P.M.: asst. psychiatrist (S.H.M.O. grade), Pen-y-Val Hospital, Abergavenny.

LÉCUTIER, M. A., M.B., M.SC. Leeds: consultant pathologist, Chesterfield Royal Hospital.

LOGAN, KATHLEEN, M.B. Aberd.: junior registrar (anæsthetist) St. Andrew's Hospital, London.

MACKENZIE, IAN, M.B. Lond.: consultant pathologist, Derbyshire Royal Infirmary.

MILLIGAN, W. L., M.D., B.SC. Glasg.: consultant psychiatrist, St. George's Hospital, Morpeth.

QUINLAN, J. T., M.B. N.U.I., D.C.P.: consultant pathologist, Wrexham hospital group.

RAE, J. W., M.D. Edin., M.R.C.P.: asst. physician, Inverness hospitals.

ROSS, R. M., M.B. Edin., D.P.H.: asst. county M.O., Lincolnshire, and M.O.H., Grantham and West Kesteven rural district.

SHARP, C. L. E. H., M.R.C.S., D.P.H.: asst. county M.O., Gloucestershire.

THOMAS, G. O., M.D. Lpool: consultant chest physician, Merionethshire and Montgomeryshire.

TILLOTSON, J. E., M.D. Glasg.: asst. tuberculosis officer, Inverness-shire, and asst. physician-superintendent, Culduthel I.D. Hospital, Inverness.

VASEY, R. H., M.D. Durh., M.R.C.P., D.OBST. R.C.O.G.: senior consultant physician, Sunderland hospital group.

WHEELER, H. Q. O., L.R.C.P.I., D.A.: consultant anæsthetist, Hexham General Hospital and Hexham War Memorial Hospital.

WILSON, A. R., M.C., M.B. Edin., M.R.C.P.: asst. physician, Inverness hospitals.

WOOD, J. C., M.B. Glasg., D.M.R.: asst. radiologist, Inverness hospitals.

To these tactile and proprioceptive means of enhancement, we can add a number of practices whereby the visual components of the body-image are elaborated.

Clothing has already been mentioned in this connection. The mere utilitarian properties of protection are obviously transcended when one considers adornments which are grotesque or outlandish in size. A woman's morale is said to be buoyed up by her hat, especially when it is new, conspicuous, or flagrantly costly. During the German occupation of France, Parisian women reacted against authority by displaying themselves with headgear even more conspicuous in size and colouring than usual. We are reminded of the fantastic head-dresses, not only of certain primitives (Zulus) but also at the French vaudeville. Accentuation of the body-image is also brought about by such practices as the painting of toe-nails, the wearing of anklets, tattooing, sun-tanning—practices which transcend the more decorative functions of make-up, such as coloured finger-nails and ear-rings, which can at least be admired by all and sundry. Whatever the motives for artificial deformations among savages—e.g., piercing the nostrils with spikes, and inserting wooden discs within the lobes of the ears or in the lips—such practices cannot fail to influence deeply the body-image. The same may be said of the custom of wearing masks, especially of gigantesque nature, in ritual, plays, or processions. We see the same aggrandisation of the body-image among the stilt-walkers in American processions.

PHYSIOLOGICAL MODIFICATIONS OF THE BODY-IMAGE

Certain regions of the body-image assume particular importance under varying physiological circumstances. Thus the sphincters possess a highly significant rôle, and according to Schilder they are felt not at the actual aperture but 1–2 cm. deeper. To the victim of diarrhœa the sphincter ani is obtrusive. The sensation of a full bladder causes an enhancement somewhere near the root of the penis in the male, and at a deeper region in the female. Hunger causes the epigastric area to assume importance; thirst focuses attention upon the sides of the tongue and the palate. Sexual excitement promotes the perineum in males, but in females the body-image is concentrated on a region deeper within the pelvis.

The cult of nudism is an interesting psychopathological anomaly with many aspects. One of them at least is associated with a kind of cutaneous hyperschematia. We see this well illustrated in Raoul Faure's novel on the Lady Godiva theme.

Feelings of cold and of heat also enhance the body-image. Alcoholic excess commonly produces complex cephalic sensations, ordinarily spoken of as a “ fat head.” As one person put it . . . “ with a few drinks, my eyelids close and my head seems to be enormously enlarged.” Something similar may be the result of physical duress. Thus Spencer Chapman, struggling alone through the tropical forest, ill with malaria and very hungry, wrote: “ Surprisingly enough I was not at all exhausted, but I felt curiously light-headed—as if the top of my skull were a foot higher than normal ” (Chapman 1949). Even simple embarrassment may cause the victim to feel “ all hands and feet.” Sudden alarm may produce an illusory enlargement and heaviness of the feet rooting one to the spot. This is particularly the case in dream-states, and also in that interesting condition known as affective hypertonus, or “ night-nurse's paralysis.”

After prolonged immobilisation the parts released may feel unnatural. Orloff de Wet had been manacled by the Gestapo for two years with forearms overlapping and fastened to the waist-belt. Of his eventual release he wrote:

> “ It is a weird sensation to be able to move my hands individually, to be able to hold two things at once, to stretch when I wish . . . and how extraordinary to be able to scratch my back! One's arms detached, how long they feel! Like caged birds, simultaneously happy and perplexed what to do with themselves ” (de Wet 1950).

PSYCHOPATHOLOGICAL ASPECTS OF THE BODY-IMAGE

The body-image, be it realised, lives “ on the fringe of awareness ” and is by no means obtrusive in ordinary circumstances. It is, however, available, and can be brought into consciousness as soon as the stream of attention voluntarily or involuntarily focuses upon it. Probably, then, an obtrusive type of body-image is in itself slightly abnormal, or at least unusual, and connotes an undue measure of introspection. Hence we find the most vivid body-imagery in many intelligent and introverted psychopaths.

The body-image may be altered in very many morbid states, the change taking the form of: (1) enhancement; (2) diminution (or ablation); or (3) distortion.

Pathological Accentuation of the Body-image

Any type of pain, dysæsthesia or discomfort, is liable to cause the affected part to loom largely in the body-scheme, and hence an accentuation (fragmentary or general) is common in many disease states, organic or psychogenic.

Thus, after an operation for acute intestinal obstruction, a patient noticed, whenever he was trying to go to sleep, that his body seemed to consist of a large painful belly, to which were attached very small limbs and a head, and that the whole structure was floating in space “ like a magnetic mine.”

If we turn to neurology for other examples of hyperschematia we can quote almost any case of partial paralysis of a limb, the affected segment usually giving the impression of being too heavy and too big. In cases of Brown-Séquard paralysis the side with pyramidal signs is the one which is hyperschematic, while the other one —with thermanalgesia—appears normal within the body-scheme.

Cases of thrombosis of the posterior inferior cerebellar artery form a particularly interesting study, for the two types of ataxia on opposite sides of the body can be compared. One patient during his convalescence stated that “ the left side [i.e., with thermanalgesia] used to be ‘ all dark ’ which was horrible. I now get mild painful feelings when I stretch, in the muscles, tendons, and joints. This feels painful but lovely because formerly it was a horrible absence. Pain is preferable. Formerly I used to feel a curious awareness in the right [i.e., cerebellar] hand.”

Hyperschematia may be encountered in cases of disseminated sclerosis, as in the following two examples:

> “ The left half of my body is outlined with feeling. I can almost feel the shape of my left shoulder and of my left hip bone . . . The left side seems bigger than the right. Some days my left leg seems bigger than the right, as if pumped up tight. After climbing stairs, my left side seems weighted down, as if I had been carrying a bucket of water. . . . The left ear at times feels as though it did not belong to me.”
>
> “ The left arm and hand often feel of elephantine proportions and as if sharply outlined . . . as if it had an edge to it. (As a child I used to have feelings like this very occasionally in bed at night-time. I am not sure whether I was dreaming or not.)”

A patient with Buerger's disease said: “ the bad leg feels bigger, heavier, and swollen compared with the good one.”

Phenomena of this sort may appear during febrile deliria:

> “ During an attack of gastro-enteritis my little boy had a high temperature and was light-headed. He kept saying that his hands felt much too big.”

degree of adjustment was achieved, so that on the ninth day, when he took off the apparatus, he was once again bewildered and nauseated and he performed wrong movements.

Postural Factors.—These, too, play a great part in determining the nature of the body-image. As Schilder pointed out, the rôle of previous experience is important, and, indeed, habitual postures may be more significant in determining the conformation of the body-image at a particular moment than is the actual posture adopted. For example, in cerebellar disease, when the eyelids are closed, the limbs may take up unusual attitudes without any corresponding alteration in the body-image.

Upsets in the body-scheme are well seen in abrupt lesions in the centres controlling tonus. It was a study of these that led Bonnier (1905) to his conception of "schematia." This author indeed described the vestibular nerve as *le nerf de l'espace.*

The focus of most vivid imagery is probably represented, as Claparède (1924) believed, by a sort of cyclopean eye situated between and somewhat behind the orbits. This may be so even in the blind. Whether this focus is accurately placed at the correct height from the ground is uncertain; or whether there is a general trend towards conventionality. That is to say we do not know whether the body-image of a midget or of a giant is located at the true height or at an imagined "average." Again, when there exists a severe, lifelong crippledom (old rickets, infantile poliomyelitis, or Pott's disease) we cannot say whether the person's body-image conforms to the misshapen reality, or whether it is rationalised so as to fall into line with the normal pattern. A patient of mine, bent and twisted by a gross and old-standing scoliosis, developed, in middle age, a right parietal tumour. The changes in the body-image were, however, no different from those found in other cases of parietal tumour: they did not seem to be influenced in any way by the deformity.

Schilder taught that especially important rôles in the corporeal image are played (1) by the openings of the body, and (2) by the bony prominences. Because of the latter, the effect of gravity is to cause pressure sensations which vary with posture—i.e., according to whether the subject is standing, seated, or lying. Thus the body-image will be correspondingly modified. In collaboration with Parker, Schilder studied the illusory shifts in the "heavy masses of the body" which occur when travelling up and down in a lift. We are reminded in this connection of the sense of imbalance which may be noted when going ashore after a long and stormy sea voyage.

According to Lhermitte (1939) the body-image is very gradually built up during infancy, by the interaction of a number of factors, including (1) painful stimuli; (2) visual impressions; (3) play, which largely entails the repetition of kinæsthetic activities; and (4) libidinous factors. The last-named would no doubt be granted first place by the Freudian psychologists.

It is some years before the body-image becomes stabilised or conforms to what might be called an "adult" pattern. For this reason phantom limbs are rare after amputations in children The plasticity of the body-image in early age is also shown by a study of children's drawings with their anatomical distortions. The same preoccupation with certain bodily parts may be mirrored in the pornographic *graffiti* of the young or immature.

The body-image usually lags behind the physical changes of advancing years. Consequently people rarely realise how old they look to others—despite the periodic evidence of their mirrored reflections.

PROJECTION OF THE BODY-IMAGE INTO OUTER SPACE

A person's idea of his body-scheme rarely remains confined to strict anatomical limits, for it may incorporate certain nearby inanimate objects intimately related with it. A few examples will suffice. One's personality may to some extent include one's clothing, and Head taught that a woman's body-image extends to the very tip of the feather in her hat. A motor-car driver; a cyclist; the pilot of an aircraft—all have for the time being a body-image which includes their vehicle. Thus a motorist who worms his way in and out of city traffic is limited not by his anatomy but by the distance of his bonnet and his off-side mudguard. This type of enhanced body-image does not apply of course to the learner but only to the experienced motorist, cyclist, or pilot. Moreover it does not apply to the passenger within the moving vehicle, for his body-image rarely attains the same measure of unity with the machine as that of the one who guides and directs it.

Inanimate objects other than clothing may be taken into the body-image. Thus a blind man groping his way among unfamiliar surroundings may be regarded as possessing a body-image which extends as far as the ferrule of his stick. A surgeon working with a probe inside a patient's body-cavity, and a soldier confidently manipulating a lethal weapon, are examples of a body-image expanding to include a tool. In such cases, skill is necessary, for a novice awkwardly fumbling with an instrument cannot yet be said to have incorporated the inanimate object within his body-image. An orchestral conductor of unusual psychosomatic sensitivity has said: "When conducting, I feel as if the audience were concentrating upon my baton, of which I become acutely conscious . . . so that it may appear to me extremely heavy."

Then there are occasions when the body-image of one individual becomes unduly aware of the bodies of others. Schilder has stated that the early discovery by a child of certain regions of his own anatomy may lead him to take notice of the corresponding regions in others. The same author also believed that human secretions and excreta remain part of the body-image even after they have been expelled. Partly on this basis he explained the "magical" properties in folklore of fæces, blood, urine, and finger-nails.

Individuals with strong mutual emotional attraction tend to make frequent tactile contact in and out of season: indeed that curious emotional state usually known as "being in love" may even lend itself to the unromantic definition of "a compulsive trend in two body-images of opposite sex towards propinquity, and contiguity, eventually culminating in a total fusion or merger."

RESTLESS PROPENSITIES OF THE BODY-IMAGE

> "We expand and we contract the postural mode of the body; we take parts away and we add parts; we rebuild it; we melt the details in; we create new details; we do this with our body and with the expression of the body itself. We experiment continually with it. When the experimentation with the movement is not sufficient, then we add the influence of the vestibular apparatus and of intoxicants to the picture. When even so the body is not sufficient for the expression of the playful changes and the destructive changes in the body, then we add clothes, masks, jewellery, which again expand, contract, disfigure, or emphasise the body-image and its particular parts" (Schilder 1935).

There is a compelling propensity for most individuals to seek some sort of kinæsthetic satisfaction from frequent and unnecessary bodily movements, all of which bring about a measure of flexibility in the conformation of the body-image. In part at least this may be regarded as a sort of play—i.e., the execution of movements for their own sake. This "ludic" activity can be observed in sport, athletics, and dancing. The antics of the contortionist illustrate the extent to which liberties can be taken with one's body-image, and questions of motivation would give a neurologist abundant food for thought.

sound of the friction produced exaggerated. . . . I seemed to have ears in my finger-tips."

Similar phenomena occur with hashish (Walton 1938), s shown by the following accounts:

"It seemed that my body had dissolved and become transparent" (Gautier 1843).

"The impression was that of wandering out of myself . . . I had two beings" (Urquhart 1850).

"The sensations produced were those of exquisite lightness and airiness . . . I expected to be lifted up and carried away by the first breeze . . . The walls of my frame were burst outward and tumbled into ruin, and without thinking what form I wore . . . I felt that I existed throughout a vast extent of space. The blood pulsed from my head, sped through uncounted leagues before it reached my extremities; the air drawn into my lungs expanded into seas of limpid ether, and the arch of my skull was broader than the vault of heaven. . . . I was a mass of transparent jelly, and a confectioner poured me into a twisted mould" (Taylor 1856).

"Through every thinnest corporeal tissure and minutest vein I could trace the circulation of the blood along each inch of its progress. I knew when every valve opened and when it shut. . . . The beating of my heart was so clearly audible that I wondered to find it unnoticed by those who were sitting by my side. Lo, now, that heart became a great fountain whose jet played upward with loud vibrations, and striking upon the roof of my skull as on a gigantic dome, fell back with a splash and echo into its reservoir . . ." (Ludlow 1857).

"I grew colossal in a delirium of pride. I felt myself the centre of all the world's immortal glory. . . . I was that soul divorced from the corporeal nature, disjoined, clarified, purified. From the air in which I hovered I looked down upon my former receptacle. . . . The chest heaved with the regular rise and fall of breathing . . ." (Ludlow 1857).

"My legs put on a strange, foreign feeling, as though they were waxen pillars underneath me" (Wood 1869–70).

". . . Body growing larger . . . Consciousness of my corporeal existence had somewhat left me though I could see and feel with my hand my lower extremities . . ." (Wiltshire 1878–79).

"He had some feeling of space enlargement and also had ideas of double consciousness. He was himself, yet was somebody else, sitting in a boat, floating through the sky amid pink clouds" (Hamilton 1913).

"The idea of oneness with all nature and with the entire universe seems to take hold" (Schneider 1923).

During the auræ of an epileptic attack, paraschematic sensations may occur. There may be an illusory movement of a limb; the arm may feel as though being torn away from the trunk.

Even in normal persons, the body-scheme may undergo most curious deformations during the predormitum, or period of "sleepening" as Gowers would have said. Federn (1928) has stated that the three-dimensional image may flatten out and become two-dimensional. One diameter may lengthen disproportionately so that the distance between two symmetrical points on the trunk may appear greater than the total length of the body. Median parts of the body-image may disappear, while erogenous regions linger until the onset of sleep.

In those rare but interesting states of ecstasy, there may be extreme aberrations in the body-image sometimes in the nature of a distortion but perhaps more often in the way of what Lhermitte calls "emancipation of the body-image." In states of near-ecstasy, as during strong emotional tension, or better still, absorption in overwhelming auditory stimuli of a musical (particularly an orchestral) character, the body-image may, as it were, be caught up, distorted, or transposed. This was emphasised years ago by Bonnier (1905). Thus a well-known composer said that when conducting, his body-image used to take up a position outside himself, but between his actual body and the players. But after an attack of meningitis this feeling changed, and his body-image would then seem to merge with the music, which would seem to be all around him, behind as well as in front. Or he might get bipartition fantasies with depersonalisation but yet an enhancement of his body-scheme. He might imagine himself a giant bestriding the whole orchestra looking down and watching the players—and himself—all quite small. At other times this feeling was so strong that he would seem to be somewhere within astronomical space, gazing down upon the earth which would look like a small ball.

A professional soprano said that while singing she would become "transported" and seemed to be free of her body and oblivious of her audience. This was particularly the case when singing compositions by Mahler.

Paraschematia may attain fantastic proportions in cases of depersonalisation, whatever the cause, and whether or not accompanied by derealisation. But of greater interest are the phenomena of partial depersonalisation. Lhermitte, who has studied this subject with particular brilliance, speaks of a "bipartition of the postural schema."

Thus the patient of Dr. Noel Harris, already mentioned, developed the illusion of "being two people." He did not actually see or hear his other self, but he would imagine it as occupying a different position in space, the two personalities being situated side by side, but one slightly in front of the other. He would feel that one of his selves was normal and the other not. The abnormal self would urge him to do foolish things.

Bonnier described a patient with attacks of labyrinthine vertigo during which he would seem to be divided into two persons, one looking at the other from outside. Oppenheim's patient had attacks of migrainous vertigo when he felt as though his whole body were doubled or divided (Oppenheim 1916).

One of Lhermitte's patients with vertigo felt the left side of the body "heavy, doughy, as if clamped in steel." The whole left side seemed filled with some foreign matter. Then would come a hemianopia within which would emerge a hallucination of a nearby figure standing to the left and slightly behind, which seemed to be made of a semi-opaque gelatinous substance.

van Bogaert's patient, a diabetic, had attacks of vertigo associated with a hallucination in which she saw a woman enter the door, come near, and then seat herself on her left. This vision resembled the patient, "like a sister."

This delusional dislocation of the body-image into the visual sphere has aroused some psychiatric interest, and which has cropped up a good deal in romantic literature. Spoken of by Féré (quoted by Lhermitte 1939) as a specular hallucination, and by others as "autoscopy," it has been termed by Lhermitte, who has taught us most on this subject, "heautoscopy." Lhermitte has given us examples from Aristotle, Wigan, Goethe, Taine, Alfred de Musset, and d'Annunzio. Others too can be found in de Maupassant and Axel Munthe. He recalls to us the theme of Oscar Wilde's *Dorian Gray* which was based partly on Balzac's *Peau de chagrin* and partly on a tale by Edgar Allan Poe.

Heautoscopy has been encountered in a number of morbid conditions, including drug intoxications, delirium, hysteria, schizophrenia, and demoniacal possession. Certain persons have also claimed the ability at times to emancipate their soul from their body and to bring about by a willed effort a transitory bipartition of the body image, as any theosophist will tell us.

Lhermitte has also discussed the phenomenon of "negative heautoscopy" whereby a patient loses his reflection in a mirror, or even his shadow. Again we are reminded of this as a romantic theme (*Peter Schlemihl*; *L'Horla*). Of a cognate character is the classical *signe du miroir* whereby a patient (often a schizophrene or a dement) fails to recognise himself in a looking-glass, the image appearing like that of a stranger (Klein 1928, Hemphill 1948).

Allied also to autoscopy and bipartition of the body image is the so-called Capgras symptom. Here the

Some of the most vivid and at the same time most bizarre examples of hyperschematia are described by patients with hypochondria. The sensations are often complex, and may be associated with states of partial depersonalisation. One of Schilder's patients said :

> "I have an intense feeling that the right and left sides are interchanged. The right side is too light. Objects feel different in the left hand ; they have more space there. The right hand is much smaller, especially the inner part. When I clench my fist the fingers do not fit my hand . . ."

Dr. Noel Harris has kindly allowed me to quote from a patient who from an early age had periodic episodes in which his hands would seem to increase in size :

> "When I say they grow big I don't just mean that they would be big enough to fill this room, but they are big enough to hold the whole of this hospital, and sometimes big enough to hold the universe."

In the remarkable case reported by Comar (1901), the patient—an ignorant, hysterical girl of 18—was seemingly able to describe the conformation of the viscera while under hypnosis. Describing her associated coxitis, she said "I see how it is with my joint ; it isn't bad, they've made a mistake ; it is simply rusty ; there's fluid inside but not enough to make it work, and there are cords around it which are too tight." Regarding the lower part of her abdomen, she said "How queer it is here in the middle . . . it's a sort of pear with the point downwards, and above on each side are strings which come and turn round in front. There are several covered up in the folds of a veil and in one of the folds there's a thing like a nut." She described her stomach as being "like a big pouch going across with openings above and below. Should I also feel the little folds inside where there are small berries with openings ?" The bladder was said to have "two little tubes going into it and another much shorter one leading out." She described the size, shape and situation of her heart and also the circulation :

> "In the heart I have valves and on one side at the top a big tube leaves, bends over and goes down the middle of the body. . . . These tubes are everywhere ; they go down the arm [pointing to the bifurcation of the brachial artery] . . . they get smaller and smaller. There are two things inside, a white liquid and a lot of little red things, nearly round but not quite. They are flat and they swim about in the white fluid . . ."

It is possible that a difference occurs in the body-image between pregnant women and those with hysterical pseudocyesis. In the former condition, little if any change takes place in the body-image despite the uterine distension, while in the latter condition the swollen abdomen is probably clamant and ever present.

Diminished or Absent Body-image (Hyposchematia ; Aschematia)

Here again the attendant circumstances are diverse. Aschematia is the rule when a segment of the body is deprived of both afferent and efferent communications. Thus it may occur after complete transection of the spinal cord, and the patient may feel as if sawn off at the waist. It may accompany severe painful experiences but only if they are generalised. Electric shocks form an example :

> ". . . Felt myself becoming smaller and smaller and squeezed into myself." (240 V, A.C., contact $^3/_4$ min.)
>
> "My head seemed to enlarge and burst with pain . . . my body, legs, and feet seemed to shrink to nothing until I felt I could stand on a ten cent piece." (22,000 V.)

Hyposchematia accompanies any condition where the action of gravity is actually, or apparently, reduced. Thus in underwater swimming, and more especially in "skin diving," the body and limbs move with ease and freedom, although slowly.

Vertigo constitutes the best examples, and formed the basis for Bonnier's original studies. In these circumstances the patient may seem unduly light ; he may appear to float through the air, or to sink through the bed ; he may seem to be rotated or jerked abruptly in one direction or another.

Lesions of the parietal lobe, more especially of the subordinate hemisphere, afford us some striking instances of ablation of the body-scheme. Even when the dominant hemisphere is involved we may discern traces of disordered body-image in an autotopagnosia, best shown in the finger agnosia of Gerstmann's syndrome. When the right parietal lobe is involved in dextrad subjects, we may encounter defects ranging from neglect of the left half of the body to hemidepersonalisation and anosognosia (or unawareness of hemiplegia). On top of these negative aspects, certain delusional and confabulatory systems may be added. Thus a patient who had sustained an embolism of his right middle cerebral artery, reported that ". . . it felt as if I was missing one side of my body (the left), but it also felt as if the dummy side was lined with a piece of iron so heavy that I could not move it . . . I even fancied my head to be narrow, but the left side from the centre felt heavy, as if filled with bricks." At one time he thought that his paralysed leg belonged to the man in the next bed. His body felt to him half as wide as it should have done. Lying on the left side gave him the sensation that he was "lying on a void" . . . that he was at the extreme edge of the bed and would presently fall off. In the early days he also felt that he had no penis at all. On this account he was clumsy with the urinal and the bed was frequently soiled. His sensation of owning a penis returned quite suddenly one morning in association with an erection, and it afterwards felt normal.

We may refer in passing to two interesting sensory defects due to a dissociation between a loss in the body-image and an integrity of sensation. When the body-image is in abeyance over one half only, sensory stimuli may be felt but incorrectly localised to a corresponding point on the other side (alloæsthesia). When the body-image is universally lost, painful contacts may be felt but completely unlocalised (achiria ; pain asymboly).

Distortion of the Body-image (Paraschematia)

This may accompany hyper- and hypo-schematia, so as to give a mixed picture. Or it may consist in spatial alterations of the body-image. Some of the best examples are to be found in states of intoxication with drugs.

Quoting from the monograph on mescal hallucinations by Kluver (1938), we may refer to the person who said he could see and feel his thorax constantly growing until it became a garden in which the arms were alleys. In another case the right half of the body was felt to be continuous with the surroundings. Another stated "my arm becomes suddenly long." A leg may seem several metres in length. Or, sometimes the whole body seems smaller. Limbs may feel "swollen" or they may "melt away."

Still more complicated phenomena may take place. Thus Serko (1913) said :

> "I felt my body particularly plastic and minutely carved. At once I had a sensation as if my foot was being taken off . . . then I felt as if my head had been turned by 180 degrees. My abdomen became a fluid, soft mass, my face acquired dimensions, my lips swelled, my arms became wooden, my feet turned spirals and scrolls, my jaw was like a hook and my chest seemed to melt away."

Again, in Knauer and Maloney's (1913) account :

> "I realised that I had no head, but in its place a sheet of ground glass, such as is used in a camera as a screen . . . where my ear was, was an insoluble mystery ; I could not find it so long as with open eyes I followed and controlled the movements of my searching hand. I was quite unconscious of the position of any part of my body."

One of my subjects, a painter, developed under mescal a curious cutaneo-auditory hyperæsthesia :

> "When peeling a banana I heard every shred straining and cracking ; when stroking anything I heard the small

TUBERCULOUS MENINGITIS IN CHILDREN

RHYTHM OF TREATMENT, PROGNOSIS, AND RESULTS

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THREE years have now elapsed since the start of the Medical Research Council trials of streptomycin in tuberculous meningitis; and, though much experience has been gained and opinion is beginning to harden in favour of certain lines of treatment, the last word about dosage and rhythm has not yet been said. Sulphones and other drugs are now commonly used in addition; but streptomycin still remains the most important therapeutic agent, and it is desirable to decide, if possible, what is the best that streptomycin alone can achieve.

We have therefore reviewed the treatment of 43 children (all under the age of 7 years except 2 aged 8 years) who were admitted under the M.R.C. scheme and treated with streptomycin on four different plans; 16 of these cases were included in the preliminary report of the Medical Research Council (1948) trials of streptomycin in tuberculous meningitis. The first child was admitted on Jan. 20, 1947, and the last on June 21, 1948. All the survivors have been followed up to Oct. 1, 1949. The minimum observation period for survivors is sixteen months, and the survival-rate for this period is 41%. Two children have been observed for two years and eight months.

The recovery of a child from tuberculous meningitis may depend on several things besides streptomycin or the manner of its administration—e.g., age, advancement of tuberculous lesions other than meningitis, clinical state at start of treatment, innate resistance to tuberculosis, and the quality of nursing and medical supervision. The number of cases affording a true comparison that can be collected by one team is therefore small. Added to this there is the difficulty often encountered in adhering strictly to a prescribed plan of treatment. The statistical approach to the problem of deciding which of many different rhythms of treatment gives the best results has not yet yielded an answer, and we have still to depend on the conclusions of treatment centres which have dealt with fair numbers. Our own series is relatively small and not suitable for statistical analysis, but some useful conclusions can be drawn from these cases, and our results are presented in a form which we hope will enable other centres to compare them with theirs (figs. 1 and 2, tables I and II).

DEFINITIONS

Normal Cerebrospinal Fluid.—The standard of normality that we have adopted is: cells 5 or less per c.mm.; protein 40 mg. or less per 100 ml.; and glucose 45 mg. or more per 100 ml.

Nearly Normal Cerebrospinal Fluid (final stage of recovery of C.S.F. in cases off treatment or on extended intramuscular treatment).—In the earlier part of the trials the attainment of a normal C.S.F. by any patient clinically recovered was considered tantamount to apparent cure, but we very soon found, when more frequent follow-up lumbar punctures were done, that a normal cell-count, protein level, and glucose level in the C.S.F. on one occasion was almost always followed in succeeding weeks by slight deviations of the protein and cells from their normal values. Only after many months do the various elements of the C.S.F. remain constantly within normal limits. Generally the first element to return to normal is the glucose, next the cells, and last the protein (fig. 3). The glucose may be within normal limits for six months or more while the cells and protein are still fluctuating between normal and slightly abnormal levels. We have come to be suspicious of a cell-count fluctuating for a long time between 10 and 20 per c.mm. as probably foretelling relapse. The higher the protein at the beginning the longer it takes to come down.

Initial Response.—By this we mean the first signs of a return towards normal—not merely an arrest of deterioration but a step in the reverse direction. We have not regarded as a response the mere prolongation of life beyond the expected time, or the continuation of a certain clinical state without change for better or worse. The essential sign of a return towards normal is an improvement in the mental state. We have found the definitions of mental states given below useful in following the patient's progress in deterioration or towards recovery. Only in cases where the mental state was normal from the start have we considered the absence of deterioration, so to speak, as a response. The state of nutrition has little correlation with the initial response, except when the meningitis is mainly confined to the spinal cord and posterior cranial fossa. In such cases the mental state remains for a time unclouded, but deterioration may be shown by very rapid emaciation. If nutrition is well maintained in the early weeks this is all to the good, but some wasting is compatible with a satisfactory initial response; it is in assessing subsequent progress that the weight-curve is most useful. We have therefore taken the mental state as the only guide in timing the initial response. The important bearing of this on the final results is discussed later.

Full Recovery.—This term applies to the child who has no symptoms or signs of meningitis, who is in good health and leading a normal life without restrictions, and whose C.S.F. *has been normal on two occasions* in a minimal period of three months. Neurological sequelæ, if static or improving, do not invalidate the definition.

Relapse.—We reserve this term for patients who have made a "full recovery" or who are perfectly well with a "nearly normal C.S.F." and then develop fresh symptoms and signs of tuberculous meningitis.

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patient has the mental impression, but not an actual hallucination, that he is not alone. This is an event which may develop in states of exhaustion, hunger, or thirst, in which loneliness is conspicuous. Hence it has been described by Antarctic explorers, by solitary travellers, shipwrecked sailors, and by climbers marooned upon the Alps.

PHANTOM SENSATIONS

The occurrence of phantom-limb sensations after an amputation constitutes the best-known evidence of a body-image. There is no necessity to recapitulate the extensive literature of the subject, but one or two aspects are worthy of emphasis.

In the first place phantom limbs are to be expected in the vast majority of all amputees, unless the limb is lost in very early life. In those born without one or more limbs, whether or not due to intra-uterine amputation, phantom sensations do not occur.

The ordinary phantom limb may participate in any widespread process of dysæsthesia. Thus a supervening diphtheritic polyneuritis will produce numbness, tingling, and pins-and-needles sensations in the phantom limb as well as the others. Even sensations of heat, or of coldness, environmentally determined, will be referred to the missing limb.

According to Leriche (1937), phantom sensations apply only to limbs. Riddoch (1941), however, mentioned that one may encounter a phantom nose or penis, and he believed that loss of any extruding part of the anatomy was liable to be followed by a phantom. Dr. L. G. Kiloh, my registrar at King's College Hospital, has kindly investigated this question for me on a series of surgical patients. According to his findings, phantom feelings are rare after removal of a breast or ear, but common after enucleation of an eye, excision of the rectum, or laryngectomy.

The following are some of the statements made by these surgical patients.

Loss of an Eye

CASE 1.—" Yes ! My right eye feels very active. It is strange that you should ask. I could almost feel that it is still there. It is hard to realise it has gone—I still feel as though I am using it."

CASE 2.—" Oh yes, definitely ! You think that you can still feel through it."

CASE 3.—" Yes, I get exactly the same thing as a phantom limb. I feel as if I had nothing missing whatsoever. It feels as if I have got my hand in front of my eye—like a pad ; and if I could take the pad away, I would see."

Abdominoperineal Excision of Rectum

CASE 1.—" I often get the feeling that I am making a motion—especially when I make water. I have to look in the pan to make sure that I haven't."

CASE 2.—" Sometimes when I wake up I feel as though I want to go to the lavatory, but of course I do not bother to sit down now. If I think about it, it does still seem to be there."

CASE 3.—" I may still feel that I have an anus and that something wants to come through. This feeling occurs once or twice a week."

Phantom feelings may occur not only after amputation but also after lesions of the nervous system, especially peripherally. Thus a phantom arm may follow an injury to the brachial plexus. A phantom anus may occur after a lesion of the conus medullaris. Transverse spinal disease may cause a paraplegia with phantom legs. Even a cerebral lesion may, very occasionally, give rise to a phantom third arm and leg in addition to the hemiplegia.

MUTILATING OPERATIONS

It is perhaps not unfair to say that many surgeons are ignorant of the extent to which some of their operative measures produce a prolonged and crippling afront to the ego—particularly in the case of young women. Certainly some dental surgeons do not hesitate to sacrifice the front teeth of a young woman upon the altar of focal sepsis, and thereby go far towards ruining the patient's self-esteem. Plastic surgeons, far more than thoracic or abdominal surgeons, are conversant with the severe psychological trauma which their patients suffer, out of all proportion to the local lesion. In the same way skin diseases, especially of the exposed parts, bring in their train much more mental suffering than the mere discomfort justifies.

We might continue the discussion by comparing the social and sexual sequelæ which are apt to follow the loss of a leg as opposed to an arm ; or to consider the assault upon the personality of the enucleation of an eye, or the amputation of a breast.

It is feared that these non-surgical considerations are not always given enough weight when the pros and cons of operative interference are discussed.

NATURE OF THE BODY-IMAGE IN MONSTERS

Already we have debated whether the body-image conforms to the actual morphology of the body, or whether it adheres to a more general group-pattern. It is interesting to speculate what kind of body-scheme would belong to one of those rare and grotesque freaks of nature should it ever survive to adulthood and to some sort of social existence. The most striking subject for conjecture would be a bicephalic or two-headed monster. Although most of these perish early, some have attained adult stature—e.g., the Tocci brothers and the Sassari twins.

Personal identity must not be confused with body-image, though the two conceptions overlap to some extent. It would be safe to assume separate " personalities " and discrete body-images to such conjoined pairs as for instance the Siamese twins. But when we consider a single monster with one trunk, one set of viscera. and two heads and necks, there is abundant room for differences of opinion. When the Sassari twins were born in 1829, a contemporary journal wrote " Already it is a matter of grave consideration with the spiritualists, whether they had two souls or one ; most of them think the twins had two as sometimes one of the heads cried and the other did not." (Quoted by Thompson 1930.)

There are other grounds for thinking that a bicephalic creature would possess two separate egos. This belief is supported by the behaviour of the two-headed tortoise filmed and studied in detail by Brickner and Lyons (Brickner 1948). The two heads were often in actual combat with each other.

A bicephalic human monster would probably also be endowed with two identities, but the body-image would be, to say the least of it, complicated. The ridiculous situation might be imagined where such a monster, having two egos and but a single body, might have very differing likes and dislikes. Do both components sleep at the same time ? Do both suffer hunger and thirst simultaneously ? Probably not, or not necessarily so. One can visualise the one partner having a liking for an article of diet which might prove indigestible to the common alimentary tract. One partner might choose to exercise and the other to rest. One might favour the eatables, the drinkables, the clothing, even the acquaintances which the other partner abhors. A little imagination will call up a wide variety of other possible predicaments. . . .

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of meningitis on admission to hospital; for the accuracy of this history largely depends on the mother's memory and acuteness of observation and on the clinician's experience in bringing out the facts. Furthermore, there is little correlation between length of history and immediate response to treatment—cases with a long history may do very well, and vice versa. We have therefore sought a simpler and more accurate method of assessment.

The state of advancement of the meningitis is probably closely paralleled by the height of the intracranial pressure, and the resulting cerebral depression is more closely reflected in the child's mental state than in any other symptoms or signs. We have therefore assessed the mental state of all our cases on admission according to the following criteria:

Stage 1.—Normal mentality of a sick child, more or less modified by drowsiness, irritability, and headache.

Stage 2.—Delirious: confused mental activity.

Stage 3.—Stupor: (*a*) Accessible—i.e., obeys simple commands; may recognise parents; exhibits little or no spontaneous activity. (*b*) Inaccessible by speech or sight; rousable only by painful stimuli or shaking; does not recognise parents.

Stage 4.—Coma: a state of absolute unconsciousness as judged by the absence of any psychologically understandable response (including, for example, change of expression) to external stimuli or inner needs; the patient may reach still lower levels of nervous disintegration—e.g., loss of swallowing reflex (see Glossary of Psychological Terms, *Med. Res. Coun. War Memo.* no. 4. London. 1941).

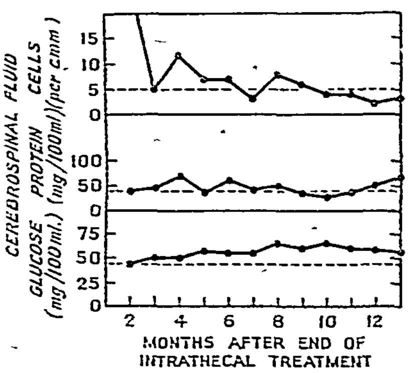

Fig. 3—Example of final stages of recovery of C.S.F. in cases off treatment or on extended intramuscular treatment (case 35).

Except for 3 infants under the age of a year we have had no difficulty in placing a patient in one or other of these categories. By adopting this method we have minimised personal bias and subjective impressions and made the assessment of mental state (and, by inference, the advancement of the meningitis) almost as objective as a physical sign. The following data and fig. 4 show clearly the serious prognosis that goes with stupor or coma:

Mental state	*Recovered*	*Died*	*Total*
Stage 1	10	8	18
,, 2	2	3	5
,, 3 (stupor or coma)	2	15	17
Infants, not assessable (cases 16, 20, and 37)	1	2	3
Total			43

Cases on intramuscular treatment (plan c) not included.

EFFECT OF PULMONARY INVOLVEMENT ON PROGNOSIS

The survival-rate according to the presence or absence of a primary complex demonstrable by X rays was as follows (see also fig. 5):

	Total	*Dead*	*Alive*
Primary complex	19	16	3 (*16%*)
No primary complex	24	13	11 (*46%*)

In many of the fatal cases we had to be content with the evidence of a single portable X-ray film. In 10 such cases radiography was negative. In 5 of these a necropsy was done, and a primary complex was found in 3 of them. The number of fatal cases associated with a primary complex was therefore probably greater than the radiological evidence showed. In the survivors, on the other hand, it seems unlikely that a primary complex would be missed, for here we had ample opportunity of taking repeated films of good quality in the X-ray department.

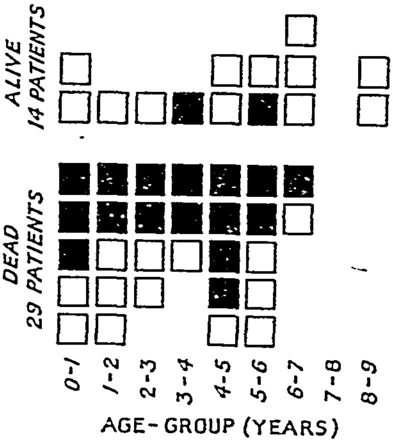

Fig. 4—Prognosis according to age and mental state on admission: blank squares, stages 1 and 2; black squares, stage 3.

The evidence tabulated above suggests that tuberculous meningitis has a worse prognosis when associated with an active focus of primary tuberculosis, and the difference is statistically significant; but, since the numbers are small, perhaps the importance of this observation should not be overemphasised.

RESULTS ACCORDING TO INITIAL RESPONSE

If we consider the over-all results in terms of the initial response made by these children, the responses may be divided into three types.

(1) *Immediate response*—i.e., in the first week—was seen in 13 patients, all on combined treatment, and 3 of them may be described as exceptionally responsive. All of them made steady progress on their first course of treatment. Only 3 have died, 2 after recrudescence and 1 after relapse; 3 have not yet fully recovered after sixteen months.

(2) *Delayed response.*—Of the 10 patients (3 on intramuscular treatment alone) showing this type of response, 5 have died, 3 after a recrudescence and 1 after a relapse. The delay varied from two to eleven weeks. In most of these children progress was slow, and neurological complications were more numerous in this group than in the first, comprising blindness and optic atrophy (2 cases), uncinate fits, hemianopia, and lethargic encephalitis picture (1 case), 7th nerve palsy and paraplegia in flexion (1 case), thalamic state (1 case), and hemiplegia (1 case). Cases with neurological complications are emphasised by Bernard et al. (1949) as having a greater tendency to relapse.

(3) *No response.*—Of the 20 patients (4 on intramuscular treatment alone) who did not respond, 15 were admitted in mental state 3. In a few cases treatment was abandoned for various reasons, for we were always dominated by fear of the late results of such disasters as cerebral softening or extreme wasting of cerebral tissue associated with gross hydrocephalus, conditions which are often demonstrable post mortem. Two of our recovered patients are mentally retarded; case 37 is only slightly backward, but case 10 is an idiot. A quicker resort to ventricular drainage or surgical intervention in the acute stage might have allowed more streptomycin to reach the C.S.F. and might perhaps have prevented hydrocephalic attacks in some of these patients; but we are not convinced that any treatment so far devised can make much impression on this type of case.

Recrudescence.—This term refers to children with an abnormal C.S.F. but otherwise well, who deteriorate soon after treatment is stopped.

SELECTION

In our series there has been no deliberate selection of cases, but it has been difficult to eliminate this factor completely. For instance, when the Emergency Bed Service was responsible for placing cases in the few streptomycin centres then existing, it was not unusual for several children to be waiting for treatment. In these circumstances it was natural to choose what appeared to be the most favourable case from those presented to us over the telephone. There has been no selection of cases after admission to hospital. All cases in which the diagnosis was confirmed are included in this review.

BASIS OF DIAGNOSIS

In 40 cases bacteriological proof of the diagnosis was obtained by positive film (47%), culture (63%), or guineapig inoculation (88%), but 3 cases are included in the series although film, culture, and guineapig inoculation were all negative, for the following reasons.

Case 9.—Diagnosis confirmed post mortem.

Case 10.—Girl, aged 9 months. Pulmonary tuberculosis (tubercle bacilli in stomach washings). Mantoux 1/1000 positive. Sixteen days' history of vomiting and convulsions; C.S.F. found at another hospital to contain: cells 30 per c.mm. (lymphocytes) and protein 35 mg. per 100 ml (glucose not tested); film negative, culture not set up. On admission six days later C.S.F. contained: cells 100, protein 45 mg. and glucose 19 mg. per 100 ml. Baby was unable to sit up, whereas previously it had been bright and cheerful and was starting to sit alone. Became stuporose during third and fourth weeks of treatment, and glucose in C.S.F. fell to 0. Glucose remained low for eight weeks and did not regain a normal level till the fifteenth week. Baby emerged from stupor in the sixth week but remained permanently mentally retarded and with right arm and leg spastic. Convulsions recurred in twentieth week but not subsequently. Developmental tests at the age of 3 years and 2 months gave her a developmental age of about 1 year. This case is included in the series because it is hardly possible to explain the association of pulmonary tuberculosis, vomiting, and convulsions with the C.S.F. changes by any other diagnosis than tuberculous meningitis, and to exclude her would be to lose sight of one of the risks which recovery from tuberculous meningitis involves in small children.

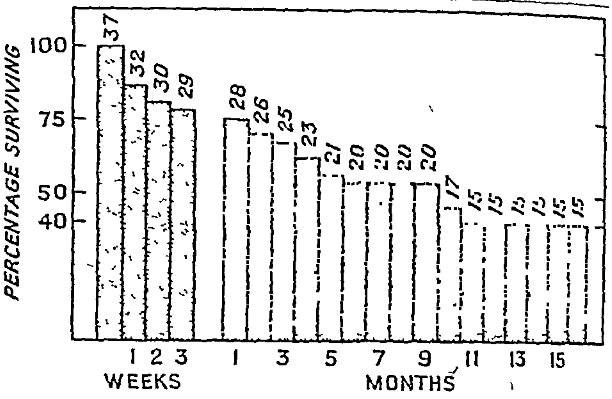

Fig. 1—Survival-rate in 37 cases on combined treatment according to time elapsed from start of treatment (shortest observation period 16 months).

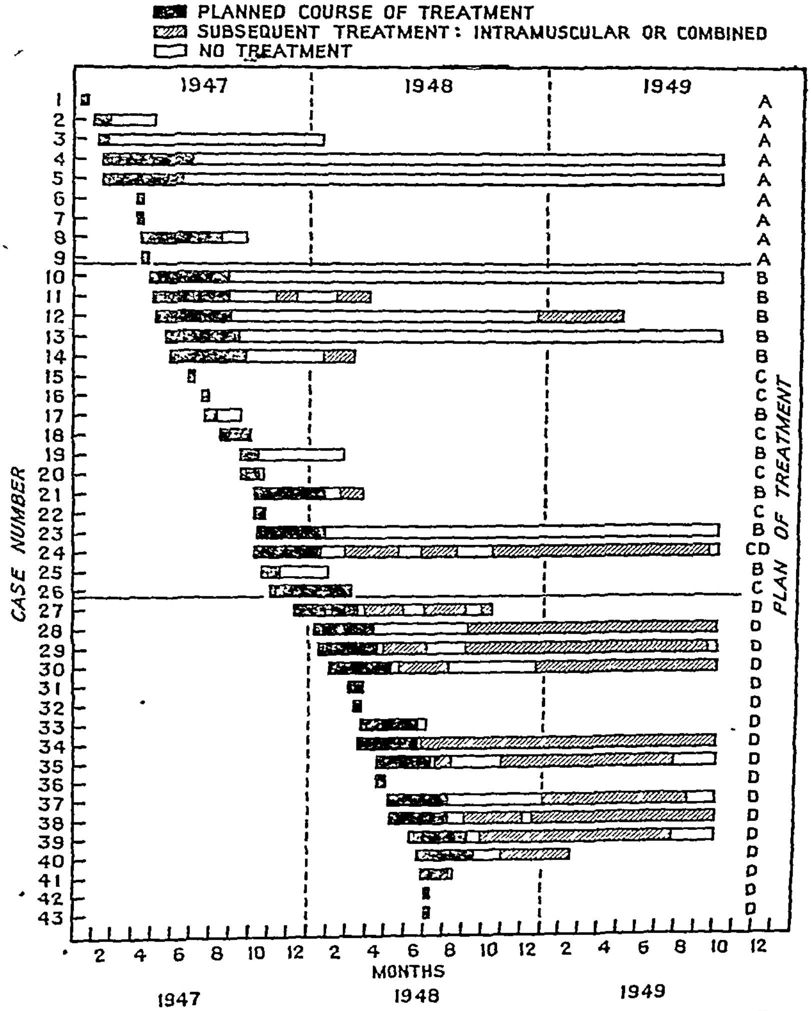

Fig. 2—Length of survival, duration of treatment, and plan of treatment adopted. For plans A, B, and D see fig. 6. Plan C, intramuscular streptomycin alone. Treatment abandoned in cases 2, 3, 17, 19 and 25.

Case 37.—Boy, aged 7 months. Close contact with tuberculous adult. Mantoux 1/1000 positive. X-ray film of chest showed primary complex. Extreme irritability. C.S.F. contained: cells 158 per c.mm. (lymphocytes 90%), protein 500 mg. and glucose 5 mg. per 100 ml. Glucose remained low for three weeks on treatment. Excellent response, but developmental tests after recovery showed slight retardation.

MENTAL STATE AND PROGNOSIS

The extent and severity of the meningitis at the start of treatment have a considerable bearing on the prognosis. The results are in general much better in "early" cases than in "advanced" cases treated in the same way. The extent to which a series is adversely weighted by advanced cases is therefore important in comparing the results of two schemes of treatment or the results in two centres. The commonly used subdivisions—"early," "medium," and "advanced"—are vague, however, and the observer assessing the state of advancement of the meningitis may be influenced by such things as the degree of meningism, the presence of neurological signs, and perhaps the length of the history.

Rubie and Mohun (1949) emphasise apathy and various degrees of withdrawal from the environment as indicating a raised intracranial pressure and they give prominence to the mental picture, though chiefly as an aid to the diagnosis of tuberculous meningitis. They rightly discount the length of history as a guide to the stage their early detection should depend more on a careful planned clinical examination than on too frequent lumbar punctures. We therefore recommend a special watch on the following points:

(1) *Temperature chart:* Rectal readings should be taken morning and evening. Fever for several days, unexplained by intercurrent infection or tuberculous activity outside the nervous system, should suggest the possibility of recrudescence or relapse, and the other confirmatory signs set out below should be sought for.

(2) *Weight chart:* The child should be accurately weighed twice a week and the readings plotted graphically. A steadily falling weight should be considered an ominous sign, especially when associated with a return of fever.

(3) *Headache, vomiting, and enuresis:* The nurses must record these tell-tale symptoms on the temperature chart. The presence of any one of them for more than twenty-four hours demands immediate examination of the C.S.F.

(4) *Mental and personality changes:* Nurses or visiting parents are often the first to note these changes and should be asked to report them promptly.

Evolution of Plans of Treatment

In the original M.R.C. trials dosage at the rate of 0·02 g. of streptomycin per lb. of body-weight per day intramuscularly and 0·1 or 0·05 g. intrathecally was more or less closely adhered to, but there was much experimenting with rhythm of treatment. The treatment is an ordeal; and it was therefore urgently necessary to find out whether less arduous treatment would give over-all results comparable to those achieved with long courses. Intramuscular streptomycin alone has produced clinical recovery and a normal C.S.F.—Rubie and Mohun (1949) reported 2 cases, and Daniels (1949) a further 2 cases—but the over-all results of this treatment have been too bad to justify its further use. Information obtained in the M.R.C. trials (Medical Research Council 1948) suggested that, when intrathecal injections were given for relatively brief periods and there were frequent interruptions with relatively long intervals of no treatment, the results were better than those of prolonged continuous combined therapy. At the same time, a general clinical improvement often followed the temporary cessation of injections. These observations led us to change from continuous treatment to a course of treatment with rest periods (plan B), and later to a considerably shorter course (plan D), also with rest periods.

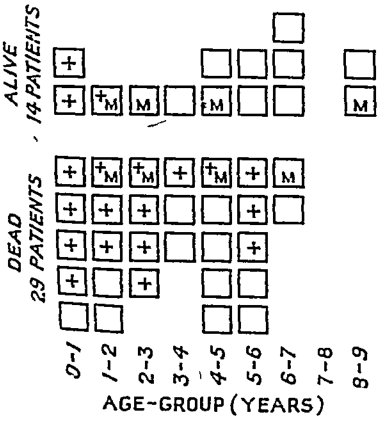

Fig. 5—Prognosis according to age and presence or absence of primary complex (+) and miliary tuberculosis (M).

Fig. 6 shows the three plans of combined treatment (A, B, and D) used. The dosage recommended by the M.R.C. was adhered to in all cases except the few in which toxic effects or local reactions obliged us to reduce it.

Before any patients were treated on plan D it was decided that those who had not responded adequately to a single course, as determined by the clinical state or the C.S.F., should receive the whole course, or part of it, again. Later, when relapses had been encountered, we began to give continuous prophylactic intramuscular cover to all. More recently we decided to give alternate periods of three weeks' intramuscular treatment and two weeks' rest, during which the child could go home. (These "holidays" have been welcomed by the children and their parents, not to mention the nurses, and the results so far in 6 such cases have been entirely beneficial.) Thus no limit was set to the amount of treatment that might be given on this plan; in effect, it could now be summed up as a course of combined treatment as in fig. 6 (D) with repetition of the whole or parts of the course according to progress, and prolonged continuous or intermittent intramuscular cover until the C.S.F. has been normal on two occasions in three months.

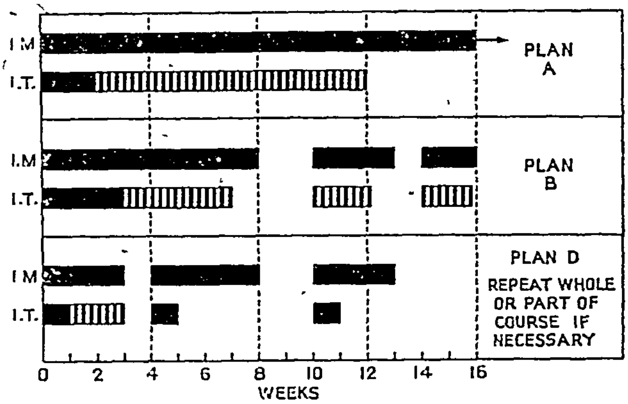

Fig. 6—Plans of combined treatment used; intrathecal injections given either daily (black) or on alternate days (barred); plan C (intramuscular treatment alone) not shown.

COMPARISON OF RHYTHMS OF TREATMENT

The response to different rhythms of treatment should not be confused with the patient's initial response. In our experience a good initial response depends mainly on early diagnosis and a free circulation in the cerebrospinal spaces. The younger the patient the more advanced is the disease likely to be and the more troublesome the mechanical obstructions to the flow of cerebrospinal fluid; but, provided that streptomycin can reach the affected tissues, a clinical response can nearly always be obtained by combined therapy in the early weeks of treatment. It is from this stage onwards that the advantage of one rhythm of treatment over another may appear.

The results of the different plans of treatment are analysed in table I. This analysis includes all cases whether they responded to treatment or not. But in trying to compare the efficacy of the different rhythms of treatment we have dealt only with cases that made an initial response (see definition) and in which the course was completed; for it is only in these that a rhythm of treatment can show its effect.

Two other cases which were eliminated from the analysis should be mentioned separately:

Case 32.—This boy died on the eleventh day from a subdural hæmorrhage due to thrombocytopenic purpura. He had miliary tuberculosis, and the thrombocytopenia was considered to be a complication of this rather than a toxic effect of streptomycin. He had not responded to treatment up to the time of his death.

Case 24.—Here intramuscular treatment alone (plan C) was given for eighteen days, and thereafter combined treatment was started because of low C.S.F.-streptomycin levels. Combined treatment was stopped after a month, but intramuscular injections were continued with rest periods. After a recrudescence, repeated courses (plan D) were given for fourteen months; finally, continuous intramuscular treatment was given for five months. After two years this child is alive and well, without sequelæ, and treatment has been stopped. His C.S.F. shows: cells 5 per c.mm., protein 55 mg., and glucose 57 mg. per 100 ml. Since the treatment has not conformed very closely to any of the given plans, particularly in the first three months, he cannot be included in any group; but we think of him as belonging to plan D.

Recrudescence and Relapse

After the last intrathecal injection of a course the C.S.F. is always abnormal, whatever the clinical state of the patient. This abnormality may be due to the persistence of the meningitis or to the residual irritative effects of the streptomycin on the pia arachnoid, or to a combination of both, and it is impossible to foretell the future trend of the C.S.F. elements. In other words, the question of activity or quiescence of the meningitis and the need for further treatment, must depend on close observation in the next few weeks. Unfortunately one cannot be guided by the patient's clinical state for, whatever the ultimate outcome, there is usually an all-round clinical improvement for several weeks after the intrathecal treatment has been stopped. During this period the intramuscular streptomycin continues to exert a suppressive action; but, when the intramuscular treatment is stopped, a recrudescence follows sooner or later in cases where the meningitis has remained active.

We think it worth while to distinguish between "recrudescence" and "relapse," and we have already defined these terms. In the relapse group we must suppose that the greater part of the meninges has been cleared of infection, and the flare-up is due to reinfection from a small stronghold of active meningitis, usually in the interpeduncular region. Recrudescence, on the other hand, is probably due to persistence of a more diffuse meningitis, temporarily suppressed by streptomycin but released when treatment is withdrawn.

Recrudescence

Recrudescence occurred in 8 of our cases; in 2 of them it occurred twice, making 10 examples in all. It is significant that, with 2 exceptions, they all followed our latest scheme of treatment (plan D). Five of the recrudescences began within a month of discontinuing the intramuscular part of the course. One started in a rest period and not at the end of the course of treatment, but this is the only recrudescence we have seen in a set rest period. The 4 remaining examples happened six, seven, eight, and eleven weeks after the course of treatment. Of the 8 children who had a recrudescence, 4 are now alive and well, including the 2 children who had two such episodes. The remaining 4 have died; in 1 of these (case 27) the tubercle bacillus had become resistant to streptomycin.

Case 38.—Plan D. Now alive and well. First recrudescence a month after last intramuscular, and six weeks after last intrathecal, injection. Activity of meningitis suggested first by weight loss and fever, and then more definitely by headache, vomiting, irritability, and return of papillœdema. No meningism. C.S.F. cell-count rose from 17 to 75 per c.mm., and the protein from 100 to 160 mg. per 100 ml., while the glucose fell from 53 to 38 ml., confirming the clinical impression of recrudescence. A second recrudescence occurred three weeks after the second course of combined treatment. The symptoms and signs were identical with those that heralded the first, except that there was no pyrexia. Papillœdema reappeared for the second time. The C.S.F. cells and protein reflected the clinical deterioration, but the sugar level, already low, fell only slightly.

The most prominent early symptoms and signs in this group were headache, vomiting, drowsiness, fever, and loss of weight. In 2 children loss of bladder control first suggested reactivation of the meningitis. In another child, who had two recrudescences, both were heralded by the reappearance of gross papillœdema. Meningism was a most inconstant sign and was therefore of little value in the early diagnosis of recrudescence. In only 1 case did the C.S.F. findings of routine lumbar puncture suggest the diagnosis before clinical signs appeared, though most of this group had had for some time a persistently abnormal C.S.F., often with a low glucose level, a state of affairs we now regard as a probable precursor of recrudescence, and an indicatio for resuming treatment.

Relapse

There were 4 relapses in our series, including 2 i patients who had attained a normal C.S.F. Case 1 remained in good health for fifteen months after th end of treatment, but all this time the C.S.F. finding were never quite within the normal limits. His sudde and rapid deterioration when he relapsed was unchecke by a second course of treatment. The other 3 relapse arose much sooner after the end of treatment—three four, and four and a half months. Of the 4 children cases 28 and 30 recovered with further treatmen and are now well. It seems likely that the relapse i case 28 was precipitated by a pneumo-encephalogram which had been done ten days previously.

Case 12.—Plan B (plan D for relapse). Died. No abnorma signs at the end of treatment. After a long convalescence at the seaside, where he successfully weathered an attack of whooping-cough and (later) measles, this boy was allowed home and back to school. Numerous lumbar punctures during the year before his relapse showed a slightly abnormal C.S.F (cells 10–20 per c.mm., protein 25–55 mg., and glucose 40–6 mg. per 100 ml.). The relapse symptoms, which began fifteen months after the last injection of streptomycin, consisted of headache, vomiting, photophobia, insomnia, and character change. There was no fever and no loss of weight, but there had been no gain for the previous two months, during which period the boy had been off his food and had occasionally vomited. On readmission he had no abnormal signs and no meningism. (C.S.F. cells 100 per c.mm., protein 80 mg., and glucose 54 mg. per 100 ml.) Organism sensitive. Slow deterioration on treatment (plan D).

Case 28.—Plan D. Now alive. Normal C.S.F. three and a half months after the end of treatment. A residual left 6th nerve paresis and minimal papillœdema were still present, but the latter was discounted in the face of a normal C.S.F. An encephalogram was done ten days before the reappearance of symptoms. The first relapse symptoms appeared four and a half months after the end of the course and consisted of loss of bladder control, shortly followed by headache, vomiting, and drowsiness. On readmission the boy was afebrile, but meningeal signs were present and he was drowsy and irritable. His C.S.F. showed cells 19 per c.mm., protein 55 mg., and glucose 54 mg. per 100 ml., suggesting early relapse. He has responded to further streptomycin.

In these 4 relapses, headache, vomiting, and loss of weight, with the addition of personality changes, were again the most constant presenting features. But, in contrast to the recrudescence series, fever was absent in 3 of the 4 cases. The fourth case had occasional spikes of temperature for several weeks before the relapse but these were attributed to the activity of another tuberculous focus. Meningism was completely absent in 2 of the 4 children at the time of the relapse. The diagnosis was first suggested in all 4 cases by clinical findings, subsequently confirmed by C.S.F. changes. The C.S.F.-*glucose level remained normal* in 3 of the children, which contrasts oddly with its value in the initial diagnosis of tuberculous meningitis.

Early Diagnosis of Recrudescence and Relapse

The gloomy prognoses we gave at the time these setbacks were encountered have not been fulfilled. Altogether, 7 of the 11 children are alive and well, 2 of them after a repeated episode. Among the survivors only case 28, who had a relapse, still causes concern. With early detection and prompt treatment it seems that, at least in the recrudescence group, the ultimate outlook is not necessarily bad.

Once we were alive to the danger of recrudescence and relapse we began to examine the C.S.F. every week in the post-treatment period until it showed a favourable trend. Thereafter lumbar punctures were done at slightly increasing intervals. In spite of this precaution, all the relapses and all but one of the recrudescences were first suspected on clinical grounds, and we now believe that their early detection should depend more on a careful planned clinical examination than on too frequent lumbar punctures. We therefore recommend a special watch on the following points:

(1) *Temperature chart:* Rectal readings should be taken morning and evening. Fever for several days, unexplained by intercurrent infection or tuberculous activity outside the nervous system, should suggest the possibility of recrudescence or relapse, and the other confirmatory signs set out below should be sought for.

(2) *Weight chart:* The child should be accurately weighed twice a week and the readings plotted graphically. A steadily falling weight should be considered an ominous sign, especially when associated with a return of fever.

(3) *Headache, vomiting, and enuresis:* The nurses must record these tell-tale symptoms on the temperature chart. The presence of any one of them for more than twenty-four hours demands immediate examination of the C.S.F.

(4) *Mental and personality changes:* Nurses or visiting parents are often the first to note these changes and should be asked to report them promptly.

Evolution of Plans of Treatment

In the original M.R.C. trials dosage at the rate of 0·02 g. of streptomycin per lb. of body-weight per day intramuscularly and 0·1 or 0·05 g. intrathecally was more or less closely adhered to, but there was much experimenting with rhythm of treatment. The treatment is an ordeal; and it was therefore urgently necessary to find out whether less arduous treatment would give over-all results comparable to those achieved with long courses. Intramuscular streptomycin alone has produced clinical recovery and a normal C.S.F.—Rubie and Mohun (1949) reported 2 cases, and Daniels (1949) a further 2 cases—but the over-all results of this treatment have been too bad to justify its further use. Information obtained in the M.R.C. trials (Medical Research Council 1948) suggested that, when intrathecal injections were given for relatively brief periods and there were frequent interruptions with relatively long intervals of no treatment, the results were better than those of prolonged continuous combined therapy. At the same time, a general clinical improvement often followed the temporary cessation of injections. These observations led us to change from continuous treatment to a course of treatment with rest periods (plan B), and later to a considerably shorter course (plan D), also with rest periods.

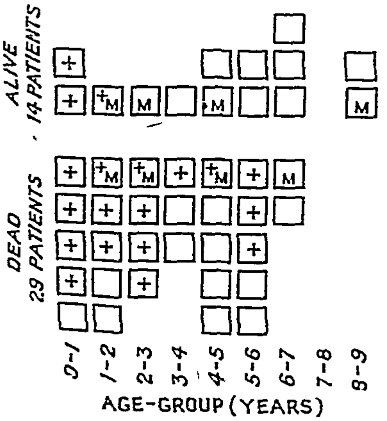

Fig. 5—Prognosis according to age and presence or absence of primary complex (+) and miliary tuberculosis (M).

Fig. 6 shows the three plans of combined treatment (A, B, and D) used. The dosage recommended by the M.R.C. was adhered to in all cases except the few in which toxic effects or local reactions obliged us to reduce it.

Before any patients were treated on plan D it was decided that those who had not responded adequately to a single course, as determined by the clinical state or the C.S.F., should receive the whole course, or part of it, again. Later, when relapses had been encountered, we began to give continuous prophylactic intramuscular cover to all. More recently we decided to give alternate periods of three weeks' intramuscular treatment and two weeks' rest, during which the child could go home. (These "holidays" have been welcomed by the children and their parents, not to mention the nurses, and the results so far in 6 such cases have been entirely beneficial.) Thus no limit was set to the amount of treatment that might be given on this plan; in effect, it could now be summed up as a course of combined treatment as in fig. 6 (D) with repetition of the whole or parts of the course according to progress, and prolonged continuous or intermittent intramuscular cover until the C.S.F. has been normal on two occasions in three months.

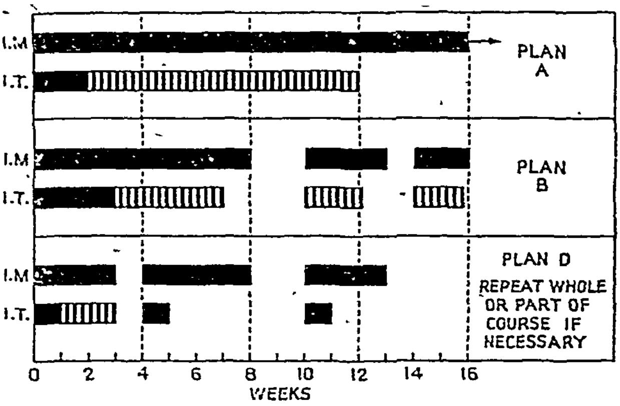

Fig. 6—Plans of combined treatment used; intrathecal injections given either daily (black) or on alternate days (barred); plan C (intramuscular treatment alone) not shown.

COMPARISON OF RHYTHMS OF TREATMENT

The response to different rhythms of treatment should not be confused with the patient's initial response. In our experience a good initial response depends mainly on early diagnosis and a free circulation in the cerebrospinal spaces. The younger the patient the more advanced is the disease likely to be and the more troublesome the mechanical obstructions to the flow of cerebrospinal fluid; but, provided that streptomycin can reach the affected tissues, a clinical response can nearly always be obtained by combined therapy in the early weeks of treatment. It is from this stage onwards that the advantage of one rhythm of treatment over another may appear.

The results of the different plans of treatment are analysed in table I. This analysis includes all cases whether they responded to treatment or not. But in trying to compare the efficacy of the different rhythms of treatment we have dealt only with cases that made an initial response (see definition) and in which the course was completed; for it is only in these that a rhythm of treatment can show its effect.

Two other cases which were eliminated from the analysis should be mentioned separately:

Case 32.—This boy died on the eleventh day from a subdural hæmorrhage due to thrombocytopenic purpura. He had miliary tuberculosis, and the thrombocytopenia was considered to be a complication of this rather than a toxic effect of streptomycin. He had not responded to treatment up to the time of his death.

Case 24.—Here intramuscular treatment alone (plan C) was given for eighteen days, and thereafter combined treatment was started because of low C.S.F.-streptomycin levels. Combined treatment was stopped after a month, but intramuscular injections were continued with rest periods. After a recrudescence, repeated courses (plan D) were given for fourteen months; finally, continuous intramuscular treatment was given for five months. After two years this child is alive and well, without sequelæ, and treatment has been stopped. His C.S.F. shows: cells 5 per c.mm., protein 55 mg., and glucose 57 mg. per 100 ml. Since the treatment has not conformed very closely to any of the given plans, particularly in the first three months, he cannot be included in any group; but we think of him as belonging to plan D.

The results with patients completing a course of treatment were as follows:

Plan	No. of cases	Surviving more than 1 year 4 mos.
A	2	2
B	7	4
D	11	8

Results of Plan A (Fig. 6)

Of the 9 patients started on this plan 7 are eliminated (cases 1, 2, 3, 6, 7, 8, and 9 in table II) because they did not complete the course. In 3 cases intrathecal treatment was abandoned after three, four, and eight weeks, and these children subsequently died. Of the other fatal cases, 1 died in less than two weeks and 3 in less than a week. Cases 4 and 5 completed the course and have fully recovered.

Case 4.—Tuberculosis of ischium. Mental state confused. Good clinical response apparent in first week. Developed spinal block after four weeks. Intrathecal treatment temporarily interrupted but resumed in twelve days when the block cleared. C.S.F. at end of four months' treatment: cells 28 per c.mm., protein 373 mg. and glucose 47 mg. per 100 ml. No further streptomycin was given. Two and a half months later, with a C.S.F. containing cells 17 per c.mm., protein 110 mg., and glucose 36 mg. per 100 ml., she was sent to a sanatorium. She was discharged from there a year and five months after the start of treatment, free from all signs of bone tuberculosis. She remains well after two years and three months off treatment. This patient did not have frequent lumbar punctures in the follow-up period as was done in later cases. Lumbar puncture a year after the end of treatment showed cells 0, protein 35 mg. and glucose 53 mg. per 100 ml.

Case 5.—Admitted in coma. Good clinical response apparent in first week. Glucose level in C.S.F. remained low for six months. Two months after the end of treatment the C.S.F. contained: cells 1 per c.mm., protein 35 mg, and glucose 43 mg. per 100 ml., a normal fluid except for the slightly low glucose level. Frequent follow-up lumbar punctures were not done. A year and two months after the start of treatment the C.S.F. showed: cells 1 per c.mm., protein 20 mg. and glucose 74 mg. per 100 ml. The patient remains well after two years and three months off treatment.

In these 2 survivors the C.S.F., though slow to return to normal, eventually did so without any further treatment. In 3 of the fatal cases (cases 2, 3, and 8), though patients developed hydrocephaly and remained stuporose and febrile, the C.S.F. trend (off treatment) paralleled that of the survivors.

Looking back on cases 4 and 5, whose complete recovery was uneventful, the C.S.F. glucose levels of 36 mg. and 43 mg. per 100 ml. at the time of their discharge were too low, and we would not happily let any of our present patients out of our hands with such a C.S.F. We thought they had had enough treatment to stamp out tuberculosis in the meninges, and that the glucose, cells, and protein in the C.S.F. would become normal in due course, as indeed they did. But in our later cases (plan D), which were given far less intrathecal treatment, a low C.S.F. glucose level at the end of the course, if not a sign of actual recrudescence was found to be almost always a precursor of deterioration unless more treatment was given. The progress of these 2 survivors suggests that, if the patient shows a good clinical response and receives combined treatment for about three months, the C.S.F. may return to normal without any more treatment. No final conclusions, however, can be drawn from 2 cases.

Results of Plan B (Fig. 6)

Of the 10 patients started on this plan, 3 are eliminated (cases 17, 19, and 25) because they did not complete the course. The clinical assessment of the 7 cases which did complete the course is as follows:

Mental state: stage 3 (coma or stupor)—none.

Miliary tuberculosis: 1 case (died).

TABLE I—RESULTS, IN SEQUENCE, OF DIFFERENT PLANS OF TREATMENT

Treatment	Plan	Cases	Mental state 3	Response to treatment	Surviving more than 1 yr. 4 mos.	Full recovery	Period covered
Combined	A	9	7	2	2	2	January, 1947, to December, 1947
	B	10	2	8	4	3	
	D	17	8	10	8	3	December, 1947 to October, 1949,
	C–D	1	0	1	1	0	
	Total	37	17	21	15 (41%)	8 (22%)	—
Intramuscular	C	6	1	2	0	0	—
	Total all plans	43	18	23	15	8	—

Among the cases followed for more than sixteen months there has been 1 death (case 12, plan B). The survival-rate for the whole group on combined treatment up to Oct. 1, 1949, is therefore 14 out of 37 (38%). All 14 are alive on Feb. 21, 1950.

Initial response: all 7 responded to treatment: 4 in the first week, and 3 after a delay of four, five, and six weeks.

Survivors: 3 cases fully recovered from meningitis. Case 10 has a residual hemiplegia and associated mental defect; cases 13 and 23 require separate mention as being exceptionally responsive to treatment.

Cases 13 and 23.—They were aged 6 and 8 years. Their mental state on admission was normal and they showed minimal signs of meningitis. X-ray films of the chest were negative. The patients responded at once to treatment, if one may describe as a response the fact that they did not deteriorate. They showed, however, a decided intolerance to intrathecal streptomycin—pyrexial peaks after the injections, severe stiffness of neck and back, pronounced Kernig reaction, and a polymorph pleocytosis in the C.S.F. So disturbing were these symptoms and so satisfactory was the patients' general condition in other respects that it was decided to omit the intrathecal injections after the first rest period; further treatment was therefore intramuscular only. Clinical and C.S.F. progress were perfect; the patients have not relapsed and are alive and well at two years and at twenty-one months after tuberculous meningitis was diagnosed.

Deaths: of the 4 fatal cases, death followed relapse in 2 and recrudescence in 2, there being no response to a second course of treatment. Case 12 is of special interest in that the relapse occurred fifteen months after the end of treatment, though for a year before the relapse the C.S.F. was slightly abnormal (see above, under discussion of relapse). Two cases had optic atrophy.

Comment: in no case which had completed the course was further treatment considered necessary at the time because of an inadequate clinical or C.S.F. response. But, if we could have been guided then by our later experience with cases on plan D, we would undoubtedly have given more treatment, even if only intramuscular, to some of these children, because of the state of their C.S.F. glucose; but we were not "glucose-minded" then as we are now.

Results of Plan D (Fig. 6)

Of the 17 cases, 6 (cases 31, 32, 36, 41, 42, and 43) died before completing the course. The clinical assessment of the 11 cases completing the course was as follows:

Mental state: stage 3 (stupor or coma)—4 patients.

Miliary tuberculosis: 4 patients (all surviving).

Initial response: all 11 patients responded to treatment, 6 in the first week, 5 after a delay of three, four, four, five, and eight weeks.

Survivors : 8 patients have survived for not less than sixteen months ; 3 have fully recovered from meningitis, though one of these (case 37), now aged 22 months, is slightly mentally retarded ; 5 patients have not yet fully recovered.

Deaths : the 3 fatal cases were as follows :

Case 33.—This patient was given a full course of plan D with half standard dosage in parts II and III because of thecal intolerance. There was steady deterioration from the start. This child is included because although she made no initial response she survived long enough for a full course of treatment to be given.

Case 27.—During eleven months in hospital and up to time of death this child's C.S.F. remained grossly abnormal. Two courses (plan D) were given because the response to the first was poor; but a month after the second course a recrudescence occurred and further treatment was without effect. Culture revealed a streptomycin-resistant tubercle bacillus (64/0·25).

Case 40.—This patient had a recrudescence six weeks after the end of one course, and deterioration was not halted by a second course.

Comment : of the 3 patients who have fully recovered, 2 showed a perfectly satisfactory clinical and C.S.F. response after one course of treatment, but both were

TABLE II—ANALYSIS OF CASES

Case no.	Age yr.	Age mos.	Mental state (stage)	Chest or other X-ray findings	Length of observation	Plan of treatment	Surviving or fatal	Latest C.S.F. of survivors			Initial response	Clinical notes
								Cells per c.mm.	Protein (mg. per 100 ml.)	Sugar (mg. per 100 ml.)		
1		11	3	PC	3 days	A	F		—		None	
2	4	5	3	PC + Mil.	3 mos.	A	F		—		None	Persistent stupor; miliary cleared
3	1		3	P.C.	11 mos.	A	F		—		None	Persistent stupor; treatment abandoned after 4 months
4	6	8	2	Bone	2 yr. 8 mos.	A	S	0	35	58 (N)	Immediate	Tuberculous osteitis of ischium healed; full recovery
5	3	5	3	Neg.	2 yr. 8 mos.	A	S	1	20	74 (N)	Immediate	Admitted in coma; full recovery
6	1	2	3	Neg.	4 days	A	F		—		None	
7	4	7	3	Neg.	3 days	A	F		—		None	
8	2	6	2	PC + Mil.	5 mos.	A	F		—		None	Miliary cleared and choroid tubercles scarred
9	1		3	PC	12 days	A	F		—		None	
10		9	1	PC.	2 yr. 5 mos.	B	S	0	30	94 (N)	Delayed	Full recovery from meningitis but with hemiplegia and mental defect; bacteriological proof lacking
11	5	8	1	PC	11 mos.	B	F		—		Delayed	Interpeduncular syndrome, blindness; recrudescence
12	5		1	Neg.	2 yr.	B	F		—		Immediate	Relapse 15 months after end of treatment
13	6	9	1	Neg.	2 yr. 4 mos.	B	S	3	5	48 (N)	Immediate	Full recovery; exceptionally responsive
14	3	10	3	PC	10 mos.	B	F		—		Delayed	Interpeduncular syndrome, partial blindness; normal C.S.F.; relapse
15	1	5	3	PC	2 days	C	F		—		None	
16		6	3	Neg.	2 days	C	F		—		None	
17	6	11	3	Neg.	2 mos.	B	F		—		None	
18	5	8	2	Neg.	1½ mos.	C	F		—		Immediate	Deterioration third week
19	1	3	1	PC	5 mos.	B	F		—		Delayed	Thalamic syndrome; treatment abandoned after 1 month; well-marked improvement 1 month later, but mental development impaired
20		11	1	PC	1 mo.	C	F		—		None	
21	2		1	PC + Mil.	5½ mos.	B	F		—		Immediate	Recrudescence; terminal measles
22	2	8	1	PC (Ca)	16 days	C	F		—		None	
23	8	11	1	Neg.	2 yr.	B	S	1	30	64 (N)	Immediate	Full recovery; exceptionally responsive
24	4	5	1	Neg.	2 yr.	C–D	S	5	55	57	Delayed	Two years' treatment required
25	1	1	1	Neg.	3½ mos.	B	F		—		None	Insidious deterioration
26	1		1	Neg.	4 mos.	C	F		—		Delayed	
27	4	9	3	Neg.	10 mos.	D	F		—		Immediate	Recrudescence; unsatisfactory progress throughout
28	5	10	1	Neg. (?)	1 yr. 9 mos.	D	S	18	55	49	Immediate	Normal C.S.F. 6 mos. after starting treatment; relapse; now doing well
29	8	11	2	Mil.	1 yr. 9 mos.	D	S	4	55	55	Delayed	Uncinate fits, lethargic encephalitis picture; partial right hemianopia and very slight ptosis in right eye; recrudescence; now very well
30	6		1	Bone	1 yr. 8 mos.	D	S	10	45	19	Immediate	Sinus mandible; recrudescence 11th month; still on treatment, with "holidays"
31	5	6	3	Neg.	1 month	D	F		—		None	
32	6	3	1	Mil.	11 days	D	F		—	—	None	Thrombocytopenic purpura; subdural hæmorrhage
33	5	3	1	PC	3½ mos.	D	F		—		None	
34	2	9	1	Mil.	1 yr. 6 mos.	D	S	4	25	56 (N)	Immediate	Recrudescence in a rest period: normal C.S.F. 11 mos. after start of treatment; then abnormal 7 mos.: now full recovery
35	1	3	1	PC + Mil.	1 yr. 6 mos.	D	S	3	60	60	Immediate	C.S.F. normal 10 mos. after starting treatment
36	2		3	PC	16 days	D	F		—		None	
37		7	1	PC	1 yr. 5 mos.	D	S	1	35	52 (N)	Immediate	Full recovery from meningitis; slight mental retardation; normal C.S.F. 9 mos. after starting treatment
38	5	6	3	Neg.	1 yr. 5 mos.	D	S	8	110	32	Immediate	Admitted in coma; developed akinesia; recrudescence twice; still on treatment
39	4	6	1	Mil.	1 yr. 4 mos.	D	S	1	35	52 (N)	Immediate	Full recovery
40	5	2	3	PC	10 mos.	D	F		—		Delayed	Unsatisfactory progress throughout
41	5		3	Neg.	1½ mos.	D	F		—		None	
42	3	3	3	Mil.	1 day	D	F		—		None	
43	2	4	3	PC	3 days	D	F		—		None	

PC, primary complex. Ca, calcified. N, normal C.S.F. Mil, miliary.

given a prolonged intramuscular course to guard against relapse. The third patient was given similar treatment, because, though he was clinically in perfect health at the end of the course, his C.S.F. still contained cells 100 per c.mm., protein 180 mg. and glucose 33 mg. per 100 ml.; after nine months' intramuscular treatment the C.S.F. reached normal and remained so.

Of the patients not yet fully recovered 4 required further courses of combined treatment because of recrudescence. One of them has weathered two such episodes. These children are still in good health, and their C.S.F. is "nearly normal," but because we are still uncertain of the significance of this state (see case 12, relapse) we have not dared to relax intramuscular cover, though their C.S.F. over a long period of observation has at times been normal. The remaining patient (case 28) is still receiving combined treatment because of a relapse after the C.S.F. had been normal, and is doing well. We are fairly confident that these children will fully recover eventually.

Discussion

In comparing the clinical condition of the patients on plans B and D it will be noted that group D was adversely weighted by 4 "advanced" cases (mental state 3), of which there were none in group B, and by 4 miliary cases as against 1 in group B. The age-distribution and the types of initial response were similar in the two groups.

In spite of these adverse factors, 8 cases out of 11 on plan D have survived for not less than sixteen months, compared with 3 cases out of 7 on plan B; and, if survival is taken as the criterion, there seems to be an appreciable difference in favour of plan D. But, if full recovery is the criterion, the results in the two groups are at present much the same, for in group D we may count 3 out of 11 as fully recovered and in group B 3 out of 7 at the end of sixteen months. However, even if we accept the evidence in favour of plan D, can we seriously adopt a scheme of treatment which may involve keeping a child in hospital with continuous or intermittent intramuscular injections and periodic bouts of intrathecal injections for one or perhaps two years (fig. 2)? A single course of treatment on plan D proved successful in 3 cases, but in our opinion this treatment must be condemned as inadequate for the majority of cases and involving a serious risk of relapse. Frequent repetitions of the course, on the other hand, may oblige us to keep the patient in hospital for an appreciable part of his childhood!

Plan B, as the results show, is also unsafe as a single course of treatment. On the basis of our later clinical experience we would undoubtedly have given these patients extended intramuscular treatment at the end of their course and might thereby have prevented the setbacks which proved fatal in 4 cases. With this addition, plan B now seems to us a promising method of treatment and better than plan D.

But now consider plan B against plan A. The only difference between these is in the rest periods. The total number of intrathecal injections is the same in both, but the inclusion of rest periods spreads out the total period of combined treatment in plan B.

The case for rest periods in a course of treatment has been presented elsewhere by one of us (Mann 1948), but we are now less impressed with their value. The child who shows intolerance to the drug, variously manifested by fever, anorexia, poor weight gain, vomiting, apathy, irritability, and sometimes meningism, derives temporary benefit from a break in treatment, but in our experience such children are few. The bulk of patients tolerate the drug fairly well, so there is little to be said for interrupted treatment. There is often an improvement in the well-being and morale of the child during a rest period, but the happiness they achieve from being spared the lumbar punctures is short-lived and they often rebel violently against further treatment. Their disappointment when the injections are renewed is often so acute that the respite is worthless. Most children after a while accept the daily lumbar punctures with pathetic resignation. Reviewing the progress of these children during the interval between one period of intrathecal injections and the next (the longest being five weeks, on plan D, fig. 6), we have not constantly found improvement either in the weight or in the C.S.F.; nor, for that matter, have we constantly found deterioration. The rest periods of a week off all treatment were too short for any significant benefit to be reflected in the weight or C.S.F.

After this experience we would prefer to discard rest periods in any future plan. Temporary intermission may be necessary for intolerance by the intrathecal route, but it is probably better to reduce intrathecal dosage in such reactors rather than break up the treatment. The elimination of the rest periods in plan B brings us back to plan A. Is this after all the best method of treatment? We have had only 2 patients who completed the course, and in a larger series we would no doubt have encountered some patients whose progress in the long run was not satisfactory. But these 2 cases have seemed more satisfactory in the end than any of the cases on other rhythms in which the initial treatment was less arduous. It is difficult to believe that any of the patients on plans B and D would have fared worse on plan A, and it seems likely that on this treatment some of their troubles would have been avoided. However, if we opt for plan A it is with the proviso that extended intramuscular cover is given after the course.

Summary of Results

Period covered by this report: January, 1947, to October, 1949.

Number of cases treated: 43. These cases were admitted between Jan 20, 1947, and June 21, 1948, a period of seventeen months.

Ages: all under 7 years, except 2 aged 8 years.

Shortest observation period: 1 year 4 months (1 case).

Longest observation period: 2 years 8 months (2 cases).

Bacteriological proof: 40 cases proved, 3 not proved (cases 9, 10, and 37).

Film positive: 47%. Culture positive: 63%. Guinea-pig positive: 88%.

Streptomycin-resistant organism in 1 case, in a relapse, sensitivity 64/0·25.

Treatment and Results

Intramuscular alone: 6 cases; surviving 0.

Combined treatment: 37 cases; surviving 14 (38%); full recovery 8 cases (22%); alive and well 6 cases; sequelæ, see cases 10 and 37 in table II and on p. 342.

The progress of all cases treated in the unit is illustrated by a survival chart, fig. 5, covering the period from January, 1947, to October, 1949. The essential clinical features of all the cases are given in table II.

Conclusions

(1) Initial response to treatment depends on a combination of several factors besides streptomycin—age, mechanical obstruction of the cerebrospinal pathways, early diagnosis, innate resistance to tuberculosis, and perhaps virulence of the tubercle bacillus—and is not greatly influenced by the manner of treatment at the start.

(2) The proportion of full recoveries in any series will depend much more on the number of initially responsive cases included than on the particular rhythm of treatment adopted.

(3) In cases showing an initial response to treatment the shortest road to full recovery for most seems to be a three months' course of combined intramuscular

and intrathecal streptomycin (with not less than 50 intrathecal injections) followed by intramuscular treatment until the C.S.F. has been normal on two occasions over a period of three months.

(4) A high proportion of survivors and ultimately of full recoveries can be obtained by giving a much shorter course of combined treatment with rest periods (plus intramuscular continuation treatment), provided this is repeated whenever the C.S.F. response is inadequate or recrudescence threatens. But this method is liable to extend treatment for well over a year and cannot be recommended in practice.

Our experience in attempting to mitigate the severity of the treatment parallels that of Dubois et al. (1949) and our conclusions are in agreement with the views of Cairns and Taylor (1949).

We wish to thank Dr. I. Doniach, department of pathology, Dr. Mary Barber and Dr. D. A. Mitchison, department of bacteriology, Hammersmith Hospital, for their collaboration in the treatment of these cases; Dr. Marc Daniels for valuable criticisms; Dr. D. G. Garrow for much assistance; Mr. S. H Moore, bacteriological technician for the Medical Research Council, the physiotherapists, and above all the nursing staff of Hammersmith Hospital for the essential part they played.

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PERFORATED MECKEL'S DIVERTICULUM
BY TOMATO SKIN

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A Meckel's diverticulum is said to be present in 1–2% of people. Acute complications, however, though well recognised, are only occasionally encountered. Their variety is well illustrated by the following list of complications found at operation in the last ten years at the Radcliffe Infirmary:

Cause of acute symptoms		*No. of cases*
Acute intestinal obstruction		11
Band	6	
Intussusception	2	
Evagination through umbilicus	2	
Volvulus	1	
Peritonitis simulating appendicitis		6
Acute inflammation	3	
Inflammation and perforation	1	
Perforated peptic ulcer	1	
Perforated by foreign body	1	
Hæmorrhage from peptic ulcer		1
Total		18

The youngest patient was aged 18 days, and the oldest 75; 6 were female and 12 male. The following case emphasises the well-known need for a thorough inspection of the terminal few feet of ileum when the appendix is found to be normal in a case of suspected appendicitis.

A normal appendix was excised, no abnormality was discovered in the neighbouring organs or in the pelvis, and $2^1/_2$ ft. of the terminal ileum was found to be normal. A small pink cystic object was found free in the peritoneal cavity and was thought by the pathologist to be a twisted appendix epiploica. After operation symptoms persisted, and five days later the patient clearly had an obstruction of the small intestine.

At a second operation, by Mr. G. Cruikshank, the obstruction was found to be due to a Meckel's diverticulum wrapped round the ileum more than $3^1/_2$ ft. from the ileocæcal valve. The diverticulum was excised and the patient recovered.

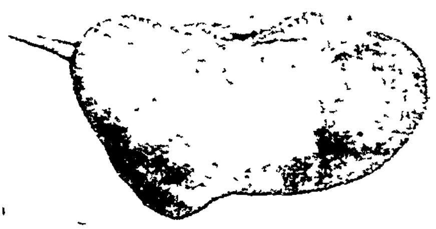
In the case of hæmorrhage from a peptic ulcer a baby, aged 8 months, had had several severe hæmorrhages from the bowel, the correct preoperative diagnosis had been made, and a Meckel's diverticulum containing a bleeding peptic ulcer was removed at operation.[1]

All of the 6 patients who died had had intestinal obstruction: 3 had been obstructed for more than two days, and in the other 3, infants under the age of $1^1/_2$ years, a resection of gangrenous gut had been necessary. The remaining 12 out of the 18 patients recovered.

The case of perforation of a Meckel's diverticulum by a foreign body, in which acute appendicitis was simulated, was most unusual and is described in detail below.

CASE-RECORD

An agricultural labourer, aged 60, was admitted to the Radcliffe Infirmary on May 25, 1949, with a diagnosis of acute appendicitis. The previous morning he had had colicky circumumbilical pain, which had gradually become worse. On the morning of admission the pain was in the right iliac fossa and the patient felt sick but did not vomit. He had had epigastric pain after meals on and off ever since a duodenal ulcer had perforated twelve years previously.


Tomato skin perforating Meckel's diverticulum.

On examination his temperature was 98°F and pulse-rate 80 per min. His tongue was furred and his breath fetid. Hyperæsthesia, muscle guarding, and release tenderness were noted in the right iliac fossa. On rectal examination there was tenderness on the right side.

Operation.—A right iliac skin-crease muscle-split incision was made under general anæsthesia. There was a little free turbid fluid in the peritoneum, but the appendix showed only serosal injection. Examination of the terminal ileum revealed a Meckel's diverticulum some $2^1/_2$ ft. from the ileocæcal valve and partly sealed off by neighbouring coils of intestine. Perforating its upper wall, near its neck, was what appeared at first to be a spike of wood, resembling the tapered end of an old yellow golf-tee. The diverticulum was excised and the ileum closed obliquely with two layers of continuous catgut sutures. The appendix was excised and the incision closed in layers with 'Nylon.' Convalescence was uneventful, and the patient was discharged eight days later.

Pathology.—The spike proved to be a piece of tomato skin, inside out, rolled to a point (see figure); it measured 4 × 3·5 cm. when spread out. The Meckel's diverticulum measured 4·5 × 1·5 × 2 cm., and its neck was 2 cm. broad. The perforation was circular and was 0·3 cm. in diameter.

Dr. J. E. French reported on the histological findings as follows: "The diverticulum appears to be lined throughout by intestinal type mucosa, and no abnormalities are seen in the wall which could account for the perforation. There is an acute inflammatory reaction in the wall at the site of the perforation, most marked on the serosal surface, where fibrino purulent material is adherent. The other coats of the wall are œdematous and show increased vascularity and a slight diffuse infiltration by round cells, polymorphs, and eosinophils. The mucosa is intact right up to the edge of the perforation."

DISCUSSION

As in the present small series, the most frequent acute complication of Meckel's diverticula is some form of acute intestinal obstruction, and the next most frequent is acute inflammation. Males are affected by these complications more frequently than females.

Perforation of a Meckel's diverticulum by a foreign body is rare, and MacFarlane[2] could find only 22 cases. These were due to a fish-bone in 15 cases, a spike of wood in 3, parts of a sewing-needle in 2, a gramophone needle in 1, and a piece of rolled tomato skin in 1. He added a case of his own, in which an inflamed diverticulum was perforated by a cabbage stalk. One reason why these perforations are much less common than the corresponding perforations of the appendix may be that the wide neck of the diverticulum allows most foreign bodies to escape. If, however, a fish-bone or a needle becomes wedged between two walls of a diverticulum its sharp point may be driven through the wall by peristalsis, as happens, for example, in the small bowel. Perforation by a blunt foreign body can be understood when the wall of the diverticulum is weakened by ulceration, inflammation, or gangrene. The foreign body may then initiate perforation, or it may merely plug a perforation already formed. Hiller and Bernhard [3] described a piece of rolled tomato skin as perforating the acutely inflamed and gangrenous wall of the diverticulum in their case. Selwyn Taylor [4] mentioned the presence of a piece of rolled tomato skin in a diverticulum removed for acute inflammation. Meckel's diverticula, however, often contain foreign bodies without any acute complication developing.

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[1] Till, A. S. *Proc. R. Soc. Med.* 1949, 42, 437.
[2] Macfarlane, D. A. *Brit. J. Surg.* 1948, 35, 421.

In the present case the patient said he had last eaten tomatoes fourteen days before his admission to hospital. The blunt point of the rolled tomato skin may have been forced through the normal wall of the diverticulum by peristalsis. Alternatively, the tomato skin may have plugged a hole already made by some sharp object that was never discovered. There was no peptic ulceration to cause the perforation; and, if the wide neck of the diverticulum had been obstructed sufficiently to cause perforation, as happens in obstructive appendicitis, inflammatory changes would have been found in its mucosal wall.

I am indebted to Mr. A. Elliot-Smith for permission to publish this case; the other surgeons of the Radcliffe Infirmary for details of their cases; Dr. French, of the department of pathology, for the histological report; and Mr. R. G. Hill for the photograph.

FUNGUS INFECTION OF THE RECTOSIGMOID JUNCTION

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IN the case reported here the patient, who was thought to have a rectal neoplasm, was found post mortem to have had a fungus infection of the rectosigmoid junction.

A retired dock labourer, aged 63, was admitted to hospital with two months' history of loss of weight, increasing constipation with attacks of diarrhœa, and intermittent colicky pain in the lower abdomen which had become much more severe on the day before admission. His appetite was poor and he had felt nauseated but had not vomited. His bowels had opened on the night before admission and again on the morning of admission.

Previous History.—The patient had had chronic bronchitis for years. His left eye had been removed three years previously because of a radio-opaque foreign body in the eyeball.

Examination revealed a pale man of poor nutrition who looked his age, and was slightly cyanosed; temperature 97°F, pulse-rate 100, and respirations 24 per min. The tongue was dry, with a brownish coating, and there were no teeth. His blood-pressure was 240/110 mm. Hg and his pulse was regular. The abdomen was distended and tympanitic; there was some diffuse tenderness on the left side, but no guarding or rigidity, and no mass was felt. There was no visible peristalsis, and no excessive peristalsis on auscultation. The liver and spleen were not enlarged. There were no external herniæ. On rectal examination a hard irregular mass was felt on the anterior wall of the rectum, just above the prostate. The mucosa was apparently moveable on it. Apart from chronic bronchitis nothing else abnormal was found.

Progress.—Shortly after admission the patient passed a large stool. Next day his abdomen was a little distended and the descending colon was palpable and slightly tender, being filled with fæces. Plain X-ray films of the abdomen and chest were normal. On the third day after admission the patient collapsed suddenly, becoming semi-comatose, greyish in appearance, and coughing up very thick sputum. His blood-pressure had fallen to 130/50 mm. Hg, and his pulse was now irregular. No neurological abnormality was detected. He died a few hours after his collapse.

Post-mortem Findings.—The lumen of the bowel at the rectosigmoid junction was encircled and almost completely occluded for a distance of 7 cm. by what appeared to the naked eye to be a carcinomatous ulcer with very thick raised edges. There was a slight excess of fluid in the peritoneal cavity. External to the mass the bowel was adherent to the posterior aspect of the left pubic bone and to the fundus of the bladder. In the pelvic mesocolon several enlarged hard lymph-nodes were palpated, but no enlarged lymph-nodes were found in the pelvis or iliac regions. There was the scar of an old healed peptic ulcer in the pyloric antrum, but the rest of the gastro-intestinal tract seemed normal. Both lungs showed a mild chronic bronchitis, and the left was also generally congested. The left ventricle of the heart was hypertrophied, but the valves were in good condition. There was some calcification of the coronary arteries and fairly severe atheroma of the abdominal aorta. Mouth, pharynx, larynx, liver, gall-bladder, bile-ducts, spleen, pancreas, kidneys, ureters, bladder mucosa, prostate, thyroid, adrenals, pituitary, meninges, and brain appeared normal to the naked eye. The bones were not extensively examined, but there were no fistulæ or subcutaneous abscesses.

Two yeast-like bodies in granulation tissue from rectosigmoid junction. (Mallory's stain for actinomyces.) (× 310.)

Histologically, the ulcer in the rectosigmoid region showed a very dense formation of fibrous tissue in its floor and walls, with a cellular reaction of lymphocytes, plasma cells, and histiocytes. The lymphocytes tended to be arranged in small collections. Only an occasional polymorph was found, and no giant cells were present. Yeast-like-bodies were scattered throughout the lesion but were not related to the lymphoid collections. In some areas they seemed to be completely absent, but in others were fairly numerous. They stained a faint red with hæmatoxylin and eosin, and with this stain were almost indistinguishable from the surrounding tissues. When stained by Mallory's method 1 for actinomyces,[1] however, they showed up clearly as homogeneous dark-blue circular bodies (see figure), most of them 7–8 μ in diameter, some slightly larger and some smaller, and appeared to be surrounded by a refractile ring like a very thin capsule. Some of them were budding, only one bud being produced at a time. No forms with multiple buds were found. No mycelial forms were present. The circular bodies did not stain with Ziehl-Neelsen stain. Sections from several parts of the lesion all showed the same picture. There was no evidence of carcinoma or other neoplasm.

Death was attributed to hypertensive cardiac failure.

COMMENTS

The rectosigmoid junction was apparently the only site involved in this infection. It is a pity that the other organs and tissues were not examined histologically but we had been sure that the ulcer was malignant.

The specimens were fixed in formalin, so no cultural studies could be made, and it is impossible to identify the organism.

Our thanks are due to Dr. R. L. Vollum for valuable criticism and advice, and to Mr. H. Warley for the photomicrograph.

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EFFECTS OF DEOXYCORTONE AND METHYLENE-BLUE IN RHEUMATOID ARTHRITIS

AN ATTEMPT TO EXPLAIN THE ACTION OF ASCORBIC ACID ON DEOXYCORTONE

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THE discovery by Hench et al. (1949) of the dramatic improvement in rheumatoid arthritis produced by 'Cortisone' and adrenocorticotropic hormone (A.C.T.H.) raised great interest all over the world and stimulated extensive research in this field. The subsequent observation by Lewin and Wassén (1949) that combined treatment with deoxycortone acetate and ascorbic acid almost immediately relieves the rheumatic symptoms attracted no less attention; this treatment, if it fulfils expectations, will mean a great step forward, because deoxycortone, unlike cortisone and A.C.T.H., is a synthetic product cheaply manufactured in unlimited quantities. Further, the dosage of deoxycortone is less and the speed of action greater than those of cortisone and A.C.T.H. Hench et al. found that about 100 mg. of cortisone acetate had to be given daily; if the dosage was reduced to 50 mg. daily symptoms reappeared. Boland and Headley (1949) recommend 300 mg. the first day and then 100 mg. daily in severe cases; in mild and moderately severe cases 50 mg. daily was sufficient. Lewin and Wassén (1949) obtained good results with only 5 mg., and in some cases only 2·5 mg., of deoxycortone. Hench et al. obtained an effect in a couple of days. Boland and Headley (1949) observed improvement 6–72 hours after the beginning of the treatment with cortisone. Lewin and Wassén (1949) obtained a full effect with deoxycortone in 15–30 minutes; sometimes relief was produced as early as 5 minutes after an intramuscular injection of deoxycortone 5 mg. combined with an intravenous injection of ascorbic acid 1 g.

It is important to find out whether the interaction of deoxycortone and ascorbic acid leads to the formation of a third substance and, if so, what this substance is. There are three chief possible ways in which deoxycortone and ascorbic acid may react with each other: (1) formation of a complex compound; (2) reduction of deoxycortone; and (3) oxidation of deoxycortone. It seems most probable that ascorbic acid oxidises deoxycortone. The hormones isolated from the adrenal cortex may theoretically be regarded as oxidation products of cholesterol. On the administration of A.C.T.H. the amount of ascorbic acid and of cholesterol in the adrenal cortex is reduced (Long 1947). Apparently ascorbic acid is in some way physiologically active in the synthesis of adrenal cortical hormones.

One way to test whether ascorbic acid oxidises deoxycortone when injected in this combined treatment is to try to obtain the same clinical effect by substituting another oxidising agent for the ascorbic acid. In my experiments I used methylene-blue.

METHOD

The patients were given intramuscular deoxycortone 5 mg. and immediately afterwards intravenous methylene-blue 8 ml. of 5% solution. Controls were given either methylene-blue alone, deoxycortone alone, ascorbic acid alone, or deoxycortone and ascorbic acid according to the method of Lewin and Wassén (1949). The results were judged by the range of mobility in each joint and by the patients' ability to walk, close their hands, put their hands on their back or to the nape of their neck, and so on. The only side-effect of methylene-blue is a bitter taste in the mouth just after the injection. The patients show a pronounced cyanosis, which disappears in a few minutes. In some cases the treatment began with deoxycortone and methylene-blue, and in others with deoxycortone and ascorbic acid.

MATERIAL AND RESULTS

The method has been tried on 8 patients so far. Of these, 6 had typical rheumatoid arthritis, 1 incipient rheumatoid spondylitis, and 1 probably acute gouty arthritis (table I). In all the cases the same rapid and pronounced improvement was obtained after combined treatment with deoxycortone and methylene-blue as well as after combined treatment with deoxycortone and ascorbic acid. The rapidity of action was the same with each method, as was also the objective improvement. The effect after treatment with deoxycortone and ascorbic acid usually lasted longer than that after treatment with deoxycortone and methylene-blue, but the amount of methylene-blue injected has only about a fifth of the oxidising effect of the amount of ascorbic acid injected. The subjective improvement was equal with the two methods. The patients felt the same after the different injections, their joints were more flexible, the pains disappeared, and mobility increased. The injection of deoxycortone alone never had any effect. In most cases I observed an insignificant but undoubted objective improvement after treatment with ascorbic acid alone or methylene-blue alone. The results are summarised in table II.

TABLE I—SUMMARY OF CASES

Case no.	Sex	*Age (yr.)*	Diagnosis	Duration	Severity
1	M	57	Rheumatoid arthritis	4 mos.	Moderate
2	F	68	Rheumatoid arthritis	3 mos.	Moderate
3	F	53	Rheumatoid arthritis	9 yr.	Severe
4	F	54	Rheumaoitd arthritis	6 yr.	Severe
5	F	48	Rheumatoid arthritis	1 yr.	Severe
6	F	47	Rheumatoid arthritis	15 yr.	Severe
7	M	27	Rheumatoid spondylitis	4 mos.	Mild
8	M	35	Gouty arthritis	2 yr. (1 week)	Moderate

ILLUSTRATIVE CASE-RECORDS

CASE 1.—A timberworker, aged 57, who had earlier enjoyed perfect health, had had four months' progressive pain in several joints when he was seen on Jan. 9, 1950. He was afebrile and slightly anæmic and his erythrocyte-sedimentation rate (E.S.R.) was 20 mm. in 1 hour. Before the beginning of the experiments he could not close his left hand—the distance between the finger-tips and the palm was 1 cm. He could not put his hands on his back or to the nape of his neck; his finger-tips only reached his ears. As an example of the range of movement the left wrist was capable of dorsal flexion 30°, volar flexion 10°, and ulnar and radial deviation 10°.

Deoxycortone and Ascorbic Acid (Jan. 19).—10–12 minutes after the injections the patient felt the stiffness of the joints receding. After 30 minutes his left hand could easily be closed; his hands could easily be placed on the back of his neck and reached the ear on the opposite side; and his left wrist was capable of dorsal flexion 75°, volar flexion 60°, and ulnar and radial deviation 30°. After 36 hours the effect subsided.

TABLE II—SUMMARY OF RESULTS

Case no.	Result of therapy				
	Deoxy-cortone and methylene-blue	Deoxy-cortone and ascorbic acid	Methylene-blue	Ascorbic acid	Deoxy-cortone
1	Very good	Very good	Some effect	Some effect	Nil
2	Very good	Very good	Nil	Nil	Nil
3	Good	Good	Some effect	Some effect	Nil
4	Very good	Very good	Some effect	Some effect	Nil
5	Good	Good	Some effect	Nil	Nil
6	Very good	Very good	Some effect	Some effect	Nil
7	Very good	Very good	Nil	Nil	Nil
8	Very good	Very good	Some effect	Some effect	Nil

Deoxycortone and Methylene-blue (Jan. 23).—Before the experiment the patient could close his hand; otherwise his status was the same as before the first experiment. After 12 minutes the stiffness of his joints had diminished and the pains had disappeared. After 30 minutes the mobility was the same as after the first experiment. The patient also subjectively considered the second treatment as effective as the first one. The duration of the effect was the same.

Deoxycortone Alone (Jan. 30).—No effect.

Ascorbic Acid Alone (Jan. 28).—The range of movement of his left wrist increased somewhat. His hands, which before the injection could not reach his back, could after 30 minutes be raised to the first lumbar vertebra. The effect lasted about 6 hours.

Methylene-blue Alone (Jan. 30).—Same initial status and results as after asorbic acid alone.

Case 2.—A widow, aged 68, who had never before had any articular troubles, had in October, 1949—some weeks after an acute cholecystitis—gradually increasing pains in her ankles, shoulders, wrists, and fingers.

On admission on Jan. 25, 1950, all the fingers of her left hand were swollen. Her hand could not be closed; the finger-tips could only reach a point 2·5 cm. from the palm. She could not put her hands on her back or to the nape of her neck, or sit up in bed without assistance. Only slight changes were observed in the other joints. The patient was subfebrile and had slight anæmia. Her E.S.R. was 19 mm. in 1 hour.

Deoxycortone and Ascorbic Acid (Jan. 27).—After 15 minutes the patient could close her left hand, put her hands on her back and to the nape of her neck without difficulty, and sit up in bed without using her arms. Subjectively her joints were free from stiffness and pain. After 48 hours the stiffness recurred and the patient's condition was the same as on admission, except that she could raise herself in bed.

Methylene-blue Alone (Jan. 30).—No effect.

Deoxycortone and Methylene-blue (Jan. 31).—Before the experiment the patient's condition was the same as on Jan. 30. About 15 minutes after the injection the patient could close her hands, raise them to the nape of her neck, and put them on her back. Subjectively she considered this treatment to be as effective as the first one. The effect began to recede after 24 hours, and after 36 hours the patient could not quite close her hands, the distance between the finger-tips and her palm being 2 cm. The improved mobility of her shoulder-joints remained.

Ascorbic Acid Alone (Feb. 4).—No effect.

Deoxycortone Alone (Feb. 6).—No effect.

Case 7.—A saw-mill workman, aged 27, who had earlier enjoyed full health, had been taken ill at the beginning of October, 1949, with stiffness and pains in his back, radiating to his left leg. On Oct. 26 his illness had become acutely severe, and he was admitted to a surgical ward. At that time he could not get up from his bed even with assistance. He showed no subjective or objective symptoms of protrusion of the nucleus pulposus. Radiography of the spine and the sacroiliac joints and myelography were normal. The patient had a leucocytosis of 14,700 per c.mm. and an increased E.S.R. (36 mm. in 1 hour) which rose after two weeks to 73 mm. in 1 hour.

The patient was then transferred to a medical ward, where urography and radiography of the lungs were normal. Rectal examination revealed no tenderness over his sacro-iliac joints. Laboratory findings were normal, except for the E.S.R., which after 6 weeks had decreased to 40 mm. in 1 hour. After two months the patient was sent home for continued rest. He could then get out of his bed alone. After a fortnight he returned, showing no considerable improvement. In spite of the absence of radiological evidence of rheumatoid spondylitis, this diagnosis seemed the most probable. On examination the spine was stiff "like a board." Bending backwards and sideways was impossible; when bending forwards, the patient reached the upper edge of the patella with his fingers (40 cm. above the floor).

Deoxycortone and Ascorbic Acid (Jan. 30).—7 minutes after the injections the patient reached a point 25 cm. above the floor with his fingers, and his back felt less stiff. After 20 minutes the distance to the floor was 20 cm., and after 50 minutes 5 cm. The patient could bend low sideways and backwards without pain. 48 hours later the stiffness began to recur.

Deoxycortone and Methylene-blue (Feb. 2).—Before the experiment the patient reached a point 25 cm. above the floor with his fingers. Bending backwards was impossible, and sideways painful. 10 minutes after the injection his back felt less stiff and the pain on bending sideways had disappeared. 30 minutes afterwards the patient reached the floor with his fingers and felt as well as ever before. After 48 hours the stiffness in his back began to recur. The patient considered the second treatment to be as effective as the first.

Deoxycortone Alone (Feb. 4).—No effect.

Methylene-blue Alone (Feb. 6).—No effect.

Ascorbic Acid Alone (Feb. 7).—No effect.

DISCUSSION

If the same substance is formed when deoxycortone and methylene-blue are injected as when deoxycortone and ascorbic acid are injected, as the results suggest, this substance is an oxidation product of deoxycortone, methylene-blue being an oxidising agent.

In most cases the injection of methylene-blue alone or ascorbic acid alone had a slight beneficial effect. This can be explained by the oxidation of steroids present in the body into active substances.

The fact that the full beneficial effect is reached only if deoxycortone is given together with methylene-blue or with ascorbic acid proves that the active substance formed by the combined treatment originates chiefly from the deoxycortone.

These experiments suggest that the physiological rôle of ascorbic acid in the suprarenal glands is that of oxidising the steroids present into various active adrenal hormones.

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Medical Societies

ROYAL SOCIETY OF TROPICAL MEDICINE

Chloramphenicol

THE society met on Feb. 16, under the chairmanship of Prof. H. E. SHORTT, the president, to hear a report on clinical trials of chloramphenicol by Dr. JOSEPH E. SMADEL, of the department of virus and rickettsial diseases, Army Medical Department Research and Graduate School, Washington.

Dr. Smadel described the development of chloramphenicol through the close coöperation of a number of groups of scientists in different fields. This was, he said, the first recognised naturally occurring compound produced by living tissue which contained a nitro group or which was a derivative of dichloracetic acid. Following laboratory studies and clinical trials in South America, observations on its use in scrub-typhus were made at Kuala Lumpur, Malaya.

On the day that the American group arrived, chloramphenicol therapy was instituted on a patient with typical scrub-typhus. Fever disappeared by crisis and 20 hours later the temperature was normal. Other manifestations diminished at the same time, except the primary eschar, which healed in 5 days. With further cases the duration of chemotherapy had been progressively shortened, and satisfactory results were now obtained by giving 5–6 g. over 24 hours (an initial dose of 3 g., followed by 0·25 g. at intervals of 2–3 hours). A satisfactory response had been obtained with a single oral dose of 4 g., and two other workers had employed a single 3 g. dose; but Dr. Smadel did not recommend such a procedure for general use.

There were no deaths among the hundred odd cases of scrub-typhus treated with chloramphenicol by Dr. Smadel's group, even though many of the patients were seriously ill and two were practically moribund when treatment was started. The fever disappeared in about 24 hours, and there were no complications.

Among 19 controls, 2 developed complications and 1 died; the average duration of the febrile period was 17 days.

The results of the therapeutic trials were so successful that prophylactic studies were undertaken. In the first field test, 17 out of 24 volunteers in the control group developed scrub-typhus between the 12th and 21st day after initial exposure; they were admitted to hospital and given specific therapy. The 22 members of the test groups remained well throughout the period of prophylaxis and for the following week, but a few days later 12 of them were admitted to hospital with scrub-typhus. Four further trials were carried out. The results of the third trial clearly indicated that chemoprophylaxis of scrub-typhus was feasible. To 31 volunteers 4 g. chloramphenicol was given weekly for 4 or 6 weeks after exposure to infection. Only 1 developed classical scrub-typhus during the period of administration; of the remaining 30, none developed clinical disease after the course was completed. Many, however, had mild febrile phases, during which they were found to have rickettsæmia. Whether the pronounced antigenic stimulus provided by the rickettsæmia was necessary to induce immunity was a point to be investigated further.

Dr. Smadel remarked that although the experiments indicated that chemoprophylaxis of rickettsial disease was feasible, its general usefulness was limited by practical considerations.

The possibility of immunising by inoculation with a living attenuated strain of *Rickettsia tsutsugamushi* and preventing the development of clinical disease by chloramphenicol was to be investigated.

The prophylactic trials provided new information on the host-parasite-drug relationship. This concerned the relapses that took place in about half of the 56 volunteers who had contracted scrub-typhus and had apparently responded satisfactorily to specific therapy. Such recrudescence had never been observed in patients who acquired the disease during normal occupational duties. The relapses almost always took place during the second week after onset and were promptly controlled by another course of chloramphenicol. The immediate problem was solved by giving a supplementary dose of chloramphenicol as a prophylactic measure about the time when a relapse was to be expected. Rickettsæmia unaccompanied by febrile illness was observed not only in patients shortly after treatment, but also in ambulatory volunteers during chemoprophylaxis and in volunteers shortly before onset of the initial attack or of the relapse. This observation was of fundamental importance to the understanding of scrub-typhus.

Chloramphenicol, Dr. Smadel explained, had a rickettsiostatic, not a rickettsiocidal, action; rickettsæmia, without symptoms, could persist after the drug had been administered. It was not yet possible to explain why a single dose suppressed clinical signs of disease for approximately a week. Chloramphenicol was rapidly excreted from the body and was no longer detectable in the blood 24 hours after a single dose of 3–4 g. Therefore the persistence of appreciable amounts of the native antibiotic could not explain the prolonged therapeutic effect. ‘Aureomycin’ produced the same therapeutic results as chloramphenicol in scrub-typhus; both drugs gave equally rapid defervescence.

Dr. Smadel then described the effect of chloramphenicol on typhoid fever. Here also the drug suppressed the pathogen and gave the host time to develop the mechanisms of resistance. The beneficial results in typhoid fever, however, did not become evident so rapidly as in scrub-typhus. Little effect was noted during the first two days of treatment, but by the third or fourth day the fever abated by lysis and the rose-spots, if originally present, disappeared; headache, cough, and toxæmia were ameliorated. From then onwards convalescence usually proceeded rapidly. Of 45 patients with typhoid fever who were treated with chloramphenicol during the initial phase of their illness, 44 survived.

A high relapse-rate might be expected if the drug was given for 8 days or less and few relapses if it was given for 14 days. Whilst it was still too early to set a standard schedule for the treatment of typhoid fever by chloramphenicol, the last one employed by Dr. Smadel's group in Malaya was as follows: an initial dose of 3–4 g., followed by 1·5 g. at 12-hourly intervals during the febrile period; then 1·5 g. in a single daily dose for 7 days; followed by 1 g. daily until the 14th day. More recently Dr. T. E. Woodward had given chloramphenicol in similar dosage to that described above, for the first 5 days; he then omitted the drug for 5 days; and after that he repeated the original course. He observed no relapses in 8 patients treated in this way. Dr. Smadel emphasised that chloramphenicol therapy did not eliminate intestinal hæmorrhage or intestinal perforation in typhoid. Patients still required the usual isolation precautions, but were less of a menace to public health than untreated patients.

Finally Dr. Smadel mentioned the efficacy of chloramphenicol in another rickettsial disease, Rocky Mountain spotted fever, and in venereal diseases of varied ætiology—gonorrhœa, lymphogranuloma venereum, lymphogranuloma inguinale, and syphilis. Benefits derived from its use in brucellosis and tularæmia were worth noting; and laboratory studies suggested that a number of other infectious diseases of man might be controlled by this antibiotic.

ROYAL SOCIETY OF MEDICINE

Recent Work on Vitamin B_{12}

THE society's section of experimental medicine met on Feb. 14 under the presidency of Prof. G. W. PICKERING.

Mr. E. LESTER SMITH, D.SC., described the steps by which he fractionated liver extract to obtain the anti-pernicious-anæmia factor in crystalline form. All assays had been made on man. The crucial procedures were physical rather than chemical and included adsorption on charcoal and partition chromatography. It was noticed that the active fractions were red, and this helped in following the active principle. He showed the elegant microbiological assay methods now used, and how, coupled with partition chromatography, they revealed the presence of at least three active substances: the vitamin B_{12}, an allied B_{12a}, and thymidine. He announced that from *Streptomyces griseus* he had obtained in crystalline form another substance which, tested on patients, had proved as effective as vitamin B_{12}. It had not yet received an official name, and he referred to it as “the unnamed substance.” Its chemical and physical properties were very close to those of vitamin B_{12}.

The investigation of the chemical structure of the vitamin was proceeding. One atom of cobalt was contained in its molecule; also a dimethylbenzimidazole group and probably a pyrrolic substance. On the physiological side Ternberg and Eakin[1] had lately found in normal gastric juice a non-dialysable, heat-labile substance which combined quantitatively with vitamin B_{12}; the gastric juice of patients with pernicious anæmia contained a great deal less than the normal amount of this substance. Vitamin B_{12} thus combined was not available to micro-organisms, and was more resistant to alkali and oxidative agents. It was thought that this substance might be either Castle's intrinsic factor or an important component thereof.

The cases on which Dr. C. C. UNGLEY had investigated the action of vitamin B_{12}, and some of the kindred substances isolated by Dr. Lester Smith, fell into two groups: (1) idiopathic addisonian anæmia with gastric atrophy and permanent loss of Castle's intrinsic factor, which, he said, led to deficient absorption of vitamin B_{12}; and (2) non-addisonian megaloblastic anæmias such as those associated with pregnancy and intestinal disorders, where a different mechanism was at work.

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[1] J. Amer. chem. Soc. 1949, 71, 3858.

With a single initial dose varying from 5 to 80 µg., the actual increase of red blood-cells on the 15th day was proportional to the logarithm of the dose used; with all doses there was little effect by the 5th day, and generally after the 15th–20th day the red-cell curve flattened. In a number of cases a dose varying from 15 to 140 µg., given over a period varying from 15 to 118 days, raised the red-cell level above 4,500,000 per c.mm. For maintenance Dr. Ungley found that in the absence of subacute combined degeneration of the cord, 10 µg. every two weeks sufficed over periods ranging up to 18 months.

A system of scoring the extent of neurological defects had been worked out in 44 patients treated with liver extract for subacute combined degeneration of the cord. It had thus been possible not only to score improvements but also to establish a scale of "expected" improvement with liver extract. Of 8 patients receiving vitamin B_{12} over periods ranging from 9 to 19 months, 2 had slight, 4 moderate, and 2 severe neurological symptoms. In 4, improvement exceeded the expected rate; in 2 it attained it; and in 2 it fell just short of it. Dr. Ungley concluded therefore that vitamin B_{12} was as effective as liver extract not only in addisonian pernicious anæmia but in subacute combined degeneration of the cord. He found that weekly doses of 40 µg. were usually adequate in the first 6 months, with half that amount for maintenance. Dosage should be increased if intercurrent infection or the least sign of relapse supervened.

Lester Smith's "unnamed crystalline substance," obtained from *Streptomyces griseus*, was given to 20 cases of addisonian pernicious anæmia, 3 of them with neurological symptoms. The initial doses had proved as effective as vitamin B_{12} as regards the blood picture, glossitis, and neurological symptoms; but since no case had been treated more than three months, judgment on its final effect should be reserved. In one case a good response to the "unnamed substance" was followed by a renewed reticulocyte rise when 10 µg. of vitamin B_{12} was given.

Dr. Ungley described one patient with what seemed to be a typical addisonian anæmia (complete achlorhydria and megaloblastic marrow), who had been treated six months previously for syphilis but showed normal liver-function tests and had apparently had a satisfactory diet. His response to vitamin B_{12} was poor; but 2·5 mg. of folic acid daily (total 15 mg.) gave a satisfactory reticulocyte rise. When subsequently this patient was given 10 µg. of vitamin B_{12} of the same batch as before, at a time when the red-cell level was beginning to fall, there was a renewed rise of the level.

Even when 80 µg. of vitamin B_{12} (or of the "unnamed substance") was given *by mouth*, the response was poor. In one case 1920 µg. by mouth in 24 days gave an increase of red cells less than that expected from 5 µg. in a single injection. When in the same case 1 µg. was given by injection daily for 10 days there was a rise equivalent to what was expected of a single dose of 10 µg.

In another patient 5 µg. daily by mouth had proved ineffective. When 50 ml. of normal unfiltered gastric juice was added, there was a satisfactory response in 15 days, a total dose of 50 µg. of vitamin B_{12} resulting in a rise of red cells equal to what would be expected of 10 µg. if injected.

In yet another patient the response equalled that expected from the injection of 20 µg. One subject who took 50 µg. by mouth at one time with 500 ml. of gastric juice, reacted as he would have been expected to react to 40 µg. when injected.

Passing the gastric juice through Seitz filters removed its intrinsic-factor activity. Generally the unaccompanied oral dose needed to be about 80 times as large as the parenteral one. Dr. Ungley's efforts to determine whether gastric juice helped the absorption of vitamin B_{12} or protected it from destruction, so far left the problem unsolved.

Dr. Ungley quoted 3 cases of megaloblastic anæmia with intestinal disorder in which results were variable. One suffered from intestinal stenosis: a single dose of 80 µg. gave a response which in addisonian anæmia would have been expected from 20 µg. In another case the rise of red cells obtained with a single dose of 80 µg would have been obtained with 5 µg. A third patient, with steatorrhœa and thyrotoxicosis, was completely refractory to vitamin B_{12} but responded well to folic acid.

Six cases of megaloblastic anæmia of pregnancy were treated. Vitamin B_{12} in doses of 65–80 µg. was completely ineffective; subsequently 2·5 mg. of folic acid daily cured the anæmia and restored normoblastic bone-marrow.

Dr. Ungley insisted that vitamin B_{12} is quite as effective as liver extract in the treatment of all manifestations of addisonian anæmia; but as a reminder of how far we are from a complete solution of the physiological problem he quoted the following observation: in pernicious anæmia a remission could be brought about by giving yeast by mouth—120 g. of 'Marmite' daily. One-tenth of that dose was effective if gastric juice was given with it; and this smaller dose was all that was required in non-addisonian anæmias. Yeast extracts appeared to contain no vitamin B_{12} when tested either microbiologically or in animals; yet it seemed to act as a source of extrinsic factor.

Dr. J. V. **Dacie** reported on 30 cases of true pernicious anæmia treated with liver extract, vitamin B_{12}, and Lester Smith's "unnamed substance." It was a study of the finer relations between the histological picture of the bone-marrow, the size of the reticulocyte response, and the increase in the red cells. With a single dose of 20 µg. of vitamin B_{12} the marrow became normoblastic in the first five days, and reticulocytes might account for nearly all the red-cell increase. In some cases the marrow reverted to an "intermediate" stage as early as the 5th day and was megaloblastic by the 10th day. Dr. Dacie found that the red-cell response was biphasic, with a shelf between the 5th and the 9th day. During the second rise there were fewer reticulocytes, and almost all the increase was due to cells already mature as they reached the blood-stream. The size of the second rise depended on the dose and could be correlated with the marrow picture. A single initial dose of 30–40 µg. caused the marrow to remain normoblastic to the 15th day; 20 µg. gave a satisfactory response in the blood but allowed a regression of the marrow to the megaloblastic stage in the same period.

Dr. J. N. M. **Chalmers** said that in his clinic a maintenance dose of 20–40 µg. fortnightly had mostly proved satisfactory; in a few cases 60 µg. had been needed. In his experience vitamin B_{12} did everything that liver did; and it had proved useful in patients who had relapsed on unsatisfactory liver extract. Eight cases treated with the "unnamed substance" were doing well. Vitamin B_{12} was satisfactory in 4 patients allergic to liver extract; 1 of these, who suffered from crippling subacute combined degeneration, was restored to actively earning a living.

Dr. A. G. **Signy** reported what he thought was an effect on the bone-marrow one hour after injection in a patient in whom the marrow was studied hourly. The

PRESIDENT and Dr. P. L. MOLLISON commented on the effect of vitamin B_{12} on the survival time of transfused blood-cells which Dr. Ungley had described in some of his patients.

Hepatitis

ON Feb. 17 Prof. JOHN R. PAUL (Yale University) addressed the section of epidemiology on Endemic Hepatitis Among United States Troops in Post-war Germany. Afterwards he received the honorary membership of the section from Dr. W. H. BRADLEY, president of the section. Honorary membership has also been conferred on two other Americans—Prof. JOHN E. GORDON and Dr. JOHN GRANT.

Professor Paul began by recalling contributions to the study of hepatitis by British workers since the war. The incidence of hepatitis among U.S. troops at home had been steadily declining; the rate in Japan, which started at a relatively high figure, was also going down. But in occupied Germany the incidence had been steadily rising, until it was comparable with that in combat areas during the war—around 14 per 1000 per annum.

In the late war hepatitis "fell like a bombshell" on the U.S. Army, which was unprepared for it; preparations had been made on the lines of the 1914–18 war. First there was the outbreak of homologous-serum jaundice in 1942, due to yellow-fever vaccine. Then in 1943 came an outbreak of infective hepatitis in which the British Forces were also involved.

At least two viruses appeared to be concerned. First there was that of infective hepatitis, the naturally occurring disease; secondly, that of serum hepatitis, which was readily produced artificially. The diseases were almost the same clinically. Although the viruses were not identical, it seemed that they were of the same group. The infective type had an incubation-period as short as 15 days; contact cases were common; and the virus was found in the fæces during the acute stage and could be transmitted orally. With serum jaundice the incubation-period was 60 days; contact cases were uncommon; the virus was present in the blood during the incubation-period as well as the acute stage; and there was only parenteral infection. There was no demonstrable cross-immunity. Both diseases could be transmitted by needles. Whilst the origin of infective hepatitis was known, that of serum jaundice was not. Both infections often appeared at one time and place.

Infective hepatitis was geographically widespread, and its diffusion was aided by poor sanitary conditions. It was prevalent particularly in China, the Eastern Mediterranean, and, it seemed, Southern Germany. In the armies in North Africa and Italy there was a sharp autumnal peak: and this seasonal incidence was seen in the civilian records of Denmark and Sweden. From the civilian point of view, infective hepatitis was essentially a children's disease.

It was common in the civilian population of Germany, where little attention was paid to it. The incidence in the old Imperial German army had been twice as high in Bavaria as in Prussia. The American occupation zone of 42,000 sq. miles was composed mostly of Bavaria: and, as he had stated, the incidence of hepatitis among the U.S. occupation troops was very high. The disease occurred in the younger individuals who had been in the area a relatively short time, cases developing around the 9th–10th month of service there and being sporadic in distribution. There were slightly higher rates among troops in Berlin and Trieste. The incidence was about the same among coloured as among white troops, and bore no special relation, as in the war, to Service rank. While the British experience in Germany showed a normal seasonal swing, the incidence among the Americans showed two peaks—in October and February. This was in keeping with Ruge's observations on 'Salvarsan' hepatitis in the German navy about twenty years ago, and might possibly imply a relationship between infective and serum hepatitis.

Investigations were made to try to determine whether immunisation or the administration of penicillin could have contributed to the spread. There was some evidence that men with hepatitis had a greater penicillin history than others, but it was not completely significant and these were the men who might have got the disease by contact with German homes.

Since infective hepatitis had been endemic in the area for many years, it was not unlikely that it should be common among the occupation troops; but that it should be so common and increasing was surprising.

Prof. E. T. C. SPOONER referred to the differences between the situation in the U.S. Army in Germany and that among British troops in the Middle East in 1942–43. In the latter epidemic the incidence was higher and there was a strong seasonal trend. In the 8th Army following El Alamein, the incidence reached 15 per 1000 per month, against 14 per 1000 per year among the American Forces in Germany. A great many of the cases were widely distributed, but there were a number of units recently arrived in the area among which true explosive epidemics occurred at a time when they had been isolated from the outside world.

Dr. KLINT, of the World Health Organisation, remarked that the Royal Medical Board of Sweden had asked W.H.O. to take international action on infective and serum hepatitis. Dr. Klint wondered whether a particular type of food could have something to do with the spread. It seemed that the virus might be preserved in tinned food.

Dr. W. GUNN said that infective hepatitis was more serious in adults than in children, whereas with serum jaundice the reverse was true. He believed there were no known cases of serum hepatitis where dry serum, prepared in the L.C.C. laboratories, had been used. In measles cases they had never had any serum hepatitis, and the reason might be that 0·5% phenol was mixed with antimeasles serum. Had the use of ultraviolet radiation to inactivate serum become a practical proposition?

Dr. F. O. MACCALLUM observed that in Great Britain the incubation-period following the parenteral inoculation of volunteers with serum had never been less than 30 days. He agreed that there were probably two viruses or strains of virus, and he thought the present terminology should be changed in favour of A and B infections, as in influenza. He recalled that in a number of inoculees who had received serum from patients with presumed syringe-transmitted hepatitis, the virus had been found in nasal washings in the presymptomatic, long incubation period. He suggested that homologous-serum jaundice (hepatitis virus B) was a naturally occurring disease with a long incubation-period and a droplet spread, and that this was why it was not found ordinarily and the virus maintained itself in nature.

Dr. C. H. ANDREWES, F.R.S., postulated that in the two types of hepatitis the same virus, though of different races, might be at work.

Dr. A. M. MCFARLAN, discussing the sporadic spread and seasonal variation, said that in 1943–44, when a number of cases were reported among troops in East Anglia, only occasionally was there more than one case in a particular unit, and this unit was usually in a town where there was a civilian epidemic; it did not appear to be due to spread by contact within the unit. A very different state of affairs prevailed in divisions brought back from Scilly before D-day. There hepatitis spread through the units, with a 30-day interval between cases. In East Anglia, where hepatitis was notifiable, an abnormal season incidence was noted in 1946, when there was a rise in April which went on until August; this appeared to be an out-of-season epidemic. Apart from that one year the rise had always been in the autumn, and it had always been possible to track it down to places where there had been just a few cases during the summer; there might be a developmental cycle in the virus. This would explain many of the facts about serum hepatitis and infective hepatitis, but in this event it would be difficult to account for the lack of cross-immunity.

Dr. W. d'A. MAYCOCK referred to the results of the investigation of serum jaundice in Liverpool. It was found that the incidence in persons who had large-pool plasma (that is, from a pool made up of 300–400 donations) was 10–12%, whilst among persons who had had small-pool plasma (from pools of not more than 10 donations) it was about 0·15%. Small-pool plasma was now being produced in quantities equal to the needs of hospitals, and it was felt that this was a considerable advance in eliminating serum jaundice. Arrangements were also being made to irradiate serum.

Dr. W. M. PICKLES said that his records, going back to 1910, showed the autumnal rise. Although the virus had been discovered in the stools of infective-hepatitis cases and no-one would say it could not be transmitted in that way, Dr. Pickles thought that most cases arose by personal contact, probably droplet infection.

The PRESIDENT remarked that there had been very few cases of homologous-serum jaundice among uninoculated persons in the environment of the American soldiers affected by the yellow-fever inoculation virus. Later MacCallum, investigating some half-dozen women who developed serum jaundice following gold injection, found that the bedfellows of two of them developed hepatitis spontaneously after about 50–60 days.

Professor PAUL agreed that the terminology represented pegs on which to hang rather vague ideas that left much to be discovered. Although he had started by saying that there were two different viruses, he was rather coming round to the monotheistic point of view at the end of his paper. He did not know of any food which would harbour the disease; but that was not to say there were not some. Sterilisation of serum by ultraviolet rays was still in a somewhat experimental stage; another method was to add nitrogen-mustard to whole blood and serum; he had no experience of phenol.

He thought that Dr. Andrewes's suggestion of symbiosis was very reasonable, if only it could be proved.

LIVERPOOL MEDICAL INSTITUTION

Sudden Death in Nurslings

AT a meeting on Jan. 12, with Prof. CHARLES WELLS, the president, in the chair, Dr. F. B. SMITH said that the sudden and unexpected death of nurslings was a recurrent problem whose suggested solution often lacked conviction. The difficulties were obvious to those who performed necropsies for coroners, but were not so obvious to others. In his experience these cases formed the second largest group of sudden deaths examined for coroners, the first being disorders of coronary arteries.

The infants were usually between 4 and 40 weeks of age, and were regarded as having had normal health within a few hours, or even minutes, of being found dead. In the past smothering, overlaying, and choking by food had been the commonly accepted causes; but with an increase in the number of cases examined by necropsy an increasing proportion was being ascribed to natural causes—most often acute infections of the respiratory tract.

Necropsies on infants were often inconclusive; the naked eye was more often inadequate than in the necropsy of an adult. A set scheme was necessary, including the use of the microscope, bacteriology, histology, and, if possible, chemistry. The damage due to a wrong verdict of unnatural death might be lasting; and despite the inexpediency of delay, the proper course might be a request to the coroner for time for microscopical studies. There was need for a series of controls of the naked-eye and microscopic data often accepted as explanation of death, whether due to unnatural anoxia or acute infection.

Dr. Smith was loth to accept the view that the average nursling of this age allowed accidental smothering. Often evidence of both the presence and effect of gastric contents in the airways was questionable; for example, vomiting was a symptom of anoxia, and food in the airways was found after death from many natural causes. He was not satisfied that small infective foci in the respiratory tract or other sites, found only by the microscope, could 'explain' sudden and unexpected death. Though serosal and interstitial hæmorrhages occurred apart from obstructive anoxia, the striking flea-bitten appearance of one or all of the three organs—thymus, heart, and lungs—had not been seen in other circumstances. The possibility of chemical, allergic, or endocrine stimulus deserved consideration. Most of these infants died in the third or fourth month of life, at which time the thymus was largest in proportion to body-weight; the function of the thymus was unknown. About one-third of these infants were found to have parietal craniotabes but without clear signs of rickets.

In no more than 15 of 60 infants examined after sudden death was the opinion offered that death was due to a specific infection; and in 7 of the 15 the evidence was slender. Most often the preferable conclusion was that the cause of death was unknown.

Dr. Smith concluded with a plea for: (1) avoiding if possible an opinion based on inadequate data; (2) the use of schematic routine histology and bacteriology after death; and (3) the collection and publication of criteria for the final medical opinion on the so-called "suffocated" infant.

Reviews of Books

Estudios sobre la Circulación Renal (Barcelona: José Janés. 1949. Pp. 208. 180 Ptas).—Prof. J. Trueta's outstanding work, *Studies of the Renal Circulation*, reviewed in our columns three years ago,[1] has now been published in Spanish. It is well that this important contribution to our understanding of the medullary vessels should be easily accessible to as wide a circle of research-workers as possible. His argument is supported by convincing photographs, the beauty of which receives full justice, in this volume, from the excellent surface of the paper.

A Text-Book of Surgery by American Authors (5th ed. Philadelphia and London: W. B. Saunders. 1949. Pp. 1150. 65*s*.).—In its 5th edition this large textbook, edited by Dr. Frederick Christopher, comes fully up to what we have been led to expect. It gives an authoritative presentation of general and gynæcological surgery as nowadays practised in America. There is a great deal of new matter and there are many new authors. The book is so well known, and its reputation so high, that praise is superfluous; but it is worth considering what appeal it may have for the English. It is so complete in its range, and reflects so truly the American outlook, particularly the physiological aspects of surgery, that it will be useful to any surgeon, and especially to those who teach. Also the references at the end of each section will be helpful. Whether our undergraduates will welcome it equally is more doubtful—for two reasons. In the first place it is a very large volume for an undergraduate student to read through two or three times during the time allotted to him for clinical work: its mere size is rather appalling in prospect. Secondly, most of the contributors *assume a certain* ground knowledge of surgery which English students do not possess when they enter on their clinical stage of study. For them numerous statements would have no meaning. Take for instance the section on prostatectomy. Four methods are mentioned with their indications, advantages, and drawbacks. But what use is this if the student has no idea what is meant by the *terms* suprapubic, perineal, retropubic, or perurethral prostatectomy? The student's ignorance could be dispersed by a description in a few sentences of each operation, and he could then take an intelligent interest in the discussion. This seems a small defect in so magnificent a compilation by nearly 200 authors; yet to the undergraduate student it looms large in a book which would otherwise delight him.

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[1] *Lancet*, 1947, ii, 135.

THE LANCET

LONDON: SATURDAY, FEB. 25, 1950

"Suffocation" in Infancy

THE Registrar-General's returns show that in England and Wales during the five years 1943–47 no fewer than 2001 infants under one year of age were certified as having died from "accidental mechanical suffocation in bed, cot, or cradle." The tragic loss of 400 infants each year from "accidental suffocation" might seem to reflect badly on the mothers of Britain; but several investigators have concluded that such figures are unreliable, and it seems probable that most of the infants supposed to have died from accidental suffocation really died from natural causes.

DAVISON,[1] the medically qualified coroner of Birmingham, was the first to show that the true incidence of accidental suffocation in infancy is much lower than statistics suggest; and a similar conclusion has since been reached by WERNE and GARROW[2] in the U.S.A., by BOWDEN[3] in Australia, and by F. B. SMITH, whose report to Liverpool Medical Institution is summarised on another page. These authorities have made it clear that acute respiratory infections sometimes associated with acute otitis media, is much the commonest cause of death. DAVISON held that of the 210 infants in his series suspected of having died from mechanical suffocation while sleeping, only 6 had actually been suffocated. All these workers mention the need for thorough post-mortem examination in every case of sudden death in infancy; otherwise the inaccurate and distressing diagnosis of accidental suffocation is likely to be made. They also emphasise the need for careful histological examination, notably of the respiratory tract and lungs, whenever the diagnosis remains in doubt. This is important because, with a rapidly fatal course, naked-eye changes are often equivocal. Routine bacteriological investigation is also required. When a supposedly healthy infant is found dead, the parents and doctor almost always suspect suffocation; and this suspicion is strengthened when the child is found lying face downwards, as it often is. The parents' grief is deepened by remorse; and an accurate history of the child's health immediately before the tragedy can seldom be obtained from them. Almost always they fail to recollect any evidence of illness; but WERNE and GARROW, and BOWDEN, have pointed out that, if they are questioned after an interval, evidence of illness can often be elicited. Such symptoms as cough, anorexia, and lethargy had often been observed; but naturally enough these did not suggest imminent death, and at the time of the tragedy they were considered irrelevant, if indeed they were recalled at all.

Deaths from "accidental suffocation" are mostly concentrated in the first six months of life. In both Britain and the U.S.A. the peak age-incidence is in the second and third months; in the first month the incidence is much lower. This age-distribution seems incompatible with accidental suffocation, since infants are most helpless during their early weeks and have become quite vigorous by the third month. The assumption that infants are easily suffocated is untenable, for all except very young and feeble infants react vigorously to a feeling of impending suffocation and certainly do not allow themselves to be asphyxiated by turning their face to a pillow. Moreover, deaths from "accidental suffocation" have an age and seasonal incidence corresponding closely with the incidence of acute respiratory infection. The coroner should insist on a complete pathological and bacteriological investigation in all cases of suspected suffocation in infancy, in the interests not only of statistical accuracy but also of the bereaved parents; and SMITH suggests that the coroner might always be asked to grant time for histological studies. A diagnosis of accidental suffocation can amount to a life sentence of self-reproach for the parents, and it should be made only in those rare instances where the clinical and pathological evidence is incontrovertible. Coroners, of whom over 70% have no medical qualification, are usually interested only in the purely legal aspects of these cases; since there is rarely any suspicion of a criminal act, necropsy is seldom ordered, and the doctor's opinion of the cause of death is accepted. In such circumstances it would be more accurate and more humane to certify the cause of death as "unknown"—a term which SMITH thinks might be used also in the many cases where a thorough pathological examination does not reveal the cause of death.

It would be wrong to infer that reasonable precautions against accidental asphyxia are unnecessary. These should not, however, be unduly emphasised, since most mothers have an instinctive fear that their infants may suffocate; and in the U.S.A. this natural apprehension must have been greatly heightened by the publicity accorded to accounts which accept the clinical diagnosis of "accidental suffocation."[4] Some years ago the Metropolitan Life Insurance Company[5] observed that "smothering has been called the greatest hazard encountered during infancy"; and in 1945 the New York Academy of Medicine[6] launched a publicity campaign for the prevention of these "unnecessary" deaths. With very young, premature, and feeble infants, simple precautions should be taken, such as the use of a firm mattress and a thin firm pillow, and careful tucking in of the bedclothes; and with older infants great care must be taken to prevent entanglement in restraining devices, such as harness. More elaborate precautions are unnecessary, and the less said about suffocation the better.

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[1] Davison, W. H. *Brit. med. J.* 1945, ii, 251.
[2] Werne, J., Garrow, I. *Amer. J. publ. Hlth*, 1947, 37, 675.
[3] Bowden, K. *Med. J. Aust.* 1950, i, 65.
[4] Abramson, H. *J. Pediat.* 1944, 25, 404.
[5] *Statistical Bulletin of the Metropolitan Life Insurance Company.* November, 1942.
[6] Annual Report of the New York Academy of Medicine, 1945; p. 40.

down to places where there had been just a few cases during the summer; there might be a developmental cycle in the virus. This would explain many of the facts about serum hepatitis and infective hepatitis, but in this event it would be difficult to account for the lack of cross-immunity.

Dr. W. d'A. Maycock referred to the results of the investigation of serum jaundice in Liverpool. It was found that the incidence in persons who had large-pool plasma (that is, from a pool made up of 300–400 donations) was 10–12%, whilst among persons who had had small-pool plasma (from pools of not more than 10 donations) it was about 0·15%. Small-pool plasma was now being produced in quantities equal to the needs of hospitals, and it was felt that this was a considerable advance in eliminating serum jaundice. Arrangements were also being made to irradiate serum.

Dr. W. M. Pickles said that his records, going back to 1910, showed the autumnal rise. Although the virus had been discovered in the stools of infective-hepatitis cases and no-one would say it could not be transmitted in that way, Dr. Pickles thought that most cases arose by personal contact, probably droplet infection.

The President remarked that there had been very few cases of homologous-serum jaundice among uninoculated persons in the environment of the American soldiers affected by the yellow-fever inoculation virus. Later MacCallum, investigating some half-dozen women who developed serum jaundice following gold injection, found that the bedfellows of two of them developed hepatitis spontaneously after about 50–60 days.

Professor Paul agreed that the terminology represented pegs on which to hang rather vague ideas that left much to be discovered. Although he had started by saying that there were two different viruses, he was rather coming round to the monotheistic point of view at the end of his paper. He did not know of any food which would harbour the disease; but that was not to say there were not some. Sterilisation of serum by ultraviolet rays was still in a somewhat experimental stage; another method was to add nitrogen-mustard to whole blood and serum; he had no experience of phenol. He thought that Dr. Andrewes's suggestion of symbiosis was very reasonable, if only it could be proved.

LIVERPOOL MEDICAL INSTITUTION

Sudden Death in Nurslings

At a meeting on Jan. 12, with Prof. Charles Wells, the president, in the chair, Dr. F. B. Smith said that the sudden and unexpected death of nurslings was a recurrent problem whose suggested solution often lacked conviction. The difficulties were obvious to those who performed necropsies for coroners, but were not so obvious to others. In his experience these cases formed the second largest group of sudden deaths examined for coroners, the first being disorders of coronary arteries.

The infants were usually between 4 and 40 weeks of age, and were regarded as having had normal health within a few hours, or even minutes, of being found dead. In the past smothering, overlaying, and choking by food had been the commonly accepted causes; but with an increase in the number of cases examined by necropsy an increasing proportion was being ascribed to natural causes—most often acute infections of the respiratory tract.

Necropsies on infants were often inconclusive; the naked eye was more often inadequate than in the necropsy of an adult. A set scheme was necessary, including the use of the microscope, bacteriology, histology, and, if possible, chemistry. The damage due to a wrong verdict of unnatural death might be lasting; and despite the inexpediency of delay, the proper course might be a request to the coroner for time for microscopical studies. There was need for a series of controls of the naked-eye and microscopic data often accepted as explanation of death, whether due to unnatural anoxia or acute infection.

Dr. Smith was loth to accept the view that the average nursling of this age allowed accidental smothering. Often evidence of both the presence and effect of gastric contents in the airways was questionable; for example, vomiting was a symptom of anoxia, and food in the airways was found after death from many natural causes. He was not satisfied that small infective foci in the respiratory tract or other sites, found only by the microscope, could 'explain' sudden and unexpected death. Though serosal and interstitial hæmorrhages occurred apart from obstructive anoxia, the striking flea-bitten appearance of one or all of the three organs—thymus, heart, and lungs—had not been seen in other circumstances. The possibility of chemical, allergic, or endocrine stimulus deserved consideration. Most of these infants died in the third or fourth month of life, at which time the thymus was largest in proportion to body-weight; the function of the thymus was unknown. About one-third of these infants were found to have parietal craniotabes but without clear signs of rickets.

In no more than 15 of 60 infants examined after sudden death was the opinion offered that death was due to a specific infection; and in 7 of the 15 the evidence was slender. Most often the preferable conclusion was that the cause of death was unknown.

Dr. Smith concluded with a plea for: (1) avoiding if possible an opinion based on inadequate data; (2) the use of schematic routine histology and bacteriology after death; and (3) the collection and publication of criteria for the final medical opinion on the so-called "suffocated" infant.

Reviews of Books

Estudios sobre la Circulación Renal (Barcelona: José Janés. 1949. Pp. 208. 180 Ptas).—Prof. J. Trueta's outstanding work, *Studies of the Renal Circulation*, reviewed in our columns three years ago,[1] has now been published in Spanish. It is well that this important contribution to our understanding of the medullary vessels should be easily accessible to as wide a circle of research-workers as possible. His argument is supported by convincing photographs, the beauty of which receives full justice, in this volume, from the excellent surface of the paper.

A Text-Book of Surgery by American Authors (5th ed. Philadelphia and London: W. B. Saunders. 1949. Pp. 1150. 65*s*.).—In its 5th edition this large textbook, edited by Dr. Frederick Christopher, comes fully up to what we have been led to expect. It gives an authoritative presentation of general and gynæcological surgery as nowadays practised in America. There is a great deal of new matter and there are many new authors. The book is so well known, and its reputation so high, that praise is superfluous; but it is worth considering what appeal it may have for the English. It is so complete in its range, and reflects so truly the American outlook, particularly the physiological aspects of surgery, that it will be useful to any surgeon, and especially to those who teach. Also the references at the end of each section will be helpful. Whether our undergraduates will welcome it equally is more doubtful—for two reasons. In the first place it is a very large volume for an undergraduate student to read through two or three times during the time allotted to him for clinical work: its mere size is rather appalling in prospect. Secondly, most of the contributors assume a certain ground knowledge of surgery which English students do not possess when they enter on their clinical stage of study. For them numerous statements would have no meaning. Take for instance the section on prostatectomy. Four methods are mentioned with their indications, advantages, and drawbacks. But what use is this if the student has no idea what is meant by the terms suprapubic, perineal, retropubic, or perurethral prostatectomy? The student's ignorance could be dispersed by a description in a few sentences of each operation, and he could then take an intelligent interest in the discussion. This seems a small defect in so magnificent a compilation by nearly 200 authors; yet to the undergraduate student it looms large in a book which would otherwise delight him.

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[1] *Lancet*, 1947, ii, 135.

Reconstruction of Trachea and Cervical Œsophagus

Reconstruction of the trachea would be a tough proposition even if it was commonly practised. In fact it is very seldom necessary to bridge a gap in the trachea, and little thought has therefore been given to the technique. Malignant growths of the trachea are very rare, the average surgeon being unlikely to see more than one or two in a lifetime. Such cases usually present with a severe respiratory obstruction, which is treated in the usual way by tracheotomy, but to the surgeon's surprise this does not bring relief and it becomes clear that the growth is lower down. Most of the cancers of the trachea occur in its distal part—often extending to one bronchus. The other problem which may confront the surgeon is an œsophageal or thyroid growth encroaching on, or recurring in, the tracheal wall.

The trachea is the only large tube in the body with a special structure to prevent its walls falling together; and any extensive repair must possess similar rigidity. In man, end-to-end repair after resection of more than 2 cm. of trachea is impossible, though in dogs, as **Clagett** and his colleagues[1] at the Mayo Clinic have shown, a gap involving as much as half the thoracic trachea may be thus brought together and sutured. **Clagett** has used 'Polythene' tubing with much success in dogs, but the patient in whom he used it died a week later. He has evolved a technique by which the whole of the lower third of the trachea, one bronchus and lung, plus the commencement of the other bronchus can be removed in one piece and the remaining bronchus then joined to the tracheal stump. A prepared tantalum-gauze tube with fascial sheath, as **Rob** described last year to the Association of Surgeons in Dublin, would probably be the best to use for this operation in man, though **Belsey**[2] told the same meeting of a case in which he had used fascia lata braced with a spiral stainless-steel wire for tracheal reconstruction. **Rob**'s[3] first case was a recurrence in the tracheal wall seven years after removal of a malignant thyroid. The tumour was radioresistant and invaded the anterior wall and lumen of the trachea. The operation entailed the removal of part of the cricoid, with the upper six tracheal rings, leaving a strip of membrane posteriorly only 0·5 cm. wide. The defect, which was 9 cm. long, was closed with a tube of tantalum gauze covered on both sides with fascia lata, which was carefully sutured to larynx above and trachea below. Apart from trouble through loosening of the inner layer of fascia, the patient made steady progress. The loose fascia was destroyed by diathermy after a fortnight; after 6 weeks he was discharged well, breathing normally; and, except for one area of granulation tissue 0·5 cm. square, all the gap was lined with normal tracheal epithelium. The man went back to work and was well a year later. **Rob** has extended this method to growths of the cervical œsophagus, and in one of his three cases the patient recovered, swallowing in comfort till the growth recurred 5 months later. The other two lived 4 and 5 weeks, one dying of aspiration pneumonia resulting from division of both superior laryngeal nerves. For reconstruction of the cervical œsophagus the tantalum-gauze tube is covered with fascia on the outside only. Both the gauze and fascia are removed, or extruded, within 3–4 weeks, having done their job of splinting and sealing off the reconstructed gullet till it is almost wholly lined by its new epithelium.

Several stimulating general principles are enunciated by **Rob**. Two things are required of the "bridge": (1) rigidity, permanent in the trachea, temporary in the œsophagus; and (2) a seal, provided by the ensheathing fascia lata, which prevents air or infection spreading into the tissues of the neck until they are sealed off. A layer of fascia inside the gauze is unnecessary and indeed dangerous, for it may obstruct the lumen when cast off. An important observation is that the new epithelium grows on the *inside* surface of the tantalum-gauze tube but on the *outside* of a polythene tube, the difference being due to the granulations growing through the meshes in the former. **Rob** remarks on the phenomenal speed with which the new epithelium spreads—about 10 cm. in 5 weeks. Extensive as these resections may be made, it is essential to preserve at least one recurrent and one superior laryngeal nerve; otherwise death is certain. The splint is required to stay in the œsophagus only until the epithelium has grown over the gap; so if the circumference of the epithelial lining is adequate a stricture will not form. If further experience confirms the first impressions of this method of reconstructing the cervical œsophagus it may well be better in some ways than the skin-tube method of **Mikulicz** and **Trotter**. As for the tracheal operations, these represent a bold and ingenious attempt to deal with difficulties previously considered insuperable.

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[1] Clagett, O. T., Grindlay, J. H., Moersch, H. J. *Proc. Mayo Clin.* 1949, 24, 555.
[2] Belsey, R. *Thorax*, 1946, 1, 39.
[3] Rob, C. G., Bateman, G. H. *Brit. J. Surg.* 1949, 37, 202.

Annotations

THE PATIENT WITH NERVOUS FATIGUE

Tenderly cherished in the Victorian age, suspect at the turn of the century, and rudely snubbed in the 'twenties, patients with nervous fatigue are at last, if grudgingly, being allowed to sneak back into the fold of general medicine through the ever-widening psychosomatic gate. In time we may even come to admit that they don't do it on purpose. Dr. Dwight L. Wilbur has given a good deal of thought to the management of these cases, and his suggestions though not new are well stated.[1] Translating the pastoral metaphor to an active form, he finds there are three hurdles to clear: the patient must be convinced of the diagnosis; he must be relieved of his symptoms; and he must be kept largely symptom-free and preserved from relapse. With such a course before him the doctor must be willing to go into training—and first of all as a listener. Few busy doctors excel at listening, but for these cases they must bring up their reserves of attention. By listening to the patient's story they will learn more about him than he tells them, and can form a shrewd opinion of the stresses under which he is living. These may be external, related to work, wife, or family; or internal, related to a disturbance of the major emotions; or —most commonly—a mixture, partly conscious partly unconscious, of both. A sight of his home surroundings may reveal still more about him. The usual causes of nervous fatigue, in Dr. Wilbur's experience, are an

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[1] *J. Amer. med. Ass.* 1949, 141, 1199.

Factors in Blood-coagulation

ANYONE who tries to find his way through the recent writings on blood-coagulation may well feel confused. The difficulties and controversies have centred round the first step in the clotting process —the conversion of prothrombin to thrombin in the presence of blood-platelets and ionised calcium. Estimations of plasma-prothrombin levels are necessary for controlling modern anticoagulant therapy, and all the techniques use the formation of thrombin as an indicator; so information on the prothrombin-thrombin reaction has a practical application. In reviewing the work on blood-coagulation in 1947 we noted[1] that QUICK and OWREN had established the existence of an additional factor concerned in this reaction which QUICK called "labile factor," because it was destroyed at 58°C and was oxidised on storage, and OWREN called "factor V." There is not much of this labile factor in human plasma, but dog's plasma contains ten times and rabbit's plasma fifty times as much as man's. There have been arguments about its nature and mode of action. QUICK thought that labile factor combined quantitively with prothrombin to form thrombin; but FANTL and NANCE, SEEGERS, and WARE et al., looked on it as an accelerator of the reaction and described an "Ac-globulin" with properties very like those of labile factor.

Many of the difficulties have been solved by the use of silicone-coated apparatus in which plasma can be handled without clotting, and the differences largely disappeared when it was realised that QUICK was working with fresh human plasma whereas SEEGERS and others were using animal blood collected from a slaughter-house. Some new experiments have made possible a further step towards simplification. QUICK had already shown that a substance more or less identical with classical prothrombin can be prepared from fresh plasma by adsorption on tricalcium phosphate and can be quantitatively recovered by elution with sodium citrate; it is not certain that this substance is prothrombin, so QUICK gave it the non-committal name of "component A." QUICK and STEFANINI[2] have now shown that the more component A there is in the plasma the more labile factor is needed to attain a fixed minimal prothrombin-time. Again, when plasma which is deficient in labile factor clots, a good deal of the component A remains in the serum and is not converted into thrombin, even though thromboplastin and calcium are present in the proper concentrations; if the amount of labile factor is increased, the amount of component A converted increases proportionately. It has been known for some time that the reaction:

prothrombin + calcium + thromboplastin = thrombin

is stoichoimetric. This seems to be true also for the now modified form of the reaction:

component A + labile factor + calcium + thromboplastin = thrombin.

The next difficulty studied by QUICK and STEFANINI arose out of the old observation that the prothrombin activity of plasma increases, up to a point, when it is stored in glass containers. Since labile factor is oxidised on standing, it was necessary to add dog or rabbit plasma to show up this increased prothrombin activity. It was found that if the plasma was kept in silicone-coated vessels its prothrombin activity did not change. Further, if the component A of the plasma was isolated by the adsorption and elution technique, then the prothrombin activity of the eluate increased on storage in glass vessels but did not change in silicone-coated vessels. QUICK and STEFANINI explain this finding by postulating that component A exists in two forms: (1) a free form that exhibits prothrombin activity (i.e., is converted into thrombin in the presence of the other factors), and (2) an inactive form that cannot be converted into thrombin. When plasma is stored in contact with a relatively rough surface, such as glass, the inactive component A is converted into the free form and the "prothrombin activity" therefore appears to be increased. Hæmophilic blood contains only a trace of thromboplastinogen but its prothrombin activity is normal; the same conversion of inactive to free component A can be demonstrated in hæmophilic plasma, so thromboplastinogen is not concerned in the reaction. There is evidence suggesting that platelets and calcium also play no part in it.

We have already noted[3] that thromboplastin is thought to exist in circulating plasma in an inactive form—thromboplastinogen—which, in the presence of an enzyme derived from platelets, changes to active thromboplastin. If we call the combination of component A (free form), labile factor, and calcium the "prothrombin complex," then the steps in blood-coagulation are as follows:

(1) Thromboplastinogen $\xrightarrow{\text{platelet enzyme}}$ *thromboplastin.*
(2) Prothrombin complex + thromboplastin = *thrombin.*
(3) Fibrinogen $\xrightarrow{\text{thrombin}}$ fibrin.

The first and third reactions are enzymatic; the second seems to be definitely stoichoimetric.[4]

If these ideas are accepted, there are at least two practical consequences. One is that there are three forms of congenital "hypoprothrombinæmia": (1) the type due to deficiency of labile factor, of which OWREN's[5] case is the only one so far described; (2) the type described by QUICK,[6] apparently due to deficiency of total component A; and (3) the type previously attributed by QUICK to deficiency of "component B," but which has now been shown to be lacking only in the proportion of component A present in the free form, the total being more or less normal. The view that component A exists in two forms may explain the different values for prothrombin activity obtained by the "one-stage" and "two-stage" techniques. The one-stage method estimates only free component A; whereas the manipulations involved in the two-stage method will ensure conversion of the inactive component A to the free form, so this method will estimate total component A. It is not yet known whether the inactive component A plays any part in the coagulation reactions, or whether it acts simply as a reservoir for the free form. In the control of anticoagulant therapy with dicoumarol and related substances, QUICK's one-stage method —using thromboplastin prepared from brain tissue by his original technique—is steadily gaining adherents as the most reliable guide to significant variations in prothrombin concentration. Here, at any rate, free component A seems to be the important factor.

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1. Leading article, *Lancet*, 1947, ii, 393.
2. Quick, A. J., Stefanini, M. *J. Lab. clin. Med.* 1949, 34, 1203.
3. Leading article, *Lancet*, 1947, ii, 798.
4. Quick, A. J. Transactions of the Second Conference on Blood Clotting, New York, 1949; p. 203.
5. Owren, P. A. *Lancet*, 1947, i, 446.
6. Quick, A. J. *Ibid*, ii, 379.

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[3] Rob, C. G., Bateman, G. H. *Brit. J. Surg.* 1949, 37, 202.

[1] *J. Amer. med. Ass.* 1949, 141, 1199.

Then comes the task of explaining—the first hurdle. The effects of emotion on the bodily functions are easier to accept nowadays than they used to be—thanks, perhaps, to the cinema. At all events patients will usually agree that emotion can produce loss of sleep, loss of appetite, urinary frequency, and diarrhœa ; and it is possible to lead them on to an understanding of other effects of emotion. Once they have grasped the principle, they are usually keenly interested and ask a great many questions. " The physician," Dr. Wilbur says, " must be able to have a reasonable explanation for any symptom or abnormality the patient presents." Indeed his armour of facts must be impenetrable, or he will lose his sparring contest ; what is more, his explanations must be consistent, or the patient will remember the discrepancies and lose confidence. The more ignorant —or the more intelligent—the patient, the harder it is to keep this up. He must be told definitely that in the absence of organic disease the eventual outlook for recovery is good, and warned that he will have his bad days and good days. As he begins to understand his situation, and his capacities, limitations, and frustrations, he will also begin to gain some control of his illness—at least to the extent of knowing when he must relax and acquiesce instead of fighting a hopeless battle. Those who are unable to accept the explanations, or revalue their situation to the benefit of their health, may need the help of a psychotherapist. Some general measures —diet, régime, drugs, physiotherapy, hormone treatment, or the correction of associated physical conditions, will benefit some patients. Dr. Wilbur believes that " stopping smoking will often reduce nervousness and fatigue." As for keeping the patient symptom-free—fortunately by the time he is well he has generally learned to do this for himself.

COLD IN CARDIAC PAIN

NEARLY all sufferers from cardiac pain of effort find that there is no surer way of bringing on pain than walking out in a cold wind after a meal. An effort test has been applied a good deal in studying this type of pain and the effect of exertion on the cardiogram in cases where the diagnosis is in doubt, but the experimental application of cold seems to be used only in the rather controversial " cold-pressor " test for latent hypertension. Berman and McGuire[1] have applied blocks of ice to various parts of the skin in twenty patients with cardiac pain of effort and twenty normal controls. In three of the cardiac cases this produced a depression of the S–T segment of 1 mm. in one or more limb leads. In one of these there was a greater depression of S–T when ice was applied to the nose than when it was applied to the forearm. Chest pain without cardiographic change was noted in three patients during or soon after the cold application. The controls showed some lowering of the T waves, and since the S–T intervals are not mentioned these were presumably unaffected. However, some normal people have a depressed S–T segment and an inverted T wave after exercise, and the sum of the depressions in all leads has been taken by some observers as a criterion of abnormality. There is also said to be a difference in the shape of the S–T depression between patients with cardiac ischæmia and normal people after exercise. More observations on the cold test in cardiac pain and in normal controls are needed to show whether it can be useful.

THE SICK HUMAN

HUMAN at all times, we become rather more human than usual when we are ill ; and perhaps none the more attractive for that. However, it is the business of doctors and nurses to cater for all our symptoms, even our humanness ; a duty, P.E.P.[1] think, sometimes neglected when the patient is taken into hospital. P.E.P. review, as we have often done, the ways in which hospital patients can be made to feel at home, comfortable, considered, and respected, and conversely the ways in which they can be made to feel inferior, snubbed, bewildered, and uneasy. Much turns on the spirit created by the matron, doctors, and ward sisters. A good spirit carries right through to the patient and the wardmaids—the ultimate convenient subjects for either benevolence or oppression. The caste system is still strong in our hospitals, perhaps unduly strong : " The doctor . . . is treated by the rest of the staff with a deference which seems to the outsider to be taken to absurd lengths." If he is a considerate and benevolent despot, perhaps this does not matter much ; and the same may be said of the matron. But a masterful and unimaginative matron and thoughtless or callous doctors can between them create an atmosphere in which resentful overanxious sisters, and harassed nurses, soon make the patient wish he had lingered without benefit of science in the kindly air of home. No doubt it does not happen as often as it did ; but it still happens—a hangover from the days when every patient was a charity patient, and therefore an appropriate object for bossing about.

This attitude is encouraged by the sick person's return, or partial return, to the dependency of childhood ; and it often finds expression in petty rules and restrictions. He may be kept waiting for hours in the outpatient department (though other hospitals can work a successful appointment system), he may be washed in the small hours (though other hospitals find it possible to let patients sleep till seven or eight), he may be kept in the dark about his illness and the results of investigations (though any general practitioner knows how to explain scientific facts simply and in ways that are not alarming). If the facts are too alarming, they should, in any case, be explained to relatives, but, as P.E.P. say, " the trouble is that, becoming accustomed to the infantilism of patients, doctors and nurses can easily carry over this attitude into their relationship with patients who are not so ill, and with relatives who are not ill at all." Frustrated and indignant relatives can pass their dissatisfaction on to the patient and help to delay his recovery.

Something, naturally, turns on the patient's nature. A temperamentally gifted patient may say " *I do not care how early they waked me or how often they washed me, they got me well and that is all that matters.*" But this agreeable willingness to overlook the means in favour of the end is not as common as it used to be. And perhaps the hospital hierarchy should welcome open criticism, on the same principle that good teachers welcome disputatious students: it keeps them up to the mark.

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[1] Berman, B., McGuire, J. *Amer. J. med. Sci.* 1950, 219, 82.

[1] *Planning*, Feb. 13, p. 205. Issued by Political and Economic Planning, 16, Queen Anne's Gate, London, S.W.1.

Most of the criticisms have been met in one hospital or another: some appoint reception officers; some have appointment systems; some feed their patients well; some let them sleep late; some have a tradition of friendliness; some answer inquiries from relatives punctiliously, accurately, and at any time of the day or night; some allow visitors every evening; some ask the patient's permission before allowing his case to be taught on; and some take pains to relieve his anxiety about his state. From which it is widely argued that what some can do all can do. Yet "this overwhelming weight of opinion of outsiders," P.E.P. say, "has been ineffective in securing any change," and though this is probably too dark a view, at all events change is partial, scattered, and—by general standards—slow. A universal advance can be achieved only through people; and P.E.P. are wise to insist that much depends on the right staff, especially in high places—the right matron, the right doctors. A new service is being built up, with new people coming on to management and house committees. It is important that they should be quite free from the old notion that the patient is an object of charity: even more important that they should think of him as a fellow human—for whom the whole service is being run.

DUTCH PATCHWORK QUILT

Dr. C. Banning's Chadwick lecture on Feb. 14 dealt with the relation between voluntary effort and the State in health work in the Netherlands. In clear and colloquial English—indeed, as Sir Wilson Jameson said, "he might have been a Scot!"—*Dr. Banning dealt briefly* with health conditions in the Netherlands from the time when he became chief medical officer, direct from general practice, at the outbreak of the late war. He described the crisis period in 1944 when north Holland was completely cut off from all food-supplies and the mortality shot up steeply—infant mortality reaching 1 in 4. And in speaking of the remarkable recovery since the liberation, by which the Netherlands vital statistics have again become the envy of the world, he paid a warm tribute to Allied aid in helping recovery, illustrating Dutch gratitude with a story of a small Dutch boy who decided that God must be an Englishman. But the main point of his talk was the great part still played by the Cross organisations—the Dutch voluntary health bodies—in the public-health system. These bodies, of which the Green Cross is the largest, are responsible not only for all domiciliary nursing services but also—since their nurses are polyvalent and trained as health visitors—for public-health services and, except in the large towns, for the clinic and school services as well. Two-thirds of the population are members, paying a small graded annual fee. The result, according to Dr. Banning, is that the Dutch regard the health services as their own and not something imposed by the Hague, to be ignored or exploited. He also laid stress on the thoroughness of the midwives' training which turns them out with far more experience of normal midwifery than the newly qualified medical student possesses. Home helps have 15 months' training, and girls in general are instructed in housekeeping. The Dutch system, Dr. Banning remarked, is like a patchwork quilt, difficult to explain on paper but depending on family life and the education and cooperation of the people.

In bringing over eminent public-health administrators to lecture on various aspects of their systems, the Chadwick Trust are performing a particularly useful service.

POST-MORTEM ANGIOGRAPHY OF THE STOMACH

THE part which the vessels of the stomach play in the development of peptic ulcer has never been elucidated. Virchow, a century ago, suggested that ulcers developed as a result of embolic occlusion of end-arteries in the stomach wall. Müller and Heimberger[1] postulated a condition of "vasoneurosis," characterised by disorders of tone, permeability, and architecture of the gastric capillary-bed, which, they believed, predisposed to peptic ulceration. They examined, by direct capillaroscopy, the mucosæ of stomachs removed at operation, and found evidence of "vasoneurosis" in all of those resected for ulcer but in less than one-third of those resected for carcinoma. Other workers[2] have produced evidence that ulceration is caused by digestion of areas of mucosa rendered anæmic by muscle-spasm.

It is clearly important to develop techniques for study of the vessels of the stomach wall. The deduction by Barclay and Bentley[3] that a vascular "shunt" mechanism exists in the stomach has now been confirmed physiologically by Walder.[4] Another contribution to gastric angiography has come from Woolf,[5] who has devised two distinct methods for demonstrating respectively the arterial pattern and the capillary network. In the first the stomach is removed at necropsy together with the duodenum, pancreas, spleen, liver, and abdominal aorta en masse, and half-strength barium meal is injected with a bladder syringe through a cannula tied into a main artery. The pancreas and liver are then removed, and the stomach is opened and spread out on an X-ray plate and radiographed. By this method Woolf has demonstrated both the normal and some pathological arterial patterns. He has found tortuosity and angulation of the vessels in a patient with degenerative arterial disease, fusiform arterial dilatations in one case of malignant hypertension, and possibly spontaneous hæmorrhages in another. In a case of healed duodenal ulcer there was a poor blood-supply in the region of the ulcer (presumably due to secondary obliterative endarteritis); while in a patient with two active duodenal ulcers there were well-marked aneurysmal dilatations. With the second method the mucosal capillary pattern is demonstrated by injecting indian ink, via the gastro-epiploic artery, into a portion of stomach isolated by clamps. A 1 sq. cm. area of mucosa is dissected off the muscularis and examined by transmitted light on a microscope slide. In normal stomachs there is an irregular mucosal capillary-plexus which is broken up by the ducts of the gastric glands to give the appearance of a regular ring-like circular mesh. Vertical sections show that this plexus arises from end-arterioles, which themselves arise from a submucosal plexus. Sinus-like dilatations also arise from the end-arterioles.

Some of the features of Müller and Heimberger's "vasoneurosis" require critical examination in the light of Woolf's work. The varicosities that they described seem *identical* with the normal sinus-like dilatations which arise from the end-arterioles. The irregular capillary pattern, which was also attributed to "vasoneurosis," can be produced by simple compression of normal mucosa, and the pattern may appear to be irregular when the mucosa is atrophic and the submucosal vessels are superimposed on those near the surface. In cases of peptic ulceration Woolf has found that sometimes the stomachs show the typical features of vasoneurosis, but the vessels of others appear normal in every way.

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1. Müller, H., Heimberger, H. *Dtsch. Z. Chir.* 1924, 187, 33.
2. Dodds, E. C., Noble, R. L., Smith, E. R. *Lancet*, 1934, ii, 918. Medvel, A. J. *Arch. Path.* 1938, 26, 988. Byrom, F. B. *J. Path. Bact.* 1937, 45, 1. Steinberg, M. E., Starr, P. H. *Arch. Surg.* 1934, 29, 895.
3. Barclay, A. E., Bentley, F. H. *Brit. J. Radiol.* 1949, 22, 62; see *Lancet*, 1949, i, 267.
4. Walder, D. N. *Lancet*, Jan. 28, p. 162.
5. Woolf, A. L. *Brit. J. Radiol.* 1950, 23, 8.

In the further study of the vessels of the stomach in health and disease the techniques described by Barclay and Bentley and by Woolf will prove most valuable. The effects on the gastric vessels of central nervous influences and of vagal and sympathetic stimulation and inhibition deserve further investigation. When we know the relation of these factors to gastric acidity and to muscle-spasm, we may have a clearer understanding of the mechanism of peptic ulceration.

A DEATH FROM ANTISERUM

Deaths following injections of antisera are so uncommon that the odds against such a catastrophe occurring after a particular injection are 50,000 or more to 1; but they seldom escape the attention of the lay press, and, besides providing ammunition for those whose revulsion from cruelty to animals sometimes leads them to misjudge the aims and methods of experimental medicine, they may well prejudice the public against methods of treatment which are in their best interests. Lately a boy who had been bitten by his dog was given tetanus antiserum and died soon afterwards from anaphylactic shock. At the inquest it was reported[1] that he had suffered from asthma; and there seems no doubt that such people are especially liable to this risk. Even now there are more deaths from tetanus than from anaphylactic shock, and tetanus deaths could almost always have been prevented. No-one would suggest that in the present case the doctor erred in giving antiserum, and he would still have been right to give it if he had been told the history of asthma, which in fact he was not. Intradermal or conjunctival tests for hypersensitivity to serum proteins have been popular in the U.S.A., but whether they have saved any lives is doubtful. The sovereign remedy for these cases derives from sound pathology and has the support of experience. It is a sterile solution of adrenaline hydrochloride 1/1000, kept at the doctor's elbow whenever he has to administer antiserum; and some near-accidents suggest that he would be wise to see that it is in the same place when he injects vaccines and other fluids containing proteins.

LADY TATA TRUST

The Lady Tata Memorial Trust has been supporting research into leukæmia and other blood diseases for seventeen years; and a short account of the first fifteen years of the work of the international section has now been published. Financial assistance has been given to 29 workers in eleven countries in one of two ways: by short-term scholarships or expenses grants for one to three years; and by long-term expenses grants to aid experimental researches by established teams of workers. The first type of grant has supported many different researches. The second type has been used almost exclusively to support researches into animal leukæmia at centres in New York, Paris, and Copenhagen; this is regarded by many as a branch of cancer research, and the reports of the three directors confirm this view. However, as Prof. Jacob Furth points out, the development of urethane and other similar treatments for leukæmia has been greatly helped by preliminary screening tests on animals; the disease is readily transferred from leukæmic to healthy mice.

The bulk of the report is taken up by a year-to-year list of the programmes at various centres and their published work. In this country the trust has lately confined its awards to expenses grants; this is because £400 a year is now too small an income to offer an experienced worker for three years. On the other hand, an expenses grant may enable extra clerical or technical assistance to be enlisted, so furthering work already in progress. The trust has preferred to spread rather than concentrate their devalued resources.

PERIODICITY IN DISEASE

There are plenty of periodic diseases whose explanation clearly lies in the life-cycle of the infecting organism, but there are others, in which symptoms recur at fairly regular intervals for years, for no ascertainable reason, and without much disturbance of the patient's general health except during the episodes. Reimann[1] originally divided such diseases into four categories: periodic fever, abdominalgia, arthralgia, and neutropenia. Now[2] he also includes periodic purpura, thrombopenia, œdema, and urticaria, and the better-recognised syndrome of periodic paralysis. He suggests that the periodicity of these states is some justification for considering them as a single "periodic disease," of which he has seen or found references to 53 cases, 36 in males and 17 in females. The most striking uniformity of rhythm seems to occur in the cases of neutropenia, where apparently a regular cycle of about three weeks may continue for years with normal health between exacerbations; the duration of disability, with pyrexia and malaise, in these "attacks" may be only a day or two. These conditions have been thoroughly investigated without finding any satisfactory cause. Infection, allergy, endocrinological and nervous factors, and other explanations have been put forward, and Reimann thinks they are a manifestation of a basic physiological rhythm. The frequency of periodic exacerbations in disease is illustrated in our "Disabilities" series where a hæmophilic man has noted periodic variations in his tendency to bleed, a manic-depressive has described the well-recognised ups and downs in mental powers, and a man with ulcerative colitis has reported a purpuric eruption recurring every fortnight for six months. It may even be true that close scrutiny would reveal a periodicity in all chronic ailments.

PRESENT VIEWS ON TUBERCULOUS MENINGITIS

What lessons have been learnt from the three years' experience with streptomycin in the treatment of tuberculous meningitis? What was said at the UNICEF conference (summarised on p. 365), and the comments by Dr. MacCarthy and Dr. Mann on children treated under the Medical Research Council scheme (p. 341), make it clear that there is no short cut to success. Intramuscular streptomycin must be given once or twice a day for at least six months, combined with intrathecal injections for the first three months or so. The survival rate has steadily increased in the last two years, largely because cases are diagnosed sooner and treated immediately, and because the C.S.F. findings, rather than the clinical picture, are taken as the guide in deciding when the streptomycin injections can stop. Mechanical obstruction to the flow of streptomycin through the cerebrospinal pathways is a common cause of a poor initial response; administration via the ventricles or cisterna magna may solve this difficulty, but sometimes more extensive neurosurgery is required. Now that streptomycin-resistant bacilli are dispersed in the population, a resistant strain may be found at the start of treatment; so sensitivity tests are advisable throughout. Combined treatment with streptomycin and *p*-aminosalicylic acid seems to prevent sensitive strains becoming resistant, but other combinations, such as streptomycin plus 'Promizole,' or sulphones plus vitamins A and D, have their advocates, and much work is being done on new antibiotics, such as Waksman's 'Neomycin' obtained from *Streptomyces fradiæ*, to which the bacillus has not yet learnt to become resistant.

Prof. S. E. Whitnall, who had held the chairs of anatomy at McGill University, Montreal, and in the University of Bristol, died on Feb. 19 at the age of 73.

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[1] *Daily Telegraph* and *Manchester Guardian* for Feb. 14.

[1] Reimann, H. A. *J. Amer. med. Ass.* 1948, 136, 239.
[2] Reimann, H. A. *Ibid*, 1949, 141, 175.

Special Articles

PERSONALITY AND NURSING

AN INVESTIGATION INTO SELECTION TESTS FOR NURSES

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IN the opinion of the Working Party on the Recruitment and Training of Nurses (1947), one in every three nurses "wasted" is unsuitable in temperament or ability and should not have been accepted for training. The Working Party added that, with the proper technique of selection, such candidates could probably be detected at entry.

A STUDY OF SELECTION TESTS

In Great Britain there are no reports of investigations designed to improve selection methods for nurses. In the United States selection tests for nurses are widely used and have reduced the wastage-rate (Sawers 1949). The tests used there at present are primarily measures of intelligence, aptitude, and educational achievement. At St. George's Hospital we have recently completed an investigation into selection tests for nurses, and as a result of it have arrived at a group of tests of personality and intelligence that we are about to use to assist us in selecting nurses for the hospital. Statistical analysis has shown that with the help of these tests we can expect to reduce the number of unsatisfactory applicants accepted at this hospital from 25 to 6%.

The investigation was planned on the assumption that personality was likely to be at least as important as intelligence in a nurse. The results lend considerable support to this assumption.

We used some of the objective measures of personality, covering various aspects of behaviour and attitude, on which considerable work has been carried out during the last few years (Himmelweit et al. 1946, Crown 1947, Eysenck et al. 1947, Petrie 1948). The plan was to find the relation between student's scores in various personality tests and her all-round performance as a nurse. It was hoped thus to arrive at a group of tests which would predict the suitability of a girl for nursing with sufficient accuracy to assist those selecting students in rejecting the majority of unsuitable candidates.

It was agreed that the official nursing examinations, though they may be an indication of whether or not a student nurse has reached the minimum academic standard required, are not an indication of the all-round performance of nurses. For example, no-one would claim that a girl who passes her examinations is ipso facto an excellent nurse; nor for that matter that those who fail may not become very good nurses. It is extremely unlikely that the actual marks on these examinations correspond to the girl's real nursing ability.

As there was no other reliable indication available of a student nurse's standing, which included her ability in the ward, the classroom, and as a member of the nursing staff of the hospital, we had to try and arrive at one. The method we finally adopted was based on rating scales; and these have proved to be reliable if certain necessary precautions are taken. It has been found also that ratings on a number of traits are more reliable than ratings on a few traits, and that the reliability of the ratings increases as the number of judges increases. By suitable statistical analysis it is possible to determine how good a measuring-rod the rating scale is, how much weight should be given to each of its items, and how reliable the judges are.

The rating scale used was devised by one of us (M. B. P.) after she had examined existing scales intended for nursing and allied professions. Nurses were rated on the following 18 personality and ability traits:

1.—Knowledge of underlying principles of nursing practice and nursing skills.
2.—Ability to adapt these to the individual needs of the patients: imagination; foresight; ability to anticipate requirements of new situations.
3.—Observation and reporting of signs, symptoms, and relevant information; accuracy; judgment; memory.
4.—General finish and smoothness of performance of clinical work; skill; accuracy, speed, and attention to detail; quietness.
5.—Care and neatness in keeping records and charts; quality of written work.
6.—Ability to rise to the occasion in emergency; initiative; resource; ability to stand up to difficult situations.
7.—Punctuality in work and in coming on duty.
8.—Reliability in carrying out assigned duties whether under supervision or not.
9.—Loyalty to the standards of the training school and the hospital; cooperation with authority; ability to accept criticism.
10.—Coöperation with other members of the ward team; influence on associates and juniors; relationship with other members of the staff.
11.—Relationship with the patients; ability to gain their coöperation; patience; understanding; kindness and sympathy.
12.—Attitude to patients' families and visitors to the ward; thoughtfulness; kindness and tact; courtesy.
13.—Ability to plan, organise, and time duties successfully; management of own work and that of others.
14.—Interest and ability in supervising work of others; instruction of patients and junior nurses.
15.—Economy in the care and use of materials.
16.—Emotional stability; poise; self-control in relation to patients and others.
17.—Appearance; general neatness and cleanliness of uniform; posture; manner.
18.—Enthusiastic interest in work of the ward or department and in learning nursing theory and practice.

Students were rated for each of these traits on a five-point scale as follows: (1) not up to standard; (2) just passable; (3) satisfactory; (4) very high; (5) outstanding. Ratings on each nurse were made by three independent judges who knew her well; these were the matron, ward sister, and the sister-tutor. The ratings were carried out after the nurses had been training for at least eighteen months to ensure that they were well known to the judges. The raters had been carefully instructed so as to avoid the main pitfalls commonly encountered.

A careful statistical analysis (including a factorial analysis) of the rating scale showed it to be comprehensive and reliable. The analysis indicated that we were justified in assessing the performance of our nurses by taking the sum of the ratings given by the three judges on each of the eighteen traits. We obtained such ratings for 126 nurses.

PERSONALITY AND INTELLIGENCE TESTS

In addition, each of these 126 nurses was given tests of personality and intelligence soon after commencing training. On the personality side we included tests of accurate observation, manual dexterity, tendency towards accuracy rather than speed in a manual task, persistence at a task, concentration, distractibility, range of interests, and degree of irritability. A word-association test was also applied; and we included a measure of the intensity of physical effort because this has been shown to be related to other facets of personality.

The intelligence tests used were of three types, measuring intelligence in a practical task (performance tests), a task involving the use of words (verbal tests), and a task involving the use of symbols (non-verbal tests).

RESULTS

Statistical analysis showed that a group of these personality and intelligence tests was closely related to the performance of the nurse as estimated by the rating scales. By using twelve of the tests that showed the closest relationship, we found it possible to predict the success of a nurse with considerably greater accuracy than we had been able to do in the past. The closeness of the relationship (multiple correlation coefficient = 0·611) compares favourably with that of the results of the Civil Service selection in this country, or with those obtained in the work that has been carried out on the selection of nurses in the U.S.A.

The practical usefulness of such a relationship can perhaps best be demonstrated in the following way. Up to the time of using the tests 70% of the applicants to this hospital had been rejected. Of the 30% selected, a quarter rated as "unsatisfactory"—i.e., they had an average rating on each trait below the "satisfactory" level of 3. If 30% of all applicants had been selected with the aid of these tests the number of satisfactory nurses would have risen from 75 to 94%. Put another way, with the aid of these tests more than three-quarters of the unsatisfactory nurses would have been eliminated.[1]

At other hospitals, where different conditions exist, the improvement in selection following upon the use of the tests will vary, depending both on the number of applications and the proportion of satisfactory nurses selected without the help of these tests. But the procedure will prove useful even where the nurses are selected from such a small group that as many as 80% of all applicants have to be accepted. The twelve personality and intelligence tests we are using take 1 hour and 6 minutes to administer, of which 56 minutes is spent in group-testing. Thus the testing of 20 nurses would take just on 4 hours.

QUALITIES OF THE GOOD NURSE

Analysis of the rating scale showed that in addition to general nursing efficiency, two separate demands were made of the good nurses—that she should have enough mental ability to cope with her work, and that she should have the kind of temperament that allows her to make the maximum use of her mental ability in this profession. Some of the tests were shown to be measuring primarily the mental ability aspects, others the temperamental aspects. For example, intelligence tests of the verbal and non-verbal types were related only to the mental ability traits, while the word-association test—a test of neuroticism—was related only to temperamental traits, and the test of manual dexterity to both sets of traits. Thus it is necessary to use a wide and varied group of personality tests in order to cover the various characteristics required of an efficient nurse.

Of the three types of intelligence tests we have used (performance, verbal, and non-verbal) only the non-verbal test is closely related to the efficiency of the nurse. Moreover, some of the personality tests were more closely related to the efficiency of the nurse than was non-verbal intelligence. For example, tendency to observe accurately, to persist in a word-building test, and to avoid mistakes in a manual task, appeared to be more closely related to success in nursing than is intellectual ability. This again emphasises the importance of not placing too much stress on intelligence tests alone in selecting nurses.

AGE AND EDUCATIONAL LEVEL

The educational status of each nurse was classified on a five-point scale, the lowest category containing those whose education had ceased at the age of 14, while the highest category contained those who had proceeded beyond the Higher Schools examination. It was found that the degree of education, in our group, was related to the success of the nurse, those in the higher categories tending to be the better nurses.

It is also of interest that there was a tendency, in our group, for the older students to be the better nurses. The age range of nurses beginning training is 18½ to 30, and it thus appears that training, as at present designed, is less suitable for the younger than for the older students.

We also found that students with fewer brothers and sisters tended to make the better nurses.

The Working Party indicated that neuroticism makes for an unsuitable temperament for nursing. It should be noted that many of the tests we have found to be most closely related to the efficiency of the nurse are also closely related to the absence of neuroticism. For example, the efficient nurse is persistent, the neurotic is not; the efficient nurse has high manual dexterity scores, the neurotic has not; and the efficient nurse has a low score on a word-association test designed to indicate neuroticism.

EXAMINATIONS

Much has been written about the desirability of changes in nursing education and in the system of examinations (Balme 1937, Bevington 1943, Working Party on the Recruitment and Training of Nurses 1947). As a slight contribution to this discussion, we mention some findings relating to the practical and theoretical examinations. We found that the relation between examination results and the performance of the nurse in hospitals, as estimated by the rating scale, was relatively low, though the practical examination gave closer results than the theoretical examination. Moreover, when contrasting the mental ability traits with the temperament traits on the rating scale, we found that the theoretical examination was related to mental ability traits only. Thus the theoretical examination is a measure almost exclusively of intellectual qualities. The practical examination was found to be related to both mental ability and to temperament traits included in the rating scale, though the relationship was not very close.

Nor was there any close relationship between the examination marks and the three types of intelligence test used. This suggests that even if we were choosing nurses solely with a view to their being able to pass examinations, we would nevertheless be ill-advised to rely on purely intellectual tests.

ATTITUDES TO NURSING

Some additional information was obtained from questionaries, in which the nurses were asked their reasons for liking and disliking nursing, their first choice of career, and so on. The answers of the 40 nurses who had been rated as the best in the hospital were compared with those of the 40 nurses who had been rated as the worst. Only those differences between the two groups which are statistically significant will be reported.

The good nurses gave more reasons for liking nursing than did the poor nurses while the poor nurses gave more reasons for disliking nursing than did the good nurses. There was a difference, moreover, in the kind of reasons given by the two groups. The good group gave more reasons for liking nursing which could be described as socially responsible—e.g., "a worth-while *job*," "it gives you a feeling of responsibility." The poor group, on the other hand, had more nurses giving as their reasons for liking nursing such things as "you are always learning," and "friendship with young people."

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[1] These figures can be arrived at by reference to the tables of Taylor and Russell (1939).

More of the good nurses gave as their reasons for disliking nursing aspects which are not inherent in nursing, as such, and which might be altered in the future—e.g., "no warning of changes in duty," "little chance to visit home," "lack of social and outdoor life," and "not enough opportunity to treat patients as individuals." On the other hand, more of the poorer group gave as their reasons for disliking nursing aspects which seem to be *more inherent in the career itself*—e.g., "night duty," "long hours," and "examinations." These differences seem worth reporting because they are an indication that some reforms are more urgent than others if good nurses are to be retained. They also suggest that further research may disclose an even stronger association between attitudes of this type and success in the chosen profession.

The good and poor nurses were also compared with regard to their first choice of career if this was not nursing. The poor nurses had more often chosen careers which might be grouped as "exhibitionist," such as dramatic art, ballet, music, and so on; or they had chosen careers which entailed relationship with things rather than with people, such as agricultural work and librarianship. The good nurses, on the other hand, had often chosen careers entailing "humanitarian" activity, such as medicine or teaching.

It may be of interest to report another difference, though it did not reach the level of significance. The question asked was "What would you have done if you had not been accepted at a London Teaching Hospital?" To this 10·5% *more* of the good nurses than of the poor nurses stated that they would have given up the idea of nursing. This emphasises the importance of maintaining the high standard of nurses' training schools attached to teaching hospitals.

COUNSELLING AND SELECTION

The Working Party stated that "wastage comes not only from asking too much of a dull girl, but arises also from lack of appreciation of the gifts of the brighter student." These tests give considerable information about the ability and temperament of the individual nurse. It is hoped that those in charge of the nurses during their training will find this information useful in helping nurses with their difficulties.

It cannot be too strongly stressed that these selection tests are not intended to replace the interview or the study of school records, or all the other measures hitherto taken to maintain the high standard of entrants to the nursing profession. But we do suggest that selection tests should be added to the earlier selection methods because they provide additional information.

We intend to repeat the assessment of the nurses each year so that their standing at different stages in the training can be related to their scores in personality tests. We shall thus be able to improve the predictive value of these measurements.

THE LANCET Commission (1932) stated "there is evidence that shortage [of nurses] is not only quantitative but qualitative." We feel it is of prime importance to improve the qualitative selection by the use of selection tests such as have been described above. If the quality of the student nurses rises, it is likely that the whole standard of nursing will rise too: for the nurses selected will be of greater service to the patients, and at the same time the profession will become more attractive to other able young women.

SUMMARY

1. At St. George's Hospital, 126 nurses who had been in training for over six months were examined on a wide and varied group of personality and intelligence tests.

2. Ratings by three independent judges on eighteen personality traits were used to assess the all-round performance of each nurse.

3. A set of twelve of the tests were found to be closely related to the standing of the nurses (multiple correlation coefficient = 0·611). These tests included measures of accuracy of observation, concentration, tendency to make manual mistakes, persistence, and number of interests: and also included a non-verbal intelligence test, and a test of neuroticism.

4. At this hospital under present conditions, the use of these tests, in addition to the present selection procedure, would increase the number of satisfactory nurses selected from 75 to 94%. The tests would also be useful in hospitals where other conditions obtain.

5. A factorial analysis of the rating-scale suggests that, in addition to general nursing ability, two distinct sets of qualities are required of the good nurses, one depending on intellectual capacity, the other on personal relationships. Some of our measures are shown to be more highly related to one set of traits than to the other.

6. The good nurse was found to give significantly more reasons than the poor nurse for liking nursing; and significantly fewer reasons than the poor nurse for disliking nursing. The type of reason given by the two groups for these attitudes also differed.

7. The type of career which was the first choice of the good nurse differed from the type of career that was the first choice of the poor nurse.

8. Examination results were found to be closely related to neither the total rating of nursing ability, nor to measures of general intelligence.

We wish to express our thanks to the Board of Governors, and Mr. P. H. Constable, the house-governor, of St. George's Hospital, for their coöperation in arranging these investigations; to Dr. Desmond Curran, head of the department of psychiatry, for his constant help and encouragement; and to the sister-tutors, sisters, and nurses (particularly Sister Waldon-Jones), without whose coöperation this study could not have been made.

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UNICEF CONFERENCE ON STREPTOMYCIN IN CHILDHOOD TUBERCULOSIS

THE International Children's Emergency Fund, in association with the World Health Organisation, has sponsored the streptomycin treatment of childhood tuberculosis, particularly tuberculous meningitis and miliary tuberculosis, in many European countries during the past year. It therefore seemed opportune to convene a technical conference of medical delegates from the countries concerned to discuss their experiences with medical experts in other countries where streptomycin has been used for the same purpose over a longer period. Most appropriately, the meetings were held in the Hôpital des Enfants Malades in Paris, under the chairmanship of Dr. ROBERT DEBRÉ, whose extensive experience in this field was again demonstrated by the contributions which he and his colleagues made on every aspect of the subject during the four-day conference from Feb. 9 to 12. The conference was organised by

Dr. Borcic, of Unicef, and it was largely owing to his efforts that the delegates completed the heavy programme within the scheduled time and went away feeling that something worth while had been accomplished. During the conference the delegates visited Brévannes, a sanatorium on the outskirts of Paris with *a unit of 70 beds for the continuance of treatment after* patients have passed the acute stages of their illness.

After the delegates from different countries had given progress reports on their work the conference settled down to discuss diagnosis, dosage, and routes of injection, indications for neurosurgery, changes in the cerebrospinal fluid (C.S.F.), the value of ophthalmoscopy and electro-encephalography, toxic and other complications, bacteriological and pathological findings, and the use of combined therapy.

DIAGNOSIS

Professor Mozziconacci (Paris), opening the discussion on diagnosis, commented on the occurrence of prodromal symptoms in over 60% of cases; in particular he had noted a subfebrile condition accompanied by fatigue and wasting and sometimes associated with a tuberculous focus in lung, pleura, or bone. In four cases tubercle bacilli were isolated from the C.S.F. before there were any localising signs and all four went on to develop meningitis. Professor Choremis (Athens), on the other hand, claimed to have isolated tubercle bacilli from the C.S.F. in cases which did not develop clinical meningitis. Fever, vomiting, headache, and constipation were the principal early symptoms of tuberculous meningitis in young children, whereas objective neurological signs such as neck-rigidity and positive Kernig sign were present in only 20% of cases. About 25% of cases were diagnosed in the first week of infection, 45% in the second week, and the rest later. When lumbar puncture, done during the course of a primary infection or miliary tuberculosis because of some neurological signs, revealed abnormalities (usually some increase in cells and protein), treatment with streptomycin was initiated by both intramuscular and intrathecal routes and was usually followed by a rapid return of the C.S.F. to normal. Such cases probably corresponded to what had been called serous tuberculous meningitis. In the subsequent discussion, attention was drawn to the value in diagnosis of the family history, a positive Mantoux reaction, and a sugar content in the C.S.F. below 45 mg. per 100 ml.

DOSAGE

Those with the longest experience—e.g., Debré of Paris, Dubois of Brussels, and Cocchi of Florence—were satisfied that the best results were obtained with *uninterrupted and prolonged treatment*, intramuscularly and intrathecally, for six months or more. Intramuscular injections (20–50 mg. per kg. of body-weight per day) were being reduced to one or two per day, with proportionately larger doses for infants than for older children. Intrathecal injections of 20–50 mg. should be given daily for some weeks and be continued at increasing intervals (three times, twice, and then once a week) until the C.S.F. returned to normal. Dr. Honor Smith (Oxford) spoke of the advantages of neurosurgery in tuberculous meningitis, and it appeared that the ventricular and cisternal routes were now being used in many centres, particularly when there were signs of spinal blockage. It was agreed that a return to normal of the cells and protein in the C.S.F. was possible during intrathecal therapy and that a cell-count below 10 per c.mm. and a sugar content over 45 mg. per 100 ml. were of greater prognostic importance than a normal protein. After return to normal the C.S.F. should be regularly examined for some months since any changes in it could give early evidence of a relapse.

CHOROIDAL TUBERCLES

An account of the appearance and significance of choroidal tubercles was given by Dr. Monbrun (Paris) on the basis of examinations in over 1000 cases of tuberculous meningitis and miliary tuberculosis. Choroidal tubercles were found in 87% of cases of miliary tuberculosis plus meningitis, in 51% of cases of miliary tuberculosis alone, and in 17% of cases of meningitis alone. Electro-encephalograms indicative of encephalitis in some cases were shown by Professor Chaptal (Paris).

BACTERIOLOGY AND PATHOLOGY

The need to establish the diagnosis bacteriologically was stressed by Prof. Robert Cruickshank (London), who recommended the inoculation by Pasteur pipette of the deposit of as much C.S.F. as could be obtained on to two tubes of Löwenstein-Jensen egg medium made with new-laid eggs. Besides its diagnostic value, repeated culture of the C.S.F. had some prognostic significance. With the appearance of streptomycin-resistant strains in the community it was becoming essential to test the streptomycin sensitivity of strains on primary isolation. For this purpose he recommended the simple procedure of direct inoculation on to egg-containing media with and without streptomycin. He spoke of the encouraging results being obtained with combined streptomycin and P.A.S. in preventing the emergence of streptomycin-resistant strains in cases of progressive exudative pulmonary tuberculosis, and thought these results had both a direct and an indirect application in the treatment of childhood tuberculosis. The pathology of tuberculous meningitis and miliary tuberculosis was discussed in detail by Professor Fanconi (Zürich) and Professor Eleftheriou (Athens).

COMBINED THERAPY

Dr. Edith Lincoln (New York) said she was obtaining very good results in both tuberculous meningitis and miliary tuberculosis with streptomycin combined with 'Promizole' by mouth in doses (0·5–1 g.) sufficient to maintain a blood-level of 1–3 mg. per 100 ml. Sulphone is demonstrable in the C.S.F. even in the absence of meningitis, and treatment with promizole is continued for three years with little evidence of side-effects except for the occasional development of secondary sex characteristics in children. It may be noted that Professor Cocchi (Florence), who gives intravenous sulphone as well as large doses of vitamins A and D, now claims over 80% cures in cases of tuberculous meningitis. However, statistics submitted by different centres could not easily be compared, and Dr. Marc Daniels (London) made a strong plea for uniformity in the recording of results of treatment. Thus, only cases treated for a year or more should be included in the report; the age of the child and the stage of the infection should be given; any selection of cases should be noted; and all deaths should be recorded. It seemed that 15–30% of all deaths still occurred in the first month of treatment; and all agreed that early diagnosis was one of the most important factors in tuberculous meningitis.

". . . An old farmer who was advised by the expert that he would shorten fattening time by adopting different feeding methods is said to have disposed of the advice with the scornful question, 'What's time to a pig, anyway?' It is easy to slip into the idea that, like the pig, the out-patient has no occasion to count the passing hours. Traditionally, if he belonged to the class for whom time was *money*, he would not (or should not) *be there. . . . But a national* service is not dealing solely with the 'sick poor' who might as well sit in a hospital waiting-room as sit anywhere else. Many who use the service will be busy people who have to plan their days as much as do doctors."—P.E.P. *Broadsheet on the Hospital Service* (II). *Planning*, Feb. 13, p. 210.

Points of View

THE CARNAGE ON THE ROADS

C. G. LEAROYD
M.R.C.S.

CHILDREN in this country are robbed of some fifty thousand years of life each year by motor traffic. Motor-cycles kill 500-1000 young men a year—twice the number of car drivers killed, though there are over four times as many cars licensed. Pedestrians, cyclists, and passengers make up well over three-quarters of the carnage. The driver of the goods vehicle has the highest average killing capacity; the private car driver comes second. The motor-bike is the most lethal form of transport; a bus can go fifteen times further before killing anybody. The ratio of killed to injured is about 1 to 30; but one or two of the 30 are economically dead.

Statistics may be convincing, but they are not so compelling as remembered scenes. We doctors in general practice collect in our memories quite a number of tragic roadside groups, snaps of crippled servitude, and cameos of homes in tears. There is always a contrasting element in them—the live animal and the pulped thing; the triviality of the error and the heavy sentence; the trip for pleasure and this. Three recent ones in my mind are: (1) a lovely English lane and a young man sprawled over a twisted motor-bike, the grey of his brain showing; (2) a nursery head and body with crushed thighs on a slab midst disinfectant smells; and (3) a dazed cluster in a cottage on the night before the inquest. We go on collecting them all our lives and can fling them in the faces of those who say: "This is an engineering or educational or legislative problem and does not particularly concern you."

Parrots say "This is a blot on our civilisation," but I am not sure that it is not part of an industrial civilisation; something of the impersonality of the machine and the ruthlessness of huge production affects its concentrated populations. The more machine-minded a nation is, the more careless of life, in that respect, it becomes; in the U.S.A. 40 million vehicles killed 32,300 people and wounded 1,150,000 in 1947.

People, however, react as strongly as ever to the isolated personal tragedy. Queen Victoria was most indignant and said that mountaineering ought to be stopped by law when Whymper left some dead friends on the Alps, but there was not any general indignation at the myriad lives halved by lead poisoning in the potteries; thousands burn with resentment at the injustice done to a Winslow boy but are left comparatively cold by "Pedestrians (under 7), 609 killed on the roads in 1948, 60·4% by goods vehicles." Most people are only capable of compassion within their own group—except in war, when the group is enlarged into the nation. This is probably defensive, for a man with a universal compassion would hardly have enough energy left to paddle out of his tears. Most doctors in their first few weeks of a job in a mental hospital feel like this.

When death, in the form of an industrial disease or a habit like gin-drinking or this road-killing, keeps stealing victims from among a moderately indifferent community, certain people with a surplus of compassion, often relatives of the victims, band themselves together and become nuclei of societies, which stimulate the Government to its duty. Eventually the Government takes on the whole job. We have not reached that stage with road casualties yet and probably will not do so for another ten years. Meanwhile the Royal Society for the Prevention of Accidents and other agencies are doing splendid work in helping to reduce the deaths, which fell from 6500 in 1938 to 4500 in 1948, though how many of the lives were saved by lack of petrol cannot be known. The individual also has his part to play, especially we doctors with our compelling pictures.

WHAT CAN BE DONE?

The problem of accident-prevention is being tackled in this country under three main headings: engineering, education, and enforcement.

Under engineering come the road schemes, the erection of a thousand signs, the robot schoolmasters of our erring feet and wheels.

"Under education, which is considered to be the main weapon in the present economic condition, a comprehensive organisation has been set up throughout the country for conducting the road-safety campaign, which was launched in 1945. Most local authorities now have their road-safety committees; the police and schoolteachers play a large part in their work of educating both children and adults in correct road behaviour."[1]

Our job here is to make instructed asides, and there is one small psychological point, probably dating back to the time when man was nomadic, which is the basis of a big proportion of road accidents—the feeling and display of superiority in those with the swifter forms of transport. You see it in the small boy with his scooter, and in primal form in the proud mien of the rider to hounds; you may remember it as an ecstasy of movement when you first took to cycling, skating, or driving a car. In others it incites envy, hatred, and admiration.

There is a simple bit of child psychology which could be turned to good account in accident-prevention education. Children and young people have a natural taste for horror stories. This is not primarily ghoulish or morbid, it is their way of learning from the experience of others. If they had to learn from their own experience there would be a terrible casualty list, and few of us would be here. The almost pleasurable apprehension of the story is kept up until it is satisfactorily topped off with an explanation or a moral, which cannot be forgotten. I remember over fifty years ago being told a satisfying story of a boy who was drowned because he ate three pounds of cherries with the stones before swimming. The modern version is: ". . . so he stepped into the road, but he was walking with the stream of the traffic and not against it, and he did not look behind him, so the Big Blue Bus . . ." Most of the children killed on the road are under seven. Cannot some genius provide them with a new set of nursery stories—*Red Riding and the Wicked Rolls*; or *Goody Twoshoes and the Bad Goods Vehicle?*

ENFORCEMENT

Excellent as all this education of children and parents is, it must cause sardonic laughter in Heaven that we train the children from earliest years and then let off the person who does the killing with half an hour's test, generally under non-testing conditions.

All that is being done for road safety now may slowly lessen the casualty list or keep it more or less stationary while the number of cars increases, but attention to the strict training of drivers would halve it in a year.

Turning a person loose with a car after the present elementary tests is like licensing a surgeon as soon as he knows the Red Cross book and how to hold a knife. Even these tests were opposed by the A.A. and the R.A.C. "They argued that tests would be of very doubtful practical utility and a source of considerable expense. They declared that the chief requisite of safe driving is 'road sense, which can only be acquired on the road itself' "[2]—i.e., by practice on the public. Yet between Nov. 1, 1946, when tests were resumed, and Nov. 26, 1949, the examiners made 976,220 tests and failed 38% of the candidates.

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[1] Part of a letter from the secretary of the Royal Society for the Prevention of Accidents, to whom I am also indebted for many of the statistics quoted.

Tests of Fitness and Accident-proneness

The questions on the present application forms for a driving licence—Can you read so-and-so? Do you suffer from epilepsy?—are silly. The driver fills in and signs his own certificate of fitness to drive, and the person with a prohibitive but not too obvious defect has merely to lie. The only object of these questions is to cover the officials, so when the epileptic driver kills a pedestrian they can say: "We are not to blame. He signed this." It is their job to find out these things themselves—to insist on a proper medical examination, including visual and auditory tests, and an examination of past history with a right to see the panel card, besides an ordinary physical examination as for life insurance.

What a medical examination will not discover is accident-proneness. In an investigation in the U.S.A. it was found that 50% of the accidents were caused by 7% of the drivers. And the Industrial Health Research Board,[3] reporting on accident-proneness, says that if a large number of people are exposed to the same risks something like 10% of them will have 75% of the accidents. Accident-proneness, the board's report continues, is a relatively stable quality; those who have an undue number of accidents in one period of exposure will tend to do so in other periods. Further, those who have an undue number of minor accidents also tend to have an undue number of major ones.

The National Institute of Industrial Psychology devised a series of tests which can pick out the accident-prone driver. These tests are truly psychosomatic. One of them tests the time from ocular stimulus to muscular action; the lag is never less than $^3/_5$ second and the average is $1^1/_5$ seconds. Thus, with a car going at 30 m.p.h., if the driver sees a child run out in front of him, the car will move forward 26 feet before the brakes start to act with a quick-reacting driver, 53 feet with an average driver, and 80 feet with a slow-reacting driver. Other tests are for visual acuity and for judgment of spatial relationships, relative size, and speed. There is a series of tests in a dummy car with a moving picture of a road in front. The track followed by the driver and the speed attained are automatically recorded. Sir Ernest Graham-Little proposed in Parliament some sixteeen years ago that certain of these tests should be made compulsory for all applicants for driving licences, and if his advice had been taken there would be a good many more people alive today. The tests pick out the potential homicide and show others in what way they are inclined to be homicidal. There is abundant foreign experience to justify their imposition.

Lectures

Then there should be a series of lectures on Roadery and Road-craft with a written examination and a viva at the end. One lecture might well be on "Alcohol and the Driver," and, if there is merit in having insight into one's own condition, another on "The Bad Driver." I can imagine a page from the notes of a putative candidate on this:

> Over 90% of fatal accidents would not have happened if the *Highway Code* had been obeyed.
>
> Six types of bad driver:
>
> (1) *The Thruster.* Generally male. Example of male aggressiveness. Hurts his pride to be overtaken.
>
> (2) *The Hurrier.* Usually with nothing to hurry for. Associated with restlessness and acquisitiveness. (Shown aerial film of London-Brighton road on a Sunday, 50 miles of continuous traffic in which one "hurrier" overtook eight times to gain half a mile in the queue.)
>
> (3) *The Downtrodden at Home* who is a hell of a fellow behind ten horse-power.
>
> (4) *The Dreamer.* You cannot see mental pictures and real ones clearly at the same time. Malcolm Campbell's definition of a good driver: "Concentration and again more concentration. Your mind must not wander for a second."
>
> (5) *The Speed Merchant* who enjoys speed for its own sake. Generally immature. Speed is the biggest single factor in fatal accidents.
>
> (6) *The Exhibitionist.* The man or youth who wants others to think he is a dare-devil.

Anyone who thinks that road-craft consists in sitting behind a wheel and steering is on a par with those who think all a judge has to do is to dress up and look wise. Road-craft requires the skill of a cricketer, the intuitions and knowledge of conventions of the bridge player, and the imperturbable patience of a dry-fly man.

The tests of accident-proneness and lectures on road-craft should be given also to the children of 14–15 at school, where Roadery and Road-craft should rank with the three Rs. Boys have a natural aptitude for these subjects, and embryo drivers would thus start their training early. In any case, safety on the road affects them vitally: "It is estimated that at the present rate every fourth or fifth child born in Great Britain is destined to be killed or injured in a road accident."[4] The *Highway Code* might be learnt by heart, as the Catechism used to be, or set to music.

Then to the actual driving test on the road should be added a dusk and night test; dusk is a peak hour for killing and it is absurd to let a driver loose until he has been tested in it.

There is also much to be said for laying out special tracks for testing drivers. London omnibus drivers have or had one and part of it was greased, so that they could practise rectifying skids. With india-rubber children and dogs scudding about, operated from a central control tower, and with other delights, it could be made a real test for a driver's reaction to emergency conditions.

Some years ago I admitted to a mental hospital a young woman with acute hysteria, who had just killed a bread-winner cycling home in the dusk. Whatever the merits of the accident—and there were no witnesses—I am absolutely certain she should not have been a driver. In the proposed course she would have failed on past history, in the medical examination, in the body-mind tests, probably in the written examination and viva, and certainly over the emergency track. She had passed the usual test.

A word must be said about the motor-bikes, which are the most lethal instruments on the road. Unless the tester rides pillion it is impossible to make the driving test for motor-cyclists a real one, and therefore it is all the more necessary to make the rider's factual knowledge as complete as possible. It is just murder allowing these boys of 16 to go on the road without letting them know what they are in for. They are, however, at an age when, though the sense of adventure is at its strongest, a wise nature has also quickened their sense of self-preservation, which expresses itself as a love and memory for horrors, warnings from vicarious experience. The lectures to them would be on these lines:

> "You may get a grand thrill going round a bend at 60 m.p.h. and banking at 60°, but just remember what you may be running into—the greasy patch and the skid, sheep, the car on the wrong side, playing children."
>
> Then follow a dozen short films of real motor-bike smashes —the roadside confusion, the twisted metal shorn of glory, close-up of the stertorous head, the ambulance, a glimpse

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[2] Vernon, H. M. Accidents and Their Prevention. London, 1936; p. 154.

[3] The Personal Factor in Accidents. *Industr. Hlth Res. Bd emerg. Rep.* no. 3, 1942.

[4] Vernon, H. M. Accidents and Their Prevention. London, 1936; p. 101.

through a door at a sheeted figure, the glimpse that does not disclose finally but suggests endlessly.

"If you want to be bold and bad, go and do it in the boxing ring or on the football field or on a horse. Only 23 people were killed in these ways last year, whereas on motor-bikes there were . . ."

At the end of the courses for drivers and riders, when they were handed their licences, they would be given a little slip telling them—quite cheerfully—that the most dangerous time for them would be not when they first went on the road but shortly afterwards, when the caution of the novice had worn off.

The whole course would take about ten days, and a driver's licence would be on a par with a pilot's certificate, and as worth guarding as a minor professional qualification.

Any motoring offence, especially exceeding the limit on restricted roads, where two-thirds of the deaths occurred last year, should automatically involve a testing or re-testing. This would make the old driver who was uncertain of passing the test extraordinarily careful. It would also threaten the livelihood of the careless goods-vehicle driver, who is the biggest killer of children. This should be made mandatory on our amateur justices, the bulk of whom are drivers themselves and can be lenient to the point of flabbiness.

CONCLUSION

The whole question is this: Having regard to the facts that 4500–5000 people are killed and some 150,000 wounded on the roads each year and that 90% of these accidents are preventable, is driving a sufficiently lethal occupation to demand skilled drivers who are adequately tested?

Whether the Minister of Transport and a Parliament of drivers are brave and selfless enough to do anything about it is another matter.

Meanwhile twelve people going about their tasks today are destined to be killed on the roads tomorrow.

Public Health

Supplies of B.C.G. Vaccine

ACCORDING to an announcement by the Department of Health for Scotland, "reports and letters appearing in the press indicate that there is a belief that the temporary stoppage of supplies of B.C.G. vaccine is due to financial reasons.

"This belief," says the announcement, "has no foundation. As has been previously stated, the stoppage is entirely due to production difficulties of a technical nature. Everything possible is being done to overcome these difficulties, and the Department of Health hope that as a result further supplies of B.C.G. will be available in the near future."

Scottish Report on Poliomyelitis

In a report on the 1947 epidemic of poliomyelitis, the Department of Health for Scotland notes that the disease seemed to attack small, rather than large, family groups; and "it was obvious that poliomyelitis was a disease especially of persons living in four apartment houses, particularly those with less than six occupants." Compared with previous years, there was a significant increase in the percentage of cases among people over 15 years of age. In the 1947 epidemic, 6·5% of cases were among children under 1 year of age, 35·8% among those aged 1–4 years, 34·6% among those aged 5–14 years, and 23·1% among people aged 15 years or more. Paralytic poliomyelitis was a disease principally of the cities. The focal attack of the outbreak in cities was in children under 5 years of age, whereas in rural areas it was in older patients.

Estimate of Births

The Registrar-General's return for the week ended Feb. 4 gives the following estimates for live births in England and Wales: final estimate for the quarter ending March 31, 186,000; provisional estimate for the quarter ending June 30, 183,000.

In England Now

A Running Commentary by Peripatetic Correspondents

I HAVE been following the activities of my colleagues, and others who are offering themselves at the hustings, with purely academic interest, because, like everyone else, I made up my mind which way to vote before the campaign had even started and quite irrespective of the candidates' oratorical powers. I have been sadly disappointed at the low standard of repartee in dealing with hecklers, which is perhaps attributable to the modern habit of politicians of haranguing defenceless audiences over the wireless. Such retorts as "Shut up!", "Oh *do* shut up!", and "You silly woman" represent a stage in the development of repartee that most of us left behind at our prep-school and are asking for the radio rejoinder: "You clot!"

There seems to be a lack of subtlety and originality in the posters, too. When Lord Addison was standing in the 1910 election his opponent put up a poster saying: "Dr. Addison asks for support on the ground that he is used to cutting up bodies. Will you let him cut up the Empire? Don't vote for Addison who Cuts Up the Stomach, but vote for Hay who will See it is FILLED." People (including the Editor of *The Lancet*) wrote to the *Daily Chronicle* about it. You can read the angry headlines in the faded cuttings in that fascinating store of medical miscellanea, the scrap-books in the Royal College of Surgeons library in London. I fancy that one of the attractions of electioneering is that sticking up posters for passers-by to see gives vent to a primitive urge. There is surely the same underlying motive in sticking slogans on outdoor walls at election times and in scribbling other things on other walls at other times.

* * *

My wife has undertaken to distribute milk to the more needy coloured infants at what may be called a welfare clinic in the grounds of our excellent maternity unit. The maximum age is about three years. Since she started this I have often been surprised to hear smatterings of pidgin-Arabic floating round the house, to the amusement of the servants, because with commendable enterprise my wife took on the job not knowing much more than *imshi* and the more useful *fissa*.

In my own ignorance I had carefully explained to her that a certain amount of organisation was needed if she was to make up, distribute, and annotate the issue of milk to upwards of fifty screaming infants whose escorts had never learnt the art of queueing. The maths involved in mixing dried milk with water, being psychic as to the number who would turn up, and opening sufficient tins in advance occupied more than one whole evening.

We need not have worried. All our planning went by the board. The children appeared with escort—usually some relative about a year older than the eldest child taking part in this new whim of the mad British. Sometimes the escorts would appear without infants but with filthy bottles in lieu, so the order went out: "No chicos, no milk." On the next few mornings the provision of "chicos" was accomplished with such speed that the only honest explanation could have been that all the "patients" lived just outside the hospital compound.

The proceedings are enlivened by the occasional appearance of the clinic doctor—a very hard-worked lady—whose method of communication can at least be said to quell the riot for a few seconds. She resorts to a flow of language, pitched in a voice even higher than that of the indigenous population, which leaves all mute and gaping with awe. The method adopted by one of the interpreters, who gave a helping hand the first few mornings, is equally effective; this consists in beating a rapid tattoo with both hands on the heads of all children in reach. The milk is distributed in emptied butter tins, and woe betide the doler-out-of-milk if, in a fit of temporary aberration, she hands out an Australian butter tin when a South African one was handed in. The very small infants are given bottles—with careful instructions as to which is the teat and which the valve. The finest sight of all is the row of babies lying on their backs on narrow benches swigging down their half pints like old topers.

* * *

The Society of Applied Omphaloscopists held its winter meeting at the Pavilion at Brighton. The programme, intellectual, social, and nutritional, could not have been bettered, and it was worth a lot to see the doyen of the society deliver his fervent address while giving fearful glances over his shoulder at the serpents and cockatrices on the walls which seemed likely to attack *a tergo*. To secretaries of similar bodies I recommend the Pavilion. There is space for man and motor-car, catering above the average—and Brighton. Of all towns in this country it has most of that gaiety which is sometimes called "Continental." (Have you ever been in Rennes on a wet Monday evening?) But these conventions of learned and less learned societies are becoming a major problem. Few medical schools can deal with an attendance of several hundred, and hotel accommodation in many towns is insufficient. Our colleagues in the U.S.A. take one or more hotels entire, and that method, or some coöperation with Mr. Butlin, might be explored here. Wouldn't the provision of accommodation offer an escape from penury to one or more noble dukes? Bed and board for a few hundred, with lectures in the ballroom and dinner in the banqueting-hall, should not be too difficult, and at the rate at which we doctors form congregations of common interest the palace might be let for ten months out of twelve. The row of Lelys or Gainsboroughs would look better on the wall than those dusty anatomical charts.

* * *

I'm not much of a one for Old So-and-So's gatherings, and I have only been to one Old Boys' dinner since I left school in 1921 (great scot! It's nearly thirty years). I went to last night's one to see Norman, a life-long though intermittent friend, and the secretary knew this, but of course he put us in opposite corners of the room, blast him. My neighbours were (*a*) a rugger enthusiast, real or simulated, who somehow recalled that I was in the XV (as 15th man) and therefore assumed that I knew and cared how the school was doing this season; and (*b*) a man who mistook me for my elder brother and regaled me with reminiscences of friends whom I had never known. But these were at least decent looking old boys (as distinct from Old Boys). What shocked me were the glimpses I kept getting of my real school friends hidden behind the battered ruins of a human face. Sometimes a trick of expression or typical gesture would give them away. Or someone would ask: "Isn't that old X over there?" Then I would realise that this fat bald puffy-cheeked debauchee was indeed all that remained of my study-mate, lively and lovely Bill X, and I would remember that Sunday off when we got up at 6 A.M., rode to my home on our bikes, and there played tennis and browsed in the strawberry bed alternately till it was time to ride back. Was it 15 or 20 sets we played? And (no, it can't be: yes it is) that scraggy old bird next to him, with a collar four sizes too big, was once Peter Y. I remembered hearing he'd been ill. He was the one who ate so many cream horns that the Head said he was getting like one. He looked as if he could do with a few now—and a wash.

I managed to catch Norman in the cloakroom on the way out and fix up to meet him at Lyons Corner House, so I needn't go next year.

* * *

Last week's disclosure that medical discussions are to be broadcast in the United States, has given me a further idea. Instead of medical journals let us have medical recordings. Then the medical library of the future will have rows of those comfortable cubicles where you can try your choice, like the gramophone shops, with perhaps a few studios for films. It is so much easier to listen than to read. Except, of course, that you cannot skip the dull bits.

* * *

Topical Terminology

Pædiatrician to mother: Is there any tuberculosis in the family?

Mother: Oh, that's all right, doctor. He was patched last month.

Letters to the Editor

SOCIAL SIGNIFICANCE OF SYMPTOMS

SIR,—Dr. Gooddy's article in your issue of Feb. 11 is more than disturbing. It starts with some paragraphs of crypto-political exposition containing a number of assumptions which could hardly be argued out in your journal. The views put forward appear to lead to a somewhat derogatory attitude towards social security, the psychiatrists, and the individual about whom this article is most concerned. Is this latter, for example, the only person who smokes under the "no-smoking" notice? Is he any worse than the patient who walks into my consulting-room smoking without permission, equally idle, equally improvident of other people's resources, but who does think that I can help him?

It would appear that there are three classes of patients in Dr. Gooddy's mind—those with organic disease, those with some psychopathology, and, in between, a definable group whose troubles arise from social circumstances, and whose difficulties are therefore not in the province of medicine.

What is this group? Perhaps Dr. Gooddy's experience in Queen Square with its highly selected sick population is not common experience; and I certainly cannot identify this impatient, ill-behaved, certificate-seeking individual, who is supposed to blackmail me with his blackouts and gastritis and fibrositis, the sequel of conscription, change of job, or amatory setback (often precipitated by seeing a romantic cinema programme). If I could identify this patient who is unadjusted because of his social background from amongst all those whose symptoms are expressed with a lavish use of superlatives and exaggeration, I would have to include many people with organic disease and perhaps all my Irish patients, whose language is naturally a rich one. In the definition of this group the causes of the disability include constitutional defects, defective education and social opportunities, and particularly inadequate housing, susceptibility to medical advertisements, ignorance, and the desire to get something for nothing. Apart from the suggestion that the "something for nothing" may be a certificate to the housing authorities, I fail to see what this patient is after. Can it really be, perhaps, that he prefers to live on sick-pay instead of his normal wage, which is probably at least three times as large?

Finally, having stated that it is impossible for the medical profession to help such patients in these matters, a solution of the problem is suggested. This consists in replacing the doctor's scientific approach by an attempt to achieve a dogmatic statement in every case—to be able to tell the patient, after a thorough examination, that it is certain that there is nothing wrong with him and to offer him sympathy and the exit door of the outpatients' department. I cannot help remembering that most of my medical mistakes in missing grave organic disease have occurred in two groups of cases: firstly, those whose description of their symptoms has sounded exaggerated; and secondly, and most importantly, those who have had the most complete and repeated examinations.

When one remembers the attitude of the medical profession in the Victorian era towards the work of social reformers and public-health authorities, when one recalls the attitude of the Royal Colleges to the report on the fitness of Boer War recruits, one should be a little humble before defining the scope of the work of the doctor. If these patients come to see me seeking my help, I will think it within my province on that account alone. Medicine is a social function and the job of the doctor relates to the maintenance of health and care of sickness of the individual living in society. If *illness* arises from any maladjustment of the individual's relationships, then it is a province of medical study.

Lastly although medicine must have a basis in the study of "the common man," such sociological study will not be promoted by the mere assertion, in ex-cathedra statements, of the effect of the welfare State.

London, W.1. HUGH GAINSBOROUGH.

SIR,—I was greatly interested in Dr. Gooddy's article. Many points stimulate thought and I should like to take one or two for comment.

In the Services in the forward areas the psychiatrist was the man to whom the commanding officer and the medical officer "passed the buck." They knew the man was no good to them, and the easiest way to get rid of him was to get him removed from the unit or from the Service on psychiatric grounds. The psychiatrist pronounced the necessary incantation and absolved them of responsibility for throwing a man out. As Dr. Gooddy says, this is not possible in peace-time, though some attempt it. In the Army or out of it one is constantly coming across the remark "the psychiatrist said" delivered in a tone which brooks no argument. The witch-doctor has spoken; the patient has an alibi for his failure successfully to tackle the problems of life.

The problem of giving advice without a bottle of medicine is a difficult one, especially when livelihood depends upon keeping patients. In essence there is little difference between the African native who goes to his weirdly dressed witch-doctor and comes away with a snakeskin or other charm, and the patient who goes to his doctor's consulting-room and emerges triumphantly with a medicine bottle of value equivalent to coloured water. Advice is good, perhaps, but a bottle of medicine is something one can see and taste, a charm, and represents value for money in the eyes of the patient.

An important aspect, which Dr. Gooddy does not mention, is the social significance of doctors' certificates. I am engaged in industrial medicine and see large numbers of patients who return to work armed with doctors' certificates. A significant proportion of these people are of the type discussed in Dr. Gooddy's excellent paper, and I am impressed with the faith they have in the certificates and the way they use them to justify their absence and ailments.

I have spent quite a lot of time explaining to some of these people that certificates are in many cases no proof of illness and in that respect are not worth the paper they are written on. It is explained to them that the certificate is a sign of the doctor's acceptance of their word that they have a pain in the head or the back, which in their (the patients') opinion is sufficient to prevent work. It is a paper provided by the doctor to enable them to justify their absence to the employers, or to qualify for sick benefit. I do this not to undermine confidence in their doctor but to try and persuade them to face their mental and social problems. Sometimes I have apparent success. I appreciate the value of a bottle of medicine as a vehicle to facilitate the acceptance of good advice; but how often is this expediency justified?

Often I am glad that as an industrial physician I cannot prescribe drugs, because I am spared the temptation to take the easy way out, and that having a salary I can speak with that little extra freedom which fear of financial loss might constrain. The process of learning is endless, but I still think the advice of Lord Horder to the medical students of Westminster is most apt: "Un peu de savoir, assez de faire savoir, et beaucoup de savoir faire." In the breadth of medical practice few things seem more important than human understanding.

The practice of medicine is becoming an important political issue, and the social significance of symptoms requires deep thought.

Stoke Park, Slough, Bucks. M. E. M. HERFORD.

SIR,—Dr. Gooddy deserves praise for ably drawing attention to one of the major problems in medical practice, although one may disagree with his conclusions.

For the most part he has discussed the symptoms of a single syndrome, which is perhaps the commonest for which adults seek medical advice. It has many names—Da Costa's syndrome, anxiety state, nervous dyspepsia—and in our opinion it can be recognised by its own characteristic features, without endless special investigations to exclude other conditions, and can be successfully treated in general practice.

A general practitioner is economically dependent on the good will of his patients. The "altercations and scenes" which he risks by an honest approach are not the only cause of his reticence. He may lose the patient and his family and friends, and their capitation fees. Moreover, a practitioner with a full list seldom has the time to educate the patient to understand the cause of his trouble. Instead he gives a tonic or other placebo.

The customary attitude of "disbelief in any symptoms . . . not . . . primarily due to a disease process" is no solution, and is in part responsible for the patient's feeling of frustration and injustice. It is right, after arming oneself with the authority of a full history and physical examination, to explain to the patient that there is no organic disease causing his symptoms; but the next step is to explain dogmatically the relationship between his symptoms and his emotional state. Treatment is started by an inquiry into the social factors causing his emotional disturbance. This approach gains the patient's confidence because the doctor accepts and explains his symptoms instead of denying their existence. Contrary to Dr. Gooddy's advice, we must be prepared to take a positive attitude to the social problems responsible for our patients' illness.

The patient whose symptoms are not due to "structural disease or a psychopathological process" is a malingerer, and in our experience is seldom encountered and is easily dealt with.

It is true that we cannot make our patients all "clean, rich, educated at a public school"; even if we could do so, we could not promise immunity to this syndrome. But we can take part in the fight against such social evils as bad housing and schooling, economic insecurity, and preparations for a third world war. If we are not prepared to do so we must accept the medical problems which they create.

L. M. FRANKLIN
St. Paul's Cray, Kent. J. D. PAULETT.

THE FUTURE OF COMMUNITY CARE

SIR,—Your leading article of Feb. 4 was most encouraging to the workers of a voluntary body such as ours concerned with the community care of the mentally handicapped. These patients present a peculiar problem to the medical and lay public. There is still a great deal of fear and superstition attached to the idea of mental illness of the psychotic type. The minor mental maladies, the psychoneuroses, are looked upon by many with contempt, as indicating "poor moral fibre," and as not requiring skilled care and attention.

The alarm caused by the onset of an acute psychiatric condition results in the speedy removal of the sufferer to a mental hospital. That many people prefer to push the whole problem of the patient and his illness to the back of the mind is shown by the fact that some of the mentally handicapped under hospital care are rarely visited by their relatives. Indeed, many doctors betray a similar lack of understanding of mental illness, and a desire to avoid handling it and to shift the responsibility elsewhere. As long as acute mental ill health is looked upon as an unpredicted volcanic eruption for which nothing can be done beforehand, and which is due to genetic and constitutional causes not amenable to prophylactic measures, so long will mental health be little regarded in the health services.

True, predisposition plays a large part in the onset of these illnesses; but work in recent years has demonstrated that the factors precipitating breakdown can be minimised by a favourable environment.

A parallel can be found in the excellent work of the National Association for the Prevention of Tuberculosis. In the very early days "galloping consumption" was looked upon with fear and superstitious horror as the "white man's disease." The measures for prevention were little understood until Sir Robert Philip made the community tuberculosis-conscious. The aftercare and following up of these cases has since advanced greatly; and under the Factories Acts prophylactic hygienic measures pay good dividends, while mass miniature radiography is increasing the number of cases diagnosed early.

This is the sort of approach that we feel the mental-health services could adopt. Early detection of the strains and stresses provoking psychiatric breakdown is essential. The strains and stresses may be modified; or if that is not wise or possible, the attitude of the potential patient to them could be changed, and his resisting power increased by an understanding of his modes of reaction. Mental hygiene depends so much on knowledge, which gives insight, and hence power to behave differently.

This seems to me to be eminently the job of the medical officer of health. He has unlimited powers under section 28 of the National Health Service Act of 1946, which provides for community care of a preventive and educative kind, as well as for rehabilitation and resettlement after clinic or hospital treatment. The volume of demand for treatment of psychiatric conditions grows, and there never will be enough trained personnel to cope with therapy. We have to tackle the problem at the stage of early signs and symptoms and develop a preventive and prophylactic service which will diminish the stream of sufferers crowding the psychiatric units. These diseases form from a quarter to a third of all illnesses.

This association is arranging short courses on public mental health designed to interest those concerned with social medicine.

National Association for Mental Health. **ALFRED TORRIE**
Medical Director.

HIRSCHSPRUNG'S DISEASE

SIR,—In your issue of Jan. 7 Bodian, Stephens, and Ward published a second communication on the clinical and histological findings in Hirschsprung's disease. Their main contribution to the understanding of the clinical picture and pathology of this condition has been the demonstration of a distal narrow segment of the large intestine, which is characterised histologically by the absence of intramural ganglion cells, and the presence of abnormal nerve-bundles in the customary sites of the intramural plexuses.

In 1945 [1] we described a condition in the large bowel in cases of generalised scleroderma with histological changes identical with those found by Bodian and his co-workers in Hirschsprung's disease. Our cases showed narrowing of part of the transverse, descending, and sigmoid colon, the narrowed parts being hard and fibrous; and a number of sacculi were seen. Above and below, the colon became abruptly dilated and the wall was very thin and atrophic.

Histological examination of the narrowed portions was reported on as follows:

> "The most striking feature of a section through the narrowed part of the transverse colon is the size of the organ. It is barely larger than a normal, fair-sized, appendix. The lumen is almost completely occluded. . . . As can be seen even on such a small enlargement, the myenteric plexus is very prominent and is characterised by a conspicuous absence of ganglion cells. In many sections we find the whole plexus surrounded by a dense fibrous capsule."

In scleroderma, cardiospasm is a common complicating feature; and in the histological examination which we were able to carry out and described in the paper mentioned above, we found that the myenteric plexus becomes extremely prominent and in one patient formed "a proper neuromatous proliferation." This reminds one very much of the description given by Bodian and his co-workers for Hirschsprung's disease.

At the time we felt that the absence of ganglion cells and the fibrosis of the myenteric plexus suggested that "the motor activity of the bowel was interfered with by some intrinsic nervous disorder brought about by the involvement of the intramural neuro-muscular apparatus."

It is of interest that in two so apparently different conditions as Hirschsprung's disease and scleroderma narrowing of portions of the large bowel is found, and that in both instances these areas of the bowel prove to be characterised by an absence of ganglion cells from the intramural plexuses.

Department of Surgical Research, University of Cape Town. **R. H. GOETZ.**

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1. Goetz, R. H. *Clin. Proc.* 1945, 4, 337.

FILARIA AND LOEFFLER'S SYNDROME

SIR,—Dr. Malhotra's case-histories (Jan. 28) were significant as the association of bronchitis and eosinophilia with filariasis has not previously been described in India. This association has, however, been described in the West Indies [1] and in the East Indies.[2] One feature which distinguishes Dr. Malhotra's cases is the finding of microfilariæ in the blood. Cases in the West and East Indies were all negative in this respect, the diagnosis being made from lymph-gland biopsies.

I have been investigating cases of so-called tropical eosinophilia in Vellore, South India, and I could find no evidence that filariasis played any part in that region. Night-blood examined for microfilariæ by a concentration method [3] in 15 cases was negative. I found that 63 of a series of 100 cases had enlarged lymph-glands, and performed 7 biopsies where these were particularly prominent. Serial sections revealed no microfilariæ.

These cases of Dr. Malhotra's show that filariasis should be added to what seems to be a growing list of the pulmonary lesions which can cause eosinophilia. Apley and Grant [4] enumerate bronchial asthma, pulmonary amœbiasis, ascariasis, periarteritis nodosa, Loeffler's syndrome, tropical eosinophilia, fascioliasis, and possibly acariasis. Willett and Oppenheim [5] add to these trichinosis, pulmonary brucellosis, ancylostomiasis, strongyloidiasis, and, from their own experience, pulmonary coccidiomycosis. Even this is not complete as one must add pulmonary schistosomiasis.[6] Though pulmonary infiltration and eosinophilia can occur in both sarcoidosis [7] and Hodgkin's disease, they do not appear to be associated in the same patients.

London, N.3. **J. DONALD BALL.**

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6. Erfan, M. *Trans. R. Soc. trop. Med. Hyg.* 1945, 42, 109. Weinberg, H. B., Tillinghast, A. J. *Amer. J. trop. Med.* 1946, 26, 801.
7. McCort, J. J., Wood, R. H., Hamilton, J. B., Erlich, D. E. *Arch. intern Med.* 1947, 80, 293.

FLATULENCE IN INFANCY

SIR,—I read with interest Dr. Tanner's letter of Feb. 4. Extension of the infant's neck while swallowing seems to be a vital factor in avoiding flatulence. For some years now I have advised mothers to hold their baby upright when feeding from either the breast or bottle. When breast-feeding, the mother can relax against pillows or chair-back and hold the baby's body upright in a very comfortable position for both. The baby does not swallow so much air, and the mother's back is rested instead of being strained as it is in the forward position usually adopted.

When the baby has to be "walked" at night, I suggest that he is held in a vertical position over the shoulder of the walker. Wind comes up easily, and the baby can drop off to sleep again with his head on the napkin previously placed to protect the male dressing-gown shoulder!

London, E.11. MARY BELTON.

DECAMETHONIUM IODIDE

SIR,—Dr. Gray's article in your issue of Feb. 11 calls for comment.

The use of any of the group of muscle-paralysing drugs in anæsthesia implies diminution of respiratory movement. It has been claimed for each new drug of this class that respiratory depression is minimal; but it follows that any drug which produces relaxation of the abdominal muscles by blocking motor impulses must inevitably have the same action on the muscles of respiration. Decamethonium iodide, used in dosage to produce adequate abdominal relaxation for surgery, causes diminution of respiratory movement in all cases and complete cessation of respiration in most. This is, however, no disadvantage, since it enables the technique of controlled respiration to be performed with ease.

Dr. Gray states that "assisted respiration" was necessary for the first few minutes in his cases. The performance of assisted respiration for a patient who retains some respiratory movement is most difficult and depends on the exact synchronisation of the inspiratory impulse with the patient's own inspiratory effort. If synchronisation is not perfect, the respiratory exchange will be even poorer than if no assistance were given. Controlled respiration, on the other hand, is without the complication of the patient's own respiratory effort.

The "element of insufflation" which Dr. Gray introduces, by means of screwing down the expiratory valve of the anæsthetic machine, would seem to me to be useless without full movement of the chest and therefore full respiratory exchange.

Neither assisted nor controlled respiration should be employed without ensuring some means of carbon-dioxide excretion. In the present state of our knowledge, this can only be done by means of carbon-dioxide absorption. The management of nitrous oxide and oxygen anæsthesia in a closed circuit presents problems, because of the difficulty of maintaining a steady percentage of oxygen; but this can be accomplished by leaving the expiratory valve slightly open and by using a greater volume of anæsthetic gases.

Failure to ensure an adequate respiratory exchange or to use carbon-dioxide absorption may lead to delayed recovery in one of two ways: firstly, it will lead to suboxygenation, which will give rise to relative cerebral anoxia; secondly, an increase in alveolar carbon dioxide will result in a raising of the threshold of stimulation of the respiratory centre, which, in turn, will lead to prolonged apnœa when the anæsthetic is discontinued and alveolar carbon dioxide is blown off.

As to the case reported by Dr. Gray, that of a stout woman who was kept in the Trendelenburg position presumably for the greater part of the duration of the operation (1 hr 25 min.), it is obvious that to produce an adequate respiratory exchange is no easy matter, whatever the anæsthetic used; adequate controlled respiration undoubtedly offers the best means. At the end of the operation, says Dr. Gray, the respiration was "slow, shallow, and jerky, being chiefly intercostal rather than diaphragmatic." This is not the picture of respiratory paralysis caused by the muscle-paralysing drugs, nor, indeed, of that produced by the deeper planes of anæsthesia with the ordinary inhalational agents, where the sequence of events is always that the intercostal muscles are paralysed before the diaphragm and function returns to the diaphragm before the intercostal muscles. The further progress of this patient can be ascribed, as I am sure Dr. Gray would agree, to the use of pentamethonium iodide.

Dr. Gray has discarded decamethonium iodide because of this case and others of a similar nature, all of which, presumably, had reacted favourably to the test dose used; also he considers that no satisfactory antidote exists. He has reverted to the use of *d*-tubocurarine chloride. It is, I think, as well to remember that neostigmine is not a direct pharmacological antidote to *d*-tubocurarine chloride and that the only real antidote to muscular respiratory paralysis is artificial respiration.

I have used decamethonium iodide routinely in a comparable series of abdominal cases, taking care to ensure adequate respiratory exchange, and have not encountered the phenomena described by Dr. Gray. I feel that it is a most useful drug which, owing to its rapid and complete excretion, has many advantages over *d*-tubocurarine chloride, particularly in the shorter surgical procedures.

Pinner, Middlesex. T. B. L. ROBERTS.

AUREOMYCIN IN STEVENS-JOHNSON SYNDROME

SIR,—Having read Dr. Church's account (Feb. 11, p. 281) of a case of Stevens-Johnson syndrome treated with 'Aureomycin,' I would like to record the following case where the response to treatment was equally dramatic.

A man, aged 21 years, was admitted to this hospital on Jan. 6, under the care of Dr. Ivan H. McCaw. On admission he was suffering from severe acute stomatitis with submucosal bleeding ulcers of the entire mouth and gums, and extending to the throat and nasopharynx. He was unable to swallow or speak properly, was in great pain, and for several days had been without food. Associated with this was mild conjunctivitis and urethritis, both of which the patient stated had been more severe before admission. On the limbs only there were several bullous erythematous lesions. The temperature was 100°F. The appearances were typical of Stevens-Johnson syndrome.

On examination no abnormality was noted in the cardiovascular, respiratory, gastro-intestinal, or central nervous systems. The blood-pressure was 120/75 mm. Hg. Dark-ground illumination of a smear from the mouth was negative for Vincent's organisms. The urine contained no albumin, and culture was sterile; microscopic examination of a urethral smear showed pus and epithelial cells. Examination of peripheral blood and blood-culture revealed no abnormality.

Before admission to hospital the patient had received six injections of penicillin, and on admission he was given penicillin 500,000 units daily, ascorbic acid 100 mg. thrice daily, and antiseptic mouthwashes. This treatment was continued for three days with no improvement, the temperature remaining 100°F and the mucosal lesions continuing to cause severe distress.

On Jan. 9 aureomycin—1 g. 6-hourly—was commenced. Within twelve hours the temperature became normal and it remained so. The following day the mouth showed definite clinical improvement; and two days later, since he was now quite well, aureomycin therapy was discontinued. On Jan. 16 the patient was discharged.

Royal Victoria Hospital,
Belfast. MARGARET A. LYNAS.

TUBERCULOSIS

SIR,—The recent correspondence in the *Times* has focused attention on undergraduate education in tuberculosis. To many engaged in the specialty this has long been a matter of serious concern. It has been pointed out, for instance, that the average time elapsing between a patient consulting his doctor and reference to a chest clinic is over three months.[1] Only too often the patient himself makes the diagnosis after medical advice has failed to satisfy him.

It is not suggested that the standard of undergraduate teaching is solely responsible for this failure to appreciate significant clinical facts. Clearly, however, the time has come for every teaching hospital to re-examine its programme of instruction in tuberculosis in the light of present realities. Even those hospitals which already have special provision in this respect should ask themselves if more can be done. Tuberculosis is still taking a tremendous toll of lives (over 400 a week in England and Wales alone) and workers in this field are in sore need of help in a form which the teaching hospitals alone can provide—namely, the well-equipped graduate who knows the basic facts about tuberculosis and can apply them, whatever field of medical work he may enter.

It is unfortunately true that too many students reach the stage of qualification with a sketchy and functionally inept knowledge of the subject. Moreover, they have the impression that this is a matter of little consequence; that tuberculosis is manifestly dull and uninteresting; and that for the most part it will be of little importance to them in the future. That keen young minds should consistently arrive at conclusions so much at variance with fact is little short of tragic. Where, indeed, is the balance we are given to understand exists in the system of teaching? Nurses, not unnaturally, derive from their training an impression of tuberculosis similar to that of young medical graduates, and this warping influence is an obvious handicap to recruitment in chest hospitals and sanatoria.

The blight extends much further. Regional boards are frequently guilty of according tuberculosis the lowest priority in spite of abundant evidence of need; and any legislative action is undertaken tardily, grudgingly, and with no pulse of urgency behind it.

The effect of reorientation of outlook at the teaching level would be of incalculable benefit—its revitalising influence would be felt immediately in every quarter. Students should learn not only the essential clinical, social, and preventive aspects of tuberculosis but also how to use the organisation for dealing with it; and they should be given a balanced appreciation of the significance of the disease in relation to other causes of illness. This correction of perspective can only come about if every teaching hospital possesses its own tuberculosis unit and if the students are taught in the chest clinic as well as at the bedside. Much more use could also be made of the opportunities afforded by tuberculosis in its many organic forms for integrating knowledge of separate systems; and study of the disease also enables the complementary claims of clinical and environmental medicine to be placed in their proper relationship.

Tuberculosis offers a variety of interest and challenge that will more than satisfy the most lively intelligence. It is no longer a single or isolated specialty but requires the integrated efforts of physician, surgeon, anæsthetist, radiologist, pathologist, biochemist, laboratory research-worker, statistician, sociologist, and many others. The sustained inflow of keen, intelligent, and interested minds into all these professional channels is another vital necessity.

The World Health Organisation has accorded tuberculosis major priority in its list of problems demanding immediate urgent action. While it is true that certain commendable steps have been taken in teaching hospitals to improve the standard of education in this subject, can it really be that in the present grim emergency nothing more can be done?

Claro Hall Hospital,
South Mimms.

NORMAN MACDONALD.

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[1] Stradling, P. *Brit. med. J.* 1948, ii, 832.

SIR,—I regret that I may have conveyed a false impression by including a particular example of the tuberculosis bed situation in my letter last week.

The board of governors to whom I referred have extensive medical educational commitments which already impose a severe strain on their accommodation. The medical school concerned took the forward step some years ago of accommodating the borough tuberculosis dispensary in order to ensure the availability of a clinic for postgraduate teaching in tuberculosis. Beds available to them in other hospitals at that time have been lost through the rearrangement of hospitals since the appointed day. Active negotiations are now being undertaken to correct the deficiency by arrangement with the regional board. I deeply regret any embarrassment to the authorities concerned which may have been caused by my letter.

Hammersmith Chest Clinic,
Hammersmith Hospital,
London, W.12.

PETER STRADLING
Chest Physician.

KIDNEY EXPOSURE THROUGH THE TWELTH RIB

SIR,—Mr. Sames is to be thanked for calling attention last week to the use of an incision through the bed of the twelfth rib for exposure of the kidney. I can corroborate all that he says about the advantages of this exposure, which I have used, almost continuously, for twenty years. No other incision gives as good an exposure of the renal pedicle; and I have, for this reason, found it particularly useful when denervating the kidney.

The only disadvantage of this incision is the risk of opening the pleura. The pleura comes down to the twelfth rib only over its inner part, as Mr. Sames shows in fig. 2 of his paper; and for this reason the periosteum of the rib bed should be incised at its outer part, for then there is no risk of injury to the pleura. The incision can then be carried backwards by gently separating the fibres with the fingers. In this way the pleura is pushed to one side and the risk of injuring it is minimised.

Liverpool.

J. B. OLDHAM.

SIR,—As one grows older, one appreciates the saying that there is no new thing under the sun. Just as Hey Groves had devised and practised the radical operation for cancer of the stomach in 1910,[1] so Deanesly, of Wolverhampton, was approaching the kidney through the bed of the twelfth rib for ten years before he published the method in 1911.[2]

Northampton.

C. C. HOLMAN.

SIR,—The benefit of the incision advocated by Mr. Sames for exposing the kidney was brought home to me sixteen years ago, when I first used it in performing an adrenalectomy. I have used it on occasion since, though not as a routine. The removal of the last rib, by extending the field, reduces the depth at which one appears to be working, at the same time affording protection to important structures such as the pleura and 11th and 12th dorsal nerves. My small experience supports Mr. Sames in his contention that the advantages of this approach as compared with the *classical* are such that it deserves wider recognition.

St. Andrew's Hospital,
London, E.3.

J. R. M. WHIGHAM.

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[1] Groves, E. W. H. *Brit. med. J.* 1910, i, 366.

[2] Deanesly, E. *Ibid*, 1911, i, 1011.

THE FORGOTTEN SWAB

SIR,—In connection with your excellent leading article last week, I am writing to ask if you know of any hospitals in this country that are fortunate enough to be able to obtain a type of swab, manufactured in the U.S.A., that has a fine metal thread incorporated in the material. We managed to obtain samples of these swabs from Illinois and New Jersey, and have tried them in the pathological department, where they have been found to be satisfactorily visible with X rays. I have made many inquiries among manufacturers in this country, and am told that the supplies of gauze do not warrant the production of these swabs in this country. We have approached the Ministry of Health and have been told that they anticipate difficulty in getting any firm to adopt the manufacture, as it would not be an economical proposition for the weavers.

If these swabs could be obtained they would be an additional protection for the patient, but they would not of course exonerate the theatre team from taking the usual careful precautions enumerated in your article.

It seems a very great pity that the manufacturers in this country cannot divert some of the existing gauze already made into theatre swabs to make the particular type described above. It is quite obvious that by making these, the number of swabs and the amount of cotton gauze would in no way be increased. This problem is of such vital importance to the patient and also to the surgeons and the theatre staffs that I would be most grateful for any help you could give us.

The London Hospital, E.1.
CLARE ALEXANDER
Matron.

TREATMENT OF WOUNDED IN MALAYA

SIR,—Dr. Binning, in his letter which appeared in your issue of Dec. 31, expressed concern lest the lessons of medical tactics learnt in the war of 1939–45 might be in danger of being forgotten. In particular he feared that early surgical treatment was not being afforded to those who were wounded in the operations against the bandits in Malaya.

I should like to reassure Dr. Binning that the valuable medical lessons of the last war are not forgotten, and the experience gained in the campaigns in Burma forms the basis on which our present medical tactical doctrine in Malaya is founded.

The War Office, London, S.W.1.
N. CANTLIE
Director-General Army
Medical Services.

RUPTURE OF EXTENSOR TENDONS OF THE KNEE

SIR,—It is interesting to observe how frequently the principles of mechanics are ill understood or wrongly applied in medical literature. One recent example is in the explanation proffered by Mr. Fowler and Mr. Mitchell (Feb. 4) of the forces underlying rupture of the extensor tendon of the knee-joint.

They reproduce the old story that the factor which alters the mechanical disadvantage of the extensor tendon is a shifting fulcrum on the patella. But by far the most important factor, as I have shown,[1] is the distance of the patellar tendon from the axis of rotation of the knee-joint. In addition, they make the curious claim that the distribution of the forces is reversed according as the tibia or the femur is free to move. They deduce that when the foot is off the ground the force of the quadriceps acts to much better advantage in the extended than in the flexed position of the knee, but that if the tibia is fixed the reverse is the case. This is the sort of argument that has been advanced in many reports on the action of muscles, and it is at variance with the principles of mechanics. In actual fact the mechanical disadvantage of the quadriceps action on the knee is less in the extended than in the flexed position, irrespective of whether or not the tibia is fixed or movable; and the reason is that the patella in the extended knee is riding on the anterior surface of the femur and is holding the patellar tendon further from the axis of rotation.

As regards the cases to which Fowler and Mitchell refer, it does not appear justifiable to go further than to say that the whole extensor apparatus was subject to a sudden strain and rupture took place at the weakest point in each case.

Rationalisation is a good thing in so far as it clarifies and aids understanding, but it must be accurate and should not be taken too far.

Manchester.
H. A. HAXTON.

SERUM-AMYLASE

SIR,—The annotation on the significance of raised serum-amylase readings in your issue of Feb. 11, conveys the impression that Musgrove,[1] of the Mayo Clinic, is the first to describe its occurrence in free perforations of gastroduodenal lesions. I should like to point out that Hughes [2] read a paper on this interesting side-effect to the Royal Society of Medicine in 1942, the only difference in his approach being in the use of the urine as the medium of study. My own paper on the serum-amylase and serum-lipase changes in a series of 30 cases of perforated peptic ulcer was published in this journal last year.[3] To Musgrove, however, must go the credit for the supposition that the alterations in the blood-levels are due to absorption of the pancreatico-duodenal juices lying free in the peritoneal cavity. In the other reference in your annotation, Pemberton, Grindlay, and Bollman,[4] also of the Mayo Clinic, are quoted as having confirmed the absorptive theory by experiments carried out on dogs.

I subscribed to the view that peritonitis leading to some derangement of pancreatic function might be the explanation; and it is to be noted that the three cases with abnormal amylase values cited by Musgrove had generalised peritonitis. It so happens, however, that I too gave serious consideration to, and carried out some experiments to substantiate, the absorptive theory. Whether or not it was due to the existence of incalculable variables one cannot say, but the results turned out to be meaningless and were therefore discarded. Moreover, I considered that the inclusion of doubtful data would only detract from the point of my article, which was in the nature of a warning to surgeons who are apt to place too much reliance on a biochemical diagnosis. Now that this problem is beginning to arouse some attention, this work may be worth publishing even if only to show how difficult is the clinical approach to it. This I hope to do in the near future.

Western Infirmary, Glasgow.
HENRY WAPSHAW.

SIR,—We were most interested in your annotation of Feb. 11, and felt that the following case was of interest in this connection:

A man, aged 32, was admitted to this hospital, under the care of Mr. J. H. Conyers, on Feb. 12, 1949, with violent epigastric pain of $1^{1}/_{2}$ hours' duration. The pain was constant, went through to the back, and made him sit up and lean forward to obtain partial relief. One hour after the onset of the pain he began to vomit repeatedly; the vomitus consisted of clear fluid and a little sediment. For a few weeks before admission he had had a constant ache in the right iliac fossa.

On examination he was in obvious pain and slightly shocked. He vomited every few minutes and sat upright with the hands

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1. *Surg. Gynec. Obstet.* 1945, 80, 389.

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1. Musgrove, J. E. *Proc. Mayo Clin.* 1950, 25, 8.
2. Hughes, E. B. *Proc. R. Soc. Med.* 1942, 35, 339.
3. Pemberton, A. H., Grindlay, J. H., Bollman, J. L. *Proc. Mayo Clin.* 1950, 25, 5.
4. Wapshaw, H. *Lancet*, 1949, ii, 414.

clasped across the abdomen. Movement appeared to cause no pain and there was no sign of jaundice. The blood-pressure was 134/64 mm. Hg, the pulse-rate 60 per min., and the temperature 97°F. The abdomen moved well but there was tenderness over the whole of the upper abdomen; peristaltic sounds were absent. X-ray examination of the abdomen showed no evidence of free gas in the peritoneal cavity.

A diagnosis of acute pancreatitis was made, and this was strengthened by the finding, eight hours after the onset of the pain, of a urinary diastatic index of over 200 units. This test was carried out with fresh solution and adequate controls.

Conservative treatment was instituted and carried on until Feb. 17, when recurrence of vomiting with a rising pulse-rate and abdominal distension led to the decision to perform laparotomy. Free fluid was present in the abdominal cavity, and 2 ft. of the terminal ileum were found to be the site of regional ileitis. Resection of the affected gut was carried out and the patient made a good recovery. Histological examination of the excised intestine confirmed the diagnosis of Crohn's disease.

It is interesting to speculate on the cause of the high urinary diastatic index in this case. It is known that after total removal of the pancreas, the blood and urine amylase levels soon return to normal and that most of the dietary carbohydrate can be digested in such circumstances.[1] We feel that it is possible that the cells of the ileum may contain amylase, which is liberated as a result of the hyperæmia due to inflammatory lesions, and thus cause elevation of blood and urine diastase levels in cases such as the one we have described. We should be interested to know if any of your readers have had a similar experience with inflammatory conditions of the small intestine.

We wish to thank Mr. J. H. Conyers for permission to report this case.

P. R. R. CLARKE
Surgical Registrar.
J. H. BLACKBURN
Biochemist.
County Hospital, York.

THE WRONG DRUG

SIR,—In the letter of Feb. 11 from Dr. Cid dos Santos, which records death following instillation of a solution of cocaine into the urethra, no mention is made of possible methods of treatment. In an accident of this sort it would, I think, be worth trying the intravenous exhibition of a soluble barbiturate to control convulsions caused by the local anæsthetic.

London, W.1. HUGH DUNLOP.

EFFECT OF DEOXYCORTONE ACETATE AND ASCORBIC ACID ON CIRCULATING EOSINOPHILS AND LYMPHOCYTES

SIR,—In view of the recent correspondence on the use of the above drugs in rheumatoid arthritis, we investigated the changes in peripheral eosinophils and lymphocytes in four patients in the fasting state over periods of $5^1/_2$ hours; two patients were suffering from rheumatoid arthritis, and two had a peripheral eosinophilia.

Peripheral-blood examinations were made following the injection of deoxycortone acetate and ascorbic acid in the dosage recommended by Lewin and Wassén[2]; and as a control, these were repeated a few days later under fasting conditions over a similar $5^1/_2$-hour period not preceded by any injection. In no case did the drugs have a significant effect on the peripheral eosinophil or lymphocyte level. These findings would seem to be consistent with Le Vay and Loxton's[3] view that these drugs act, not through the production of 'Cortisone,' but by a peripheral mechanism.

E. K. BLACKBURN
J. B. BURKE.
Sheffield.

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[1] Everett, M. R. Medical Biochemistry. New York, 1946; p. 162.

[2] Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.

[3] Le Vay, D., Loxton, G. E. *Ibid*, Feb. 4, p. 209.

THE CHEST PHYSICIAN

SIR,—Chest physicians throughout the country share the concern expressed by Dr. Toussaint in your issue of Feb. 11. The Ministry's attitude was made clear at a meeting of treasurers of regional hospital boards held at the Ministry of Health on Nov. 2, 1949. Boards were advised that

> "the proper course to adopt was for the Tb. Officers to have separate part-time contracts: (*a*) with the Regional Hospital Board, and (*b*) with the Local Authority. For this purpose, where the two part-time contracts together were intended to amount to full-time employment it was necessary for the Regional Hospital Board and the Local Authority to agree as to the proportion of the services of the Officer which each employing body required. As Regional Hospital Boards had no power to employ staff to carry out L.H.A. duties, it was not a proper arrangement for the Regional Hospital Board to enter into a full-time contract with the Officer under which he would be paid by the Regional Hospital Board the full-time salary at the rate specified in document enclosed with R.H.B. (49) 85 and for the Local Authority to pay to the Regional Hospital Board an amount for the time given by the Officer to the Local Authority service *calculated at the lower rate of salary at present payable by the Local Authorities to such Officers.* If the combined duties of the Tuberculosis Officer add up to full-time employment, the Officer was not entitled to the weighting factor applicable to part-time employment. The weighting factor would only apply where the combined duties amounted to part-time employment only."

The following resolutions have been accepted by the tuberculosis group committee of the British Medical Association and by the Central Consultants' and Specialists' Committee:

1. That a practitioner engaged predominantly in work for a regional hospital board and also giving part of his time to work for a local authority should be employed under one contract by the authority in whose duties he is predominantly engaged. The authority for which the smaller proportion of work is done should reimburse the employing authority and not the individual officer. Where the rate of repayment is higher than that received by the officer under his employing authority, a corresponding addition should be made to his salary.
2. That work carried out by a chest physician on behalf of a local authority is consultant and advisory in character and is indivisible from his clinical work. The physician is able to do this work only by virtue of his skill and experience. Such work should be remunerated at a rate not less than the physician's appropriate rate according to the terms and conditions of service of hospital medical staff.
3. That practitioners in the specialty of chest disease should have the same freedom of choice between full-time and part-time employment as practitioners in other specialties, and that all superannuation rights should be safeguarded where a practitioner excercises the choice to transfer from full-time to part-time duties.
4. That it is contrary to the terms of service for a regional board to offer a whole-time contract for part-time duties, and that the terms of service do not give the regional board power to stipulate or determine the manner in which a part-time officer shall spend that part of his time not governed by his contract with the board.

It is clear that the employment of chest physicians is governed by the terms and conditions for hospital medical and dental staff and that the Ministry cannot legally depart from those terms and conditions except by prior mutual agreement or through the operation of Whitley machinery. Whether "Tb. Officers" still exist, or what are their conditions of service I do not know. Regional hospital boards must obey the Ministry's orders and will offer dual contracts. I suggest that chest physicians should regard the above resolutions as the only basis for negotiation.

Two points in Dr. Toussaint's letter call for further comment. My legal adviser tells me that the interim contracts now being offered, though unstamped, unwitclasped across the abdomen. Movement appeared to cause no pain and there was no sign of jaundice. The blood-pressure was 134/64 mm. Hg, the pulse-rate 60 per min., and the temperature 97°F. The abdomen moved well but there was tenderness over the whole of the upper abdomen; peristaltic sounds were absent. X-ray examination of the abdomen showed no evidence of free gas in the peritoneal cavity.

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Two points in Dr. Toussaint's letter call for further comment. My legal adviser tells me that the interim contracts now being offered, though unstamped, unwitnessed, and without date of expiry, are legally valid. Secondly, I think Dr. Toussaint does the local authorities an injustice in assuming that they have pulled the Ministerial strings. I have most reliable information that local authorities, together with the official organisations of medical officers of health, favour a single contract in the terms of resolution (1) above. In its proposals to the Joint Tuberculosis Council in 1946, the Ministry made clear its determination that the prevention of tuberculosis should be divorced from its clinical handling, and I drew attention to this in my letter to the *Times* of April 11, 1946.

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[1] Everett, M. R. Medical Biochemistry. New York, 1946; p. 162.
[2] Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.
[3] Le Vay, D., Loxton, G. E. *Ibid*, Feb. 4, p. 209.

Leeds Chest Clinic,
Leeds, 1.

FRANK RIDEHALGH
Consultant Chest Physician.

SIR,—Although I cannot be acquitted of having a personal, though small, axe to grind, I am not interested primarily in the subject of chest physicians' emoluments. Yet I believe that your annotation last week is sound sense and good doctrine, and will be acclaimed by chest physicians everywhere.

What I wish briefly to point out here—a consideration omitted from your annotation—is that by no means all of a chest physician's duties under section 28 of the N.H.S. Act are administrative and therefore worthy, presumptively, of an administrator's hire. As a minor illustration, two children with adult-type pulmonary tuberculosis were discovered recently in a large secondary school, having been referred originally to the chest clinic for diagnosis by their family doctors. The physician is now faced with the duty of visiting that school twice or oftener, and (*a*) tuberculin-testing, (*b*) clinically examining, (*c*) and X-raying and interpreting the chest films of, 50–60 adolescents (their parents having consented) and as many teachers as will volunteer for examination. Is that administrative work? And yet does it not fall to the chest physician's lot under section 28 (prevention, care, and aftercare)? You assert that "the Act leaves the responsibility for organising and conducting this section of the service with the local health authority." But, as in the above and similar instances, will the "conducting" not be, in practice, the responsibility of the chest-clinic staff?

Non-pulmonary tubercle continues to be notified, and cases of it referred to us. On receipt or intimation of notifications, the chest physician has an obligation to see those patients at his clinic or (if they are unable to attend) to visit them in their own homes, as, so far as I am aware, the old regulations covering his duties in this respect have not been rescinded or replaced by anything that is in the N.H.S. Act. Here, patients are still being referred to the chest clinic for diagnosis of swollen glands, abdomens, and joints, chronic diarrhœa, skin conditions, and chest-wall abscesses. I assume that when we take the necessary action on receipt of a non-pulmonary notification from the M.O.H.'s department, we are doing so under section 28—"care." These duties involve clinical decisions, confirmation, and sometimes reversal of the notified opinion, assessment of the case, and finally its disposal for purposes of treatment. Follow-up supervision of non-pulmonary cases must continue to be carried out for 3 years following quiescence of the disease. Such supervision is mainly clinical, and if we now stop this medical "care" work I do not know who will undertake the responsibility, or for how long.

Many other aspects of work and duties implicit in section 28 and coming under the heading "prevention, care, and aftercare," will fall to be done by former tuberculosis officers. Some of that work is non-administrative and can only be carried out by doctors, who have experience in tuberculosis. I would mention only two—rehabilitation and medical supervision of workers in Remploy factories, and B.C.G. vaccination.

I concur with the sentiments of your anonymous correspondent last week (p. 327). The bias of the health service is heavily on the side of treatment. In tuberculosis and other chronic diseases, "patching up" would often be a more accurate expression. If specialist advice and action on prevention is to be available, and if the chest physician is to leave his office and sanatorium or hospital ward and sally into the field, not only with his A.P. apparatus but with mobile X-ray unit and tuberculin, then he should be rewarded for this side of his work no less than for the clinical.

It used to be said, and wisely, that a tuberculosis officer's main job was not to treat tuberculosis but to prevent it. Sickness costs the nation 7% of its total annual income, but the prevention of disease is only $4^1/_2$% of the cost of sickness. I would wager that, in 1939–45, the nation expended more on the prevention of malaria, seasickness, and mustard-gas burns among her Armed Forces and population than the total expenditure incurred in tuberculosis prevention since 1921 when the tuberculosis service was set up. The salaries of those engaged in it will only form a small part of the total costs of prevention.

In the past, we have paid too often mere lip-service to prevention of tuberculosis. Let us see to it that we do not risk, by cheese-paring methods, a continuation of the same attitude towards the prevention of a disease that is the most clamant public-health problem of modern times in this country.

Tuberculosis Dispensary,
100, Coltman Street, Hull.

R. HARDY.

DIPHTHERIA IMMUNISATION

SIR,—There is much to be said for Dr. Bousfield's views (Feb. 11, p. 279) on the usefulness of the Schick test, and I think that our differences in the matter can be explained by one sentence in his letter: "in such an investigation as they have just described, blood-antitoxin titrations are essential if the fundamental facts are to be understood."

The Schick test is the only tool at our disposal for any large-scale investigation of the state of immunity of the population, whether the purpose be to obtain general information or to judge the efficiency of immunisation procedures. The conclusions to be drawn from the results are, however, very limited, and it is therefore highly desirable to obtain more detailed information by means of tests on blood-samples from small groups. Unless this is done, the fundamental facts are not really known and some wrong impressions may be registered. From the results of titration of blood-samples, a scheme can be drawn up as to how soon after immunisation routine Schick-testing would give information of value.

Dr. Bousfield believes that the Schick-negative state several months after inoculation can be accepted as the criterion of satisfactory basal immunity. This may be so, although in my experience a person giving a low-grade intermediate response may possess an antitoxic titre of 0·004 unit per ml. as long as nine months after the last injection of prophylactic. However, is satisfactory basal immunity all that is required at the present time? Some years ago, when the population received "natural boosting doses" from subclinical infections, good basal immunity probably was all that was necessary; but we cannot be sure that this is so today, when the incidence of diphtheria has become negligible and natural boosting doses almost non-existent. In a well-immunised population before the decline in the disease, the bulk of antitoxic values were very probably distributed around 0·2 unit per ml. and remained fairly steady, so that the great majority of Schick-negative subjects had titres far above the Schick level. In some work on young adults in which I am now collaborating with Dr. A. C. Cunliffe, and which we hope to publish very shortly, there are indications that this state of affairs does not prevail today. For this reason, not only sound basal immunity but antitoxic values far above the Schick level must be aimed at in the immunisation of young children, if the need for numerous boosting doses is to be avoided.

Any conclusions about the suitability of the Schick-negative state as a criterion for safety against clinical diphtheria can only have been drawn in the past, when there were epidemics; then the antitoxic values of the population were receiving intermittent boosts and were actually considerably above the Schick level. The fate, on exposure to infection, of people with antitoxic values only just above the Schick level is not known; but the high incidence of diphtheria among adults in epidemics in the occupied countries during the war, suggests that their antitoxic values had fallen in the absence of recent natural stimulation, and consequently they were inadequately protected by the basal immunity conferred by immunisation in childhood. It should be our aim to act on this experience, and attempt to immunise young children in such a way that reasonably good antitoxic titres are maintained into adult life.

Dr. Bousfield has done much valuable work with the aid of the Schick test, but I am convinced that a higher standard than the Schick-negative state is now required.

Finally, I hope that Dr. Bousfield was referring to boosting doses when he mentioned single-injection prophylaxis. Both the antitoxic response and the duration of antitoxic immunity increase with the number of injections given, and in these days when "natural boosts" are almost negligible, these factors are of the utmost importance.

The Wellcome Physiological Research
Laboratories, Langley Court,
Beckenham, Kent.

MOLLIE BARR.

ON WASHING THE DISHES

SIR,—Your timely annotation last week is of considerable interest not only to dermatologists but also to industrial medical officers. There has been a noticeable increase in dermatitis among housewives, particularly of dermatitis caused by alkalis and detergents. On the other hand, I find that in the factories under my supervision there has been no increase in dermatitis among workers exposed to steam (as in plating-shops), and among canteen workers and others whose occupation necessitates the hands being in water for long periods or their using solvents or detergents which are soluble in water. Rubber gloves have never been considered satisfactory, particularly where instruments have to be handled or where the rubber marks glassware. The use of barrier creams is enforced throughout this organisation, but it must be emphasised that a variety of barrier creams are used, each covering specific risks against acids, alkalis, and organic materials. Education of the workers in the correct method of use is essential.

The hands should, I suggest, be treated late at night with an emollient cream. I have found that treating the hands after exposure to the risk is not a very satisfactory procedure. It is better to rely upon prevention with a barrier cream, and to see that it is regularly used through supervision by nurses and factory personnel.

It seems to me that to expect a woman to confine her domestic activities, even for a while, to the less hazardous job of drying is almost impossible in most households.

A. C. Cossor Ltd.,
Highbury Grove, London, N.5.

L. B. BOURNE
Senior Medical Officer.

SIR,—I wonder how many of your readers would confess, like me, that they do not use any "detergent" for washing up? Plain hot water and a mop on a stick comprise the outfit.

Hove, Sussex.

G. M. WAUCHOPE.

Notes and News

MEDICAL POSTS IN SYRIA

THE medical faculty of the Syrian University, Damascus, is seeking British candidates for the vacant posts of assistant professor of anæsthetics, anatomy, physiology, biochemistry, and histology and pathology. The faculty has been considerably developed since the war in the face of serious difficulties, chiefly lack of accommodation and equipment. Much progress has been made in the last four years; new premises have been taken over and much new equipment has been bought from Britain, France, and the U.S.A. The teaching staff includes eleven Syrian professors, under the head of the faculty. There is at present no British professorial staff, but there are a British matron and three British nursing sisters at the teaching hospital. Courses in pharmacy (five years) and dentistry (four years) are run in addition to the six-year courses of medical studies. There are 450–500 students.

Teaching facilities, at present limited, are constantly being expanded, and lecturers engaged from abroad are given considerable scope to choose and buy necessary equipment. The faculty buildings include laboratories of histology and pathological anatomy, physiology, biology (animal and vegetable), medical and general chemistry, and bacteriology; a theatre of anatomy and dissection; and a medicolegal institute. Great efforts are being made by the Syrian authorities to ensure that medical teaching is of the highest quality and to raise the standard of the health service. These posts are an important element in their programme, and the British doctors appointed to them will, therefore, be able to make a real contribution to the welfare of the country.

Inquiries about terms of engagement and living conditions should be addressed to the Middle East Secretariat, Foreign Office, London, S.W.1, who will be glad to see anyone requiring further information about these posts.

FOR RELATIVES OF THE MENTALLY ILL

MENTAL breakdown in a member of a family is a bewildering and terrible experience for the relatives. Many of them know nothing about modern forms of treatment, or the régime of care and reablement now established in all good mental hospitals. Crichton Royal, Dumfries, has just published a short clear guide for patients' relatives and friends, explaining that a patient may need to be admitted to hospital in order to protect him from disturbing circumstances (among which must be classed familiar surroundings), and to protect him from suicidal impulses. Relatives are advised to let patients settle down before coming to visit them, but are told that after that visits are welcome and helpful in most cases, and that patients may send and receive letters freely unless the relatives or doctor think it unwise. The brochure explains how the psychiatrist assesses the illness (by physical examination, laboratory investigations, and history-taking); how the patient will spend his days, and how occupation, recreation, relaxation, and possibly hydrotherapy can help him; what amenities in the way of games, excursions, library, and entertainment are offered; and what religious services are held. Special treatments, such as psychotherapy, insulin treatment, electrical convulsive treatment, prolonged narcosis, and prefrontal leucotomy, are briefly and fairly described, and there are reassuring final paragraphs on convalescence and the return home.

Without raising any false hopes this little guide gives an encouraging and truthful picture of modern mental-hospital care, and should help to allay the anxiety and distress which relatives inevitably suffer. The idea might well be adopted by all mental hospitals.

WHITAKER 1950

THE serious student of any recent epoch of English social life always turns to *Punch* for the subjective flavour of his period. For its objective background he could have no better reference book than the appropriate volumes of Whitaker, and the 1950 almanack[1] continues to reflect faithfully the variety and limitations of our national life. On its hospitable pages you will find the orders of chivalry and the Olympic records, the friendly societies and the learned societies, the stellar system and the metric system. This comprehensiveness sometimes makes strange page-mates; for instance, under the longest bridges stand the seven cardinal virtues and the seven mortal sins, while seasonable and unseasonable fish adjoin the compound-interest tables. But it is very nearly impossible to fail to find the information you want, somewhere in Whitaker, and it is quite impossible to dip into it anywhere without finding something of interest.

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[1] Whitaker, 13, Bedford Square, London, W.C.1. 1950. Pp. 1126. 12*s.* 6*d.*

KIND KILLING

A LEAFLET to guide those who have to destroy animals without expert help has been compiled on behalf of the Universities Federation for Animal Welfare.[1] The leaflet contains clear instructions for dealing with domestic and other animals, fish, and birds.

University of Cambridge

On Feb. 10 the degrees of M.B., B.CHIR. were conferred by proxy on K. P. Abel and I. F. Bishop.

University of Leeds

On Feb. 17 Sir Alexander Fleming, F.R.S., was presented with a Wood gold medal, which under the terms of the will of Mr. Hoffman Wood, a Leeds architect, was awarded for "the most successful discovery for the relief of human pain and suffering."

University of Sheffield

Lord Boyd-Orr, F.R.S., will deliver the fourth Basil Hicks lecture on Friday, Nov. 10.

Dr. E. W. Clarke has been appointed assistant lecturer in physiology, Dr. F. N. Ghadially assistant lecturer in pathology, and Dr. R. A. Trevethick honorary lecturer in industrial medicine.

Royal College of Surgeons of England

On March 22, 1800, King George III granted a charter to the "Royal College of Surgeons in London"; and at the Buckston Browne dinner on Feb. 15, Sir Cecil Wakeley, president of the college, said that this year there would be various celebrations to mark the 150th anniversary. Sir Cecil began his report on the activities of the last twelve months by referring to Lord Nuffield's gift of £250,000 which is to be used for the construction of the Nuffield College of Surgical Sciences. This gift, he said, was a fitting climax to the eight years' wonderful work by his predecessor, Lord Webb-Johnson. Plans for the new college and for reconstructing the existing college were now far advanced. There was a tremendous demand for the facilities offered by the college; and during the past year some sixty to seventy thousand pounds had been spent on teaching and research. Fees charged to students could not cover the cost: and it should be possible for the college to obtain a grant. In welcoming the guests, Sir Harry Platt spoke with regret of Sir Wilson Jameson's retirement from the post of chief medical officer at the Ministry of Health: "If he is to cultivate his garden and to reduce his handicap at golf, somebody must see to it that it is only at the weekends." In replying, Sir Wilson surveyed his years at the Ministry, contrasting the conditions in war and in peace. During the war the Emergency Medical Service ("the exact make-up of which no-one really understood") worked because people were determined to make it work. With the return of peace, life became more complicated: action gave way to discussion, and the atmosphere became tinged with politics. At the moment things were easier: there was no Parliament; "I've hardly got a Minister"; and even the British Medical Association was in a resting phase with its secretary away electioneering. Air Marshal P. C. Livingston, who also spoke for the guests, mentioned the prevailing difficulty of filling civil appointments abroad. Often the salaries offered were good, and undoubtedly the filling of such appointments with British doctors would be a good advertisement for this country; yet, because the appointments were for limited periods and loss of status on return to this country was feared, candidates were few. The toast of The College was proposed by General Sir Bernard Paget, a grandson of Sir James Paget, president of the college in 1875. As a soldier, Sir Bernard attributed the reduced mortality from wounds in the late war partly to improved tactics and training; but medicine had played a great part. "I do not think there is any other field of human activity in which more beneficent progress is being made."

Faculty of Homœopathy

On Thursday, March 2, at 5 P.M., at the Royal London Homœopathic Hospital, Mr. C. Naunton Morgan will give an address on Rectal Surgery.

University College Hospital Medical School

Prof. F. G. Young, F.R.S., will deliver the Sydney Ringer lecture at the school, University Street, London, W.C.1, on Thursday, March 16, at 4.30 P.M. He is to speak on the Experimental Approach to the Problem of Diabetes Mellitus.

Empire Rheumatism Council

Lord Webb-Johnson has been elected a vice-president of the council in place of the late Sir Henry McMahon. He has also accepted the position of vice-chairman of council in place of Sir Walter Kinnear, who has resigned on grounds of health.

British Health Resorts Association

A meeting of this association will be held today, Friday, Feb. 24, at 4 P.M., at 11, Chandos Street, London, W.1.

Royal Statistical Society

The council of this society are offering the Frances Wood prize (value £30) for the best investigation, on statistical lines, of any problem bearing directly or indirectly upon the economic or social conditions of the people. Competitors must be under 30 on Jan. 1, 1950. Further information may be had from the honorary secretaries of the society, 4, Portugal Street, London, W.C.2.

International Conference on Pneumoconiosis

The following have been nominated by the Government to attend a conference of experts on pneumoconiosis, arranged by the International Labour Office, which is being held at Sydney, New South Wales, from Feb. 28 to March 11, 1950: Dr. E. R. A. Merewether, H.M. senior medical inspector of factories; Dr. J. C. McVittie, member of the Swansea pneumoconiosis medical board; Dr. C. M. Fletcher, director of the Pneumoconiosis Research Unit, Cardiff; and Mr. E. A. Shearing, assistant secretary, Ministry of Fuel and Power.

Hunterian Society

At this society's annual dinner in London on Feb. 16, Dr. W. Thomson Brown, the president, reported that the society, founded 26 years after John Hunter's death, was flourishing and increasing in numbers. Its members included the shy and the bold, the young and the old, general practitioners and consultants who derived pleasure and profit from meeting. The whole value of these meetings was often not immediately apparent; for it might not be until the next morning that the apt criticism or the new idea came to mind. The presidents, each of whom served for one year, were chosen in turn from surgeons, physicians, and general practitioners; and as a general practitioner, absorbed and isolated in his practice, Dr. Thomson Brown testified to the society's value in enabling him to lift his eyes and contemplate larger fields. The president was replying to the toast of The Society, proposed by the Bishop of London, who had spoken of the growing unison, in these days of psychotherapy, between clergyman and doctor. The value of the society, in his eyes, was that it promoted free discussion and encouraged those who spoke to improve their style. (This, he added in parenthesis, would have appealed to John Hunter, who, it seemed, could hardly read or write at the age of 21.) The medical profession had included many distinguished men of letters; prominent among these were Henry Vaughan (1622–1695), the poet, and Sir Thomas Browne (1605–1682), author of *Religio Medici*, in his opinion the best prose book of all time. Toasting the Lord Mayor and Corporation of the City of London, Mr. A. E. Roche referred to the society's close ties with the city. Sir Cecil Wakeley and Mr. C. R. Havers, K.C., replied for the guests to a toast proposed by Mr. J. C. Ainsworth-Davies. Sir Cecil praised the society's habit of meeting for dinner before its discussions; for this not only promoted good fellowship but fitted the fellows for the discussion which followed. Sir Cecil went on to say that whichever political party gained power, there would soon be placed on the statute-book a law by which young doctors would have to serve one year in a hospital before they were registered. The wisdom of this measure he did not dispute; but where, he asked, were these doctors to be accommodated?

The society's gold medal was presented to Dr. S. M. Rivlin for his essay on the Treatment of Varicose Veins and their Complications.

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[1] Kind Killing. Compiled by F. Jean Vinter, technical secretary of UFAW. Obtainable from UFAW, 284, Regent's Park Road, London, N.3. Pp. 12. 3d.

and which we hope to publish very shortly, there are indications that this state of affairs does not prevail today. For this reason, not only sound basal immunity but antitoxic values far above the Schick level must be aimed at in the immunisation of young children, if the need for numerous boosting doses is to be avoided.

Any conclusions about the suitability of the Schick-negative state as a criterion for safety against clinical diphtheria can only have been drawn in the past, when there were epidemics; then the antitoxic values of the population were receiving intermittent boosts and were actually considerably above the Schick level. The fate, on exposure to infection, of people with antitoxic values only just above the Schick level is not known; but the high incidence of diphtheria among adults in epidemics in the occupied countries during the war, suggests that their antitoxic values had fallen in the absence of recent natural stimulation, and consequently they were inadequately protected by the basal immunity conferred by immunisation in childhood. It should be our aim to act on this experience, and attempt to immunise young children in such a way that reasonably good antitoxic titres are maintained into adult life.

Dr. Bousfield has done much valuable work with the aid of the Schick test, but I am convinced that a higher standard than the Schick-negative state is now required.

Finally, I hope that Dr. Bousfield was referring to boosting doses when he mentioned single-injection prophylaxis. Both the antitoxic response and the duration of antitoxic immunity increase with the number of injections given, and in these days when "natural boosts" are almost negligible, these factors are of the utmost importance.

The Wellcome Physiological Research
Laboratories, Langley Court,
Beckenham, Kent.

MOLLIE BARR.

ON WASHING THE DISHES

SIR,—Your timely annotation last week is of considerable interest not only to dermatologists but also to industrial medical officers. There has been a noticeable increase in dermatitis among housewives, particularly of dermatitis caused by alkalis and detergents. On the other hand, I find that in the factories under my supervision there has been no increase in dermatitis among workers exposed to steam (as in plating-shops), and among canteen workers and others whose occupation necessitates the hands being in water for long periods or their using solvents or detergents which are soluble in water. Rubber gloves have never been considered satisfactory, particularly where instruments have to be handled or where the rubber marks glassware. The use of barrier creams is enforced throughout this organisation, but it must be emphasised that a variety of barrier creams are used, each covering specific risks against acids, alkalis, and organic materials. Education of the workers in the correct method of use is essential.

The hands should, I suggest, be treated late at night with an emollient cream. I have found that treating the hands after exposure to the risk is not a very satisfactory procedure. It is better to rely upon prevention with a barrier cream, and to see that it is regularly used through supervision by nurses and factory personnel.

It seems to me that to expect a woman to confine her domestic activities, even for a while, to the less hazardous job of drying is almost impossible in most households.

A. C. Cossor Ltd.,
Highbury Grove, London, N.5.

L. B. BOURNE
Senior Medical Officer.

SIR,—I wonder how many of your readers would confess, like me, that they do not use any "detergent" for washing up? Plain hot water and a mop on a stick comprise the outfit.

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[1] Whitaker, 13, Bedford Square, London, W.C.1. 1950. Pp. 1126. *12s. 6d.*

BLOOD pH AND BLOOD-FLOW DURING MUSCULAR ACTIVITY*

KLOTHILDE GOLLWITZER-MEIER
M.D. Munich
PROFESSOR OF PATHOLOGICAL PHYSIOLOGY IN THE UNIVERSITY OF HAMBURG

IN spite of the numerous experiments made on isolated frog-muscle preparations to study the relation between the chemical changes of muscular contraction and their mechanical effects, many problems remain unsolved. In fact, the problems have become more complicated from year to year, and it might appear doubtful whether experiments on a more elaborate preparation, such as the mammalian skeletal muscle in situ, would be more suitable for studying this intricate relationship. Nevertheless, attempts of this kind have been made again and again because such experiments offer certain advantages. It is possible to examine the blood flowing to and from the muscle. Further, the muscle remains under the influence of all the nervous, hormonal, and respiratory changes which occur in the animal and by affecting the vascular reactions in the muscle, adjust its blood-supply to its metabolic requirements.

There is one important problem which can be studied under these conditions only and has never been satisfactorily settled—i.e., the relation between blood pH and the blood-flow in an active muscle. Our experiments are concerned with this question and the results show conclusively that the blood pH is not the sole or even the main factor responsible for the vascular reactions occurring in a muscle in situ during and after muscular activity.

Our experiments were made on the dog's gastrocnemius muscle in situ with its normal circulation intact, but with every branch of the femoral artery and vein not going to, or coming from, the gastrocnemius carefully tied so that the blood in the femoral vein could be regarded as coming from the gastrocnemius only. The dogs were anæsthetised with chloralose and heparinised. The peripheral end of the cut sciatic nerve was stimulated electrically with alternating current from a Philips "Schwebungs-Oscillator" with a phase frequency of 100 hertz per sec. Submaximal contractions were obtained with a current intensity of 0·5–1 mA.

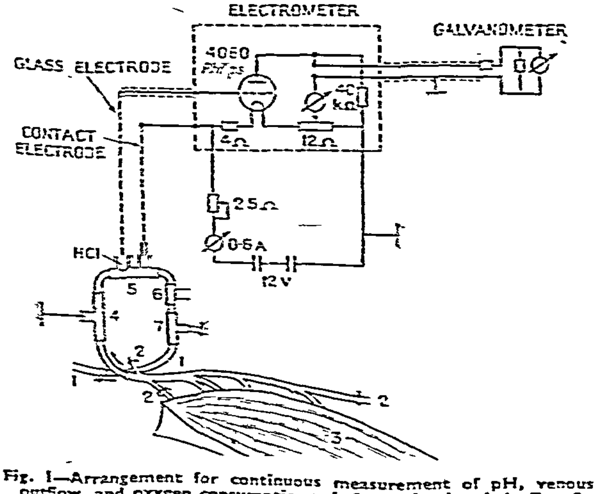

Fig. 1—Arrangement for continuous measurement of pH, venous outflow, and oxygen consumption: 1, femoral vein, tied off at 2; 3, gastrocnemius muscle; 4, earthed brass tube; 5, glass electrode; 6, oxygen cell; 7, hot-wire arrangement.

Two different groups of experiments were performed. In the first group the nerve was stimulated for a single period of 2–60 sec. to produce a single tetanic contraction. In the second group the nerve was stimulated every other second for 3–8 minutes to produce a series of rhythmic tetanic contractions. The results of the two groups of experiments will be discussed separately.

METHOD FOR CONTINUOUS MEASUREMENT OF BLOOD pH IN THE LIVING ANIMAL

The experiments required continuous measurements of the blood pH in the living animal. The general arrangement and the special features of the method used can be seen from fig. 1. The pH had to be taken outside the animal body. For this purpose a short loop consisting of glass, brass, and rubber parts was inserted into the two ends of the divided femoral vein. The blood pH was taken from the inside of this loop with a glass electrode connected to a valve electrometer and registered with a Rubstrat-Göttingen galvanometer. The blood had to be earthed before entering the part of the loop containing the glass electrode; this was accomplished by letting the blood pass through an earthed brass tube 5 cm. long. The electrometer and the connections to the galvanometer also had to be earthed. The electrometer was shielded by being installed in an earthed metal box. The connections between the glass electrode and the electrometer were metal wires supported by insulating amber inside an earthed metal tube or high-frequency cable. The MacInnes glass electrodes were manufactured by our glass blower and made from special Jena glass (Schott & Gen. 4073/III). The electrode was filled with N/10 HCl, and contact was made through a calomel electrode. The speed of the response of the whole measurement was 2–3 sec. and the accuracy was ± 0·02 pH.

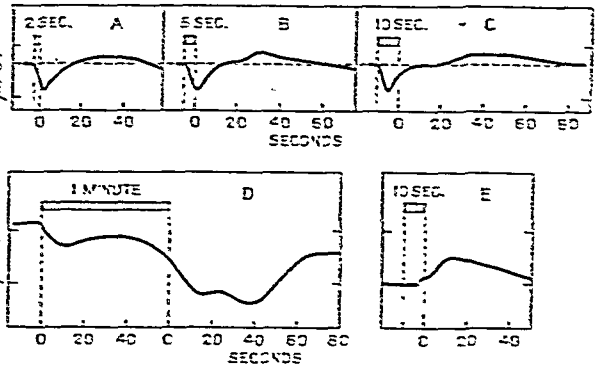

Fig. 2—Changes in pH of blood in femoral vein during and after tetanic contraction of gastrocnemius muscle lasting: (A) 2 sec., (B) 5 sec., (C) 10 sec., and (D) 60 sec. (E) muscle poisoned with mono-iodoacetic acid.

EFFECTS OF A SINGLE TETANIC CONTRACTION

Blood pH

The venous blood from the isotonically contracted gastrocnemius muscle showed three distinct changes in blood pH: (1) an initial short phase of acidity, followed by (2) a longer-lasting phase of alkalinity, and finally by (3) a protracted persistent phase of acidity. Results obtained with different periods of stimulation are shown in fig. 2.

With a contraction lasting 2 sec. (fig. 2A) the reaction shifts immediately towards the acid side, but the lowest point of acidity is reached a few seconds after the end of tetanus. The subsequent alkaline phase is faint and reaches its maximum 30 sec. after tetanus. The third phase is not distinct after such a brief contraction.

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* Lecture given at King's College, London, on May 18, 1949.

York Medical Society

At a meeting of this society to be held on March 4, Dr. C. W. Curtis-Bain will read a paper on Angina Pectoris. On March 18 Prof. Margaret Fairlie will speak on Hormones.

Number of Pharmacists

The number of pharmacists rose last year to 25,662, the largest number there has ever been. The increase of 214 was more than double that of 1948, and is the biggest increase since 1939.

South-Wales Medical Ex-Service Association

This association will hold their annual reunion dinner on Saturday, March 4, at the Park Hotel, Cardiff, at 7.45 P.M. Tickets (price 12*s.* 6*d.*) may be had from the hon. secretary, Mr. C. W. D. Lewis, surgical unit, Royal Infirmary, Cardiff.

Professor F. M. Burnet, F.R.S., director of the Walter and Eliza Hall Institute, who is visiting this country in the spring, will deliver the Croonian lecture for 1950 to the Royal Society on June 15.

Dr. Benjamin Viel, professor of hygiene and preventive medicine in the University of Chile, Santiago, is spending two months in this country under the auspices of the British Council to study the National Health Service in operation.

CORRIGENDUM : *Antigen-antibody Reactions.*—In this article by Dr. F. Stratton (Feb. 11, p. 247) the first sentence of the summary should read : "A method is described of using an anti-rabbit serum prepared in hens with sensitised sheep cells as an indicator to detect rabbit serum."

Diary of the Week

FEB. 26 TO MARCH 4

Monday, 27th

UNIVERSITY OF LONDON
5.30 P.M. (London School of Hygiene, Keppel Street, W.C.1.) Prof. J. W. Bigger : Synergism and Antagonism in Relation to Antibacterial Substances.
5.30 P.M. (University College, W.C.1.) Prof. Jerzy Neyman (University of California) : Statistical Problems Connected with Medical Diagnosis. (First of three lectures.)
MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Mr. A. Dickson Wright : Surgical Aspects of Hyperpiesia. (Second Lettsomian lecture.)
HUNTERIAN SOCIETY
8.30 P.M. (Mansion House, E.C.4.) Dr. D. T. Davies : John Hunter—the Man and his Message. (Hunterian oration.)

Tuesday, 28th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. E. M. Evans : Fractures of the Radius and Ulna. (Hunterian lecture.)
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. I. Muende : Fungus Diseases of the Skin.

Wednesday, 1st

INSTITUTE OF PSYCHIATRY
4.30 P.M. (Maudsley Hospital, S.E.5.) Dr. E. Stengel : Postgraduate lecture-demonstration.
MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
8.30 P.M. (Royal College of Surgeons, 18, Nicolson Street.) Dr. Douglas Nicholson : The Rheumatic Problem in Childhood.
UNIVERSITY OF GLASGOW
8 P.M. (Department of Ophthalmology.) Dr. D. Christison : *Prognosis in Iridocyclitis.*

Thursday, 2nd

ROYAL COLLEGE OF SURGEONS
5 P.M. Prof. B. Windeyer, Mr. C. P. Wilson : Treatment of Malignant Disease of the Paranasal. (Otolaryngology lecture.)
ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Anthony Feiling : Neurology lecture-demonstration.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. D. I. Williams : Exfoliative Dermatitis with Special Reference to BAL (dimercaprol).

Friday, 3rd

MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. Douglas McAlpine : Neurological demonstration.
ROYAL MEDICAL SOCIETY, 7, Melbourne Place, Edinburgh
8 P.M. Sir Edward Mellanby, F.R.S. : Widespread Nerve Degeneration Due to Abnormal Bone Growth.

Saturday, 4th

BRITISH ASSOCIATION OF PHYSICAL MEDICINE
10.30 A.M. (St. Margaret's School, Coombe Road, Croydon.) Dr. J. H. Crosland : Treatment of Cerebral Palsy.

Appointments

BLAIR, R. A., M.D. Lond., D.P.M. : consultant psychiatrist, Cane Hill Hospital, Coulsdon, Surrey.
BRUZAUD, J. D., M.R.C.S. : appointed factory doctor under the Factories Acts, Duffield district.
CAMPBELL, C. G. H., M.A., M.D. Camb., D.P.H. : senior asst., department of venereal diseases, London Hospital.
COCKREM, GWENDOLINE, M.R.C.S., M.R.C.O.G. : consultant obstetrician and gynæcologist, hospitals in Dewsbury, Batley, and Mirfield area.
FITTON, J. M., M.B. Leeds, F.R.C.S. : consultant orthopædic surgeon, hospitals in Dewsbury, Batley, and Mirfield area.
GALLAGHER, EVA, M.B. Lpool : senior asst, department of venereal diseases, London Hospital.
* GRAF, K. A., M.D. Vienna, D.P.M. : asst. psychiatrist, Brentwood Mental Hospital, Essex.
GROARKE, F. L., M.B. N.U.I., D.P.H., D.C.H. : M.O.H., Brightlingsea, Clacton, Frinton, Walton, and Tendring, and asst. county M.O.H., Essex.
HALL, R. A., M.B. Leeds, F.R.C.S. : consultant general surgeon, York A and Tadcaster hospital group.
HARRIS, C. R., M.B. Dubl., D.P.M. : consultant psychiatrist, Holloway Sanatorium, Virginia Water.
KIRMAN, B. H., M.D. Lond., D.P.M. : consultant psychiatrist, Fountain hospital group, Tooting, London.
MCINTYRE, W. M., M.D. Edin., M.R.C.P.E. : consultant psychiatrist, St. Ebba's Hospital, Epsom.
MCKIDDIE, J. M., M.B.E., M.B. Aberd., M.R.C.O.G. : consultant obstetrician and gynæcologist, hospitals in Wakefield A, Pontefract and Castleford, and Goole, Howden, and Selby areas
MADDEN, STEPHEN, M.B. Leeds, F.R.C.S.E., M.R.C.O.G. : consultant obstetrician and gynæcologist, hospitals in East Riding, Hull A, and Hull B areas.
MONTGOMERY, N. M., M.D. Glasg., D.P.M. : consultant psychiatrist, Storthes Hall Hospital, Kirkburton, Yorks.
NEUSTATTER, W. L., M.D., B.SC. Lond., M.R.C.P. : consultant psychiatrist, St. Ebba's Hospital, Epsom.
NUSSBAUM, ILSE, Staatsexamen Berlin, D.P.M. : consultant psychiatrist, Rainhill Hospital, Lancs.
O'MALLEY, A. G., M.CH.(ORTH.) Lpool, F.R.C.S.E. : consultant orthopædic surgeon, St. Helens Hospital, Lancs.
ROSS, THOMAS, M.B. Glasg., D.P.H. : M.O.H., Walsall.
RYAN, M. J., M.B. Dubl., D.C.H. : asst. county M.O.H., Essex.
STALKER, HARRY, M.D. Edin., F.R.C.P.E., DIPL.PSYCH. : consultant psychiatrist, Cane Hill Hospital, Coulsdon, Surrey.
WEST, H. F., M.D. Lond., M.R.C.P., D.T.M. : physician i/c. Sheffield Centre for Investigation and Treatment of Rheumatism.
WYATT, MABEL, M.D. Lond. : asst. county M.O.H., Essex.

* Amended notice.

Colonial Service :

CHARLES, L. J., M.B. Edin., D.T.M. & H. : chief officer, mosquito control service, British Guiana.
EDMUNDSON, KENNETH, M.B. Lpool : deputy director of medical services, Tanganyika.
GAULD, E. R., M.B. Aberd., M.R.C.P., D.T.M. & H. : physician specialist, Gold Coast.
GOODMAN, LEONARD, F.R.C.S. : gynæcologist, Gold Coast.
GRAHAM, J. L. T., L.R.C.P.I. : M.O., Nyasaland.
HASTINGS, J. M., B.M. *Oxfd* : M.O., British Honduras.
HURLEY, D. W. H. : M.B. N.U.I. : M.O., Kenya.
MAJEKODUNMI, M. A., M.A., M.D. Dubl., D.C.H. : specialist (gynæcology), Nigeria.
NAYLOR, E. G., M.B. St. And. : M.O., Northern Rhodesia.
ROBERTS, M. A. W., M.B. Dubl., F.R.C.S.I. : senior surgical specialist, Nyasaland.
SELBY, J. A. R., M.B. Edin., D.P.H. : senior social-hygiene officer, Hong-Kong.
SHEZLEY, RUPERT, M.D. Lond., D.T.M. & H. : specialist physician, superscale grade B, Federation of Malaya.
SOLTYSIK, ADAM, M.D. Lwow : temporary district M.O., St. Lucia, Windward Islands.
TIMMS, G. L., M.B. Lond. : asst. director of laboratory services, Kenya.
VILAIN, PHYLLIS, M.R.C.S. : M.O., grade B, Trinidad.
WILKINSON, P. B., M.B. Lond., M.R.C.P. : medical specialist, Hong-Kong.
WILSON, THOMAS, M.B. Belf., D.P.H., D.T.M. & H. : senior malaria-research officer, Federation of Malaya.

Births, Marriages, and Deaths

BIRTHS

BATES.—On Feb. 12, the wife of Dr. J. A. V. Bates—a son.
BICKFORD.—On Feb. 6, at West Kirby, Cheshire, the wife of Mr. B. J. Bickford, F.R.C.S.—a daughter.
CUTTING.—On Feb. 9, the wife of Dr. A. H. Cutting—a son.
D'ABREU.—On Feb. 16, in London, the wife of Mr. Frank D'Abreu, F.R.C.S.—a daughter.
FLEMING.—On Jan. 17, at Greenock, the wife of Dr. John Fleming—a daughter.
GORDON.—On Feb. 11, the wife of Dr. I. R. S. Gordon—*a daughter.*
GRIFFITHS.—On Feb. 7, to Dr. G. Audrey Griffiths (*née* Meigh), wife of Dr. A. L. Griffiths—a daughter.
SAMES.—On Feb. 13, the wife of Mr. C. P. Sames, F.R.C.S.—a daughter.

DEATHS

COLDSTREAM.—On Feb. 13, in London, George Probyn Coldstream, M.B. Edin., aged 79.
HELME.—On Feb. 15, Arthur Crofts De Beetham Helme, M.A., M.B. Camb., D.T.M. & H.
HENDERSON.—On Feb. 11, in London, Eleanor Maud Henderson, M.B. Aberd., D.P.H., aged 50.
WIGGIN.—On Feb. 17, at Torquay, Hugh Peter Victor Wiggin, M.R.C.S., aged 79.

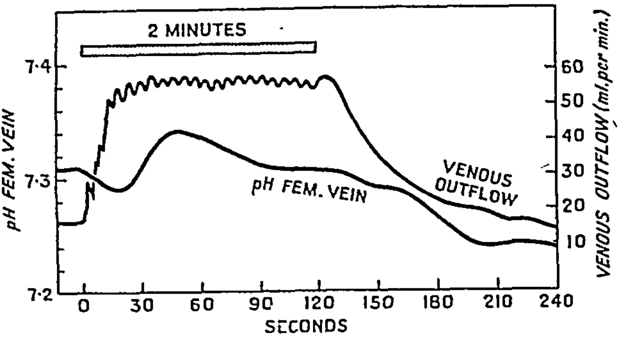

Fig. 5—Changes in blood pH and venous outflow from muscle during rhythmic tetanic contractions (3 min.)

phase and finally by an acid phase. A typical experiment is illustrated in fig. 5. The three phases were observed whether the period of rhythmic stimulation was short or long, but the phases varied in duration and intensity from experiment to experiment even if the duration of stimulation remained constant. Fig. 6 shows such variations in four different experiments, in each of which the duration of stimulation was 4 minutes.

Muscular fatigue prolongs the second alkaline phase and extinguishes the third but not the first acid phase. In fig. 7 the striking difference between a fresh and a partially fatigued muscle is seen in the same animal, in which simultaneously the nerve to the left gastrocnemius was stimulated for the first time and that for the right gastrocnemius for the fourth time. The alkaline phase is distinctly prolonged in the right partially fatigued muscle though the third acid phase is not yet abolished. Later in the same experiment, when the left gastrocnemius was stimulated for the fourth time there was the same change in blood pH as occurred before in the muscle on the right side, and this time the final acid phase was absent.

Blood-flow

Measurements of blood-flow during such series of short periods of tetanic stimulation show certain differences compared with the effects obtained with a single short tetanus. These differences result from the fact that the muscle is stimulated every other second only. A typical result is illustrated in fig. 5. The venous outflow increases and attains within the first 30 sec. a high plateau, which is maintained during the whole period of repeated stimulations. The initial rise does not proceed continuously but is interrupted by short periods of reduced outflow, and there are similar shallow waves during the whole time that the hyperæmia is maintained. These shallow waves represent effects of phases 1 and 2, described for the single tetanus—i.e., expulsion of blood at the beginning of each single 1-sec. tetanus and diminution of blood-flow by vasocompression from the contracting muscle. As will be seen, however, these waves are not synchronous with each 1-sec. tetanus in such a series. This is because, from the second or third tetanus onwards, phases 3 and 4 of the preceding, and phase 1 of the following, tetanus become superimposed.

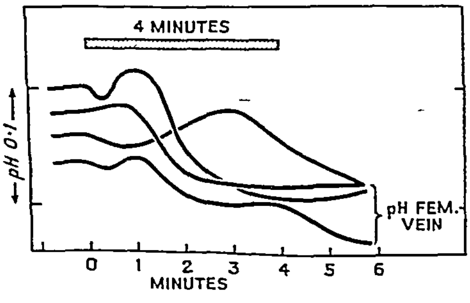

Fig. 6—Variations in blood pH, in different experiments, during 4 minutes' rhythmic tetanic contractions.

Though there are no indications of an insufficient blood-supply during such repeated tetanic stimulations, there is always a slight increase in blood-flow immediately afterwards, and for 5–10 sec. the flow is greater than the average flow measured during the period of stimulation. This indicates a short overshooting of the vasodilatation in the relaxed muscle. The blood-flow then decreases rapidly, and after a few minutes may be even less than it was before stimulation.

Consumption of Oxygen

The utilisation of oxygen increases only slightly in the muscle during rhythmic tetanic stimulations because of the continuous hyperæmia. The consumption of oxygen, however, increases rapidly and reaches a steady state after the first minute. A certain oxygen debt nevertheless accrues during the following minutes of stimulation even *if the muscle is not working too hard. This is evident* from the increased consumption of oxygen which persists for 1–4 minutes when stimulation has come to an end. In the fatigued muscle the consumption of oxygen during the repeated tetanic stimulations is less than in the fresh muscle. This corresponds to the reduced blood-supply of the tired muscle, and in our experiments was partly caused by the lowering of arterial blood-pressure which occurred in the course of the experiment.

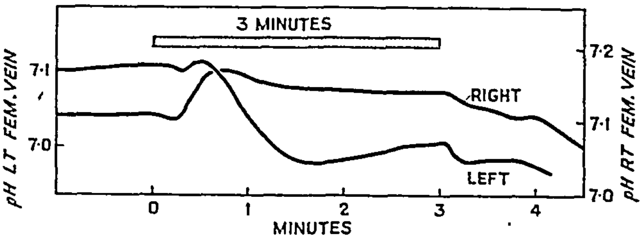

Fig. 7—Effect of fatigue on changes in pH of venous blood caused by 3 minutes' rhythmic tetanic contractions (right gastrocnemius fatigued, left fresh).

Lactic Acid

The concentration of lactic acid in the outflowing venous blood is of special interest. During a series of rhythmic tetanic stimulations the level rises from the beginning to the end of stimulation. The rise proceeds at first very quickly and continues later more slowly. At the end of the series of stimulations the concentration does not decrease immediately but for 3–5 minutes even surpasses the highest level reached during stimulation. It then declines and reaches its original level within 10–15 minutes.

From the arteriovenous difference in the concentration of lactic acid and from the blood-flow the amount of lactic acid passing from the active muscle into the blood has been calculated. The increase during a series of tetanic stimulations is considerable and in some experiments amounted to 30–40 mg. If the stimulation lasts longer than 2 minutes, the maximal output of lactic acid occurs during the period of stimulation; otherwise it is not reached until after the cessation of stimulation. The output of lactic acid then decreases again rapidly, and the blood-flow diminishes at the same time.

EXPERIMENTS ON RESTING MUSCLE

In the course of our experiments several factors were examined in resting muscle. Among these adrenaline, acetylcholine, oxygen lack, and passive stretching of the muscle deserve special mention.

With a contraction lasting 5–10 sec. (fig. 2B and C) the lowest point of acidity is reached during the period of tetanic contraction, but the second alkaline phase does not develop before the contraction is over. The third phase is not yet distinct.

With longer periods of stimulation the alkaline phase tends to fall more and more into the period of tetanic contraction. During a contraction lasting 60 sec. (fig. 2D) the first acid phase is over within 10 sec., and the whole alkaline phase falls in the period of tetanic contraction. It is followed by a pronounced third acid phase. Still longer periods of tetanus bring even this phase within the period of contraction.

These results show that the three phases are not related to the duration of a contraction, and that the effect is fundamentally the same in short and long periods of tetanus.

When a muscle becomes fatigued in the course of an experiment, the acidity of the third phase disappears; the change in the blood pH is then characterised by a fairly uniform and long-lasting alkalinity. Similarly, the third acid phase disappears when the muscle has been poisoned with mono-iodoacetic acid (fig. 2E). The final phase of acidity is also lacking when the muscle undergoes tetanic contractions in oxygen lack (fig. 3); the initial phase of acidity may still develop in this condition. The alkaline phase becomes more pronounced with each successive tetanus produced during oxygen lack.

Mention must be made of the changes in the utilisation and consumption of oxygen in the fatigued and in the non-fatigued muscle. The *utilisation of oxygen* is greatly increased in the non-fatigued muscle during tetanus and decreased afterwards. In the fatigued muscle in which the third phase of acidity is absent the exchange of oxygen is so slow that the utilisation of oxygen is hardly changed during the tetanic contraction. The consumption of oxygen in a non-fatigued muscle reaches a peak during, or shortly after, the tetanic contraction. For a short time afterwards the consumption of oxygen remains high, but it then falls rapidly to its previous level. This is completely different from the conditions in the fatigued muscle. Here there occurs only a slight and slow increase during the contraction and afterwards the consumption of oxygen falls even below its original value.

Venous Blood-flow

Changes in venous blood-flow have been measured with the hot-wire anemometer (Anrep and Downing 1926). This method has the advantage of registering very rapid changes. Four phases of muscular outflow could be distinguished during a single tetanic contraction (fig. 4): (1) at the beginning of tetanus there is an initial increase lasting 1–2 sec., caused by the expulsion of blood from the vascular bed of the muscle; (2) there follows a diminution in outflow lasting 5–8 sec. in which the blood-flow may stop completely, and which is due to vasocompression by the contracting muscle; (3) during prolonged tetanus there is an increase in blood-flow due to active local vasodilatation in the muscle which overcomes the compression of the intramuscular vessels (this hyperæmia lasts as long as the contraction and can be considerable, depending on a sufficient aortic pressure); and (4) starting at the beginning of relaxation and associated with it there is a short augmentation of blood-flow, followed by the prolonged hyperæmic after-effect, the duration of which varies greatly and during which the blood-flow is even a little greater than the maximal blood-flow during tetanus.

The second phase of diminution of outflow has been discussed by Anrep and von Saalfeld (1935) and Rein et al. (1935). The problem was taken up by Kramer and Quensel (1937), whose results are in full agreement with ours. With a short tetanus the decrease in outflow is certainly the most striking effect. The blood-flow may even stop. But during a more prolonged tetanus the active local vasodilatation will overcome the compression of the intramuscular vessels, as Rein *et al.* (1935) rightly concluded. According to Anrep and von Saalfeld (1935) such increases in blood-flow during prolonged tetanus are only possible if the muscle is partially *contracted*; the increase in blood-flow is thought to be restricted to the relaxed muscle-fibres. It is doubtful whether this view is correct. The increase in utilisation of oxygen, and particularly the fact that this increase remains fairly high in spite of the increased blood-flow, suggest that all the blood passing through the muscle comes into close contact with the places where the consumption of oxygen is increased.

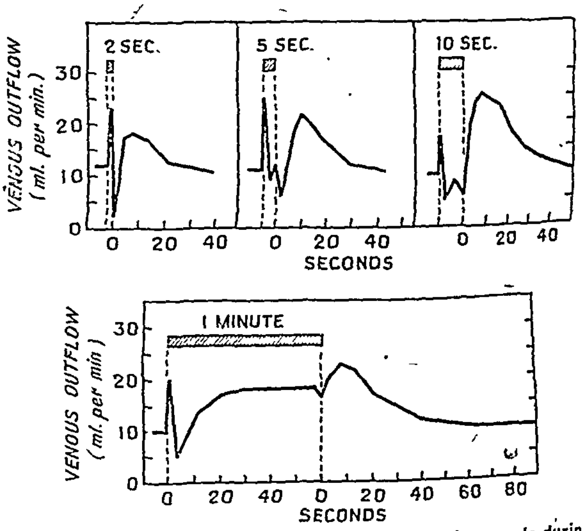

Fig. 4—Changes in venous outflow from gastrocnemius muscle during different periods of tetanic contractions.

There is thus an intense and active dilatation of the blood-vessels in a *contracting muscle* during prolonged tetanus. The mechanisms by which this *vasodilatation may* be brought about are discussed below.

EFFECTS OF STIMULATION FOR 1 SECOND REPEATED EVERY OTHER SECOND

Blood pH

A series of short tetanic *stimulations* produce essentially the same changes in the pH of the venous blood as have been described for a single short tetanus. There is again an initial phase of acidity followed by an alkaline

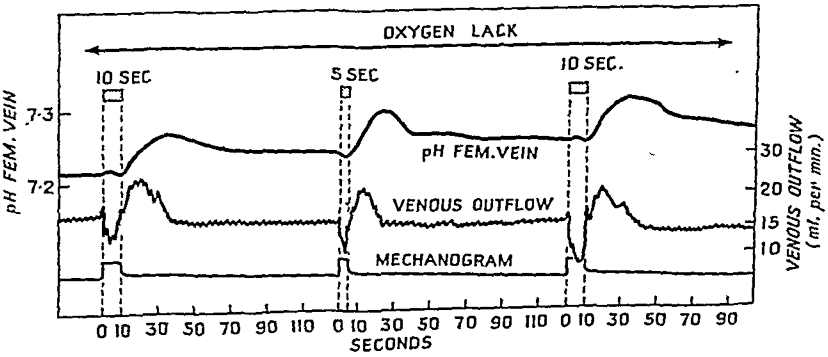

Fig. 3—Three periods of tetanic contraction (10 sec., 5 sec., and 10 sec.) during protracted oxygen lack, showing shifting of blood pH to alkaline side.

brought about in this way was at most about a tenth of that occurring during muscular activity. Clear-cut as these results were, they did not weaken the conception of the rôle of acid metabolites held by most physiologists. One reason was that in those experiments the increase in carbon dioxide and hydrogen concentration in the blood would naturally affect the arteries and arterioles first before reaching the capillaries. This criticism does not apply to our experiments, in which the change in blood pH was brought about by the muscular activity itself and would therefore directly affect the capillary lake.

We limit our discussion to the experiments in which the muscle was stimulated every other second, because in this condition there was no phase in which the blood-flow became severely restricted by vascular compression. If we consider the time relations between the changes in blood-flow and blood pH in these experiments, it becomes clear that the increased blood-flow, which starts simultaneously with the first contractions and is then maintained at a steady level while the contractions last, cannot be the outcome of the changes in blood pH. It is doubtful whether the initial acidity plays more than an insignificant rôle in the increased blood-flow, and the subsequent alkalinity can certainly be of no consequence in the adaptation of the blood circulation to the requirements of the working muscle. Since the nerves were cut and the muscle was stimulated indirectly, proprioceptive reflexes are naturally excluded in our experiments. There remain thus only the following three possibilities to explain the initial vasodilatation: the effect of vasodilator metabolites; the massaging effect of the contracting muscle; and the activation of axon reflexes. These three factors may naturally work in unison.

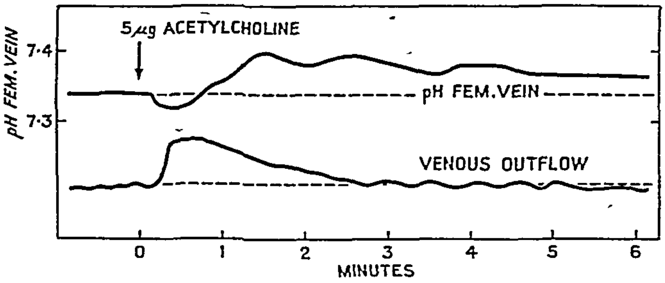

Fig. 10—Effect of injection of 5 µg. of acetylcholine into femoral artery on pH of venous blood and on venous outflow.

The third phase of the blood pH, that of persistent acidity, may well have to be considered as a contributory factor in maintaining the increased blood-flow in the muscle, but our results furnish no evidence to support this view. In most of our experiments we saw no sign of further vasodilatation when the blood pH shifted to the acid side; the blood-flow remained at its high steady level and apparently did not respond to the change in blood pH. Thus, so far at least, our experiments have unfortunately not provided any evidence which might strengthen the theory that acid metabolites play a part in the local adjustment of blood-flow.

We have also been unable to find that lactic acid exerts any specific influence. The increase in blood-flow which took place during the contractions preceded the rise in the lactic-acid concentration of the venous blood. Further, the lactic-acid level reached its peak some time after the cessation of stimulation, yet this did not produce any further increase in blood-flow. In a different way Domini and Rein (1943) have ascribed to lactic acid a specific effect on the blood-flow. They suggest that lactic acid acts locally by sensitising the blood-vessels to those physiological vasodilator stimuli which are responsible also for the regulation and adjustment of

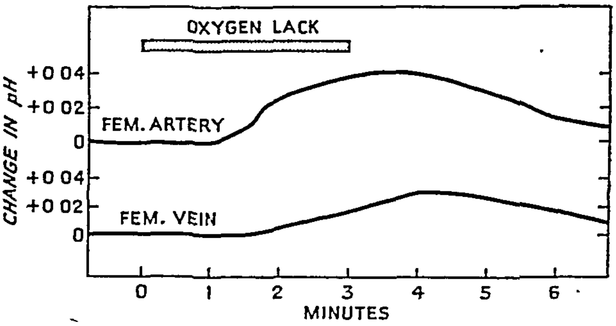

Fig. 11—Effect of oxygen lack in inspired air on pH changes in arterial and venous blood, showing maximal alkaline shift in pH of arterial blood of 0 04 and in venous blood of 0 03.

blood-flow in resting muscle. This hypothesis is of great interest and might possibly explain some of the phenomena of the adjustment of local blood-flow.

Of the known vasodilator substances, acetylcholine, adenosine triphosphate, and histamine have to be considered as being involved in the muscular vasodilatation. *Acetylcholine* may exert an important influence on the muscular blood-flow. When it is released at the motor end-plates its effect may not be limited to these structures; it may also locally dilate the muscle vessels. In our experiments on the dog's muscle acetylcholine may have been released from another source. Bülbring and Burn (1935) have shown that the vessels of the limb muscles in dogs are supplied by sympathetic cholinergic vasodilator fibres, and stimulation of these has not been excluded in our experiments. *Adenosine triphosphate*, the breakdown of which is regarded as the first chemical reaction in muscular contraction, has been considered by Fleisch as a possible vasodilator of the contracting muscle. Up to now, however, there has been no experimental evidence of an increased level of this substance in the venous blood leaving a muscle during or after contraction. Finally, there is *histamine*, the concentration of which has been shown by Anrep and Barsoum (1935) to be higher in the venous than in the arterial blood during muscular contractions. Such a finding suggests that the histamine released from working muscle has a function in the local regulation of blood-flow during muscular activity.

RELATION BETWEEN pH CHANGES IN BLOOD AND CHEMICAL PROCESSES DURING MUSCULAR CONTRACTION

This question cannot be dealt with without referring to the excellent studies of Dubuisson on the isolated frog muscle. The three phases in blood pH which were found in our experiments in the venous blood as a result of isotonic muscular contractions were observed also by Dubuisson (1947) in the isolated sartorius muscle of the frog. He registered continuously by a photographic method the pH changes in the fluid film surrounding the isotonically contracting muscle. As in our experiments, there was an initial phase of acidity followed by alkalinity and finally by prolonged acidity. Dubuisson correlated these changes with (1) the shifting of the iso-electric point of myosin, (2) the breakdown of adenosine triphosphate, (3) the breakdown of creatine phosphate, and (4) the breakdown of glycogen with the formation of lactic acid.

The chemical changes of muscular contractions are so complex that one feels reluctant at this stage of our knowledge to make any definite statement concerning their relation to the pH changes; nevertheless, Dubuisson's work and interpretation deserve careful consideration. On the other hand, the pH changes which we observed in the venous blood of resting muscle under

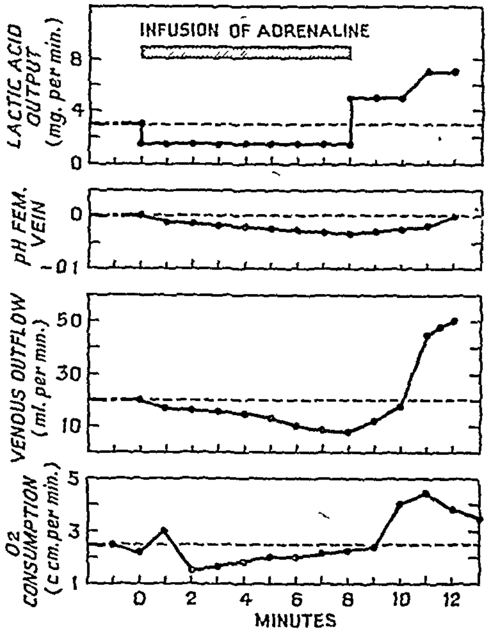

Fig. 8—Effect of adrenaline infusion (0·9 µg. per min.) into femoral artery on: (1) output of lactic acid; (2) pH changes in venous blood; (3) venous outflow; and (4) oxygen consumption of gastrocnemius muscle.

Adrenaline

During a slow infusion of adrenaline into the artery of a resting gastrocnemius muscle the blood in the femoral vein becomes gradually more and more acid. The effect is obtainable with an arterial infusion of 1 µg. of adrenaline per minute (fig. 8). When the adrenaline infusion is discontinued, the acidity persists for a few minutes before the pH gradually returns to normal.

During the infusion of adrenaline the concentration of lactic acid in the venous blood increases slightly, while the output from the muscle decreases by 10–15%; but after the infusion the output of lactic acid increases by as much as 90–290%. The discrepancy between the concentration and the output of lactic acid during the infusion is explained by the changes in muscular blood-flow. The arteries in the resting muscle become constricted during the infusion, and the blood-flow decreases by 50% or even 70%; but afterwards there is considerable hyperæmia. These effects are illustrated in fig. 8, which also shows that the consumption of oxygen follows the blood-flow. Thus during adrenaline infusion an oxygen debt is contracted which is repaid afterwards.

Acetylcholine

When the effects of arterial injections of acetylcholine on the blood pH and oxygen consumption of a muscle are examined, a distinction has to be made between those effects which are the result of muscular contraction and those which are independent of it (Gollwitzer-Meier 1947). With a "closed arterial injection" acetylcholine causes a short twitch-like contraction (Dale et al. 1936), which was shown by Fenn (1941) to be associated with increased oxidation. In our experiments the technical arrangements required for measuring the pH made a "closed arterial injection" impossible. The acetylcholine was either slowly infused in small concentrations for several minutes or injected in a single dose into the femoral artery without special precautions.

In the experiment shown in fig. 9, 2·2 µg. of acetylcholine per minute was infused for 6 minutes. There was a slight muscular effect at the start of the infusion. The blood pH showed an initial shift to the acid side, followed by a strong and persistent alkalinity. The blood-flow increased at the same time, whereas the oxygen consumption decreased by about 50% and remained low during the whole time of infusion. This long-lasting reduction in oxygen consumption suggests that acetylcholine spares the basal metabolism of the muscle. In the experiment shown in fig. 10 a single arterial injection of 5 µg. of acetylcholine was given. A sharp contraction ensued, and at the same time the muscular blood showed the initial shift towards acidity. The contraction was over before the blood became alkaline. The alkalinity coincided again with a lowering of oxidation. Though we have yet no definite proof that the initial acidity is brought about with the muscular contraction, the following observation supports this conclusion. When arterial injections of acetylcholine are repeated, the muscular contractions become smaller and smaller and finally disappear (Brown 1937). We have noted a similar reduction and final disappearance of the initial shift to the acid side on repeated arterial injections of acetylcholine.

Oxygen Lack

During oxygen lack, produced by breathing air with diminished oxygen pressure, the venous blood leaving a resting muscle becomes more alkaline, but the pH of the arterial blood, as is well known, also increases (fig. 11)—more, in fact, than that of the venous blood (Gollwitzer-Meier 1942). This reduction in the arterio-venous pH difference is explained by our finding that the level of lactic acid rises more in the venous than in the arterial blood. There is also an increase in the blood-flow through the muscle of about 50% during oxygen lack, and a further even greater increase when the breathing of normal air is resumed. This hyperæmic after-effect facilitates the repayment of the oxygen debt contracted during the oxygen lack.

Passive Stretching of Muscle

We found that passive stretching makes the venous blood leaving the inactive muscle more alkaline. By this finding Dubuisson's (1947) important discovery that passively stretched isolated frog muscle becomes more alkaline is extended to dog muscle in situ.

MECHANISM OF VASODILATATION DURING MUSCULAR ACTIVITY

It has been assumed for many decades that acid metabolites originating in the active muscle are the cause of the vasodilatation occurring in the muscle during and after its contraction. This conception was challenged to some extent by the results obtained by Fleisch and Sibul (1933) and Fleisch (1938), who perfused the hind legs of a dog with blood containing increasing amounts of carbon dioxide, and found that an increase in hydrogen concentration augmented the blood-flow not more than 100%. In other words, the vasodilatation

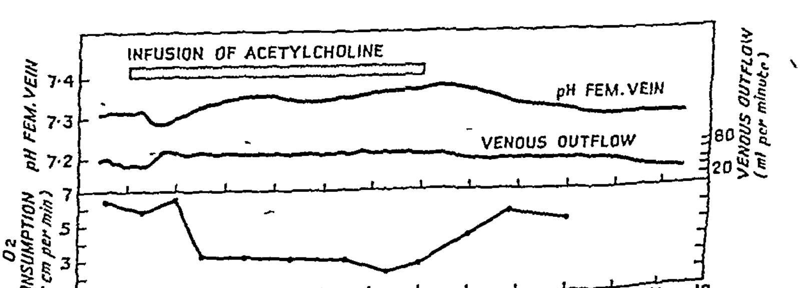

Fig. 9—Effect of infusion of acetylcholine (2·2 µg. per min.) into femoral artery on blood pH, venous outflow, and oxygen consumption of gastrocnemius muscle.

fully. She has been well since, and a further bronchogram, taken five years after the first, showed that there was no bronchiectasis in the re-expanded lower lobe (figs. 4 and 5).

Case B.—A boy, aged 10 months, also a tuberculosis contact with a positive Mantoux test and positive gastric lavage, showed collapse of the right upper lobe. Bronchoscopy on Dec. 17, 1940, showed a narrowed right main bronchus. The collapse persisted but varied in degree from time to time. Bronchoscopy on Feb. 4, 1942, showed a smooth stenosis of the right upper-lobe bronchus. Bronchography of the collapsed area showed crowding of the bronchi and no dilatation. Five years later an X-ray film showed what appeared to be bronchiectasis at the extreme apex of the right lung. This was not confirmed by bronchography, because the parents refused consent. The child has remained symptomless.

These 2 cases seem to indicate that collapse in itself is insufficient to cause bronchiectasis, since in each case bronchography done while the collapse was present showed crowding of the bronchi but no dilatation.

EFFECT OF INCREASED NEGATIVE PRESSURE

Our next step was to measure the intrapleural pressure on both sides in cases of pulmonary collapse.

Technique.—General anæsthesia was induced, usually with gas, oxygen, and ether through an intratracheal tube. Care was taken to be certain that the Magill's tube was in the trachea well above the carina, because early observations showed that inaccurate pressures were obtained if the tube projected into either main bronchus. When the breathing was steady and regular, the intrapleural pressure was measured in the anterior axillary line at corresponding positions on the two sides, with the child on its back. A water manometer was used with the shortest possible piece of rubber tubing connecting it to the Saugmann needle, so as to avoid both lag in manometric swing and introduction of air into the pleural space. There was no discrimination as to which side was investigated first, and the pressures were confirmed by the anæsthetist to avoid any personal bias. When bronchoscopy was performed it was done after the measurement of intrapleural pressures and after chloroform had been substituted for ether. There were no complications. The results are summarised in the accompanying table.

Where the pleuræ were free, as was found in practically all the cases, there was usually no appreciable difference in the pressures. We suggest that, in segmental collapse with free pleura and with the compensatory mechanisms present in the chests of children, the negative intrapleural pressure plays no significant part in the production of bronchiectasis.

In cases A and B, in which collapse persisted for many months, when eventually the bronchial obstruction was relieved, presumably by shrinkage of the gland obstructing the bronchus, oil entered the still collapsed area and the bronchi were seen to be crowded together but not dilated. This finding further supports the view that pull on the bronchi from the pleura plays little part in causing bronchiectasis. In case 11 (see table), where the right upper lobe was collapsed for about five months (fig. 6) and the pleural pressures were virtually equal on the two sides (right − 4 to − 26 mm. ; left − 28 to + 2 mm.), bronchoscopy showed that the right upper lobe was obstructed by caseous material, which was sucked out. The lobe re-expanded (fig. 7), and subsequent bronchography showed no bronchiectasis (fig. 8).

INTRAPLEURAL PRESSURES IN PULMONARY COLLAPSE

Case no.	Situation of collapse	Pleural pressures (mm. of water)		Occurrence of bronchiectasis	Remarks
		Right	Left		
1	Left upper zone	−3, −7	−3, −7	Yes	. .
2	Right upper lobe	−6, +4	−6, +4	Yes	. .
3	Left upper lobe	−5, −10	−4, +2	Yes	Pressures less negative on affected side
4	Left upper lobe	−6, +2	No swing	Yes	Previous left pleural effusion
5	Left upper and middle zones	−4, −2	−10, −2	Yes	.
6	Left upper zone	0, −14	−18, +6	Yes	. .
7	Right upper lobe	−8, −12	−4, −8	Yes	. .
8	Left upper lobe and, later, whole lung	0, −11	0, −8	Yes	. .
9	Left upper lobe	−5, −10	No swing	Yes	Previous left pleurisy
10	Right middle zone	−7, −10	−5, −10	No	. .
11	Right upper zone	−4, −26	−28, +2	No	. .
12	Right middle lobe	0, −5	0, −5	Yes	. .
13	Right middle lobe	−2, −6	−2, −6	Yes	. .
14	Right upper lobe	−2, +2	−2, +2	No	Pressures atypical ; shallow breathing
15	Right upper lobe	0, −10	0, −10	No	. .

OTHER FACTORS

It was observed that in some of the children with primary lesions and pulmonary collapse the collapse persisted for many months without bronchiectasis developing. It was difficult to explain why irreversible bronchiectasis developed in some cases but not in all, and many factors seemed to be concerned.

Distension of Bronchi

The bronchi beyond the block are over-distended and stretched by the retained secretions—mucus, caseous tuberculous material, or pus. This has been found on bronchoscopy in the present investigation, the nature of the retained secretion being determined by sucking up a sample through a catheter passed down the bronchoscope and manœuvred beyond the obstruction. If these secretions can be largely removed by suction or by spontaneous expectoration, the distended bronchi may recover completely and no bronchiectasis will result.

Loss of Elasticity of Bronchial Wall

The spread of tuberculosis to the bronchial wall would interfere with its elasticity ; this risk is increased by the presence of an active primary focus in the collapsed lobe. In the cases bronchoscoped hyperæmia and œdema of the bronchial wall have been seen many times. Gross hyperæmia and œdema causing complete obstruction were seen in 2 cases, and partial obstruction by this means in several cases. In 1 case the grossly affected mucosa was thrown into folds and caused complete collapse of the right middle lobe for sixteen months.

In case 8 (see table) glandular swelling, with overlying œdema, caused complete obstruction of the left main bronchus, associated with pyrexia and severe malaise. The obstruction was relieved by passing a gum-elastic catheter and sucking up the infected secretions from beyond the block. The lumen was re-established by passing a gum-elastic catheter repeatedly until the danger of complete obstruction recurring had passed. Twelve months later a granulomatous polyp was seen projecting into the right main bronchus. Two years later an irregularity of the margin of the orifice of the left upper-lobe bronchus and a little generalised narrowing of the left main bronchus were found. Bronchography showed bronchiectasis in the left upper lobe, but the remainder of the lung, despite the previous collapse, was normal (figs. 9–11).

In 8 other cases granulomatous polypi were seen projecting into the lumen of the bronchi and causing complete or partial obstruction. Caseous ulceration was seen in 4 cases. In 1 case the pedunculated polyp was sucked off, leaving a bleeding area at the site of attachment and a thickened swollen mucosa throughout the remainder of the bronchus. This polyp showed calcification and tubercles but no giant cells. Obstruction was present in this case for fifteen months. These large polypoid masses have been seen to persist, gradually getting smaller, for sixteen months, for it was the practice to repeat bronchoscopy on these patients at intervals of three to six months.

If these gross findings are seen in the main bronchi, it is reasonable to suppose that in some cases the bronchi outside bronchoscopic range may become involved in a tuberculous lesion, either directly or by ulceration of various conditions show how difficult it is to associate such changes with chemical processes of muscular activity, and how cautious one must be in trying to generalise and to correlate pH changes in the blood with definite processes of muscular metabolism.

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BRONCHIECTASIS IN PRIMARY TUBERCULOUS LESIONS ASSOCIATED WITH SEGMENTAL COLLAPSE

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With illustrations on plate

A GREAT deal has been written on the possible causative factors in bronchiectasis. Andral, writing in 1824, mentioned that, especially in children, the bronchi are sometimes distended by accumulated mucus, and their walls may then yield. Stokes, of Dublin, in 1837, suggested that in most cases bronchial dilatation occurs when a bronchial wall has been weakened by inflammation or by loss of its muscular tone, so that it yields to forces, such as violent cough, which it would otherwise withstand. He also believed that interference with ciliary movement plays an important part in the ætiology. Hughes and Simpson (1940) discussed the rôle of enlarged glands and granulation tissue. They thought that tuberculous hilar glands may interfere with respiration in various ways: (1) a gland may narrow or completely occlude a bronchus by external compression; (2) an abscess in a gland may point through a bronchial wall and rupture into the bronchus, asphyxiating the child; and (3) a mass of granulation tissue in the bronchial wall may obstruct a bronchus. With any of these conditions the additional factor of thick viscid purulent obstructive secretions may co-exist. Hughes and Simpson stated, however, that these conditions are comparatively rare.

Meneghello and Smith (1943) reported on 15 infants and children in whom tuberculosis caused mechanical obstruction of the bronchial passages, and they indicated that the tuberculosis may produce either pulmonary collapse or emphysema; that younger children were more often affected than older children; and that, though collapse and emphysema may persist for six months or more, complete recovery is the rule. In their follow-up they found only 1 case out of 7 in which long-standing collapse of the lobe led to evidence of bronchiectasis.

Brock et al. (1937) described the anatomy of the bronchial glands and suggested that the secondary changes in the lung are due to simple collapse following bronchial obstruction from the pressure of enlarged caseous lymph-glands. They stated that no proved case has been followed into adolescence and adult life and bronchiectasis demonstrated clinically and radiologically.

Lee Lander and Davidson (1938) focused attention on pulmonary collapse and bronchiectasis and, from experimental evidence in cats, advanced the theory that the bronchi in the collapsed area are subjected to pull because of the increased negative intrapleural pressure. They obstructed the bronchi with mucin.

Jennings (1937) reported a case in which bronchiectasis occurred in a collapsed lobe and then disappeared with re-expansion.

PRESENT INVESTIGATION

During the war years 421 children were inpatients at Harefield Hospital, and it was decided to investigate the incidence of pulmonary collapse and the incidence and ætiology of bronchiectasis in this group. There were 400 cases of primary lung lesions, of which 77 (19%) showed collapse of a segment, a lobe, or a lung. Owing to war-time difficulties not all of these 77 cases were fully investigated, but bronchography was done in 37, bronchiectasis being found by this means in 34. In addition, 12 cases showed obvious bronchiectasis on plain radiography, bringing the total to 46 (60%). Cases were followed for periods up to seven years. There were 31 cases of pulmonary collapse in which the most careful clinical and radiological scrutiny did not reveal any suggestion of bronchiectasis.

The anatomical distribution was as follows:

Pulmonary collapse with bronchiectasis	
Right upper lobe	17
Right middle lobe	5
Right lower lobe	2
Combined (R.M.L. and R.L.L.)	4
Total	28 right
Left upper lobe	15
Left lower lobe	2
Total	17 left
Both sides (R.L.L. and L.U.L.)	1
Pulmonary collapse without bronchiectasis	
Right upper lobe	8
Right middle lobe	7
Right lower lobe	6
Total	21 right
Left upper lobe	4
Lingula	1
Left lower lobe	2
Combined (L.L.L. and lingula)	2
Whole left lung	1
Total	10 left

EFFECT OF COLLAPSE ALONE

It seemed reasonable to suppose that uncomplicated mechanical pulmonary collapse should produce crowding and not dilatation of the bronchi unless increased negative intrapleural pressure is sufficient, as Lee Lander and Davidson (1938) suggested, to dilate the bronchi. This aspect was investigated first.

Case A.—A girl, aged 8 months, had a localised emphysema of the right lower lobe due to partial obstruction, probably by a gland (fig. 1). There was no doubt about the tuberculous ætiology, for she was a tuberculosis contact, her Mantoux test was strongly positive, and tubercle bacilli were grown after gastric lavage. The presenting symptom was continuous asthma, thought to be due to reflex bronchial spasm from vagal stimulation in the over-distended right lower lobe. This was followed by collapse of this lobe and cessation of the asthma. Bronchoscopy while the collapse was present showed no intrabronchial lesion. Bronchography showed crowding of bronchi in the collapsed lower lobe (figs. 2 and 3). It was concluded that the obstruction was probably due to glandular pressure which had subsided, and that, though alveolar collapse persisted, there was no bronchiectasis. The lobe remained collapsed for about a year and then re-expanded. The infant remained free from symptoms for three years and then had pneumonia, from which she recovered unevent-

STREPTOMYCIN AND THE PRIMARY LUNG LESION IN TUBERCULOSIS IN CHILDREN

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With illustrations on plate

IN this country the use of streptomycin in tuberculosis of children has been confined almost entirely to the treatment of miliary or meningeal disease. Many feel that it should be used for the treatment of primary tuberculosis in an attempt to cure the disease and to prevent miliary or meningeal spread.

Now that streptomycin has been released for general use, it is opportune to examine the evidence for and against its use in primary pulmonary tuberculosis. Children with uncomplicated primary lesions have been treated abroad, but without controls and with an insufficient follow-up period. It is generally agreed that, though there may be symptomatic improvement, the large parenchymal or hilar foci are little influenced by streptomycin (Sanford and O'Brien 1947, Fanconi and Dolivo 1948, Lamy et al. 1948, Löffler and Piotti 1948, Mouriquand et al. 1948, Wissler 1948, McEnery et al. 1949, Morin 1949).

Several writers, describing the effect of streptomycin on miliary and meningeal tuberculosis, have noted that the primary lung complex did not respond to treatment either from the clinical or the pathological point of view (Baggenstoss et al. 1947, McDermott et al. 1947, Dubois et al. 1948, Flory et al. 1948, Medical Research Council 1948, Montgomery 1948, Zollinger 1948, Rubie and Mohun 1949).

Most of the above observations formed a minor part of papers dealing mainly with other subjects. It was therefore decided to investigate a series of cases treated in Sheffield to determine the effect of streptomycin on the primary lung lesion.

MATERIAL

Over 90 tuberculous children have been treated with streptomycin, mostly for miliary and meningeal dissemination. Only those 22 cases which satisfied all the following criteria were included in this study:

(1) Part or whole of a large primary tuberculous complex was clearly demonstrated in chest radiograms just before or immediately after the start of treatment.

(2) The tuberculous nature of these lesions was established beyond doubt by the presence of a positive tuberculin reaction in all the patients, and by positive cultures from gastric washings or by coexistent miliary or meningeal tuberculosis.

(3) A minimum of three months' streptomycin treatment was given.

(4) Survival permitting, a minimum of six months elapsed after the start of the treatment.

(5) Autopsy was performed in all children who died.

In association with the primary tuberculous complex 5 children had meningitis, 7 miliary tuberculosis and meningitis, and 8 miliary tuberculosis; 2 had uncomplicated tracheobronchial primary tuberculosis. The age on admission ranged from 9 months to $7^1/_2$ years; 15 children were under the age of 2 years.

TREATMENT

Intramuscular streptomycin was given usually in doses of 20 mg. per lb. of body-weight daily, but 6 children had larger doses for part of the time. The treatment was continuous in 20 children. Rest periods were given in 1 case because of an unusually protracted course, and in 1 other case because of toxic erythema. In 4 of the continuously treated children further courses had to be given because of relapse of the meningitis. This scheme of treatment has proved satisfactory in miliary tuberculosis and meningitis; in this series 15 of the 20 children are alive after six to twenty-four months' observation.

The details of age, sex, dosage, duration of treatment, and of observation are given in table I. Table II shows the radiological features.

EFFECT ON SYMPTOMS

Symptoms attributable to the glandular component of the primary complex were present in 6 children: 2 of these had tracheobronchial tuberculosis without miliary spread (cases 9 and 19); 1 child was admitted to hospital because of primary tuberculosis and the miliary spread took place during observation; the remaining 3 children were admitted with miliary tuberculosis already present. The following is a summary of the histories of these 6 cases.

Case 5.—A girl, aged 22 months, was admitted with chronic cough, anorexia, and irritability. She had a large tuberculous primary lesion in her right lung. She improved considerably with rest in bed, gained weight, and was discharged after four months. Two months later she was readmitted because of increase of cough and loss of weight, and a radiogram suggested miliary spread.

A protracted course of streptomycin was given, but eight months later, long after the suspected miliary lesions had disappeared, she still had a cough. The primary lung lesion was still present.

Cases 6 and 7.—Both these children had miliary tuberculosis which cleared on treatment. Case 6, a girl of one year, was left with a cough and stridor due to compression of the left main bronchus by enlarged glands. These symptoms were clearing fourteen months after treatment ended. Case 7, a boy of sixteen months, was similarly left with stridor and dyspnœa on exertion, but these symptoms disappeared five months after the end of treatment.

Case 9.—A girl, aged 10 months, had been wheezing and coughing for seven months but was otherwise well. On admission to hospital she had a severe cough and some stridor. During four and a half months' observation before streptomycin therapy the clinical course was fluctuating. There was steady improvement for three months, but the patient relapsed and had cough and stridor for the next six weeks. As a result of a particularly severe attack of stridor and dyspnœa streptomycin was started. The patient improved for six weeks but had another relapse with dyspnœa and cyanosis. A remission was followed by a third relapse. Cough persisted at the end of four and a half months' treatment, but subsequently the patient made a good clinical recovery.

Radiologically a tuberculous focus in the right upper lobe and a mass of paratracheal glands showed steady slow improvement which was not hastened by streptomycin treatment. The chest was not quite clear a year after admission.

Case 18.—A boy, aged 18 months, had had a cough for a year and loss of appetite for four or five months. He was admitted with miliary tuberculosis and right hilar flare (fig. 3). The miliary tuberculosis was cured, but after six months cough and wheezing on exertion persisted and the radiogram showed segmental consolidation of the right middle and lower lobes. After nearly nine months' treatment the cough was severe even at rest. Radiography showed no improvement (fig. 3a).

Case 19.—A boy, aged 14 months, had suffered from wheezing for five weeks and cough for three or four weeks. On admission he had well-marked expiratory stridor but was not very ill. Four days later he suddenly became severely dyspnœic, cyanosed, and semiconscious, and his stridor increased. The cerebrospinal fluid was normal. Spontaneous improvement was evident within a few hours. Streptomycin was started and was given for three months. There was progressive improvement, though the patient still had a slight cough at the end of treatment and six months later.

Radiologically the right upper lobe and paratracheal lesions were worse at the end of treatment than at the beginning, in spite of some initial improvement.

It may be concluded that in these 6 cases there is no clear evidence that streptomycin affected the symptoms extrinsic disease into the bronchi. These factors would obviously reduce the elasticity of the bronchial wall and prevent its recovery, particularly if the bronchi were subjected to distension by frank caseous material or retained mucus. Provided these distended bronchi are not subjected to secondary infection, some recovery may be anticipated, and a striking absence of symptoms is found.

Inflammation of Bronchi

The bronchial wall, if the bronchus is distended with pus, will soon become involved in the inflammatory process and further weakened. If the obstruction is unrelieved, the inflammation may involve the surrounding lung tissue and further irreparable damage may be done. Case 2 (see table) illustrates this point. At the height of this boy's illness his clinical state and physical signs were those of pneumonia of the right upper lobe (fig. 12). A mistake was made in not appreciating the true condition—i.e., retention of pus beyond the bronchus blocked by tuberculous inflammation. The patient showed little response to chemotherapy. Bronchoscopy relieved the symptoms, but unfortunately by this time irreparable damage had been done, and the end-result was a shrunken bronchiectatic upper lobe (fig. 13).

SYMPTOMS AND TREATMENT

As would be expected from mechanical considerations, symptoms tend to arise when bronchiectasis is situated in the lower part of the lungs, where spontaneous drainage is more difficult. That the bronchial dilatation may persist for many years without symptoms is borne out by the cases which we have followed up for periods up to seven years (31 out of 42 cases symptomless). The patients may, however, have a hæmoptysis even after many years (2 out of the 42 cases had hæmoptysis after one and a half and seven years). The following 2 cases in adults further illustrate this point.

Case C (figs. 14 and 15).—In this patient there is gross cystic bronchial dilatation in the right upper lobe, with a calcified gland at the root; the only symptom was hæmoptysis at the age of 36.

Case D (fig. 16).—This patient, aged 25, who has obvious disseminated calcified lesions in the lungs, also presented with hæmoptysis, and was found to have bronchial dilatation in a collapsed left lower lobe, an obvious relic of primary infection in childhood.

Secondary Infection

Constitutional disturbances may arise if the bronchiectatic areas become infected, which is likely to happen in children either from a downward spread of an upper respiratory infection or as a complication of measles or whooping-cough. An upper-lobe dilatation is less likely to cause symptoms, because of the mechanical drainage owing to its position. On the other hand, the bronchi in the more dependent parts of the lungs will tend to become infected and secretions to be retained whenever the patient contracts an infection (such as measles and whooping-cough complicated by bronchitis), unless the bronchi are kept clear by postural drainage. The rôle of secondary infection seems to be of paramount importance, particularly if some obstruction is present.

It has been observed in our cases that a primary lesion with segmental collapse may cause little or no symptoms; but, if secondary organisms penetrate beyond the obstruction, the retained mucopus will cause further distension and damage to the bronchial wall. Toxic absorption may then occur; an event which is indicated clinically by pyrexia. As a rule the fever shows little response to chemotherapy. This is an indication for immediate bronchoscopy with the passage of a gum-elastic catheter beyond the block and suction. This has been done in some of our cases from time to time with dramatic results. Where basal collapse exists it is a wise precaution to use postural drainage of the affected area, even if there is no sputum. When the obstruction is relieved by the shrinkage of a gland, or by the coughing up or resolution of a polypoid mass, the retained secretions are expectorated and secondary infection with retention minimised. Any intercurrent infection in children with primary lesions associated with collapse demands prompt and energetic treatment to prevent or minimise permanent damage to the bronchi and lungs.

There is another important point about childhood bronchiectasis following a primary tuberculous lesion. If bronchoscopy shows an active bronchial lesion, or pressure by an enlarged gland is diagnosed, two years or more should be allowed to elapse after resolution, before lobectomy, if indicated, is undertaken. Further, the operation should be covered with streptomycin. A short course of streptomycin has also been used in a few cases where the bronchial involvement seemed to be severe.

SUMMARY

Primary tuberculous lesions associated with pulmonary collapse are followed in an appreciable proportion of cases by bronchiectasis, which is often symptomless.

Involvement of the bronchi by a tuberculous lesion, whether through extrinsic pressure from a gland, œdema of the bronchial mucosa, or infiltration of the bronchial wall, may lead to distension of the bronchi beyond the obstruction by retained mucus, tuberculous caseous material, or by secondary infection of the retained mucus. This distension is an important factor in producing bronchiectasis. Symptoms commonly arise when secondary infection intervenes.

Increased negative intrapleural pressure causing a pull on the bronchi in localised pulmonary collapse where the pleura is free seems to be of negligible significance in the causation of bronchiectasis.

In children with pulmonary collapse a Mantoux test should be done and, if it is positive, possible sources of tuberculous infection should be sought.

Bronchoscopy for diagnosis, combined with suction and postural drainage, is advised both for prophylaxis and treatment, and should be undertaken immediately if there is evidence of secondary infection beyond the block.

If an operation is indicated for bronchiectasis in a child, a tuberculosis aetiology should always be considered, and, if it is found, at least two years should be allowed for the tuberculous lesion to heal before operation is undertaken, and streptomycin should be used to cover the operation.

In view of the rôle of secondary infections in producing symptoms and irreversible changes in the bronchi and lung, these infections should be treated energetically. Particular attention should be paid to the upper respiratory tract as a potent source of infection of the collapsed area.

We wish to thank Dr. I. Parry Brown for his skill in anæsthetics, making the investigation possible and free from complications, and for his helpful criticism; Mr. A. W. Holder and the staff of the X-ray department for their technical assistance; Sister Creed, department sister of the children's unit, for her coöperation; Dr. Mary Tate for assistance with the analysis of the cases; and Dr. K. R. Stokes, medical director, Harefield Hospital, for encouragement and discussion.

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TABLE II—RADIOLOGICAL DETAILS OF THE PRIMARY LESIONS

Group	Case no.	Part of lung involved	Course during treatment	Radiological appearances	
				At end of treatment	On Sept. 30, 1949
1 (gradual improvement)	1	R.L.L., R. hilum	Slow improvement	Improved	Clear
	2	L.L.L.	Slow improvement	Improved	Clear
	6	L.U.L., L.L.L., L. hilum	Slow improvement (calcifying)	Improved	Still large opacity and mass of calcification
	9	R.U.L., R. paratracheal	Slow improvement	Improved	Focus in R.U.L. and glands calcifying
	13	R.U.L., R. hilum	Slow improvement	(Died)	..
	20	R. paratracheal	No change, followed by slow improvement	Improved	Clear
	21	R. hilum and paratracheal	No change, followed by slow improvement	Slightly improved	Glands still enlarged
2 (fluctuating course)	3	R.U.L.	Getting worse for 2 mos., then improving	Improved	Faint fibrosis R.U.L.
	5	R.M.L., R. hilum	Fluctuating course, but getting worse for 7 mos.; new lesion L.U.L.	Worse	R.M.L. collapse; mass of left paratracheal glands
	10	R.U.L. and R.M.L., R. paratracheal	Getting worse for 5 mos., then slow improvement	Worse	R.M.L. collapse
	11	Normal	Primary complex appeared in L.U.L. and L. hilum, followed by improvement	Worse	Clear
	12	L. hilum	L.U.L. collapsed and partly cleared again	(Died)	..
	16	R. hilum	Lesion extending into R.U.L., later clearing	Still being treated	R. paratracheal glands calcifying
	19	R.U.L., R. paratracheal	Initial improvement followed by marked relapse	Worse	Clear
3 (no change)	4	R. hilum	No change	Same	Clear
	7*	R. lung, R. hilum	No change	Same*	Slightly smaller mass
	15	L. hilum	No change	(Died)	..
	22	L. hilum	No change	(Died)	..
4 (progressive deterioration)	8	L.U.L.	See text	Worse	Incipient calcification
	14	R. hilum	Progressively bigger, extending into R.U.L.	(Died)	..
	17	L. paratracheal	Progressively bigger	Worse	Almost normal
	18*	R.L.L., R.M.L., R. hilum	Much increasing in size and density	Worse*	Still very large lesion

* Again treated for meningeal relapse. R.U.L., R.M.L., R.L.L., right upper, middle, lower lobe. L.U.L., L.L.L., left upper, lower lobe.

sulated, being multiple in case 13. In the 2 others they were small and encapsulated. The regional glands were also caseous in all 5 children, and particularly large in case 14. Segmental collapse of a lobe was present in cases 12 and 13, and in case 12 this was associated with tubular bronchiectasis. There seemed to be no difference between these lesions and those found in untreated cases.

TOXIC EFFECTS

Toxic effects persisted after the end of treatment only in case 8; this girl is now totally deaf. A transient toxic erythema developed in 4 children.

DISCUSSION

This study cannot be taken to show the effect of streptomycin on uncomplicated primary pulmonary tuberculosis in childhood; only 2 of the children fall into this category, all the others having miliary or meningeal tuberculosis in addition. Conclusions therefore must be guarded. Even so, the findings indicate the course of the clinical, radiological, bacteriological, and pathological response of the primary pulmonary lesion during and after protracted treatment with streptomycin given in adequate doses. The number of cases is small, but the results were uniform. There were no controls, because of the special nature of the cases treated. It is clear, however, that in these cases streptomycin had little or no effect on the primary complex or on the excretion of tubercle bacilli even after protracted treatment.

There is no evidence that streptomycin will prevent miliary tuberculosis when given for the treatment of primary tuberculosis. There does not seem, however, to be any certain record of miliary tuberculosis developing when uncomplicated meningitis was treated with streptomycin. There is good evidence that in miliary tuberculosis streptomycin treatment will not prevent the development of meningitis. In 21 children admitted and treated for uncomplicated miliary tuberculosis, meningitis developed during treatment in 10 (unpublished results). Streptomycin is toxic and may cause permanent deafness, and the tubercle bacillus may become resistant to it.

The good prognosis of primary tuberculosis in children over the age of 3 years is well known (Wallgren 1941, Brailey 1943, Levine 1944). The prognosis is worse in infants and children under this age, but Mitchell and Willis (1944) have shown that even in this group the case-mortality can be reduced to 9% by conservative management. Death is usually due to meningitis and miliary tuberculosis. These figures were obtained before the days of streptomycin treatment of miliary tuberculosis and meningitis and could probably be considerably bettered today, in view of the good response of many cases of meningitis and most cases of miliary tuberculosis.

In conclusion, these results suggest that it is unwise and possibly dangerous to give streptomycin for uncomplicated cases of primary tuberculosis. Protracted experiment with proper controls is required to confirm or disprove this suggestion.

SUMMARY

The effect of streptomycin on the primary complex in the lung in 20 children with miliary tuberculosis and meningitis and 2 children with tracheobronchial tuberculosis is described.

It was not possible to demonstrate any beneficial effect of streptomycin on the primary complex or the symptoms attributed to it.

In 8 cases tubercle bacilli persisted in stomach washings for over six months after treatment had started.

On the present evidence it seems unwise to treat uncomplicated primary tuberculosis with streptomycin.

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References at foot of next page

due to the primary lesions. The course of all cases corresponded with what could be expected from rest in bed alone.

EFFECT ON RADIOLOGICAL CHANGES

The response of the 22 cases during treatment, as seen radiologically, can be classified as follows:

Group 1:	progressive slow improvement	7 cases
Group 2:	fluctuating course during treatment ..	7 ,,
Group 3:	*no appreciable change*	4 ,,
Group 4:	progressive deterioration	4 ,,

These cases are listed in table II, but some of the radiological changes are described in greater detail below (see also figs. 2 and 2a).

Case 6.—This girl presented with an extensive opacity in the left lung (fig. 1). After four months' treatment this was appreciably smaller and calcification had appeared in the left upper lobe. The improvement continued and the calcification increased for the next six months. Then, however, a left-sided pleural effusion developed as evidence of continued activity of the disease, together with further positive gastric washings. The fluid was absorbed, but nineteen months after the original film was taken there was still a considerable opacity in the left lung, with glandular enlargement, displacement of the trachea to the right, and a large calcified mass in the upper lobe (fig. 1a).

Case 8.—The original film of this girl, aged 16 months, showed a massive coarse miliary picture, partly hiding the primary focus in the left upper lobe. In fifty days the bases cleared, leaving opacities at both apices, with a cavity on the right side. A month later a left-sided spontaneous pneumothorax developed. The apex of the lung contained at least one cavity which was held out by a thick adhesion to the chest wall. The pneumothorax resolved in a month. Cavities were present in both upper lobes, and at the right apex obstructive emphysema was present which increased in size for a month, but disappeared later. Six months after the beginning of treatment the films were typical of bilateral fibrocavernous tuberculosis of the adult type. Improvement then occurred, but after more than a year's treatment and seventeen months' observation the patient still has chronic apical lesions, though cavities are no longer evident and calcification is beginning to show.

Case 12.—This girl, aged 17 months on admission, died. At the beginning of treatment for meningitis she had merely a left mediastinal lymph-node enlargement, but this led to massive collapse of the left upper lobe four months later. This collapse had largely cleared before death, but not before it had led to tubular bronchiectasis, which was found at necropsy.

Case 16.—The treatment in this case was unorthodox. The girl, aged 2 years 10 months, was given a massive dose of 60 mg. per lb. of body-weight for two months for her meningitis. During this period there was progressive deterioration in the radiological appearances. A large mass of right paratracheal glands led to collapse of the whole upper lobe. Then she had *no further treatment for nearly five months.* During this time there was considerable fluctuation in the radiological appearances; the lobe became re-aerated only to collapse again later. When streptomycin therapy was started again because of relapse of the meningitis there was but slight enlargement of the glands. During the second course of streptomycin these glands are beginning to calcify.

At the end of September, 1949, 17 of the 22 children were alive. In 6 of them the X-ray films of the chest were clear, and in 3 others healing took place by calcification or fibrosis in a minimum of seven and maximum of twenty months from the beginning of treatment. *In the 8 other survivors lesions of various size, some very large,* were still present six to nineteen months after treatment had started.

There is no evidence on the basis of these findings that streptomycin affected either beneficially or adversely the natural course of the primary complex.

EFFECT ON BACTERIOLOGY AND PATHOLOGY OF PRIMARY TUBERCULOSIS

Positive cultures were obtained during life from the gastric contents of 12 children. All the organisms tested were sensitive to streptomycin before therapy. Positive cultures were repeatedly obtained from 10 of 12 children after treatment had started—in 8 of them for six months or longer. In one child (case 8) the organism became resistant to 1000 μg. of streptomycin after four months. In contrast, no positive cultures could be obtained more than two months after treatment had started in any of our cases of miliary tuberculosis without a radiologically visible primary focus.

Caseous primary foci were found in the lungs in all 5 children who died. In 3 these were large and not encap-

TABLE I—DETAILS OF CASES AND TREATMENT

Case no.	Age on admission yr.	mos.	Sex	Treatment Started	Ended	Length of treatment (mos.)	Length of observation (mos.)	Dose (mg./lb./day)	Reason for treatment	Remarks
1	7	10	M	Sept. 15, 1947	Jan. 22, 1948	4	25	20	Miliary	..
2	1	4	M	Nov. 11, 1947	April 26, 1948	5½	24	20	Miliary	Toxic erythema
3	1	3	M	Oct. 24, 1947 May 4, 1948	April 20, 1948 May 10, 1948	6	23	20 for 116 days 40 ,, 70 ,,	Miliary and meningitis	Toxic erythema
4	7	4	M	Feb. 12, 1948	June 12, 1948	4	20	20	Miliary	..
5	1	10	F	Aug. 16, 1948	May 25, 1949	8	19	20	Miliary	..
6	1		F	Feb. 20, 1948	June 25, 1948	4	19	20	Miliary	..
7	1	4	M	April 13, 1948 Aug. 30, 1949	Oct. 30, 1948 ..	8	17	20	Miliary and meningitis	Toxic erythema. Still treated
8	1	4	F	April 24, 1948 Dec. 17, 1948 Mar. 30, 1949	Dec. 1, 1948 Mar. 25, 1949 May 15, 1949	12	17	20	Miliary and meningitis	Total deafness
9		10	F	Oct. 9, 1948	Feb. 18, 1949	4½	16	20	Stridor	..
10	1	4	M	July 29, 1948 Nov. 11, 1948 Jan. 24, 1949	Oct. 25, 1948 Nov. 29, 1948 May 28, 1949	7½	14	60 for 70 days 40 ,, 49 ,, 20 ,, 127 ,,	Miliary	..
11	1	9	M	Aug. 6, 1948	Feb. 8, 1949	6	13	20	Meningitis	..
12	1	5	F	Sept. 25, 1948	April 16, 1949	6½	6½	20 for 117 days 30 ,, 21 ,,	Meningitis	Died
13	1	8	M	Oct. 2, 1948	Jan. 13, 1949	3½	3½	20	Meningitis	Died
14	3	9	F	Oct. 7, 1948 May 4, 1949	April 7, 1949 May 10, 1949	6	6	20 for 167 days 30 ,, 21 ,,	Miliary and meningitis	Died
15		9	M	Oct. 12, 1948	Mar. 5, 1949	4½	4½	20 ,, 121 ,, 30 ,, 21 ,,	Miliary and meningitis	Died
16	2	10	F	Nov. 15, 1948 June 13, 1949	Jan. 19, 1949 Oct. 6, 1949	5½	10	60 ,, 64 ,, 20 ,, 115 ,,	Meningitis	..
17	1	8	F	Nov. 25, 1948	May 25, 1949	6	10	20	Miliary and meningitis	..
18	1	7	M	Nov. 28, 1948 June 22, 1949	May 28, 1949 ..	9	10	20	Miliary and meningitis	Toxic erythema. Still treated.
19	1	2	M	Dec. 27, 1948	Mar. 27, 1949	3	9	20	Stridor	..
20	4	4	F	Feb. 23, 1949	Aug. 23, 1949	6	7	20	Miliary	..
21	6	9	M	Mar. 12, 1949	Sept. 13, 1949	6	6½	20	Miliary.	..
22	3	6	F	April 21, 1949	Aug. 28, 1949	4	4	20	Miliary and meningitis	Died

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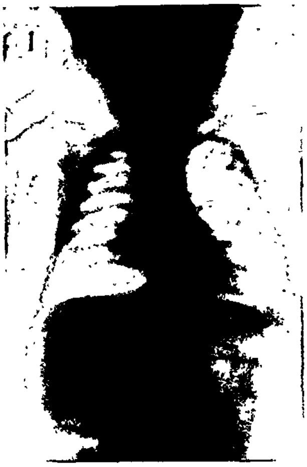

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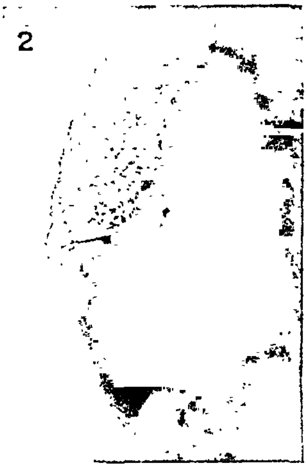

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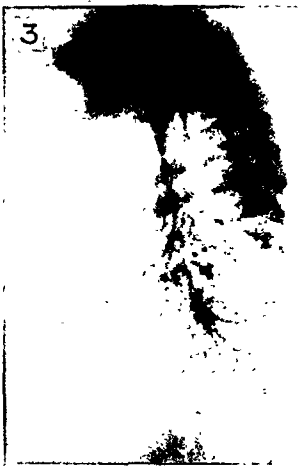

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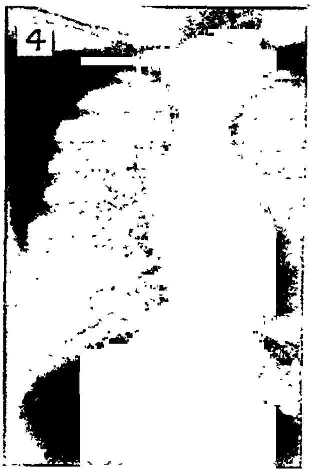

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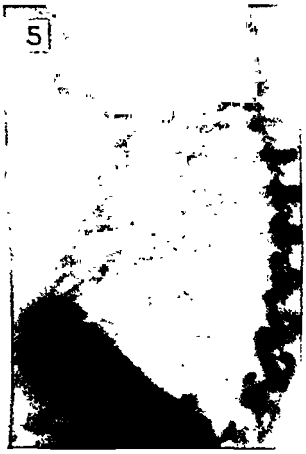

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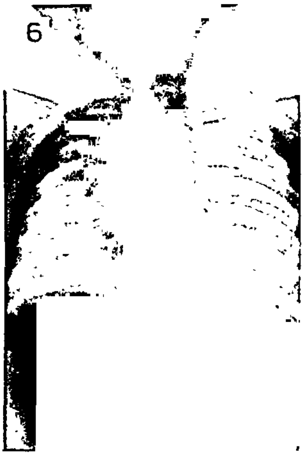

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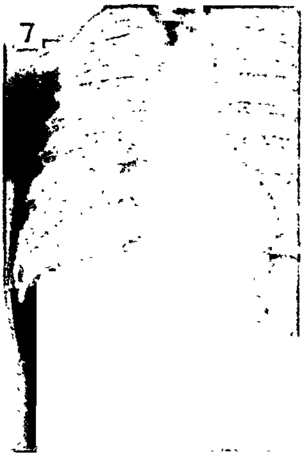

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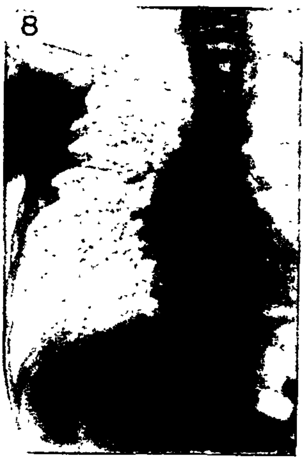

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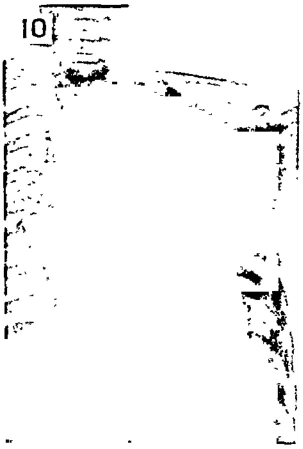

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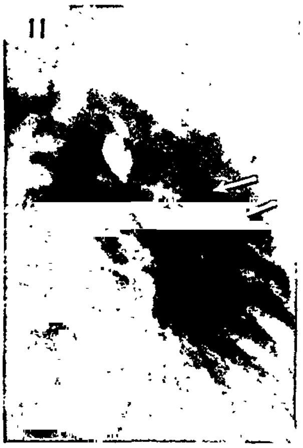

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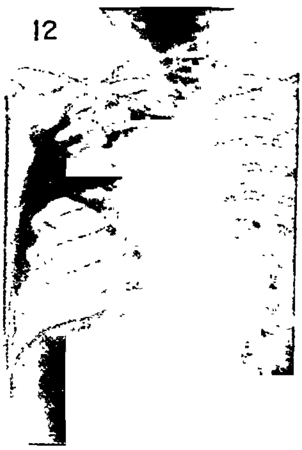

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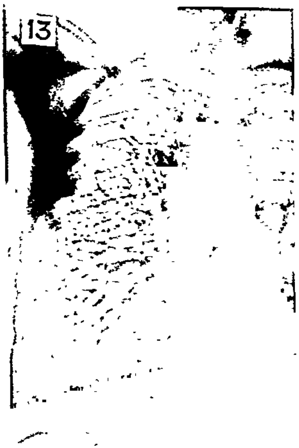

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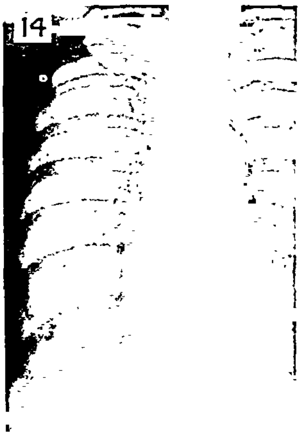

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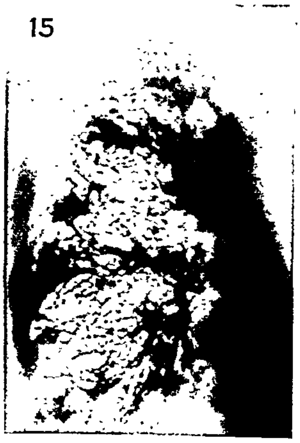

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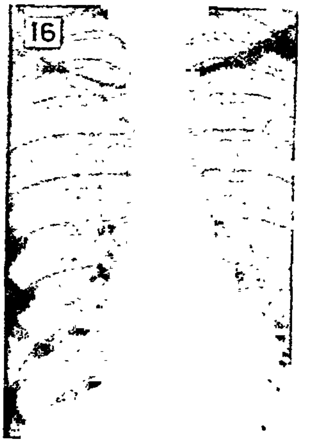

CYSTIC PULMONARY FIBROSIS IN GENERALISED SCLERODERMA

REPORT OF TWO CASES

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With illustrations on plate

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In early descriptions of generalised scleroderma dyspnœa and liability to pulmonary infection were generally attributed to restriction of respiratory movements by sclerotic changes in the skin and muscles of the chest wall, but it seems likely that respiratory symptoms may often have been due to undetected fibrotic changes in the lungs themselves. In 1889 Finlay described the case of a man, aged 36, with generalised sclerosis of the skin, clawing of the hands, and pigmentation. The patient was troubled with chronic cough and dyspnœa. Examination showed impaired movement of the chest with signs of generalised bronchitis and of consolidation at the left base. Two years later Finlay (1891) recognised the association between scleroderma and pulmonary fibrosis. Lewin and Heller (1895) reviewed a large number of published cases of scleroderma, including that of Finlay. In 6 of these cases dyspnœa was conspicuous, and they associated it with sclerosis of the chest wall rather than of the lung. Thickening of the aryteno-epiglottic folds was suggested as a contributory factor. Of their 28 autopsy cases, fibrosis of the lungs was present in at least 2, and emphysema, pleurisy, and tuberculosis were found in others. Matsui (1924) reported 6 cases of scleroderma with post-mortem findings. In 3 of these pulmonary fibrosis was found at autopsy though there had been no symptoms to suggest it during life.

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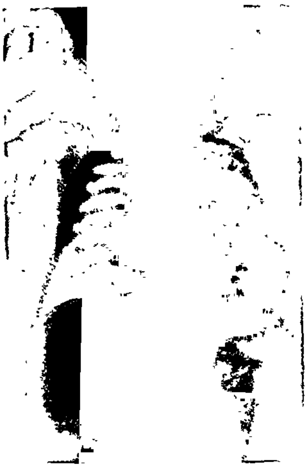
LEGENDS TO ILLUSTRATIONS ON PLATE

DR. ROBERTS, DR. BLAIR

Fig. 1—Case A, showing localised emphysema at right base due to partial obstruction of the right lower-lobe bronchus by a gland. The symptoms were continuous asthma.
Fig. 2—Case A, showing crowding of bronchi in right lower lobe.
Fig. 3—Case A, lateral view of fig. 2.
Fig. 4—Case A. Bronchogram five years later, showing normal bronchi in right lower lobe.
Fig. 5—Case A, lateral view of fig. 4.
Fig. 6—Case 11, showing collapse of right upper lobe.
Fig. 7—Case 11, when the lobe had re-expanded after bronchoscopy.
Fig. 8—Case 11, bronchogram of right upper lobe showing absence of bronchiectasis.
Fig. 9—Case 8, showing collapse of left upper lobe.
Fig. 10—Case 8, five months later, showing complete collapse of left lung.
Fig. 11—Case 8, two years later. Oblique view. Bronchogram showing bronchiectasis of left upper lobe, but normal lower-lobe bronchi.
Fig. 12—Case 2, showing partial collapse of right upper lobe with possible early bronchiectasis, due to blockage of bronchus.
Fig. 13—Case 2, end-result showing shrunken bronchiectatic right upper lobe.
Fig. 14—Case C (adult), showing cystic appearance of right upper lobe, with calcified gland at the root.
Fig. 15—Case C. Bronchogram showing cystic bronchiectasis of right upper lobe, with calcified gland at the root.
Fig. 16—Case D (adult), showing disseminated calcified lesions in both lungs with bronchial dilatation in the collapsed left lower lobe.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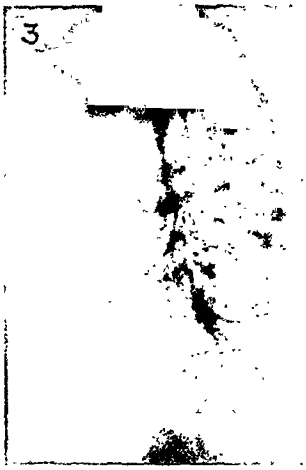
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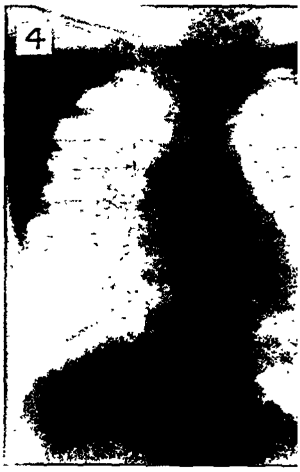
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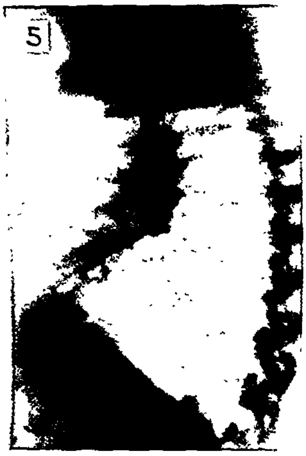
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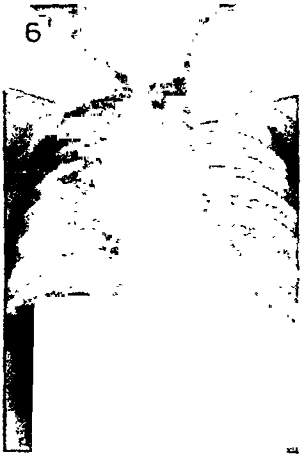
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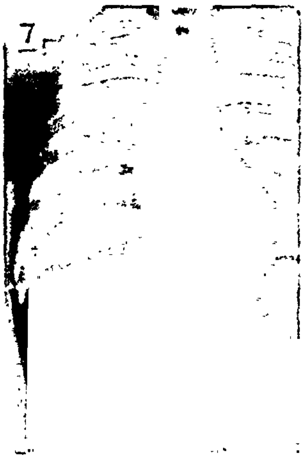
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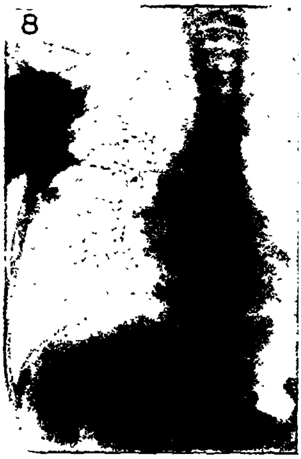
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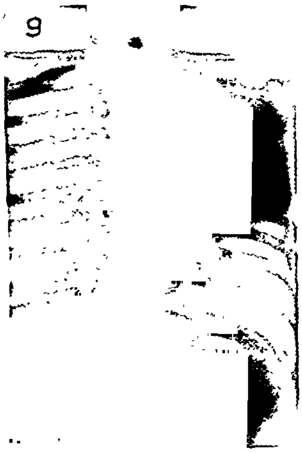
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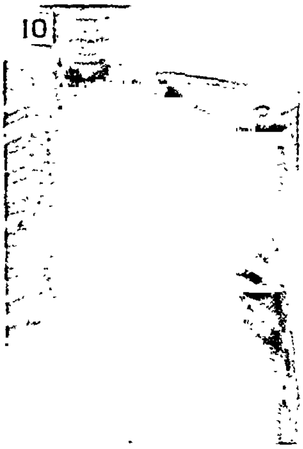
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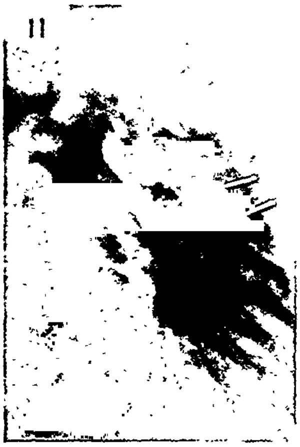
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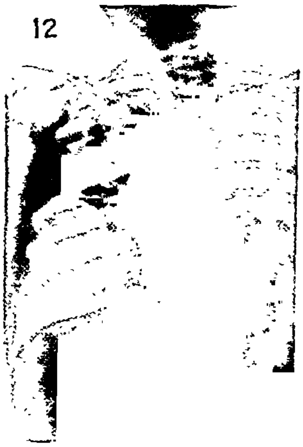
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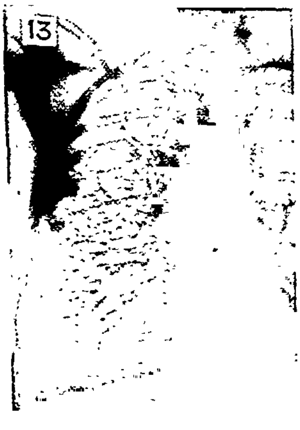
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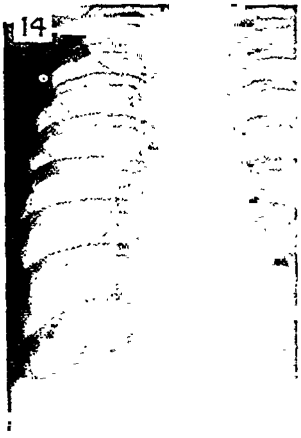
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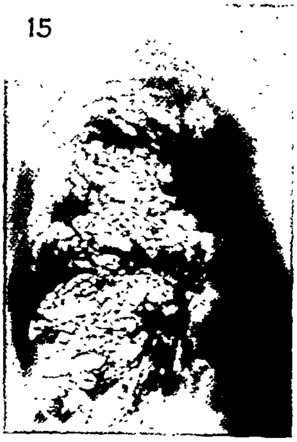
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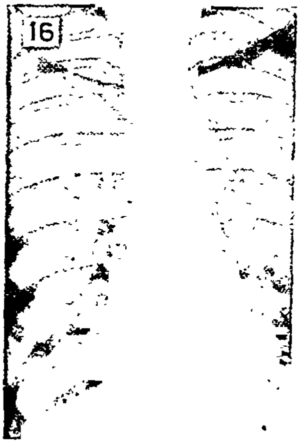
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LEGENDS TO ILLUSTRATIONS ON PLATE

DR. ROBERTS, DR. BLAIR

Fig. 1—Case A, showing localised emphysema at right base due to partial obstruction of the right lower-lobe bronchus by a gland. The symptoms were continuous asthma.

Fig. 2—Case A, showing crowding of bronchi in right lower lobe.

Fig. 3—Case A, lateral view of fig. 2.

Fig. 4—Case A. Bronchogram five years later, showing normal bronchi in right lower lobe.

Fig. 5—Case A, lateral view of fig. 4.

Fig. 6—Case 11, showing collapse of right upper lobe.

Fig. 7—Case 11, when the lobe had re-expanded after bronchoscopy.

Fig. 8—Case 11, bronchogram of right upper lobe showing absence of bronchiectasis.

Fig. 9—Case 8, showing collapse of left upper lobe.

Fig. 10—Case 8, five months later, showing complete collapse of left lung.

Fig. 11—Case 8, two years later. Oblique view. Bronchogram showing bronchiectasis of left upper lobe, but normal lower-lobe bronchi.

Fig. 12—Case 2, showing partial collapse of right upper lobe with possible early bronchiectasis, due to blockage of bronchus.

Fig. 13—Case 2, end-result showing shrunken bronchiectatic right upper lobe.

Fig. 14—Case C (adult), showing cystic appearance of right upper lobe, with calcified gland at the root.

Fig. 15—Case C. Bronchogram showing cystic bronchiectasis of right upper lobe, with calcified gland at the root.

Fig. 16—Case D (adult), showing disseminated calcified lesions in both lungs with bronchial dilatation in the collapsed left lower lobe.

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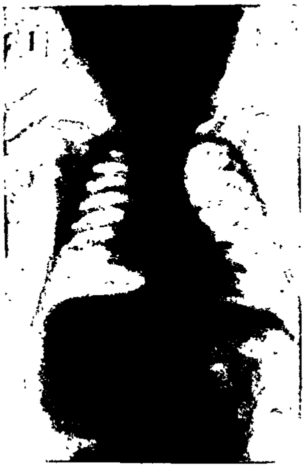

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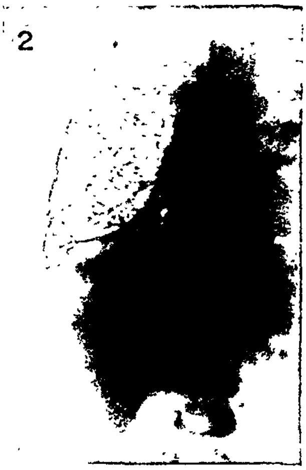

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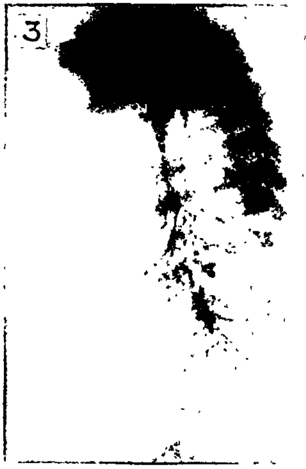

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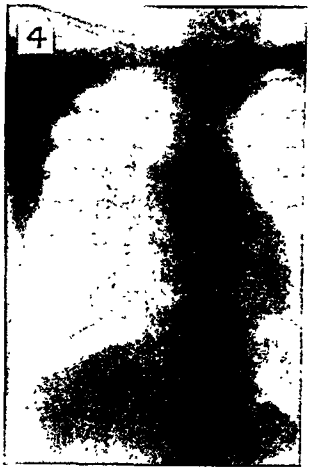

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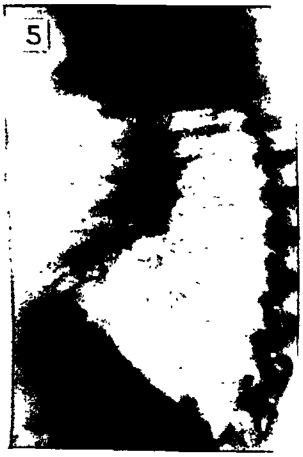

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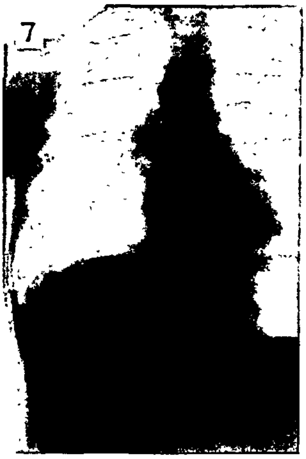

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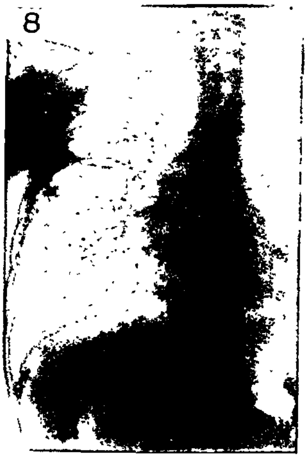

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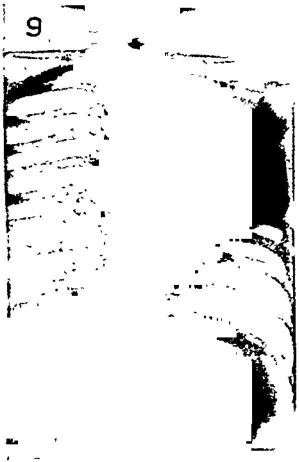

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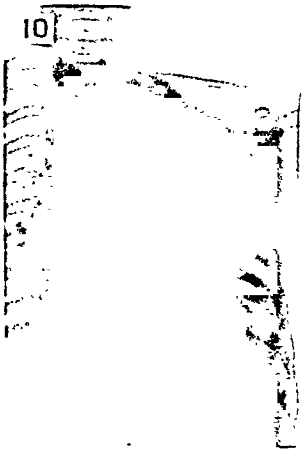

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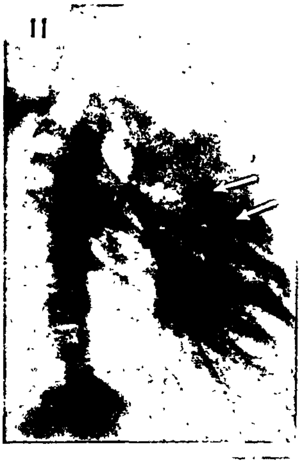

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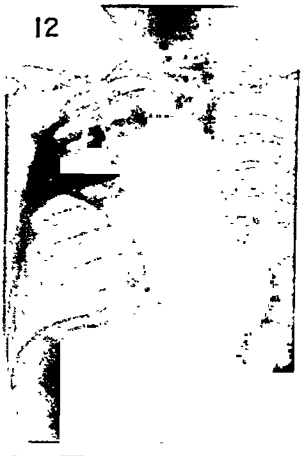

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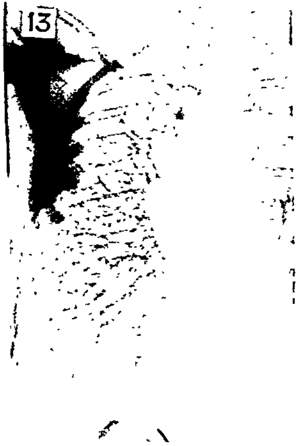

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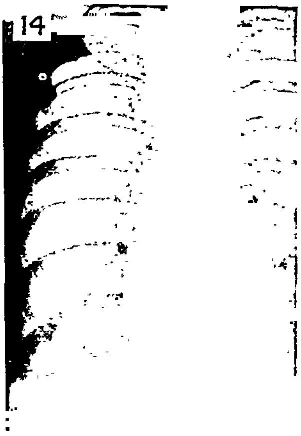

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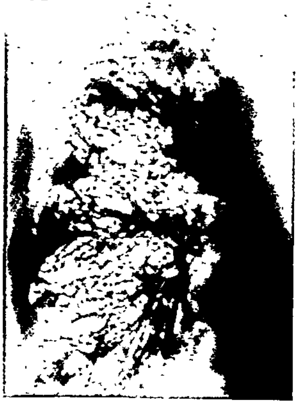

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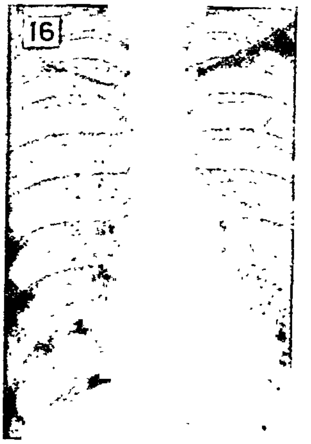
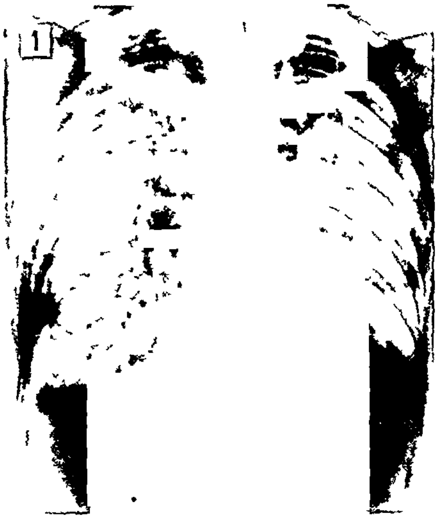


DR. CHURCH, DR. ELLIS : PULMONARY FIBROSIS IN SCLERODERMA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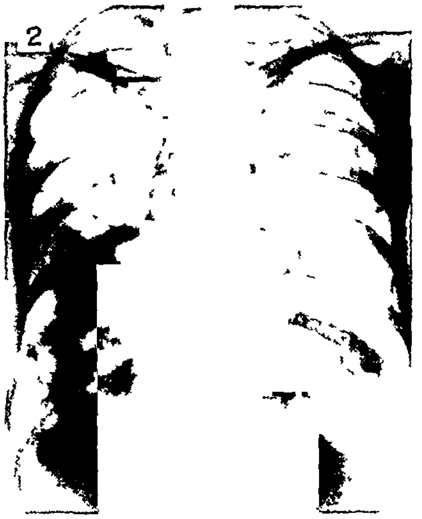
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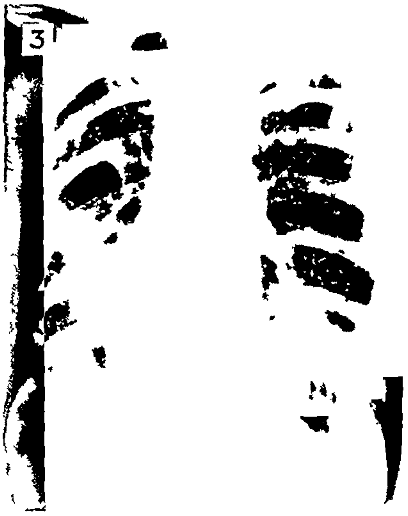
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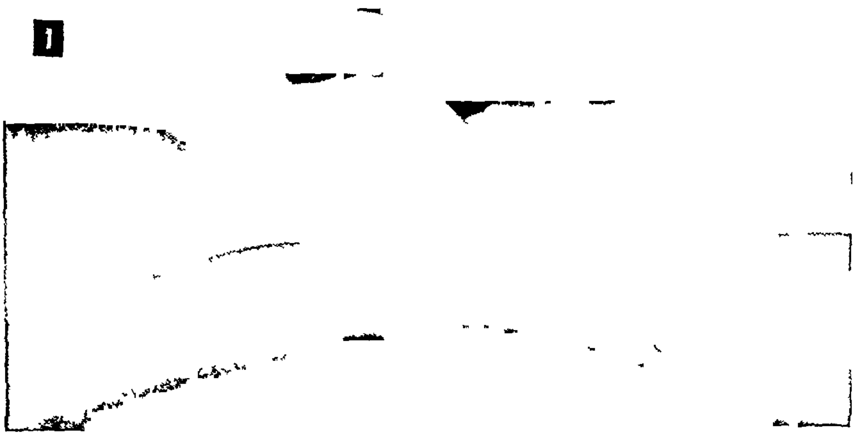
SIR ADOLPHE ABRAHAMS : ARTERIAL CALCIFICATION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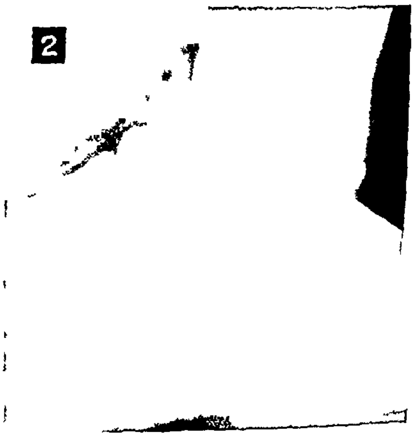
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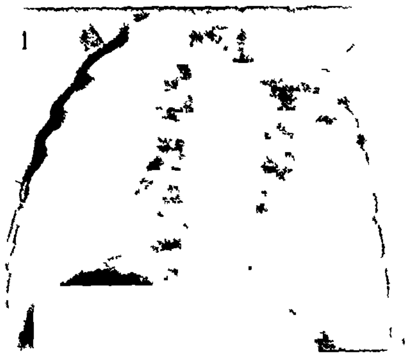
DR. J. LORBER : STREPTOMYCIN IN TUBERCULOSIS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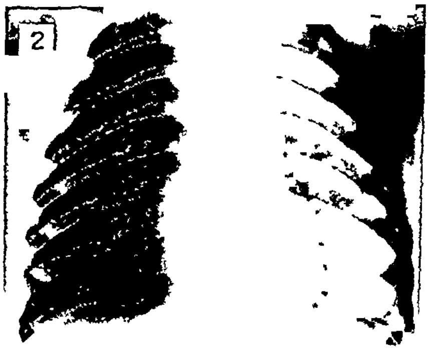
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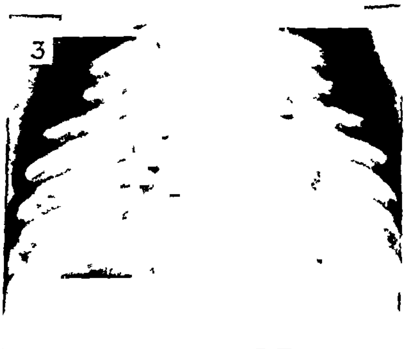
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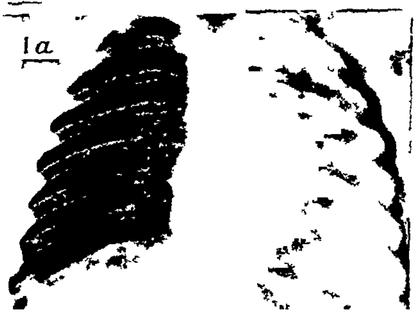
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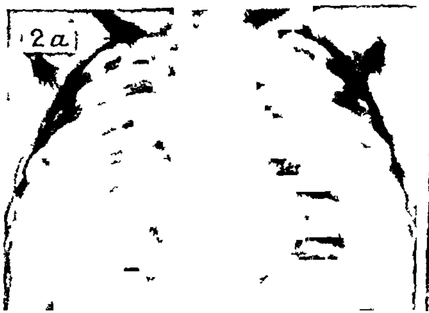
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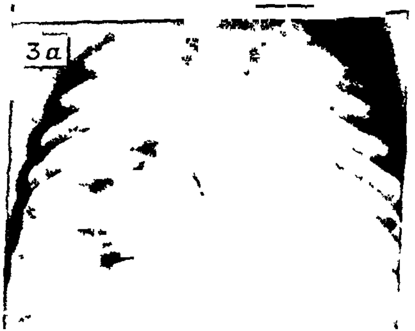
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The histological changes in Dostrovsky's cases are discussed by Getzowa (1945), who suggests that the primary morbid process takes place in the connective tissue, the blood-vessels and lung parenchyma being secondarily affected. The microscopic changes in the lungs were found to be identical with those occurring in the sclerosed skin. This is not in agreement with Baehr and Pollack (1947), who consider that the primary changes of scleroderma are vascular with endarteritis and fibrinoid necrosis of the vessel walls and surrounding collagen tissue. It may be concluded that fibrosis, which is the predominant feature of scleroderma, particularly as it affects the lungs, is secondary to these changes.

CASE-REPORTS

Case 1.—A married woman, aged 49, was well until fourteen years ago when she was admitted to North Cambridgeshire Hospital with fever, weakness, and generalised pains in the limbs and stiffness of the joints. This illness lasted for three months and was diagnosed as rheumatic fever. The pains persisted in the fingers, toes, knees, and spine. Raynaud's phenomena are described as occurring in the fingers during cold weather. Two years later the fingers began to contract into a fixed position of flexion, and subsequently the patient noticed difficulty in opening her eyes because the eyelids felt stiff. Intermittent dysphagia was first noticed at this time. Over a period of five years the patient lost 3 stone in weight.

In 1942 she was admitted to Addenbrooke's Hospital diagnosed as sclerodactyly. Examination then showed a milder degree of her present condition, save that there were no symptoms referable to the lungs and the X-ray films showed only slight pleural thickening at the right base. Other investigations at that time showed a basal metabolic rate (B.M.R.) of + 18%, negative Wassermann reaction, and a normal blood-count. Mantoux test (1 in 1000) was positive.

Six months ago she had an attack of laryngitis accompanied by pleurisy. Since then she has had troublesome dyspnœa on exertion and cough with up to an ounce of sputum per day. The scleroderma continues to progress slowly and she has now lost 4 stone in weight since the onset of the disease.

Family history: one sister suffers from stiffness of the fingers attributed to rheumatoid arthritis.

On examination, the patient is very emaciated with scanty body hair. The skin of the face is pigmented, stretched, and taut but not hard. The lips are thinned and contracted with radial furrowing. The nose is sharp and pinched with the skin drawn tightly over the cartilage. The fingers are fixed in a position of flexion of all the joints. There is slight clubbing of the nails and ulceration over some of the interphalangeal joints. The skin is shiny and pigmented over the fingers, hands, and in decreasing degree up the forearms. Hard pea-like subcutaneous nodules are palpable round both elbow-joints. Flexion of the knee-joints is limited to 90°. The tongue is smooth and depapilated. The trachea is deviated to the left. There is poor but equal expansion of the chest and an impaired percussion note over the left base where bronchial breathing is audible. There are râles and rhonchi over both lungs, most marked on the left side. No abnormalities were noted in other systems.

X-ray examination of the hands and forearms shows advanced rarification of the terminal phalanges, with calcareous deposits round the wrists and elbow-joints. X-ray films of the chest (fig. 1) show diffuse fibrosis, especially at the left base. A cyst is present at the left base and other fine cystic outlines are visible throughout the left lung. A bronchogram shows a mild degree of bronchiectasis, but the cysts were not entered by the iodised oil. A barium swallow showed no abnormality of the œsophagus.

LEGENDS TO ILLUSTRATIONS ON PLATE

DR. CHURCH, DR. ELLIS

Fig. 1—Case 1 on June 17, 1949: *diffuse fibrosis and cyst formation.*

Fig. 2—Case 2 on Dec. 9, 1946: consolidation in right lower zone. (Film on April 21, 1947, showed further consolidation of right lung.)

Fig. 3—Case 2 on June 6, 1947: cysts, particularly in right upper zone.

SIR ADOLPHE ABRAHAMS

Fig. 1—Calcified arteries of leg.

Fig. 2—Calcified phalangeal artery of hallux.

DR. LORBER

Fig. 1—Case 6 on admission: miliary, with opacity in left lung. (*a*) 19 months later: opacity persists, with calcified mass in upper lobe.

Fig. 2—Case 14 on admission: miliary, with primary focus at right hilum. (*a*) After 6 months' treatment: lesion larger (fatal case).

Fig. 3—Case 18 on admission: miliary, with primary lesion at right hilum. (*a*) After 10 months' treatment: lesion much larger.

No tubercle bacilli were found in the sputum. Electrocardiogram and urinary creatinine output were normal. The urine contained no creatine. Red-cell count 3,740,000 per c.mm., Hb 10·4 g. per 100 ml., white cells normal.

Case 2.—A married woman, aged 47 years. In 1935, at the age of 33, she started to get typical Raynaud attacks, with "deadness" and pallor of the fingers. These attacks have gradually become more severe. The feet, ears, nose, and occasionally the tongue, are now similarly affected. At the same time she noticed that her skin was becoming darker and she began to suffer from epigastric pain and vomiting. Her symptoms at that time suggested a peptic ulcer but a barium meal in 1936 did not show an ulcer, though there was some dilatation of the stomach.

In 1937 she was admitted to Addenbrooke's Hospital and diagnosed as scleroderma with Raynaud's phenomenon. Chemical investigations gave no support to the possibility of her pigmentation being due to Addison's disease. (Blood-pressure 115/75 mm. Hg.) She was treated with injections of 'Padutin' with slight improvement. However, she continued to have attacks of abdominal pain and occasional episodes of diarrhœa. The spleen was repeatedly palpable at this time. She lost weight.

In 1944 she began to have dysphagia. Her food seemed to stick substernally. A barium swallow showed a tapering constriction at the lower end of the œsophagus; and follow-through showed considerable delay in the passage of barium with absence of the normal intestinal pattern and clumping of the barium. For her dysphagia she subsequently used a mercury bougie with considerable benefit.

In 1946 the vomiting became more severe and persistent. A gastroenterostomy was performed for pyloric stenosis. She continued to vomit occasionally after the operation and soon developed a cough with mucopurulent sputum. There was one small hæmoptysis and she became dyspnœic on effort. This was followed by a long illness with irregular fever and consolidation of the right lung, beginning in the right lower lobe (fig. 1). The process gradually spread to involve part of the right upper lobe. Many samples of her sputum were negative for tubercle bacilli. There was no leucocytosis but she had a considerable microcytic anæmia (Hb 8·2 g. per 100 ml.). Her weight had now fallen from $7^{1}/_{2}$ to 5 stone.

No appreciable response followed a full course of chemotherapy (sulphadimidine 35 g. and penicillin 8 mega units), but her fever slowly settled and the opacity in her right chest gradually resolved to leave a cystic appearance particularly affecting the right upper zone (fig. 2). There was also some residual fibrotic change in the left lung. The X-ray findings were reported on by Dr. F. R. Berridge, radiologist to Addenbrooke's Hospital, who correlated the lung changes with her scleroderma.

Since 1947 she has gradually improved and has gained weight. She is still dyspnœic on effort and has a troublesome cough with up to 1 oz. of sputum per day. Her anæmia has improved (Hb 11·0 g. per 100 ml.).

On examination she now has the typical pinched immobile facies of scleroderma with tightly stretched skin and fissures radiating from the corners of her mouth. Small telangiectatic spots are present on both cheeks and the lower lip. There is generalised pigmentation of the skin. The flexures, nipples, and her operation scar are not conspicuously pigmented but there is one small patch of pigmentation inside the right cheek. A few depigmented patches are present on the legs. The skin is dry and atrophic and there is induration of the subcutaneous tissues, especially of the forearms. A typical Raynaud's attack was witnessed during recent examination. There is some limitation of movement in the joints of the fingers and wrists, but no obvious deformity of the hands. Small superficial ulcers are present on the fingers. The patient also shows evidence (radiological only) of subcutaneous calcinosis in the upper extremities. Cardiovascular examination, including E.C.G., shows no abnormality. Her blood-pressure is now 130/80 mm. Hg. On routine examination the urine is also normal. Physical examination of the chest shows a pronounced dorsal kyphosis with poor but apparently equal expansion. Percussion note is impaired over the right upper chest and there are poor breath sounds and occasional crepitations over the same area. There are no clinical signs of cavitation, which suggests that there is no free communication between the cysts and the corresponding bronchi.

DISCUSSION

The onset of generalised scleroderma is commonly gradual with symptoms suggesting Raynaud's disease. This form of onset is differentiated into a distinct entity by Sellei (1934) and named acrosclerosis. Scleroderma may also begin with an acute afebrile illness and show many of the features of dermatomyositis, with which condition it was grouped by Dowling (1940). The 2 cases reported show this contrast in type of onset. Of the 9 cases described by Weiss et al. (1943), 6 presented as acrosclerosis and in 3 there was an acute febrile onset.

Involvement of the internal organs to such a degree as to be clinically detectable is usually a late manifestation of scleroderma, occurring in most reported cases years after the onset of symptoms. However the case of Wigley et al. (1949) suggests that pulmonary changes at least may precede the more common features of the disease.

The 2 cases reported here have been under observation for many years. In case 1 the lung changes became manifest with certainty less than seven years from the onset of the disease. The lung condition in case 2 has been observed developing during the last three years, ten years from the onset of symptoms. In this case the Raynaud's phenomenon, pigmentation, epigastric pain, and vomiting began simultaneously.

Dyspnœa is a common feature of all reported cases of fully developed pulmosclerosis and there is constantly a large reduction in the vital capacity, but the dyspnœa is often out of proportion to the lung damage. The mechanism of this dyspnœa is probably similar to that of cardiac dyspnœa and due to increased rigidity of the lung tissue. Cough is a common symptom, and the quantity of sputum depends on superadded infection, to which the subjects of pulmosclerosis are unduly liable. Pulmonary infection is commonly cited as a terminal event in uncomplicated scleroderma. It is probably often due to the favourable soil offered by undetected pulmonary sclerosis rather than to restriction of chest expansion.

Cystic changes in the lungs are an unusual finding in scleroderma. Clinically the changes produced are similar to those described in "honeycomb lung" (Oswald and Parkinson 1949). It is reasonable to suppose that the mechanism of cyst production is similar. Progressive fibrosis leads to bronchiolar obstruction. Areas of obstructive emphysema result from this, and ultimately when the obstruction becomes almost complete cysts are formed. This process of cyst formation, once begun, may be accelerated by fibrotic contraction of the surrounding tissues. In case 1 iodised oil introduced into the bronchial tree did not enter the cystic cavities, suggesting advanced stenosis of the communicating bronchioles.

Getzowa (1945) found that the epithelial lining of these cysts consisted of either cuboidal or columnar cells. More rarely ciliated epithelium may be present. No basement membrane was recognisable.

The widespread distribution of visceral lesions in scleroderma may clearly provide a difficult problem in diagnosis, and the underlying condition may be overlooked if examination is concentrated on the system predominantly affected. This is especially true of the lung changes in scleroderma, which show considerable variation both clinically and radiologically, and thus may mimic a number of lung conditions, notably bronchiectasis and chronic bronchitis, tuberculosis, "congenital cystic lungs," atypical and unresolved pneumonia, or fibrosis from other causes.

Although scleroderma may occur primarily in the skin, its name obscures the disseminated nature of the disease. Goetz (1945) suggested the adoption of the name progressive systemic sclerosis as more descriptive of the condition, and we agree.

Lung changes showing a similar histology are reported in disseminated lupus erythematosus (Klemperer 1948), and in rheumatoid arthritis (Ellman and Ball 1948). Clinically, rheumatoid arthritis has much in common with generalised scleroderma and has been reported in association with it (Ellman and Parkes Weber 1948). Lung changes are also reported in polyarteritis nodosa (Miller and Daley 1946). The X-ray changes show as increased vascular markings, particularly at the hila, and transitory infiltrations of the lower lobe regressing without residual abnormality. These changes are probably due to perivascular infiltration œdema and hæmorrhage. Permanent fibrosis is not reported.

Scleroderma and lupus erythematosis have been associated in the group of collagen vascular diseases, which also includes dermatomyositis and polyarteritis (Banks 1941). The diseases do not resemble one another clinically, and the appearance of lung affection, Raynaud's phenomenon, or renal involvement occasionally in all of them is understandable in view of the disseminated nature of the collagen vascular change.

The grouping together of these diseases is based largely on the histological findings, for perivascular cellular infiltration, endarteritis, and fibrinoid necrosis of the collagen ground substance of the arterial walls and surrounding connective tissue are present in all. The occurrence of similar changes in anaphylactic lesions of the lungs and other organs both experimentally produced in animals and as found at autopsy in patients with serum sickness (Rich and Gregory 1943, 1946) has been held to support the allergic theory of the ætiology of these diseases. However, the production of fibrinoid necrosis in collagen tissue has been described in a number of widely separated clinical diseases and experimentally produced conditions. It is recognised as occurring in malignant and experimentally produced hypertension, and locally it may be found in the base of peptic ulcers and in the vicinity of foreign bodies and abscesses (Baehr and Pollack 1947). These facts offer little support to the hypothesis of a common ætiology in these collagen vascular diseases.

SUMMARY

The published work on scleroderma with fibrosis of the lungs is reviewed.

Cystic pulmonary fibrosis is reported in two cases; these demonstrate the widespread nature of scleroderma, which is sometimes regarded as primarily a disease of the skin.

Scleroderma should be considered in the differential diagnosis of obscure fibrotic lung conditions, remembering that the lung lesion may occur without obvious skin changes.

The association with pulmonary lesions in other diseases of collagen tissue is discussed.

We are indebted to Dr. L. B. Cole and Dr. C. H. Whittle for permission to publish these cases, and to Dr. Ff. Roberts and Dr. F. R. Berridge for permission to reproduce the X-ray films.

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ARTERIAL CALCIFICATION

A PERSONAL OBSERVATION*

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With illustrations on plate

THE familiar saying that "a man is as old as his arteries" may be regarded either as a mere platitude repeated irresponsibly, or as a pointer to a convenient means of estimating general physique and viability. If we desire to apply it seriously we must first establish the criteria of arterial age.

The first difficulty is to distinguish between senile and pathological changes—a difficulty which is complicated by the uncertainty of deciding if so-called degeneration may be accepted as a normal process, and when the limit of what may be regarded as physiological is transcended; or, to put it simply, when senescence becomes senility. There is the further difficulty of selecting the arteries which provide an index of the circulatory system as a whole, since it is recognised that their vulnerability or resistance varies considerably. It is well known that the coronary arteries alone may be the seat of pathological changes, and that the cerebral vessels may be prematurely sclerosed independently of the arterial system as a whole. An estimation of life-expectation based on the condition of such vital structures must be very different from an estimation based on a presumably similar condition in vessels which are less directly related to survival and therefore to longevity.

Hence the observations recorded in this paper can have only a limited value, yet certain conclusions appear to be legitimate and worth presenting.

FINDINGS

Twenty-five years ago, after an athletic injury, X-ray examination of my lower limb revealed not only a fractured metatarsal but, rather unexpectedly, also calcification of the arteries. Having continued during the ensuing twenty-five years to take strenuous exercise in the form of running, fast walking, and climbing, I thought it might be worth while investigating the present state of these arteries. Skiagrams (fig. 1 and 2, on plate) show gross calcification in all the arteries of the lower limb, from the femoral artery down to the phalangeal artery of the great toe, including collateral vessels, particularly a subcutaneous vessel running over the calf. The arteries in the upper limb, however, are completely invisible radiographically. The thoracic and abdominal aorta similarly appears to be free from calcification.

A portion of a dorsalis pedis artery was excised and examined histologically. Sections stained with hæmatoxylin and eosin and with Weigert's elastic stain exhibit the features accepted as those of medial calcification (Mönckeberg's sclerosis). Projecting into the lumen at one point, but not causing any serious occlusion, is a strand of organised thrombus (fig. 3). The intima shows slight fibrous thickening but no true atheroma. The internal elastic lamina is fragmented and, at one or two places, reduplicated (fig. 4). The media shows calcification in the form of clearly circumscribed blocks of variable thickness apparently originating just below the inner elastic layer and at certain points spreading out almost to the adventitia (fig. 5). The surviving media exhibits advanced degeneration of the elastic and smooth muscle fibres with replacement by a lightly staining myxomatous stroma between the attenuated muscle-fibres (fig. 6). There is general dilatation of the vasa vasorum in the adventitia—presumably an attempt to improve the collateral circulation to compensate for any loss of contractility. Microscopy of an excised portion of a radial artery provides a striking contrast in all the features enumerated (fig. 7).

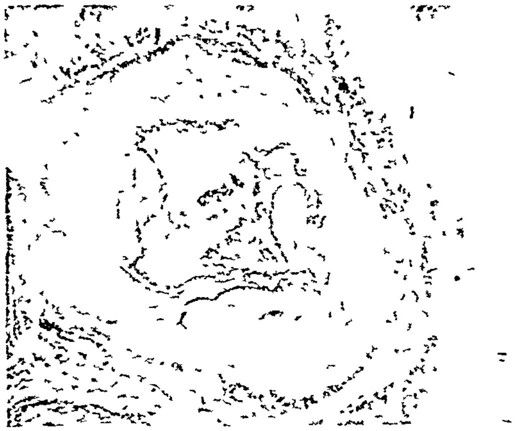
Fig. 4—Section of dorsalis pedis artery, showing reduplication and fragmentation of internal elastic lamina of intima. (Low power, Weigert's elastic stain.)

DISCUSSION

Medial calcification is generally held to be a degenerative process, and, as relating to the arteries of the leg,

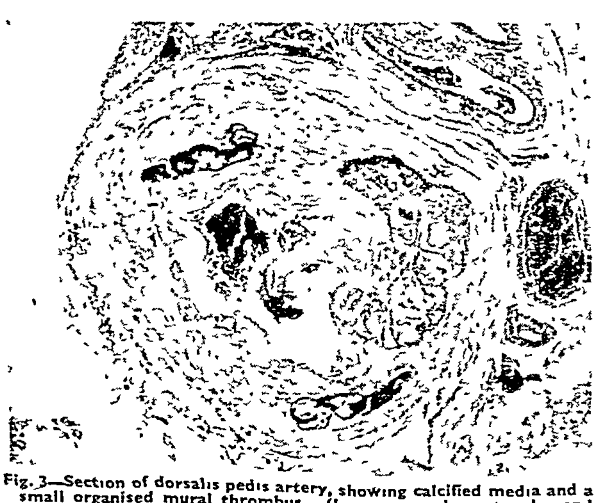
Fig. 3—Section of dorsalis pedis artery, showing calcified media and a small organised mural thrombus. (Low power, hæmatoxylin and eosin.)

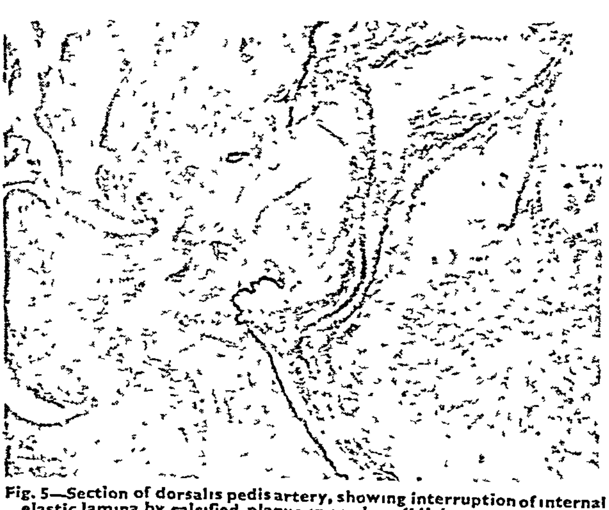
Fig. 5—Section of dorsalis pedis artery, showing interruption of internal elastic lamina by calcified plaque in media. (High power, Weigert's elastic stain.)

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* A communication to the Association of Physicians of Great Britain and Ireland, Belfast, June 4, 1949.

DISCUSSION

The onset of generalised scleroderma is commonly gradual with symptoms suggesting Raynaud's disease. This form of onset is differentiated into a distinct entity by Sellei (1934) and named acrosclerosis. Scleroderma may also begin with an acute afebrile illness and show many of the features of dermatomyositis, with which condition it was grouped by Dowling (1940). The 2 cases reported show this contrast in type of onset. Of the 9 cases described by Weiss et al. (1943), 6 presented as acrosclerosis and in 3 there was an acute febrile onset.

Involvement of the internal organs to such a degree as to be clinically detectable is usually a late manifestation of scleroderma, occurring in most reported cases years after the onset of symptoms. However the case of Wigley et al. (1949) suggests that pulmonary changes at least may precede the more common features of the disease.

The 2 cases reported here have been under observation for many years. In case 1 the lung changes became manifest with certainty less than seven years from the onset of the disease. The lung condition in case 2 has been observed developing during the last three years, ten years from the onset of symptoms. In this case the Raynaud's phenomenon, pigmentation, epigastric pain, and vomiting began simultaneously.

Dyspnœa is a common feature of all reported cases of fully developed pulmosclerosis and there is constantly a large reduction in the vital capacity, but the dyspnœa is often out of proportion to the lung damage. The mechanism of this dyspnœa is probably similar to that of cardiac dyspnœa and due to increased rigidity of the lung tissue. Cough is a common symptom, and the quantity of sputum depends on superadded infection, to which the subjects of pulmosclerosis are unduly liable. Pulmonary infection is commonly cited as a terminal event in uncomplicated scleroderma. It is probably often due to the favourable soil offered by undetected pulmonary sclerosis rather than to restriction of chest expansion.

Cystic changes in the lungs are an unusual finding in scleroderma. Clinically the changes produced are similar to those described in "honeycomb lung" (Oswald and Parkinson 1949). It is reasonable to suppose that the mechanism of cyst production is similar. Progressive fibrosis leads to bronchiolar obstruction. Areas of obstructive emphysema result from this, and ultimately when the obstruction becomes almost complete cysts are formed. This process of cyst formation, once begun, may be accelerated by fibrotic contraction of the surrounding tissues. In case 1 iodised oil introduced into the bronchial tree did not enter the cystic cavities, suggesting advanced stenosis of the communicating bronchioles.

Getzowa (1945) found that the epithelial lining of these cysts consisted of either cuboidal or columnar cells. More rarely ciliated epithelium may be present. No basement membrane was recognisable.

The widespread distribution of visceral lesions in scleroderma may clearly provide a difficult problem in diagnosis, and the underlying condition may be overlooked if examination is concentrated on the system predominantly affected. This is especially true of the lung changes in scleroderma, which show considerable variation both clinically and radiologically, and thus may mimic a number of lung conditions, notably bronchiectasis and chronic bronchitis, tuberculosis, "congenital cystic lungs," atypical and unresolved pneumonia, or fibrosis from other causes.

Although scleroderma may occur primarily in the skin, its name obscures the disseminated nature of the disease. Goetz (1945) suggested the adoption of the name progressive systemic sclerosis as more descriptive of the condition, and we agree.

Lung changes showing a similar histology are reported in disseminated lupus erythematosus (Klemperer 1948), and in rheumatoid arthritis (Ellman and Ball 1948). Clinically, rheumatoid arthritis has much in common with generalised scleroderma and has been reported in association with it (Ellman and Parkes Weber 1948). Lung changes are also reported in polyarteritis nodosa (Miller and Daley 1946). The X-ray changes show as increased vascular markings, particularly at the hila, and transitory infiltrations of the lower lobe regressing without residual abnormality. These changes are probably due to perivascular infiltration œdema and hæmorrhage. Permanent fibrosis is not reported.

Scleroderma and lupus erythematosis have been associated in the group of collagen vascular diseases, which also includes dermatomyositis and polyarteritis (Banks 1941). The diseases do not resemble one another clinically, and the appearance of lung affection, Raynaud's phenomenon, or renal involvement occasionally in all of them is understandable in view of the disseminated nature of the collagen vascular change.

The grouping together of these diseases is based largely on the histological findings, for perivascular cellular infiltration, endarteritis, and fibrinoid necrosis of the collagen ground substance of the arterial walls and surrounding connective tissue are present in all. The occurrence of similar changes in anaphylactic lesions of the lungs and other organs both experimentally produced in animals and as found at autopsy in patients with serum sickness (Rich and Gregory 1943, 1946) has been held to support the allergic theory of the ætiology of these diseases. However, the production of fibrinoid necrosis in collagen tissue has been described in a number of widely separated clinical diseases and experimentally produced conditions. It is recognised as occurring in malignant and experimentally produced hypertension, and locally it may be found in the base of peptic ulcers and in the vicinity of foreign bodies and abscesses (Baehr and Pollack 1947). These facts offer little support to the hypothesis of a common ætiology in these collagen vascular diseases.

SUMMARY

The published work on scleroderma with fibrosis of the lungs is reviewed.

Cystic pulmonary fibrosis is reported in two cases; these demonstrate the widespread nature of scleroderma, which is sometimes regarded as primarily a disease of the skin.

Scleroderma should be considered in the differential diagnosis of obscure fibrotic lung conditions, remembering that the lung lesion may occur without obvious skin changes.

The association with pulmonary lesions in other diseases of collagen tissue is discussed.

We are indebted to Dr. L. B. Cole and Dr. C. H. Whittle for permission to publish these cases, and to Dr. Ff. Roberts and Dr. F. R. Berridge for permission to reproduce the X-ray films.

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without further treatment (see below), though the healing is much slower than with penicillin, aureomycin, or even chloramphenicol. Thus, if soft sores are treated with penicillin, streptomycin, aureomycin, or chloramphenicol (all of which seem to have some action in the natural infection if given in sufficient dosage), the patient should be observed for 2 years in case a concomitant syphilitic infection has been missed. However, streptomycin seems to be the most effective antibiotic against soft sore. In-vitro tests by Wetherbee et al. (1949) confirm this view and suggest that penicillin and aureomycin are only slightly active.

So far in this country there has been little confirmation of the American work, partly because soft sore is comparatively uncommon here but more especially because streptomycin has been largely reserved for more serious conditions. The following case-records indicate the effectiveness of quite small doses of the drug.

Case 1.—A young male native of Southern Rhodesia reported in May, 1949, with two preputial sores of 4 days' duration and a developing right bubo. No gonococci were found in the urethral smear, three daily dark-field examinations of material from the sores were negative for *T. pallidum*, and the Wassermann, Kahn, and Ide tests on his blood were negative. Ducrey's bacilli were found in the sores, and the Dmelcos skin test for chancroid was positive. The lygranum skin test for lymphogranuloma venereum was negative. The patient was given the small dose of 0·5 g. of streptomycin daily for 4 days (total 2 g.). The Ducrey's bacilli disappeared from the sore, the sore healed, the bubo subsided without fluctuation, and the patient was considered fit for discharge on the 5th day. The bubo was not aspirated.

Case 2.—A young male native of Southern Rhodesia reported with two preputial sores and a developing left bubo, having had his last sexual exposure 10 days before. No gonococci were seen in the urethral smear, three dark-field examinations of material from the sores were negative for *T. pallidum*, and the Wassermann, Kahn, and Ide tests on his blood and the lygranum skin test were all negative. Ducrey's bacilli, however, were found in smears from the sores, and the Dmelcos skin test was positive. He was given 0·5 g. of streptomycin once daily for 5 days (total 2·5 g.). The Ducrey's bacilli disappeared from the sores, which healed by the 7th day. The bubo, however, fluctuated and was aspirated on the 4th day.

Case 3.—A young male native of Portuguese East Africa reported with multiple preputial sores and a right inguinal bubo, having had his last sexual exposure 7 days before. The urethral smear was negative for gonococci, two dark-field examinations did not show *T. pallidum*, and the lygranum skin test was negative. The Wassermann, Kahn, and Ide tests on his blood were also negative, but the Dmelcos skin test was positive. He was given eight daily injections of 0·5 g. of streptomycin intramuscularly (total 4 g.). The sore was slow in healing but had healed by the 12th day. The bubo required two aspirations, on the 5th and 9th days.

Case 4.—A young male native of Southern Rhodesia reported with two ulcers on the prepuce but no inguinal adenitis. His last sexual exposure had been 5 days before. No gonococci were found in the urethral smear, three dark-field examinations of material from the sores were negative for *T. pallidum*, and the Wassermann, Kahn, and Ide reactions of his blood were negative. The lygranum test was negative, but the Dmelcos skin test was positive. He received nine daily injections of 0·5 g. of streptomycin (total 4·5 g.). The sore healed by the 9th day.

Case 5.—A male native of Southern Rhodesia reported, 7 days after intercourse, with preputial sores without enlargement of the inguinal glands. The urethral smear showed no gonococci, two dark-field examinations were negative for *T. pallidum*, and the Wassermann, Kahn, and Ide tests on his blood were negative. The Dmelcos and lygranum skin tests were also negative but Ducrey's bacilli were found in smears from the sore. He was given three daily injections of only 0·5 g. of streptomycin, and the Ducrey's bacilli disappeared from the sore, which healed on the 3rd day, after which the patient was discharged. He relapsed, however, and, denying further exposure, returned 17 days later with multiple preputial sores and tender non-fluctuant but enlarged inguinal glands of 5 days' duration. The sores healed, and the developing bubo subsided without aspiration, after treatment with only four daily injections of 0·5 g. of streptomycin.

Case 6.—A male native of Southern Rhodesia reported with a rosette of soft sores on the prepuce and a developing right bubo. Smears from the urethra showed no gonococci, repeated dark-field examinations of material from the sores were negative for *T. pallidum*, and the blood Wassermann reaction was negative. The Dmelcos and lygranum skin tests were also negative. He was given four daily injections of 1 g. of streptomycin (total 4 g.). The bubo required aspiration on the 2nd day, but the sores healed in 3 days and he was discharged on the 5th day.

Case 7.—A male native of Nyasaland reported with a rosette of preputial sores without inguinal adenitis. Dark-field examinations of material from the sores were negative for *T. pallidum*, and the Wassermann reaction of the blood was negative, but the Dmelcos skin test was positive. Gonococci, however, were found in a purulent discharge from the urethra. The patient received 1 g. of streptomycin twice daily on the 1st day and a single injection of 1 g. on the 2nd day (total 4 g.). The urethral discharge disappeared at once, and the urine became clear in 24 hours. The sores healed by the 3rd day.

EFFECTS OF STREPTOMYCIN ON EARLY SYPHILITIC LESIONS

It has already been shown (Willcox 1948) that a small single dose of streptomycin, up to 0·6 g. as used for gonorrhœa, is insufficient to banish *T. pallidum* from a syphilitic chancre. Therefore in three cases of early syphilis repeated doses of streptomycin, such as might be used for soft sore were tried. It was found that the larger doses could abolish *T. pallidum* from the dark field and that thereafter the sores slowly but completely healed.

The three patients treated were all natives with typical primary syphilis. One was from Portuguese East Africa, and the remainder were from Southern Rhodesia. In one the chancres were multiple and in the others single. One was seronegative and the others were seropositive. All, however, showed typical syphilitic enlargement of the inguinal glands, and from all of them *T. pallidum* was recovered without difficulty.

One patient was given 1 g. of streptomycin three times a day for 2 days followed by 1 g. on the 3rd day (total 7 g.). The dark fields were negative at 24 hours and thereafter daily for the next 7 days. The sore healed slowly and had completely healed by the 11th day.

The second patient was given 1 g. of streptomycin twice daily for a day and 1 g. in two divided doses on the second day (total 3 g.). The dark field was still positive at 24 hours, and *T. pallidum* was again isolated, albeit with considerable difficulty, at 48 hours. Daily dark fields for the next 5 days, however, were negative, and the sore healed slowly by the 10th day.

The third patient received 1 g. of streptomycin twice daily for a day and 1 g. in divided doses on the 2nd and 3rd days (total 4 g.). The dark field remained positive at 24 hours and again at 48 hours. Thereafter it was negative for the next 4 days, and the sores healed without further treatment by the 10th day.

STREPTOMYCIN IN EXPERIMENTAL *H. ducreyi* INFECTION

The effectiveness of streptomycin against chancroid was tested in another way. Chancroid is readily inoculable; indeed, before it was recognised to be distinct from syphilis, deliberate inoculation was, for a time, a well-recognised treatment (syphilisation).

An intradermal injection of unsterilised bubo fluid from an untreated person will, in 48–72 hours, produce a small pustule which, if the person is untreated, will develop into an ulcer within the usual incubation

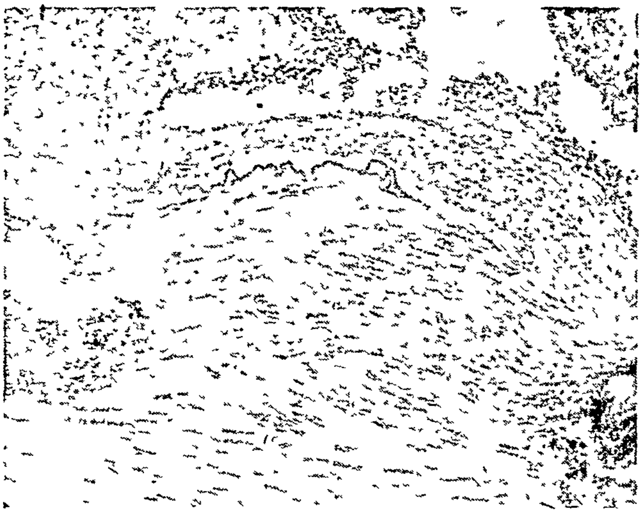

Fig. 6—Section of dorsalis pedis artery, showing degeneration of muscle-fibres in media. (High power, hæmatoxylin and eosin.)

a more or less normal one after the fifth decade. It is highly probable that appropriate investigation would reveal the onset in a considerable number of cases at an earlier age than that usually accepted. Since what is regarded as a senile change is in question, whether or no the term physiological may be used as synonymous, it is not easy to estimate the effect of exercise in the direction of aggravation, for very little material is available to investigate the influence of strenuous activity in middle and old age as these epochs are generally understood. Certain occupations which necessitate either long periods of standing or of protracted locomotion might provide information—e.g., those of waiters or postmen.

Medial calcification is relatively infrequent in the subjects of thromboangiitis obliterans. This suggests that occlusion, with non-functioning arteries, protects against calcification. If activity is a responsible factor, a high degree of Monckeberg's sclerosis would be expected in the vessels of the arms in those whose occupation demands vigorous use of the upper limbs, but I am not aware of any such observation.

What explanation is forthcoming for the far greater incidence in the vessels of the lower limbs of both medial calcification and Buerger's disease, though entirely different processes are concerned and it seems that activity is not responsible ? Is it the greater blood-pressure resulting from the erect attitude which operates for a considerable portion of the twenty-four hours of each day ?

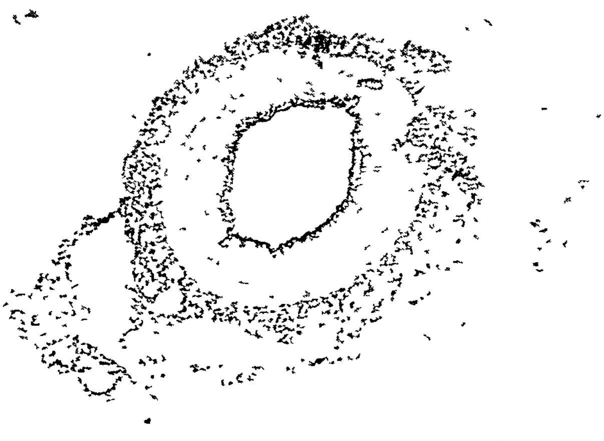

Fig. 7—Section of radial artery, showing no abnormality. (Low power, Weigert's elastic stain.)

The possibility of biochemical influence has to be remembered, and from time to time various hypotheses have been advanced about arteriosclerosis, especially in connection with the coronary arteries, but calcification appears to be in an isolated category. In my own case the serum-cholesterol has been found to be 168 mg. per 100 ml., the serum-calcium 10·4 mg. per 100 ml., and the plasma-inorganic phosphates 3·8 mg. per 100 ml. It is doubtful whether any useful deductions can be drawn from figures that are regarded as within normal limits.

It is not easy to take an objective view of a personal investigation. Symptoms which might be interpreted as evidence of circulatory inadequacy in the small peripheral vessels may be explainable as the exponent of a constitutional vasomotor dysfunction and quite unrelated to the conditions under consideration.

One criterion seems reasonably valid. The extensive calcification and the presumed reduction of contractility of the arteries can scarcely have caused substantial vascular impairment; for no muscular pain (so-called intermittent claudication) was noted even on the performance of such exercise as running nine miles in the hour.

SUMMARY

Extensive calcification of the vessels of the lower limb having been radiographically identified, a portion of a dorsalis pedis artery was excised and showed the features of Mönckeberg's sclerosis. A considerable amount of strenuous exercise could nevertheless be taken without giving rise to any muscular pain whatever. Evidently a high degree of medial calcification is compatible with circulatory efficiency.

I am greatly indebted to colleagues in various departments of Westminster Hospital for their generous cooperation.

STREPTOMYCIN IN SOFT SORE

OBSERVATIONS ON CLINICAL AND EXPERIMENTAL INFECTIONS

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IT is over 3 years now since Mortara and Saito (1946) showed that *Hæmophilus ducreyi* is sensitive to streptomycin, and in 1947 they demonstrated that streptomycin could prevent the appearance of chancroid in experimentally infected animals. The first results with the drug in the natural infection in man were reported by Hirsh and Taggart (1948), who treated fifteen patients with 1 g. daily in divided doses until the sores had healed, which took 5–25 days. Some of their patients were followed up for only a short time, and there was one possible recurrence at 6 weeks.

Streptomycin has one possible advantage which is not possessed by the sulphonamides or by penicillin, 'Aureomycin,' or chloramphenicol—that in small doses it has only a slight action on syphilis and thus does not appreciably affect the results of dark-field examinations. Thus (Willcox 1948) *Treponema pallidum* were found without difficulty in a primary chancre 24 hours after the patient had been given a single injection of streptomycin 0 6 g., a dose curative for gonorrhœa. It seemed therefore that streptomycin given in such doses for gonorrhœa, was unlikely to screen a simultaneous syphilitic infection. Larger doses, however, may banish *T. pallidum* from a chancre, and syphilitic sores may subsequently heal

After operation she was treated with continuous gastric suction for 24 hours and then for 3 days the stomach was aspirated twice a day. The residue averaged 2 oz. On the 8th day she was distended and gastric aspiration produced 60 oz. Aspiration of the stomach thrice daily was then started. On Feb. 28 a barium meal showed slow emptying of the stomach, with a third of the barium still in the stomach after 4½ hours.

At this time she started to have diarrhœa, the bowels moving about three times during the night but not during the day. She also complained of feeling bloated. An insulin test on March 12 showed no rise in gastric acidity after intravenous injection of 15 units of insulin.

At outpatient follow-up she complained of constant heartburn, and said she was so distended in the evenings that she could not wear her usual clothes, and spent the evenings in a dressing-gown. She had periods of vomiting when she brought up large quantities at intervals of two or three days. She stated that she had none of the original ulcer pain but could not decide whether the heartburn and distension were preferable to it. She was seen on April 13, 1949, and at that time it was thought that a gastro-enterostomy would almost certainly be necessary.

Second Admission

On May 11, 1949, she was admitted at midday with a history of very severe pain in the belly, which had started suddenly 2 hours previously. The pain was constant, worst in the upper abdomen, and did not radiate; there was no pain in the shoulder or back. She had vomited repeatedly and copiously since its onset. She was pale with a cyanotic tinge and looked very ill. Her pulse-rate was 80 per min., regular but almost imperceptible. Her systolic blood-pressure was 50 mm. Hg and the diastolic pressure could not be recorded. There was no trace of rigidity, and the posterior abdominal wall could be palpated easily from in front. Nevertheless the abdomen was exquisitely tender to touch; no mass was palpable, and gut sounds were present. Palpation of the pouch of Douglas per rectum was painful. A systolic murmur was heard at the apex. There was no sign of pneumothorax.

A perforated peptic ulcer was the probable diagnosis, but the complete absence of any rigidity and the severity of the shock suggested a coronary thrombosis. Radiography showed much gas under the diaphragm.

Her condition improved gradually and a plasma transfusion was started. Not until 1 A.M. on the 12th—15 hours after perforation—when her blood-pressure was 90/65 mm. Hg, was she deemed fit for operation.

Second Operation: Suture of Perforated Duodenal Ulcer

Through a small transverse incision, which preserved the recti though opening the rectus sheath on each side, a large quantity of clear fluid was seen and there was a considerable escape of gas from the peritoneal cavity. A perforation about ⅛ in. across was found on the anterior wall of the first part of the duodenum. This was sutured and a drain through a suprapubic stab wound was left in the pouch of Douglas.

She was treated with continuous gastric suction for 48 hours and then by repeated aspirations of the stomach. The aspirations were discontinued on May 21, but recommenced on the 26th, after she had become distended and a splash was heard. She was aspirated daily till June 8, when, with plasma-protein 6% and hæmoglobin 74%, she was considered fit for a partial gastrectomy.

Third Operation: Partial Gastrectomy

A Polya Hoffmeister antecolic partial gastrectomy was performed. The duodenum was divided distal to the ulcer and about four-fifths of the stomach was removed. She was given two pints of blood during the operation and her condition on leaving the table was good.

After the operation she was treated by continuous gastric suction for 48 hours and then stomach aspiration thrice daily. Gut sounds returned on the 3rd postoperative day and on the 4th day she said she had passed "the merest zephyr" of wind. In view of her vagotomy and previous gastric retention, daily gastric aspiration was continued until the 9th day.

Since the gastrectomy she has complained of weakness, but is pleased with the condition of her stomach. She has no pain, vomiting, or distension, and she enjoys her food.

DISCUSSION

Alvarez (1948), discussing vagotomy, says that there have been a few cases in which some time after the operation an ulcer has perforated without producing the usual paralysing pain. He refers to a case reported by Walters et al. (1947). The *British Medical Journal* (1948) repeats this statement, and, when asked by Johnson (1948) for details, refers to Walters's case.

I have been able to trace only two reported cases of perforation after vagotomy and not much detail is given about either of them.

In the one described by Walters et al. the patient died 14 days after transabdominal vagotomy and gastro-enterostomy for duodenal ulcer. A perforation had not been suspected but at necropsy a perforated duodenal ulcer and a subphrenic abscess were found. In this case, despite the gastro-enterostomy, there had been considerable postoperative gastric retention.

The other case, reported by Weeks et al. (1946), was that of an alcoholic hypertensive patient who had a duodenal ulcer of 15 years' standing. At the first operation a transthoracic vagotomy and a left thoracolumbar sympathectomy were performed. There was some postoperative gastric retention. After 13 days a right thoracolumbar sympathectomy was performed and 6 days later the patient became confused and obstreperous. On the 15th day after the second operation he complained of pain in the lower abdomen, and slight diffuse abdominal tenderness was found. Examination was difficult because of his lack of coöperation. At necropsy a perforated duodenal ulcer 2·5 cm. in diameter was found.

The issue in both of these cases is confused by the additional procedures performed—in one a gastro-enterostomy and in the other a thoracolumbar sympathectomy.

The present case differs from these two cases in many ways. The ulcer perforated 15 months after vagotomy and not in the postoperative period. It is well known that perforation of viscera, or intraperitoneal leak from a suture line in the early postoperative period, may occur with very little pain, and in fact this is one of the most difficult conditions to diagnose; but this patient suffered very severe pain. The most remarkable feature was the complete lack of rigidity, the abdomen being soft but intensely tender. In the two American cases there is no mention of rigidity, though the impression given is that rigidity, if present, was slight. Until radiography showed much gas under the diaphragm, the diagnosis in the present case was in doubt. The lack of rigidity might be attributed to the shock, which was profound—the systolic blood-pressure being 50 mm. Hg on admission. But even when the systolic pressure reached 90 mm. Hg there was still no rigidity. The other suggestion is that division of the vagi in some way interfered with the appearance of rigidity, though it has been widely held that abdominal rigidity is due to a segmental spinal reflex, the vagus pathway not being involved.

Why the ulcer perforated is uncertain. At the time of vagotomy the pyloric canal was the size of a little finger and there was severe postoperative retention of the gastric contents. This was also noted in the other two reported cases. The most obvious contention would be that the vagotomy was not complete: but the postoperative insulin test was satisfactory, and she developed two of the common complications of adequate vagotomy—namely, diarrhœa and a feeling of distension after food.

In the light of experience I should probably not do a vagotomy on a patient with as much stenosis as this one had. I now do vagotomy only in cases of duodenal ulcer where stenosis is very slight: in all others operated on I prefer to do a high partial gastrectomy, rather than confuse the issue by combining vagotomy with some additional procedure such as gastro-enterostomy or antrectomy.

period of the disease. Such ulceration may be avoided by needling the pustule and treating with appropriate systemic drugs, whose relative effectiveness may be tested in this way. Such a method, however, involves a positive take in every case and is therefore less suitable than the methods to be described.

If inoculated persons are treated with the drugs to be tested at the time of inoculation, a "take" is only to be expected in the failures of treatment. Either the fluid may be obtained from the recipient's own bubo, in which case no controls are available, or hetero-inoculations may be used with proper controls in volunteers. A second method is to test the virulence of a given bubo by inoculation into a volunteer and then treat the patient with the drug to be tested, serial inoculations being made into volunteers at various times after the start of treatment. Both methods limit the numbers of positive takes, and both were used with streptomycin.

Three patients with chancroidal buboes had 0·05 ml. of bubo fluid injected intradermally into their own forearms and were treated with 0·5–1·0 g. of streptomycin daily for 3 days. In none did a pustule form; in one case a small non-tender papule formed at 48 hours and disappeared within 96 hours of inoculation. The objection to this method is that there can be no control apart from an injection of the same material into another person, which cannot be regarded as a strict comparison.

Seven other volunteers, therefore, received hetero-inoculations from four donors and were treated with 1·5–6·0 g. of streptomycin over 2–5 days. In none did a pustule develop, though one showed a well-marked indurated papule at 96 hours, which was not needled and, in the light of later experience, was possibly a minor take. Fourteen of sixteen controls, on the other hand, given similar inoculations from the same four donors but receiving no systemic treatment, developed the pustular reaction, which was aborted by needle aspiration and with suitable drugs, of which streptomycin was found to be one.

In addition, two patients with chancroidal buboes were shown to have virulent fluid in so far as the pustular reaction developed in two out of the three controls injected. The donors were given 1–2 g. of streptomycin daily, and intradermal injections of 0·05 ml. of aspirated bubo fluid were made each day into others. The first donor received 2 g. of streptomycin on the 1st day and thereafter 1 g. daily for 3 days. Intradermal injections were made into the forearms of four others 24, 48, and 72 hours after the start of treatment without producing a pustular or ulcerative reaction in any of them. Incidentally, the donor of this series was discharged with the bubo subsided and the sore healed 5 days after treatment with streptomycin. The second donor received 3 g. of streptomycin in 3 days, and injections of the bubo fluid were made into five volunteers 24 and 48 hours after the beginning of treatment without producing a reaction in any of them.

SUMMARY AND CONCLUSIONS

Eight African negroes with soft sore were treated with 1·5–5·0 g. of streptomycin in 2–9 days. No adverse effects were noted.

The sores healed in an average of 6 days. Four out of five actual or developing buboes required aspiration. There was one known relapse.

Three patients in whom dark-field examinations showed primary syphilis were given 3–7 g. of streptomycin in 2 or 3 days. At 24 hours the dark-field examination was negative in one and positive in two, in both of which *T. pallidum* was again recovered with difficulty at 48 hours. Subsequently daily dark-field examinations were made in all the cases until the sores had healed, with negative results. Healing was slow, taking 10–11 days.

Ten persons received injections of 0·05 ml. of bubo fluid of proved virulence intradermally into the forearm and were treated with 1·5–6 g. of streptomycin in 2–5 days. In none did a reaction develop, though fourteen of sixteen controls showed a positive result.

Injection of bubo fluid of previously proved virulence from two persons with chancroidal buboes treated with streptomycin into the arms of nine others 24–72 hours after the start of treatment also did not provoke a single reaction.

It is confirmed that streptomycin is effective against soft sore both in natural and in experimental infection. It may be inferred from the experiments described that it is also prophylactic.

Streptomycin has some action on a syphilitic infection when given in sustained dosage.

The sulphonamides continue to be the drugs of choice for the treatment of chancroid. They are just as effective and, if properly handled, no more toxic, but have no action on syphilis, and therefore a follow-up of only 3 months is necessary after treatment to exclude a tardy syphilitic infection, whereas, if streptomycin is used, the follow-up should be longer.

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PERFORATION OF A DUODENAL ULCER FIFTEEN MONTHS AFTER VAGOTOMY

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PERFORATION of a duodenal ulcer after vagotomy is one of the rarer complications of this operation, and the following case seems to be the first reported example of a late perforation after vagotomy.

CASE-RECORD

A retired schoolmistress was 65 years old when she was admitted to hospital on Dec. 18, 1947, having vomited about a pint of "coffee grounds" 4 days previously. She had fainted the day before admission and passed a black stool.

She had a 24 years' history of recurrent attacks of abdominal pain and vomiting. The attacks lasted about a fortnight with intervals of 2–3 months. She had had two attacks of hæmatemesis, one 24 years and one 21 years ago. She had lost her appetite for a few months before admission but had no recent vomiting.

Her general condition was fair. The abdomen was scaphoid and there was no tenderness or mass. The blood-pressure was 140/80 mm. Hg and the hæmoglobin 70%. A barium meal showed deformity in the region of the pylorus, but the radiologist could not say on which side of the pylorus the lesion was. Gastroscopy did not reveal any lesion of the stomach, but a good view of the antrum was not obtained. An insulin test showed a steep rise in gastric acidity after 15 units of insulin given intravenously, and a high resting acidity.

First Operation (Feb. 6, 1948): Vagotomy

At operation a duodenal ulcer was found, with the duodenal lumen narrowed down to the size of the little finger. A strong band crossing the pyloric antrum probably accounted for the radiologist's doubts in diagnosis. As the stenosis was not regarded as excessive, a trans-hiatal vagotomy was performed, about 3 in. of each vagus being resected. An isolated branch of the right vagus was also resected. At the same time a right ovarian cyst was excised after enlarging the incision downwards.

Reviews of Books

Urological Aspects of Spinal Cord Injuries

George C. Prather, M.D., department of genito-urinary surgery, Harvard Medical School, Boston, Mass. Oxford: Blackwell Scientific Publications. 1949. Pp. 146. 27*s*.

The danger of forgetting the lessons of war is as great in medicine and surgery as in the military arts. At the outbreak of the second world war there was no settled policy for the treatment of the bladder in spinal injuries, and despite advances made in the light of increased experience there are still many differences of opinion on the right methods to use. This monograph, setting out the evidence available, should revive interest in a problem which still awaits final solution. The opening section on the anatomy, nerve-supply, and physiology of the normal bladder at once reveals some conflicting views, but summarises those generally accepted. The term "internal sphincter" is retained for convenience, but with the proviso that it does *not* denote a circular arrangement of muscle at the bladder neck. In line also with modern concepts is the belief that sympathetic-parasympathetic antagonism does not hold good in the bladder. The changes in bladder function after spinal-cord injury are clearly described; Dr. Prather recognises three stages of recovery, the atonic neurogenic bladder, the autonomous bladder, and the periodic reflex automatic bladder of complete transection, or the voluntary neurogenic bladder of partial transection. This perhaps oversimplifies a complicated subject, and no mention is made of the not uncommon longitudinal spinal lesion. The special methods of examination of the bladder by cystometry, cystoscopy, and cystography are described, with reliance placed on cystometry as an index of progress. He rightly demands that cystoscopy in these cases should only be done by an expert. Ureteric reflux in cystography is found to be uncommon, and is ascribed to inflammation rather than to the effect of the nerve lesion.

The care of the paralysed bladder is discussed; whatever may be the outcome of the arguments between urethral and suprapubic catheter drainage Dr. Prather is of the opinion, shared by most competent observers, that intermittent catheter drainage, is the worst form of immediate treatment. In the early stages he accepts either urethral or suprapubic continuous drainage, with either manual or automatic (tidal) irrigation. His criterion for abandoning the urethral catheter is the severity of the case, as assessed by further neurological examination. Where drainage for more than a few weeks is required, he prefers the suprapubic route, and recognises the need for a high opening. Bladder-neck resection is used selectively and only when the maximum neurogenic activity has been attained. There is a good section on the genito-urinary complications, including those due to a urethral catheter. He gives the results of treatment in his own cases as well as those of others, and British surgeons will share most of his opinions. It is interesting that, despite an official programme of urethral tidal-drainage ordered by the U.S. Chief Surgeon in the European theatre of operations before D-day, it was not long before patients began to return with suprapubic tubes. Suprapubic drainage was the official British policy and undoubtedly paid handsomely. A good bibliography, which does not neglect British work on the subject, completes a useful book.

The Natural History of Mosquitoes

Marston Bates. New York and London: Macmillan. 1949. Pp. 379. 25*s*.

This book is neither a handbook to the mosquitoes of the world, nor a medical text, but a true natural history, covering both our knowledge of mosquitoes in the field and our attempts to analyse our observations in the laboratory. Dr. Bates dislikes the division of biology into "self-important little sciences, each preoccupied with the accumulation of its own peculiar kind of facts, according to the forms and rituals that are prescribed by its traditions." His book is therefore a collection of all sorts of information about living mosquitoes, beginning with an account of the differences in the ways of life of various species, as well as of their similarities. He holds that cryptic species (i.e., species which are physiologically distinct, but difficult to separate on anatomical points) have a real value in systematics; and certainly such distinctions are most useful in the field identification of any animal. This section is separated, by chapters on the relation of mosquitoes to pathogenic organisms, from a section entirely devoted to the species problem—an arrangement which entails some irritating repetition. In dealing with the enemies of mosquitoes, and the rôle of mosquitoes as vectors of human disease, Dr. Bates has not emphasised the medical aspect of mosquito biology; but in the chapter on the strategy of mosquito research he uses the considerable body of knowledge collected through medical research on mosquitoes. The time has undoubtedly come for the academic biologist to use this knowledge as the start of more critical studies of mosquito populations, for it is on such analyses that successful mosquito control might be built. Dr. Bates has made a useful contribution to this end.

Metabolic Interrelations

Transactions of the first conference, Feb. 7–8, 1949. Editor: Edward C. Reifenstein, M.D. New York: Josiah Macy, Junior, Foundation. 1949. Pp. 193. $2.95.

Biological Antioxidants

Transactions of the third conference, Oct. 7–8, 1948. Editor: Cosmo G. Mackenzie. New York: Josiah Macy, Junior, Foundation. 1949. Pp. 146. $2.70.

The Josiah Macy, Junior, Foundation sponsors a number of conferences of special investigators representing, so far as possible, all the branches of science which bear on a particular problem. The proceedings of the conferences are published, and we have reviewed a number of those on convalescence. The transactions of the first of the conferences on metabolic interrelations consist of a series of 19 papers, and that of the third conference on biological antioxidants of 10 papers, each followed by a long discussion, reported at full length, after the pattern laid down for other conferences. The authors of the papers are all experts in their own fields, and each of their contributions demands a considerable degree of specialised knowledge on the part of the reader. These conferences must certainly be most useful and stimulating to the participants; but it is doubtful whether those who were not at the conference will find the papers more useful in this form than as articles appearing in the usual way in the scientific journals. If these transactions continue to appear regularly, and if they acquire reputations comparable to those of the well-known scientific journals, they will find their place in scientific literature; the papers will be abstracted and it will be easy to obtain access to them. Unless that happens few people in this country are likely to get them, and it is difficult therefore to appraise their future value to British scientists.

Vitamins and Hormones

Vol. VII. Editors: Robert S. Harris; Kenneth V. Thimann. New York: Academic Press. 1949. Pp. 488. $7·80.

This volume is similar in substance to others in this series. It contains 13 articles, and some are inevitably more readable or stimulating than others. The only one by British authors is on the puzzling subject of vitamin P.

On the physiology of aneurin, Prof. B. C. P. Jansen contributes a balanced account which is historical in approach and very readable; and W. A. Krehl's article on the nicotinamide-tryptophane relationships will help many people to get that confusing story clear in their minds. The chemistry of 4 gonadotropic hormones has been discussed by Choh Hao Li, but this is a more difficult chapter and the nomenclature assigned to the hormones, I.C.S.H., F.S.H., P.M.S.G., and H.C.G. does not simplify the issue for the ordinary mind. Some of the articles—e.g., those on the infra-red spectrometry of the steroids and the one on the sterioisomeric provitamins A—are highly technical and will be useful only to a limited circle of experts. Into rather a different category come the

SUMMARY

Perforation of a duodenal ulcer 15 months after vagotomy is reported. Only two other cases have been traced and in both of these the perforation occurred within a month of the vagotomy. The remarkable feature of the present case was the lack of rigidity after perforation. Pain, however, was severe, and shock was profound.

My thanks are due to Mr. Ivor Lewis for permission to publish this case and for his criticism, and to Dr. D. Ferriman who referred the case for surgery.

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CHLORAMPHENICOL IN WHOOPING-COUGH

REPORT ON 5 SEVERE CASES

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The care of small infants with whooping-cough has always been anxious work. The case-fatality is high under the age of 3 months, and moreover the pulmonary complications of whooping-cough in infancy often remain as a permanent disability and may shorten the patient's life.

When it was reported in July, 1949, that chloramphenicol was active against *Hæmophilus pertussis* in vitro and in experimentally infected animals, a small stock of the drug was obtained and set aside for the treatment of infants with severe whooping-cough.

Since then, five infants have been so treated. The cases were selected as being severely ill, with a poor prognosis, but at a relatively early stage of the disease before secondary infections had been added. There was no clinical doubt of the diagnosis, which is sometimes difficult in small infants, and there was clear-cut evidence of direct contact with other cases of whooping-cough in every case.

The dosage, which was necessarily rather guesswork, was based on a minimum of 50 mg. per kg. of body-weight daily, with a generous increase in view of the severity of the infection and the low toxicity of the drug. Each baby received 0·25 g. as a first dose and thereafter 0·125 g. 6-hourly for 7 days and 0·125 g. 12-hourly for a further 7 days. It may be that these doses can be reduced as more experience is gained.

Administration of the drug was not difficult. The capsules were opened and the unprotected powder given by mouth in a little black-currant juice ('Ribena') by teaspoon some minutes before a feed. It was rather surprising to see this bitter-tasting drug go down so easily.

All the infants were nursed in complete isolation throughout the illness. The feeds the baby had been accustomed to before infection were continued, and replacement feeds with, if necessary, replacement doses of chloramphenicol were given to allow for vomiting. Careful records were made of coughing spasms and vomiting. No other drugs were given.

The details of the five cases are summarised in the accompanying table. The consistent gains in weight are remarkable considering how ill the infants were at the start of treatment.

Case 1.—This infant was badly cyanosed on admission and was having almost continuous ineffective spasms of coughing intermingled with tiny vomits. She was given oxygen without great effect for 24 hours. Great improvement was noted 12 hours after chloramphenicol was started, and general recovery was complete in 48 hours. Thereafter coughing spasms were short-lived and mild.

This child's life was despaired of by her mother and her recovery was regarded as a miracle by the parents. Even the more knowledgeable and disinterested nursing staff regarded the recovery of this first case as very remarkable.

Case 2.—Though not so severely ill as case 1, this little boy was cyanosed and exhausted from prolonged coughing spasms. His general recovery was well marked 24 hours after chloramphenicol was started, and after the 3rd day his coughing spasms became innocuous.

Case 3.—This little boy was as severely ill as case 1 and his recovery was equally dramatic, being complete in 24 hours.

Cases 4 and 5 ran a very similar course. Initially the exhausting, very protracted, coughing spasms were obviously useless and becoming more distressing each time. Some cyanosis was constantly present and the infants had become terrified of feeds because they brought on spasms of coughing. After 12 hours of chloramphenicol a remarkable repose was noted, and though coughing continued for a time it was obviously no longer a terrifying experience.

SUMMARY

Five infants severely ill with whooping-cough were treated with chloramphenicol. There was an immediate improvement in general condition in all the cases, followed by rapid recovery.

This somewhat preliminary report is submitted because of (*a*) the undoubted severity of infection in each case; (*b*) the dramatic recovery following chloramphenicol; and (*c*) lack of the drug to treat a larger series.

DETAILS OF CASES AND RESULTS

Case	Age (weeks)	Sex	Weight on admission		Clinical severity on admission	Day of disease when chloramphenicol started	Number of coughing spasms and vomits on each day of treatment																								Days to become free of all symptoms	Days in hospital	Weight on discharge		Total chloramphenicol (g.)
							1		2		3		4		5		6		7		8		9		10		11		12						
			lb.	oz.			Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.	Sp.	Vo.			lb.	oz.	
1	9	F	9	5	+ + +	4	27	9	10	4	10	3	8		9		5		6		7		3		3		4		3		12	32	10	6	5
2	26	M	19	5	+ +	7	12	6	8	1	5		4		2		5		5		7		3		2		0		1		12	17	21	6	5
3	8	M	8	11	+ + +	5	19	13	2	1	1		1		1		0		2												7	31	10	6	5·5
4	12	F	12	13	+ +	7	10	5	6	2	7		5		3			2													6	18	13	4	5·25
5	24	M	19	12	+ +	6	13	3	4	1	2		2		2																5	20	20	5	5

Sp. = spasms. Vo. = vomits.

THE LANCET

LONDON: SATURDAY, MARCH 4, 1950

Function of the Regional Hospital Boards

As the months pass and the conflicts over the National Health Service Act subside, we see more clearly the size of the task entrusted to the regional hospital boards. Here and there in the counties people are beginning to ask not only what are the prospects of getting the funds for long-deferred improvements and extensions, but also more searching questions. Does the regional board really grasp the relative need of this or that ? Is not the allocation of funds sometimes decided by the eloquence of a management committee's spokesman rather than by reference to the region's master plan ? Indeed, might it not really be preferable, in the long run, if management committees were to deal direct with the Ministry rather than go through so tedious and uncertain a process as committing their projects to a regional board ?

Many have wondered whether the Act did not press the regional idea too far when it loaded one duty after another on the regional boards. Behind the vague and comprehensive phraseology of the Act dealing with the boards—" for the purposes of exercising functions with respect to the administration of Hospitals and specialist services in these areas "—one can discern four main responsibilities which they are expected to bear. First, there is the planning of hospital services in large areas, adumbrated in the Dawson report of 1920 and revived in the Sankey report of 1937. The need for grouping has been partly met by establishment of the hospital management committees, but the region has been left with much to arrange, involving attention to the shifting stresses and strains of modern society, such as the movement of populations and their tendency to grow older. Closely allied with this was a second idea—the integration of medical work in the hospitals throughout an area, the raising of standards in backward hospitals (as in the emergency services during the war), and the spread of influence from the universities. Before ever the nationalisation of the hospitals was mooted these first two functions of a possible regional body were already being vigorously discussed, and informed opinion was well-nigh unanimously behind them. The third and fourth functions—administration and financial control—fall into a different category, however, because they were called into existence only when the Bill was prepared. Under the Act, the regional boards, as the Minister's agents, became in theory responsible for the hospital and specialist services in the region: nominally, they appoint the staff and maintain the premises and equipment. Hence it follows that, within the limits laid down by the Ministry, they are responsible for settling all sorts of administrative questions and policies, answering queries, and giving advice over a vast range of topics. With this in turn is intertwined their financial responsibility. It was intended that they should have the greatest degree of financial autonomy consistent with the safeguards required in connection with public money: in other words, they were to have block grants and to manage their own affairs.

How far are the regional boards achieving success in these four functions ? The original emphasis on planning as the correction of the haphazard distribution of physical facilities has been pushed somewhat into the background, partly by the exigencies of the times, but partly also, one may suggest, by preoccupation with other issues and inadequate recognition of the need for staff free to settle down and concentrate on the job. It is fairly easy to arrange in a rough order of priority the schemes for capital developments submitted by the different hospital management committees, and to christen this the regional plan. But, though such a plan is much better than none at all, it falls short of what is needed. Planning, if it is to be business-like, must be based on accurate data: it must imply the use of existing resources to full capacity, and there must be a ceaseless study of comparative statistics. A great deal of work remains to be done, for even the current statistics of bed occupancy are unreliable: indeed, it is probably fair to say that we have not yet even formed a clear conception of what " planning " ought to mean in respect of hospital facilities over a large area. Secondly, the original emphasis on raising of standards—and especially medical standards—seems to be in some danger of getting lost in preoccupation with the grading of specialists and their remuneration. It is not, at present, apparent just how much further progress is to be made in the spread of university influence, except by the slow process of university participation in the appointment of consultants as vacancies occur from time to time throughout the region. This too is certainly something, but it falls short of the enthusiastic proposals current five or six years ago whereby able young men from the medical schools were to be sent out as registrars to establish and maintain new and better standards in the hospitals far distant from the medical schools. It falls short too of what is being done under the Bingham plan in Massachusetts with the aid of the Commonwealth Fund, and one is tempted to ask how many regions have found time to study these isolated but pregnant American experiments.

It is, however, the discharge by the regional hospital boards of the third and fourth functions that is causing the most heartburning. The idea that administrative responsibility for the hospital and specialist services would be vested in the region was never fully realised. On the one hand, by the time the Act was finally passed, much of this responsibility had been handed on to the hospital management committees. On the other hand, the passing of the Act was not accompanied by any sufficiently drastic overhaul of the machinery at Whitehall to ensure that circulars, or other decisions, did not by-pass or overrule the regional hospital boards. The boards thus received the insignia of administrative authority without the substance, and a certain amount of friction and confusion has followed. This is exemplified by the uncertainty surrounding the responsibility of the hospital management committee for its own medical staff, and may be summarised by saying that nominal articles on the vitamin requirements of the growing rat and of the guineapig, which have a value for all interested in the health of their laboratory animals.

It is difficult to see just why C. M. McCay's article on diet and ageing should have found a place in this volume. It contains little about vitamins or hormones and it might have found a wider circle of readers elsewhere. R. L. Stehle's section on the action of the post-pituitary hormones is rather disappointing: the historical approach is often helpful, but here undue prominence seems to have been assigned to older work, and not enough to the action of the antidiuretic hormone in the light of modern renal physiology. None of E. B. Verney's work since 1929 receives any recognition at all; the last of H. Heller's papers to be mentioned was published over ten years ago.

Despite this criticism, the volume as a whole is certainly as good as its predecessors, and it can be recommended to all those who have interests in these fields.

Finding the Missing Link

R. BROOM, D.SC., LL.D., F.R.S. London: Watts. 1950. Pp. 104. 6s.

DR. Robert Broom originally took up the cudgels on behalf of Prof. Raymond Dart, discoverer of *Australopithecus africanus* in South Africa in 1925, before giving up his medical practice and digging in this same field himself. After a couple of chapters on early forms of man he puts the case for the ape-man status of *A. africanus* extremely well, even polemically, not merely from the appearance of the Taungs skull but also from the indirect evidence of the associated fauna, which, he points out, was in all probability the remains of the meals of *A. africanus* and slain with sticks or stones. Next follows a thrilling account of Dr. Broom's own discoveries of further interesting hominoids in South Africa. Altogether he distinguishes four new species, belonging to three new genera: *Plesianthropus transvaalensis* found at Sterkfontein in 1936; *Paranthropus robustus* found at Kromdraai in 1938; and *Paranthropus crassidens* and *Telanthropus capensis* found at Swartkrans in 1948 and 1949 respectively. A description is also given of *Australopithecus prometheus* discovered at Makapan by other workers. Dr. Broom made his valuable finds in spite of the fact that the Historical Monuments Commission did all it could to stop him from excavating, and actually succeeded for a while, until General Smuts came to his rescue. The descriptive part of the book is followed by a discussion about whether these fossils are of men or apes. Dr. Broom prefers to call them ape-men, though he tells us that Prof. W. E. Le Gros Clark "now thinks they are human." This little book would be much more convincing if it did not attack English anthropologists for their caution in not accepting Professor Dart's and Dr. Broom's claims immediately.

The Temporal Bone and the Ear

THEODORE H. BAST, A.B., PH.D., professor of anatomy, University of Wisconsin; BARRY J. ANSON, M.A., PH.D., professor of anatomy, Northwestern University, Chicago. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1949. Pp. 498. 60s.

THIS book is the collected and documented account of researches carried out by the authors for over twenty years. The bulk of the work has already been published in numerous papers in various periodicals, and is here presented as a unified whole. The method adopted throughout was morphological—the study of numerous series of sections of many temporal bones of different ages. Photomicrographs, reconstruction models, and projection tracings of sections were the means used in analysing and synthesising the material. The authors suggest that a new terminology should be introduced in describing the structures of the labyrinth which more accurately fits their development. The special value of the research lies in the significance given to two fissures in the labyrinth anterior and posterior to the oval window. These fissures may retain an unstable embryonic structure into adult life and may become the site of aberrant cartilage and new bone formation. The relation of this process to the pathogenesis of otosclerosis is of great importance. In other parts of the book the development of the ossicles and air-cells is described: there is a special description of those cells in the petrous portion of the bone. The final chapter is an excellent historical summary of the theories of inner-ear function, with numerous well-selected quotations from the original accounts. The work is of high scientific quality, and beautifully printed and illustrated.

Colours and How We See Them

H. HARTRIDGE, M.A., M.D., SC.D., F.R.S., director of the vision research unit, Medical Research Council; professor of physic, Gresham College. London: G. Bell & Sons. 1949. Pp. 158. 15s.

Professor Hartridge gave these Christmas lectures at the Royal Institution in 1946. The many ingenious and striking demonstrations which he introduced then have been replaced in the book by some coloured plates and black-and-white diagrams, and in most cases by detailed descriptions of how they were contrived. This device is not very satisfactory, since it makes the book suitable neither for the children to whom the lectures were addressed nor for those who may wish to repeat the demonstrations. The exposition shows evidence of a similar conflict, being sometimes extremely elementary, and at others pretty advanced. Nor does there seem to be any underlying scheme to hold the arguments together: for instance, a good deal of elementary visual physiology is included which has no bearing on colour-vision. Moreover many of the views given here as facts are controversial: and this, surely, should have been indicated. The lectures themselves, with their demonstrations, must have been very good entertainment, but the book does not do them justice.

What is Psycho-analysis?

ERNEST JONES, M.D. London: Allen & Unwin. 1949. Pp. 126. 7s. 6d.

TWENTY years ago Dr. Jones drafted this book, and he has left it substantially as it was, with an addendum in which he summarises some changes, such as those Melanie Klein has introduced into the Freudian corpus. The account shows the clarity attained through mastery of a most complex subject. In his final remarks Dr. Jones rejects the half-hearted adherents whom his book might otherwise persuade: he says that we are impelled to conclude that either the findings of psycho-analysis are untrue or else they are of momentous import, but it is certain that they are not half-true. Non-analysts, even after reading this book, will hesitate to believe all Freud's findings wholly true, though they may not wish to insist that the fraction should be a half.

Problems of Bisexuality as Reflected in Circumcision (London: Imago Publishing Co. 1949. Pp. 83. 10s.).—In this article, reprinted from the *International Journal of Psycho-analysis*, where it appeared in 1947, Dr. Herman Nunberg maintains that circumcision represents submission to the will of the father, an essentially homosexual relationship: since it also activates masculine aims, according to Dr. Nunberg, it produces a conflict which can lead to the creation of myths and religious systems. Based on the psycho-analysis of a very small number of patients, the material presented is not likely to convince theologians or anthropologists.

The Chemical Analysis of Foods (4th ed. London: J. & A. Churchill. 1950. Pp. 340. 28s.).—It is only four years since the third edition of this book by Mr. Henry Edward Cox, D.SC., appeared, and everyone who has used that edition will hasten to buy the fourth. There are new data about baking-powders, vinegars, soya meal, onions, meat extracts, sausages, tomatoes, ketchups, and egg products; moreover, the numerous orders or standards issued by the Ministry of Food have been sorted out, and those likely to be of permanent value are included. The methods of analysis are clear and foolproof and there is enough comment to make the reasons for the different steps of the techniques apparent. Sometimes the comment strays into the realm of nutritional science—for example, "the pulse proteins have peculiarly high biological value"; which is unfortunately not true. A reading of this book with an eye to adulteration of foods throws an unpleasant light on unrestricted individual initiative in the food industry.

THE LANCET

LONDON: SATURDAY, MARCH 4, 1950

Function of the Regional Hospital Boards

As the months pass and the conflicts over the National Health Service Act subside, we see more clearly the size of the task entrusted to the regional hospital boards. Here and there in the counties people are beginning to ask not only what are the prospects of getting the funds for long-deferred improvements and extensions, but also more searching questions. Does the regional board really grasp the relative need of this or that ? Is not the allocation of funds sometimes decided by the eloquence of a management committee's spokesman rather than by reference to the region's master plan ? Indeed, might it not really be preferable, in the long run, if management committees were to deal direct with the Ministry rather than go through so tedious and uncertain a process as committing their projects to a regional board ?

Many have wondered whether the Act did not press the regional idea too far when it loaded one duty after another on the regional boards. Behind the vague and comprehensive phraseology of the Act dealing with the boards—" for the purposes of exercising functions with respect to the administration of Hospitals and specialist services in these areas "—one can discern four main responsibilities which they are expected to bear. First, there is the planning of hospital services in large areas, adumbrated in the Dawson report of 1920 and revived in the Sankey report of 1937. The need for grouping has been partly met by establishment of the hospital management committees, but the region has been left with much to arrange, involving attention to the shifting stresses and strains of modern society, such as the movement of populations and their tendency to grow older. Closely allied with this was a second idea—the integration of medical work in the hospitals throughout an area, the raising of standards in backward hospitals (as in the emergency services during the war), and the spread of influence from the universities. Before ever the nationalisation of the hospitals was mooted these first two functions of a possible regional body were already being vigorously discussed, and informed opinion was well-nigh unanimously behind them. The third and fourth functions—administration and financial control—fall into a different category, however, because they were called into existence only when the Bill was prepared. Under the Act, the regional boards, as the Minister's agents, became in theory responsible for the hospital and specialist services in the region : nominally, they appoint the staff and maintain the premises and equipment. Hence it follows that, within the limits laid down by the Ministry, they are responsible for settling all sorts of administrative questions and policies, answering queries, and giving advice over a vast range of topics. With this in turn is intertwined their financial responsibility. It was intended that they should have the greatest degree of financial autonomy consistent with the safeguards required in connection with public money : in other words, they were to have block grants and to manage their own affairs.

How far are the regional boards achieving success in these four functions ? The original emphasis on planning as the correction of the haphazard distribution of physical facilities has been pushed somewhat into the background, partly by the exigencies of the times, but partly also, one may suggest, by preoccupation with other issues and inadequate recognition of the need for staff free to settle down and concentrate on the job. It is fairly easy to arrange in a rough order of priority the schemes for capital developments submitted by the different hospital management committees, and to christen this the regional plan. But, though such a plan is much better than none at all, it falls short of what is needed. Planning, if it is to be business-like, must be based on accurate data : it must imply the use of existing resources to full capacity, and there must be a ceaseless study of comparative statistics. A great deal of work remains to be done, for even the current statistics of bed occupancy are unreliable : indeed, it is probably fair to say that we have not yet even formed a clear conception of what " planning " ought to mean in respect of hospital facilities over a large area. Secondly, the original emphasis on raising of standards—and especially medical standards—seems to be in some danger of getting lost in preoccupation with the grading of specialists and their remuneration. It is not, at present, apparent just how much further progress is to be made in the spread of university influence, except by the slow process of university participation in the appointment of consultants as vacancies occur from time to time throughout the region. This too is certainly something, but it falls short of the enthusiastic proposals current five or six years ago whereby able young men from the medical schools were to be sent out as registrars to establish and maintain new and better standards in the hospitals far distant from the medical schools. It falls short too of what is being done under the Bingham plan in Massachusetts with the aid of the Commonwealth Fund, and one is tempted to ask how many regions have found time to study these isolated but pregnant American experiments.

It is, however, the discharge by the regional hospital boards of the third and fourth functions that is causing the most heartburning. The idea that administrative responsibility for the hospital and specialist services would be vested in the region was never fully realised. On the one hand, by the time the Act was finally passed, much of this responsibility had been handed on to the hospital management committees. On the other hand, the passing of the Act was not accompanied by any sufficiently drastic overhaul of the machinery at Whitehall to ensure that circulars, or other decisions, did not by-pass or overrule the regional hospital boards. The boards thus received the insignia of administrative authority without the substance, and a certain amount of friction and confusion has followed. This is exemplified by the uncertainty surrounding the responsibility of the hospital management committee for its own medical staff, and may be summarised by saying that nominal authority often rests with the regional board, but local knowledge and hospital experience mean that the hospital management committee must in practice have the last word. As to the financial responsibility, the failure so far to devise any system which would enable the Ministry to make block grants has produced a series of shocks to the confidence of the hospital management committees, and has more than any other single factor weakened the position of the regional hospital boards. They have to face both ways—to ask the Ministry for more, and to tell the hospital management committees to do with less—and it is therefore hard for them to gain the committees' confidence. Praiseworthy efforts are now being made in a number of places to develop costing systems which will permit of the rational calculation of block grants; and success here might well transform the whole scene by making possible real delegation of financial, and subsequently administrative, responsibility. Success here would also—if this were thought desirable—permit of a direct relationship between the hospital management committees and the Ministry in regard to maintenance finance; but the Ministry's decision to delegate final approval of management committees' estimates to the regional boards (see p. 426) indicates that it wishes to strengthen their hand rather than circumvent them.

The line of argument we have followed suggests that there is a good deal to be said for concentrating the efforts of the regional boards on the planning of physical facilities in the broad sense, and on the raising of standards of diagnosis and treatment. If the various administrative responsibilities could be clarified it may be that we could go further and relieve them of many of the somewhat fictitious responsibilities they now carry in regard to administration. But it cannot be pretended that the discussions on these large matters have yet been carried far enough to justify any sweeping conclusions on the ways in which the work of the boards can best develop.

Choice of Weapons against Infections

FOR the time being chloramphenicol and 'Aureomycin' are distributed only through regional centres for use in a limited range of infections which do not respond to penicillin or streptomycin. But it may not be long before the restrictions are removed from chloramphenicol, since it is being made synthetically in England in increasing quantities; and if the dollars can be found no doubt aureomycin will follow suit. The clinician will then have the various sulphonamides and four powerful antibiotics to choose from when treating bacterial diseases. How should he make his choice? Therapeutic effectiveness and low toxicity are obviously the first considerations, but ease of administration and cost may also have to be thought of when treating the less severe infections. Ideally the causal organism and its drug sensitivities should be determined in every case before treatment is begun. But this takes time, and the clinicopathological studies of the last few years have made clinical diagnosis much more precise as regards the flora likely to be found in a given case. Nevertheless, an exact bacteriological diagnosis is always desirable in severe infections and those not responding to treatment as expected, for the bacteriologist can guide the clinician not only in choice of drug but also in the dosage required.

There has so far been little opportunity in this country to compare the range, activity, and toxicity of aureomycin and chloramphenicol with those of the other antibiotics and the sulphonamides. Controlled clinical trials in specific infections are badly needed, but meanwhile we can learn something from the American experience. The accompanying table is based on the recommendations of Prof. PERRIN H LONG and his colleagues,[1] with a column added to show which of these common infections responds to the sulphonamides.

Infecting organism	Order of preference of antibiotics				Response to sulphonamides
	Penicillin G	Streptomycin	Aureomycin	Chloramphenicol	
Group A streptococcus	1	3	2	—	+
Group D streptococcus	2	—	1	—	0
α Hæmolytic streptococcus	1	2	2	—	±
Staphylococcus ..	1	—	2	—	+
Pneumococcus ..	1	3	2	—	+
Meningococcus ..	1	—	—	—	+
Gonococcus	1	2	3	3	+
Brucella abortus ..	—	—	1	1	±
H. pertussis	—	—	2	1	0
H. influenzæ	—	2(+ Sd)	1(+ Sd)	—	+
B. anthracis	1(+ Sd)	—	—	—	+
S. typhi	—	—	2	1	0
Salmonella-shigella group .. .	—	—	—	1	+
Bact. coli ..	—	2	1	1	±
Proteus vulgaris ..	—	2	—	1	0
Ps. pyocyanea	—	1	—	2	0
Tr. pallidum	1	—	2	—	0

1, 2, and 3: 1st, 2nd, and 3rd choice. —: inactive or insufficient evidence of value. Sd: sulphadiazine. +, ±, and 0: good, partial or variable, and no response.

This table at best represents only current practice; for some of the recommendations there is still little detailed evidence, and the newer antibiotics are still untried in a great many less common infections In some diseases the choice is fairly obvious: in typhoid, for instance, chloramphenicol seems to be far more active than any other known drug, with the possible exception of aureomycin. In some infections there is little to choose between two or more drugs Thus against the meningococcus, penicillin and sulphonamides (given intravenously) are both highly effective. The real difficulty arises with the everyday coccal and coliform infections. The mention of a staphylococcal infection immediately brings to mind the use of penicillin, or streptomycin, if the strain is penicillin-resistant. Now, however, Professor LONG tells us in his letter on p. 420 that the drug of choice is aureomycin, to which the staphylococcus has so far not become resistant. But it should not be forgotten that sulphathiazole and sulphadiazine are both effective against penicillin-fast staphylococci, and for local application so is dibromopropamidine. Against other cocci there is at first sight little that the antibiotics can do that the sulphonamides cannot do equally well. And in ordinary streptococcal infections, such as tonsillitis, sulphanilamide is still one of the best remedies. Where a streptococcal or pneumococcal infection is exceptionally acute the neutral salts of sulphonamides for injection are useful to ensure a rapid therapeutic concentration in the blood. Against the coliform organisms streptomycin must be placed

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1. Long, P. H., Chandler, C. A., Bliss, E. A., Bryer, M. S., Schoenbach, E. B. *J. Amer. med. Ass.* 1949, 141, 315.

below aureomycin and chloramphenicol and perhaps below the sulphonamides also, because of the readiness with which these organisms become streptomycin-fast. This fastness is particularly common in urinary infections, and in these the sulphonamides are probably the drugs of choice, at any rate while the new antibiotics are scarce. Bacillary infections of the gut, other than the typhoid group, respond fairly well to the less soluble sulphonamides such as phthalylsulphathiazole and succinylsulphathiazole. Gonococcal infections are perhaps best treated with penicillin; but thousands of cases, particularly in the East, will still be treated with sulphonamides because of their convenience and cheapness.

The side-effects of the sulphonamides have been considerably reduced by improvements in the technique of administration and the introduction of new compounds; but penicillin still leads the field in freedom from toxicity, its only serious side-effect being skin eruptions due to acquired sensitivity. The most toxic of the drugs we are considering is undoubtedly streptomycin, with its tendency to produce rashes and damage to the eighth nerve when it is given for more than a very short period. The new drugs both produce gastro-intestinal upsets, and chloramphenicol has some curious effect on the muscles of accommodation; it cannot yet be said that all the unwanted effects of aureomycin and chloramphenicol are known.

Both aureomycin and chloramphenicol are fully active by mouth, as, of course, are the sulphonamides. Penicillin, on the other hand, must be given in much larger doses by mouth to get the same blood-level as by injection; and the level produced is not always reliable. In a long-lasting infection it is to everybody's advantage if injections can be avoided, as they usually can, at any rate after the first few days, in sulphonamide therapy. However, the objection to penicillin that frequent intramuscular injections are needed has largely been overcome by the introduction of the slowly absorbed preparations; with procaine penicillin in oil plus aluminium monostearate the injections can be cut down to one a day or even one in several days. When streptomycin is given by mouth the blood-levels obtained are insufficient for the treatment of systemic infections, but there is a startling effect on the flora of the bowel. The coliform organisms are almost entirely eliminated, and something approaching bacteriological sterility of the fæces may be found. The same sterilising effect is produced by chloramphenicol by mouth, though it also produces a therapeutic blood-level. The poorly absorbed sulphonamides are widely used for their effect on the bowel organisms, and it is not always remembered that sulphaguanidine produces a considerable blood-level as well. It comes to this therefore: the sulphonamides, aureomycin, and chloramphenicol will be given by mouth unless an exceptionally rapid effect is required, when injection will be preferred. Streptomycin will be injected unless the aim is to sterilise the bowel. Penicillin will usually be injected but when an exact blood-level is not important and the patient is a child or there is some other reason for avoiding injections it may be given by mouth in four to five times the dosage. As regards cost, there seems to be little to choose between penicillin and sulphonamides in the everyday case, but special preparations, such as the "depot" penicillins (but not the neutral injectable sulphonamides), are somewhat more costly. Streptomycin is much cheaper than it was, but still dearer than either of these two. The cost of the new antibiotics can hardly be considered while their present scarcity continues.

PERRIN LONG and his colleagues suggest that a combination of drugs should be used more often in severe infections. Thus in subacute bacterial endocarditis they advocate a combination of penicillin, streptomycin, and aureomycin if the organism is a gram-positive coccus, whereas if it is a gram-negative bacillus they replace the penicillin by chloramphenicol. In anthrax and *H. influenzæ* infections they give sulphadiazine plus an antibiotic. The purpose behind these combined operations is to attack the micro-organism's metabolic cycle from different directions or at more than one point. Sometimes, too, a combination reduces the risk of the organism becoming drug-fast, the most firmly established example of this effect being the use of streptomycin plus *p*-aminosalicylic acid in tuberculosis. A mixture of sulphonamides is now known to give better results than a single drug in some infections, besides reducing the incidence of crystalluria. The potentialities of combined therapy certainly deserve to be explored further, but it will be a pity if the blunderbuss returns to fashion against infections which will always succumb to a single well-directed bullet.

Multiple Primary Tumours

ARE people who have had a malignant tumour successfully removed more likely or less likely than other people to get a new primary growth? In other words, has the cancer patient an immunity or a heightened susceptibility to further cancer? There is no plain answer to this plain question.

Multiple tumours are of two main classes: (1) multiple similar tumours arising from the same kind of tissue, and (2) multiple dissimilar tumours arising from different tissues. Examples of the first class are multiple carcinomas of the large intestine (e.g., in polyposis), multiple basal-cell or squamous-cell cancers of the skin, bilateral carcinomas of the breast, ovaries, or other paired organs, bilateral retinoblastoma, and the multiple osteogenic sarcomas arising in men or animals after exposure to radioactivity. In all of these cases a more or less extensive field of similar tissue has been exposed to similar agents, the tumours which appear are the result of multifocal cancerous change—simultaneous or successive—in this prepared field, and there is nothing surprising in the fact that the incidence of multiplicity greatly exceeds that due to mere chance. The reported incidence of multiple dissimilar tumours vary widely. Some statistical analyses seem to show that they are more common than would be expected by chance, whereas others seem to show the reverse. But these analyses are all unsatisfactory because they are based on inaccurate estimates of the frequency of the individual kinds of tumours If we knew the true incidences of, say, cancer of the stomach and cancer of the lung in a whole community, or in any specified age-group or other section of it, we could estimate how often those two tumours would be associated by chance in that community or group and compare the result with the observed frequency. But for the great majority of dissimilar primary tumours the data are not accurate enough to make this possible.

There are many other difficulties and fallacies in this field. As "benign" and "malignant" are only relative terms and do not denote sharply distinct classes of tumours, all neoplasms, whether benign or malignant, should strictly be included in an analysis of the incidence of multiple primary growths; yet this is seldom done. If we confine our attention to "malignant" tumours only, we must specify precisely what tumours we regard as malignant. Among gliomas, mixed salivary tumours, basal-cell growths of the skin, osteoclastomas, ganglioneuromas, teratomas, and papillary growths of the breast, intestine, and urinary tract, the distinction between innocence and malignancy is highly arbitrary. Shall we include all members of these classes in our analysis of multiplicity, or only those which show unquestionable evidence of malignancy? Clearly also, how often multiple primary growths are discovered will depend on the thoroughness of the search. Purely clinical studies will reveal far fewer examples than necropsies, and perfunctory necropsies will reveal fewer than thorough ones; thus, as we pointed out on Feb. 11 (p. 268), by cutting sections at 4 mm. intervals ANDREWS [1] has found carcinomas in 12% of prostates which gave no clinical or naked-eye signs of malignancy.

All these factors detract from the value of published series of multiple primary tumours.[2] If from these series we subtract the multiple similar tumours which have arisen in predisposed fields of similar tissue (a multiplicity which was to be expected) we are left with various coexisting dissimilar tumours, whose frequencies are wholly unreliable.

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1. Andrews, G. S. *J. clin. Path.* 1949, 2, 197.
2. Barrett, W. D., Miller, K. T., Fessenmeyer, C. R. *Surg. Gynec. Obstet.* 1949, 89, 767.

Annotations

ADMISSIONS TO HOSPITAL

INQUESTS at Ipswich and Hove have lately drawn attention to the difficulty of getting patients admitted to hospital. The Ipswich case arose out of the death of a baby who was admitted to hospital after a delay of $4\frac{1}{2}$ hours. It turned out that the delay probably had nothing to do with the child's death; but the fact remains that the child's doctor spent a good deal of time being passed from one official to another in various hospitals.

In July, 1948, the responsibility for admitting any given patient passed from the local hospital to the National Health Service in general; and in practice this may mean the hospital management committee or the regional board, according to whether the district is rural or urban. It is, therefore, most important that these authorities should have their own admission office which can take from the doctor the responsibility of finding a bed, thus releasing him from the tiresome business of ringing up a number of hospitals. Already such offices have been established by most of the regional boards and by many management committees; but in large areas there is still no such system and the responsibility for securing patients' admission lies solely with the general practitioner.

The Hove case takes the problem a stage further, dealing with a patient who had been put on the waiting-list owing to lack of accommodation, and who died while still waiting. Until many more beds are available, waiting-lists of chronic sick are inevitable; but it seems that tragedies could be averted if every case were visited by a doctor from the management committee, in order to ensure strict medical priority. Such a system already operates in the St. Helier group, where it has not only ensured that urgent cases get in first, but also that cases found not really to need admission are looked after by the various domiciliary agencies. There is nothing mysterious about this valuable scheme, which could, it seems, be reproduced elsewhere with equally good effect.

MEN, FOOD, AND CIVILISATION

How many more of us can this distracted globe maintain? This is not a question which appeals deeply to enthusiasts for a higher birth-rate, who are apt, indeed, to look another way when it is raised. But as Dr. A. S. Parkes, F.R.S., remarked in his Galton lecture [1] (ominously entitled The Primrose Path), food-supplies are increasing barely as fast as population; so, unless great efforts are made, present standards of living will not even be maintained, let alone improved.

Population trends in Great Britain, thanks to the report of the Royal Commission on Population,[2] are now well known. We are increasing in numbers and will most likely go on increasing for another twenty-five years; we are ageing, as a population, but also living longer, and we muster about 49 million. The world population is thought to be about 2000 million, and "short of some major upheaval it seems likely that the human race will continue to increase in total numbers." Even during the course of Dr. Parkes's lecture, as he fairly warned his hearers, it had increased by some 3000; in the same time the average age had risen, and the inborn quality, he thought, had very likely declined. We might well be settling down to thinking how we are going to feed this prospective society of decadent greybeards; but our most active research on a large scale at the moment has to do with atomic warfare. A cynic might suppose that this offered one answer to the population problem, but as Dr. Parkes pointed out, modern warfare is a failure from this point of view. "The military technician has latterly made killing so inefficient in relation to effort, and so expensive in relation to resources, as to be almost prohibitive. The number of man-hours required and the average cost of killing a combatant by military means in the last war must have been quite fantastic." There seems to be a hint of good news in this for somebody: the ordinary civilian, perhaps—unless civilians are cheaper to kill than combatants. At least it raises the hope that somebody, some day, will say, "My dear fellow, I simply can't afford to kill you." Of course atomic warfare might well thin the population in one generation by rendering large numbers of males sterile. But even this difficulty might be overcome, Dr. Parkes hinted: recent research suggests that it may soon be possible to store the spermatozoa of animals in such a way that they will survive in a functional state for years.

He took the somewhat old-fashioned view that war, even if not particularly destructive of mankind, is at all events dysgenic, since it removes selectively young virile males. Apart from the fact that this form of selection no longer holds in modern warfare, there is some evidence that even in the old days, when civilians were less exposed to assault, the effects of war on the race were hardly perceptible. Raymond Pearl [3] estimated

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1. Delivered to the Eugenics Society on Feb. 17.
2. H.M. Stationery Office, 1949; see *Lancet*, 1949, i, 1110.
3. *Amer. J. Sociol.* January, 1941, p. 487; and see *Lancet*, 1941, i, 730.

that after the 1914–18 war the loss to the American race was only 0·055% of the 1910 population and 0·048% of the 1920 population: and he thought it unlikely that any geneticists would regard 5 hundredths of 1% as a significant loss from the gene-pool of the race. Even the figure for France in that war—which Pearl put somewhere between 1·3 and 3·4% of the population—could have had no measurable effect on the quality of the race. The survivors came home in the prime of manhood and no doubt most of them founded families. Dr. Parkes himself quoted the findings of Dr. Richardson that deaths from "fatal quarrels" in the world, between 1820 and 1945, only accounted for 1·6% of the total death-rate; and he included under the heading of fatal quarrels everything from murders to world wars—an example, Dr. Parkes said, of the broad flexible outlook. Murderers came second to world wars in their contribution; small wars were, relatively speaking, nowhere. Senility does not account for a very large proportion of deaths, and pestilences are steadily declining in killing power under the assault of medicine.

The impression is left of a virtually immortal species looking round for something to eat. Taking the long view, surely now is the time to start cultivating our gardens, and that in a big way.

TRAINING FOR THE HEALTH SERVICES

Throughout the world, and especially in Africa, Asia, and the rural areas of Europe and America, the shortage of doctors and other health workers is a grave problem: and from Feb. 6 to 11 an expert committee, called together by the World Health Organisation, discussed in Geneva what could be done to improve professional and technical education, in both advanced and underdeveloped countries. The rôle of the doctor in modern society, the committee pointed out, has changed remarkably within a generation. His clinical responsibility has been broadened by his increasing sense of the importance of the background of his patients, including social and economic conditions, nutrition, industrial health, and the whole environment of home and family. For this if no other reason the undergraduate medical curriculum has in most areas lost its balance. Almost everyone admits that outworn disciplines remain while countless new subjects jostle with one another for a place in the disordered course of study; but the real fault lies deeper—in the failure of training to keep abreast of social and industrial progress. A drastic revision of the curriculum *as a whole* is necessary, not merely a readjustment of the parts.

One of the essential tasks of W.H.O. is to lay down basic standards of training for the practice of public health, but this cannot be even attempted until undergraduate education has been reshaped. Social medicine, the committee agreed, is not simply another "subject" introduced into the curriculum: on the contrary it is a way of thinking and teaching which should aim at giving the student a new outlook on all his subjects. When the teaching of social medicine has been given its proper place, and its practice has been established in the clinical studies generally, we shall be able for the first time to set out a design for postgraduate education in public health.

In the committee's view the medically qualified health officer, the sanitary engineer, and the public-health nurse should learn to work together, and to understand one another's points of view, during the training period. In this way they will carry the team spirit into their work in any part of the world. The committee recommended various ways and means of meeting the shortage of health workers, above all by making the best and most economical use of the more highly trained staff. This demands greater care in the selection and training of auxiliary staff, especially in countries where the doctors and fully trained nurses are lone figures among a huge mass of people. W.H.O.'s programme in this field includes plans for assisting countries to develop their own medical schools and other teaching institutions, for organising group training for health workers at various levels, and for the training of local personnel by demonstration teams. The committee gave their blessing to these plans, and also to schemes for awarding fellowships to senior teaching staff, and for providing experts to develop teaching methods in the regions themselves, against the background of local conditions.

Unesco will continue to coöperate with W.H.O. on training and scientific exchange, and plans are being made for further collaboration in the technical assistance programme for under-developed countries.

DANGER FROM THE NEWER INSECTICIDES

Powerful new insecticides are now on sale which are from three to five times as toxic as nicotine. They will shortly be in use in greenhouses, orchards, and fields, and it is as well that practising doctors should be aware of the hazards they present alike to the agricultural worker and the householder. They contain organic compounds of phosphorus and they are as dangerous to man and domestic animals as to the creatures they are intended to destroy. In factories protective measures can be successfully applied to prevent poisoning, but in the field the difficulties in ensuring adequate protection for individual workmen are almost insurmountable. Poisoning may be caused either by the accidental ingestion of vegetation containing systemic insecticide[1]—a risk perhaps more likely to affect animals than man—or by direct contact with the chemical during preparation or application. Some months ago Dr. James Wilson,[2] secretary of the American Medical Association's council on pharmacy, urged that the public should be protected against some of the newer insecticides; and this warning was powerfully reinforced on Nov. 15 by Dr. Donald Hunter at the end of his Ernestine Henry lecture to the Royal College of Physicians.*

Dr. Hunter was speaking particularly about the organic phosphorus compounds, of which 'Parathion' (diethyl - *para* - nitrophenylthiophosphate) is a good example. These compounds, discovered in Germany in 1939, were put into production in the United States and Britain soon after the end of the war and are now being widely used as sprays in agriculture. Liquid preparations, wettable powders, and dusts containing parathion are already in use; and smoke canisters containing it are being tested for the fumigation of enclosed spaces. The organic phosphorus insecticides are alkylpolyphosphates resembling di-isopropyl fluorophosphonate (D.F.P.) They are extremely poisonous. All preparations readily penetrate the skin and exposure to no more than 0·3 g. a day may be fatal; absorption also follows inhalation and ingestion. At first the victim complains of giddiness and possibly headache, aggravated by eating or smoking; and the pupils are usually constricted to pin-point size. Then follow gastro-intestinal symptoms, muscular twitching, coma, convulsions, pulmonary œdema, and commonly incontinence of urine and fæces. In fatal cases death may occur an hour or two after the onset of symptoms. Atropine is the antitode to parathion. Large doses—up to gr. $^1/_{30}$ hourly—must be given. For pulmonary œdema oxygen should be administered early and under slight pressure to overcome bronchial spasm. Where fibrillary twitching of muscles affects particularly the diaphragm, artificial respiration is necessary to save life.

In factories where parathion is manufactured the precautions should include conditions assuring its absence from the atmosphere; protective clothing should be worn (all clothes, including underwear, being laundered after one day's wear), and respirators should be at hand for use in emergency. In the field, respirators must be worn during dusting and during the diluting of wettable powders containing parathion. Hitherto there seem to have been no serious mishaps in Great Britain; but Dr. Hunter's account of the accidents in the U.S.A. and elsewhere made it clear that the strictest precautions are indispensable if casualties are to be avoided. Moreover, every practitioner and casualty officer must be ready to recognise the symptoms and signs for what they are, so that the right treatment shall be given immediately.

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[1] See leading article, *Lancet*, 1949, i, 658.

[2] *Ibid*, p. 717.

* This lecture is appearing in the *British Medical Journal*.

REPORT ON NUTRITION

In 1933 the British Medical Association appointed a committee "to determine the minimum weekly expenditure on foodstuffs which must be incurred by families of varying size if health and working capacity are to be maintained, and to construct specimen diets." The committee assumed in its report[1] that to maintain health and working capacity the normal man of average stature required 3400 calories daily in the food as purchased; and it suggested that these should be derived from 100 g. of protein (half of which should be first-class), 100 g. of fat (of animal origin as far as possible), and 500 g. of carbohydrate. On this basis a scale of man-value calorie coefficients was drawn up, and sixteen specimen diets were constructed and costed; the average daily cost of the "bare ration" for a normal man was about 4*s.* 10*d.* In constructing the diets the committee underlined the importance of sufficient milk for children, and of dairy produce, fruits, and green vegetables. The recommendation of 3400 calories appeared to conflict with that of an official committee of the Ministry of Health. In January, 1931, a nutrition advisory committee had been appointed as a permanent body to "advise the Minister of Health on the practical application of modern advances in the knowledge of nutrition." In a memorandum, entitled "the Criticism and Improvement of Diets," the committee maintained that 3000 calories and 37 g. of first-class protein was enough for the average "man" of the entire population. Since the two committees seemed to differ, a joint conference was held; it concluded[2] that there was no fundamental disagreement on matters of scientific fact.

In October, 1947, the council of the British Medical Association again appointed a special committee "to examine the whole question of nutrition in this country and prepare an authoritative report with particular reference to the adequacy or inadequacy of the wartime and post-war diet." The committee's report is issued this week.[3] This includes tables of nutritional allowances for the two sexes in different age-groups; and the age-groups and most of the nutritional allowances adopted are those which were used during the war by the Oxford Nutrition Survey and have lately been published.[4] This makes for a welcome uniformity, for there are already several scales of nutritional allowances: a new edition of the Recommended Dietary Allowances of the National Research Council was published in 1948,[5] and a new dietary standard has also been introduced for Canada.[6] The B.M.A., Oxford, and Canadian standards refer to the average person, but the National Research Council standards are "levels enough higher to cover substantially all individual variations in the requirements of normal people." In general, the National Research Council standards are highest, with the B.M.A. next, the Oxford third, and the Canadian lowest. The greatest discrepancies come in ascorbic acid. For instance, in the age-group 0 through 1 year, the National Research Council allows 32 mg., the B.M.A. 10 mg., Oxford 10 mg., and Canada 30 mg.; for a moderately active man the respective figures are 75, 20, 30, and 30 mg; for a lactating woman they are 150, 50, 90, and 30 mg. The B.M.A. report does not give much evidence for the figures adopted, and some will not generally be accepted. For instance, the committee states that the energy derived from protein during the late war usually represented 10–14% of the total calories; and for adults (other than pregnant and nursing women) not engaged on hard work, the committee recommends that 11% of the total energy should be provided from protein. If there is no serious deficiency in the population this figure (which represents 87 g. of protein daily for a moderately active man) appears to be high; if it represents about the *average* intake in the population, half the population probably consume less and half more, yet there is no evidence that half get insufficient.

A comprehensive chapter on food-consumption levels includes unpublished figures of the Ministry of Food. The committee concludes that

> "since 1939 the diet of the nation has, on the average, deteriorated in variety and palatability, but that supplies of calories have been well maintained and those of most nutrients have increased. . . . Nevertheless, in spite of the large amounts of data which the Committee has considered, direct information about the consumption of food by different groups is disappointingly scanty and it is not possible to determine with any certainty what degree of underfeeding, if any, there has been in the population."

From the medical aspect, most interest will be found in the chapter on clinical assessment of the nation's health in terms of nutrition. Unfortunately the methods for this assessment are not simple, and the committee "urges that every effort be made to devise reliable methods of assessing by clinical (including anthropometric and biochemical) procedures the state of nutrition of the population." The evidence is considered under several headings. From statistics of mortality and morbidity it is concluded that "because of the complex nature of the many factors involved, it is not possible to say to what extent, if any, the wartime improvement in mortality rates has been due to changes in diet." Data on growth and development are scanty, and the committee regrets that the results of the body-weight survey by the Ministry of Food have not been published; data for children indicate that "physique was maintained or improved during the war years, with perhaps the exception of 1941, but tended to fall back in the years 1945–7." The results of purely clinical surveys are rapidly dismissed; and a number of biochemical results are given, including unpublished data of the Oxford Nutrition Survey. From all this emerges the cautious conclusion that "having regard to all the facts and data which have been before the Committee, it would appear to be a fair conclusion that the health of the population as a whole, despite the trials and tribulations of recent years, has been well maintained."

The main value of the report appears to lie in the marshalling of a number of scattered data relating to various aspects of nutrition, and in the interpretation of these data by the expert committee. The report emphasises over and over again the scantiness of the published data on the nutritional state of the country during and after the war. However, in due course the valuable and extensive data of the pre-war Aberdeen Carnegie Survey and of the war-time Oxford Nutrition Survey are to be issued in detail. The moral seems to

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1. *Brit. med. J.* suppl. Nov. 25, 1933.
2. Ministry of Health. Nutrition: Report of Conference. H.M. Stationery Office, 1934.
3. British Medical Association. Report of the Committee on Nutrition. London, 1950. Pp. 106. 7*s.* 6*d.*
4. Malnutrition and Starvation in Western Netherlands. The Hague, 1948; part II, table 4.
5. National Research Council, reprint and circular series, no. 129. 1948.
6. Canadian Council of Nutrition. *Canad. J. publ. Hlth*, 1949, 40, 420.

be that the work of those who are attempting by various means to assess the nation's nutrition should be more closely coördinated—and perhaps more keenly encouraged.

THE SYSTEMIC COLLAGENOSES

SEVERAL of the diseases which a few years ago were thought to affect the skin only are now known to be systemic diseases with dermal manifestations. Thus scleroderma, dermatomyositis, and lupus erythematosus were so called because to earlier clinicians they seemed to be essentially skin disorders. It is now apparent that they are better regarded as collagenoses—conditions involving the collagen of the blood-vessels, or of the connective and supporting tissues, or both. Morphœa, or localised scleroderma, usually seems to be confined to the skin, but the lesions may be multiple, and in 13 cases of linear scleroderma Rubin [1] found a high incidence of spina bifida occulta and other spinal abnormalities, suggesting a trophoneurotic ætiology. Generalised scleroderma usually begins either as Raynaud's phenomenon or the acrosclerosis of Sellei,[2] or as an acute febrile illness closely resembling and probably identical with dermatomyositis. In this issue, Dr. Church and Dr. Ellis report 2 cases of scleroderma with cystic pulmonary fibrosis, and they point out that it was D. W. Finlay, of Middlesex Hospital, in 1891, who first recognised that the lungs may be involved in generalised scleroderma; in fact, the lungs may be affected before the skin.[3] They describe similar histological changes in the lungs in disseminated lupus erythematosus, rheumatoid arthritis (which is sometimes associated with scleroderma), and polyarteritis nodosa. Besides the lungs, scleroderma may involve the connective tissue, heart, gastro-intestinal tract, kidneys, ductless glands, and eyes, and Goetz [4] therefore suggests that "progressive systemic sclerosis" would be a more suitable name for the disease, at least until its ætiology is established. Wainger and Lever [5] regard the muscular and collagenous degeneration of dermatomyositis as primary and the inflammation as secondary. Pagel and his colleagues,[6] from their histological observations, conclude that the changes in muscle, collagen, and blood-vessels are all non-specific, only differing from those found in disseminated lupus erythematosus in the additional involvement of muscle and the relative rarity of renal and endocardial lesions. When lupus erythematosus occurs in the so-called acute disseminated form—an unfortunate term because the condition is systemic rather than disseminated and severe rather than acute—it may be widespread on the surface but some of the worst cases have phases in which there are no active skin lesions but ample evidence of severe systemic involvement in albuminuria, leucopenia, a raised erythrocyte-sedimentation rate, and an inverted albumin-globulin ratio. McCreight and Montgomery [7] have found that collagenous and vascular degenerative changes in lupus erythematosus are much less common in the skin than in other organs, and from an analysis of 132 disseminated cases they concluded [8] that lupus erythematosus is not primarily a collagenous disease. Nevertheless, collagenous degeneration of the endocardium, and focal fibrinoid degeneration of the arterioles of the heart, liver, spleen, lymph-nodes, and other organs are often found [9] with "wire looping" of the glomerular capillaries which is probably also a fibrinoid degeneration.

Is there a common denominator in scleroderma, dermatomyositis, disseminated lupus erythematosus, and polyarteritis nodosa? Fox [10] suggested that disseminated lupus erythematosus may be the response to an antigen which persists in the body and is being continually applied. He described fatal lupus erythematosus after injections of anti-tetanus serum, and polyarteritis has been reported in relation to serum sickness and the administration of sulphonamides and other drugs, and also probably as a reaction to bacterial and parasitic antigens. Alexander and his co-workers [11] explained the unresponsiveness of human skin to weal-forming drugs for 48 hours after the first exposure by assuming that, once the intermediary H-substance is released from the dermal cells by such drugs, it takes 48 hours for this essential component of the defensive mechanism in the vessels to be built up again to the level of an effective urticarial reaction. Here perhaps lies the explanation of some of the dermal and vascular collagenoses. Dermatomyositis, disseminated lupus erythematosus, polyarteritis nodosa, the Hutchinson type of erythema elevatum diutinum, and erythema nodosum may all prove to be variations of a theme of failed allergy or anergy. They have been called "hyperergic inflammation"; but surely this term should be reserved for successful reactions of hypersensitivity which protect the shock organs, whereas hyperergy implies a partial and anergy a complete failure to react, with the result that the vascular endothelium, being "caught napping" in the unresponsive phase, is irreparably damaged by the circulating antigen, whether in the form of drug, foreign protein, or organism. Escape of the noxa and absence of the protective and diluting urticarial transudate may then lead to a secondary affection of the connective-tissue collagen. The fibrinoid reaction in the vessels and connective tissue seems to represent a makeshift stopgap measure of repair.

TIMES FOR SIGHT-TESTING

THE Working Party set up, under the chairmanship of Mr. William Penman, to discover the average time taken by ophthalmic medical practitioners to test sight, has now reported.[12] The committee finds that the average time per test is 25·2 minutes; but the total is brought up to 27·4 minutes by additions for filling up forms (1·2 min.), and writing letters to general practitioners (1·7 min.), and by an allowance to cover losses due to broken appointments (0·3 min.). From these additions, totalling 3·2 minutes, 1 minute is deducted to remedy overstatement through the concluding time of a sitting having sometimes been given as a multiple of 5 minutes. There is no evidence of widespread overwork. The three men who did most testing during the sample week made 90, 78, and 62 tests respectively, the corresponding number of sittings being 93, 81, and 79. Whole-time ophthalmologists, it seems, take on average about 5 minutes less to make a test than do their part-time colleagues. In about one-third of the completed cases letters are written to general practitioners. Conditions other than refractive errors are found in about 40% of the tests made by whole-time ophthalmologists, and in about 34% of the tests made by part-time ophthalmologists.

WE regret to announce the death on Feb. 27 of Prof. JOHN RYLE at the age of 60. He retired at the end of last year from the Nuffield chair of social medicine in the University of Oxford.

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Special Articles

EINSTEIN'S THEORY OF RELATIVITY

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At the close of last century the classical experiment of Michelson and Morley showed that the velocity of light, which was *supposed to be propagated as a wave* through the æther, was the same relative to all observers irrespective of their own velocity relative to the æther. This result, which seemed to conflict with common sense, was explained by Fitzgerald and by Lorentz on the purely ad hoc assumption that the clocks and measuring rods which the observer used and which moved with him underwent changes, the clocks running more slowly and the rods contracting in the direction of their motion, to an extent depending on the ratio of their velocity through the æther to the velocity of light. This slowing and contraction, the amount of which could be calculated from the four equations of the "Lorentz transformation," precisely compensated for the motion of the measuring instruments through the æther, so that the velocity of light relative to them always came out at 186,000 miles per second.

This experiment and the explanation given implied that motion of the observer relative to the æther was for ever undetectable. Thus, while the theory of Fitzgerald and Lorentz demanded the existence of an æther, it demanded properties for it which made it impossible to demonstrate its existence by experiment—a most unsatisfactory state of affairs. But there were further difficulties. Newtonian theory required an all-pervading æther in which the force of gravity could be propagated across otherwise empty space, and electromagnetic theory required a similar medium in which light waves could be transmitted. And yet, after that, neither classical mechanics nor Maxwell's electromagnetic equations took any further interest in the æther; it might just as well not have been there.

It is an essential feature of the laws of classical mechanics that they are equally valid for all observers and *their coordinate-systems*, irrespective of their rate of motion, provided only that this motion is uniform and in a straight line. The question then arose whether this statement could not be extended to embrace *all* natural laws, not only those of mechanics. Before the Michelson-Morley experiment such a possibility could scarcely have been entertained; for how could one have *rationally* supposed that the propagation of light in vacuo with a constant velocity, itself a general law of nature, could be the same for all coördinate-systems? But now that experiment had shown that this was a fact, the above statement, which is known as the *special principle of relativity*, became much more plausible.

THE SPECIAL THEORY

At this point Einstein entered the arena and, after exposing some fundamental assumptions as fallacious, built anew *the foundations* of physics in his *special theory of relativity* (1902–05).

Einstein showed that the idea of the absolute simultaneity of two distant events was erroneous. The only way to define simultaneity is to say that if an observer is at a point equidistant *from the two events and receives* simultaneously electromagnetic (light or radio) signals of those two events, then those two events are *for him* simultaneous.

Looked at from the point of view of the æther theory, and remembering that the observer *cannot determine his* motion through the æther, this definition must imply: (1) that a second observer timing the same two events in an identical manner, but being in uniform motion relative to the first observer, will in general find that the events are *not* simultaneous; and (2) that the opinions of the two observers are equally valid, so that the *simultaneity of distant events must* be a purely relative matter depending on the motion of the observer.

But why introduce an æther and then neutralise it with such compensating effects as will make the velocity of light *appear* to be the same for all observers? *Einstein saw that the only rational thing to do* was to cut out the compensated æther and admit what after all is the only experimental datum, that the velocity of light *is* the same for all observers moving without acceleration. The relativity of simultaneity leads *directly to the relativity of all time and distance measurements*—two observers moving at different speeds past a given rod and clock will get different results for their length and rate. Moreover, the four equations which enable us to convert the time and space measurements of one observer into those of another observer moving relative to him are identical with those of the Lorentz *transformation*.

The special theory of relativity states that if the Lorentz transformation is used in converting the space and time measurements of one observer into those of another, all general laws of nature will hold with equal validity for all observers provided their motion is unaccelerated. From this Einstein made the further *deduction of the relativity* of mass. *An observer at* rest in relation to a body measures what is called its "proper mass"; but as the relative velocity between the observer and the body increases and approaches the velocity of light the measured mass increases and approaches an infinite value. That is why a *material* body can never achieve the velocity of light. *It also* follows that mass and energy are interchangeable, two aspects of the same thing; and that the two classical conservation laws must be replaced by a single law of the conservation of mass plus energy.

FOUR-DIMENSIONAL SPACE

At this stage Einstein perceived that the theory of relativity was peculiarly well suited for consideration in terms of the four-dimensional geometry of Minkowski (1908). *In the space of ordinary experience*, with its three dimensions of forwards-backwards, side-to-side, and up-and-down, it had often been convenient to look on time as the fourth dimension. But whereas by a simple rotation in your study you could convert your side-to-side into your forwards-backwards, or by going from pole to equator convert your up-and-down into one of your other two space dimensions, no such effect could be produced on the time dimension: it was quite independent of the other three. But in Minkowski's space-time all four dimensions were on an equal footing, and equally interchangeable with one another.

We have seen that in relativity theory two observers in relative motion obtain different time and space measurements. In terms of four-dimensional geometry, they divide up their space and time dimensions differently. In fact, it was shown that the use of the Lorentz transformation *in changing over from the coördinate-system* of one observer to that of the other corresponded precisely to a rotation of the coördinate-system in the four-dimensional continuum, analogous to the above-mentioned rotation in one's study.

When *you are being* driven in your car with the blinds down you have no means of deciding whether you are moving uniformly or whether you are standing *still*. But directly the accelerator-pedal is depressed, the brakes put on, or a sharp corner taken, the behaviour of *moveable objects inside* the car is profoundly modified and you are immediately aware of a change. Thus it seems that while uniform motion is relative, accelerated motion is absolute; that while uniform motion denies absolute space, accelerated motion requires it. This in itself was scarcely credible; but, apart from that, all reason seemed to demand that the relativity theory, which was so convincingly justified in the realm of uniform motion, should be extendable to embrace accelerated motion also.

Einstein perceived that accelerated motion was not quite so absolute as at first appeared. Imagine a man shut up in a chest which is far removed from gravitating matter and is being propelled upwards with an acceleration of 32 feet per second per second. It will be impossible for him to decide whether that is in fact what is happening, or whether the chest is at rest on the ground in the earth's gravitational field. On the other hand, our man would equally be unable to distinguish a situation in which his chest was in uniform motion far away from matter from one in which it was falling freely to its destruction in the earth's gravitational field. In each of the first two cases objects dropped from his hand would fall to the floor with an acceleration of 32 feet per second per second; while in each of the second two cases such objects would remain suspended in the air, moving uniformly in straight lines with whatever velocity the man happened to impart to them. But a gravitational field can be created or neutralised by rotation as well as by a linear acceleration. Thus if the chest had been lashed in empty space to a rapidly rotating disc—lashed on its side with its roof directed inwards—the occupant would have experienced a similar gravitational field; while conversely on a rapidly rotating planet the gravitational field at its equator may be partially or wholly neutralised by the oppositely directed centrifugal field.

Einstein quickly realised that the fact that gravitational fields, real and artificial (the latter produced by an acceleration or rotation of the coordinate-system), gave rise to identical mechanical effects might be of fundamental significance, and if so would point the way for the hoped-for extension of his theory. Was it possible that in the extended theory the gravitational field would emerge as a mere relation between the objects observed and the changing coördinate-system of an accelerated observer, just as in the special theory lengths and durations emerged as relations between the objects observed and the coördinate system of an observer in uniform motion?

Now, a curious property of the gravitational field, which distinguishes it from electric and magnetic fields, is that it produces the same acceleration in all bodies irrespective of their mass. If we drop a 2 lb. and a 1 lb. weight together in a vacuum they reach the ground at the same time. Yet, to give them the same acceleration, twice the force is required in the case of the 2 lb. as in the case of the 1 lb. weight. To explain this Newton had to assume that the gravitational force acting on the 2 lb. weight was also twice as great as that acting on the 1 lb. weight.

This remarkable coincidence means that the inertial and gravitational masses are always equal. If they were not equal a real and an artificial gravitational field would not be identical, and the experiments in the chest would give different results in the two cases. But if the special theory was to be extended in the way suggested above, the effects of a real gravitational field being produced in fundamentally the same way as those of an artificial field, then the gravitational mass must be the same as the inertial mass, and the equality of the two would no longer have to be regarded as an independent law of nature. Einstein saw that this argument weighed heavily in favour of the suggested extension.

THE PRINCIPLE OF EQUIVALENCE

Guided by these ideas, Einstein in 1911 put forward the principle of equivalence, which states that real and artificial gravitational fields are equivalent not only for the laws of mechanics but for all general laws of nature; for if this was not true the extension of relativity along the lines suggested would not be possible.

The importance of this principle was that it enabled one to derive the properties of a real gravitational field by simply calculating the effects of an artificial field. We know that a rifle bullet fired in empty space will travel uniformly in a straight line in relation to an unaccelerated coördinate-system. Simple calculation shows that in relation to an accelerated coördinate-system this same bullet track must in general be curvilinear. But in relation to this second coördinate-system there is a gravitational field (artificial); therefore in a real gravitational field the bullet must move curvilinearly.

But the principle takes us a step further: it enables us to argue from a bullet to a light ray and predict that in a gravitational field light also travels in a curve.

An observer is seated eccentrically on a rotating disc in empty space with a measuring rod and two clocks, one of which is fixed near the edge of the disc and the other at its centre. According to the special theory the clock near the edge, owing to its motion, must be going more slowly than the clock at the centre. Moreover, if the observer uses his rod to measure the circumference and radius of the disc he will obtain for their ratio a figure somewhat greater than π; for when he is measuring the circumference the rod will contract whereas it will not do so when he is measuring the radius.

A second observer situated outside the disc and not moving with it will ascribe these anomalies to the rotation of the disc. But the first observer can equally well contend that his disc is not rotating, but that he and his instruments are in a gravitational field which is itself the cause of the discrepancies.

Thus Einstein concluded that in a gravitational field there are no such things as rigid measuring rods and regularly running clocks, and moreover that the geometry of the region must be non-Euclidean. It was not, of course, supposed that the properties of a real gravitational field would be identical with those of an artificial field, but they would have to include those of an artificial field as a special case. And it was hoped that the properties of a real gravitational field could be inferred from those of the special case.

CURVED SPACE

The final step in the development of the generalised theory necessitated a return to the four-dimensional space-time of Minkowski with the realisation that its geometry was non-Euclidean. By simple measurement we can easily see that the well-known propositions of Euclid are not valid for a *curved* surface; the geometry of such a surface is therefore said to be non-Euclidean. For us three-dimensional beings who are not mathematicians it is easier to understand remarks about the curvature of such a surface into the third dimension than statements about its departure from Euclidean geometry. But two-dimensional beings living on the surface would be quite incapable of visualising its curvature into a third dimension and yet could readily demonstrate its non-Euclidean properties by direct measurement.

The method of investigating the geometry of such a surface was invented by Gauss. A quite arbitrary coördinate-system is constructed over the surface and measurements are made on the surface in relation to this system. From these measurements certain coefficients are obtained, which, when analysed, reveal not only the nature of the coördinate-system but also the nature of the geometry of the region. But why introduce an unnecessary complication by constructing an arbitrary coordinate-system? Why not in the first instance draw up some perfectly regular mesh-system? The reason is that the type of mesh-system is partly determined by the type of curvature of the surface, and in the problem at issue one cannot know that in advance.

In precisely the same way the geometry of our four-dimensional space-time can be investigated by making measurements in relation to an arbitrary four-dimensional Gaussian coordinate-system constructed in it. Any departures therein from Euclidean geometry can thus, by analogy with a two-dimensional surface, be looked on as "curvatures" of the four-dimensional space-time into still further dimensions.

It will be noticed that the arbitrariness of the Gaussian mesh-system corresponds with the arbitrariness of the non-rigid rods and irregular clocks which we saw had necessarily to be used in a gravitational field. The actual form of this mesh-system will depend (1) on the arbitrary way in which it is laid down, (2) on the kind of acceleration it and the observer have in three-dimensional space, and (3) on the curvature impressed on the continuum by the presence of gravitating matter.

The problem remained to find the law governing the curvature of space-time in the vicinity of matter—in fact, the law of gravitation. This law would have to be such that in the special case of an artificial field it gave rise to a distortion of the mesh-system identical with that corresponding to an acceleration (linear or rotational) of the observer and his coordinate-system; and also such as to give an approximately "flat," or Euclidean, space-time at great distances from matter. This was the law which Einstein finally discovered about 1915.

In empty regions of the four-dimensional world the track taken by an object moving freely from one point to another in space-time must be uniquely definable—otherwise the object could not decide which track to adopt and chaos would result. In ordinary space the unique track of a freely moving object between two points is the shortest distance between them, the straight line. In the four-dimensional world the corresponding uniquely definable track between two space-time events is called a geodesic. Though it is impossible to draw a straight line on a curved surface, such as that of a sphere, one can define a unique line between any two points on it, namely a *great circle*. Even if this surface had localised curvatures in it, such as hills and valleys, one could still define a unique track between any two points, though, since it must follow the curvatures of the surface, it would be of more complicated form. Similarly in the four-dimensional world one can still define geodesics uniquely even in the "curved," non-Euclidean, regions in the vicinity of heavy bodies.

According to Einstein's theory the four-dimensional track of every material body, so long as it is not impeded by actual collision with other bodies, will be a geodesic; far from matter the geodesics are straight and correspond with the state of rest or of uniform motion in a straight line in ordinary space; but in the neighbourhood of matter they follow the curvature of the surrounding space-time and give rise in ordinary space to the characteristic elliptical orbits of the planets and double stars.

It will be seen that the geodesic "law" is not an independent law, but emerges as a necessary consequence of the geometrical nature of the theory. Thus Einstein's law not only replaced Newton's law of gravitation but also his three laws of motion and the law of the equality of gravitational and inertial mass. It also did away with the necessity of assuming a mystical force of gravity which could be propagated across empty space.

Except in the case of very rapidly moving bodies or of very intense gravitational fields the new theory gave the same results as Newtonian theory. So far only three cases are known where the results of the two theories differ sufficiently to form a crucial test: an anomaly in the motion of Mercury, the fastest moving of the planets; the bending of light when a ray passes close to the sun's surface; and the slowing-up of atomic vibrations producing a shift in the spectral lines of very dense stars, where the gravitational field at the surface reaches unusual intensity. The results of the first of these tests agree precisely with the theory; those of the other two agree within the uncertainty of the observations.

THE UNIFIED FIELD THEORY

The generalised theory of relativity, while accounting for the gravitational field, completely ignores the electric field. Yet reason seems to demand a still more generalised theory which will embrace both the gravitational and the electric fields: a so-called "unified field theory." The first solution of this problem, a welding together of electricity and gravitation into a single geometry, was achieved by Weyl in 1918; and in the last thirty years other solutions have been produced by Eddington, by Einstein himself, and by others. But though some authorities have considered them convincing, it has not been possible to put any of them to a crucial experimental test. Einstein has now produced another solution which he regards as fully satisfactory and which has lately been acclaimed in the press as "Einstein's new theory": but again he cannot yet point to any means of testing it.

DOCTORS IN PARLIAMENT

NINE medical men and one medical woman have been elected to the new House of Commons. Dr. Charles Hill and Dr. R. F. B. Bennett are newcomers; all the others were members of the last Parliament.

R. F. B. BENNETT, V.R.D., B.M. Oxfd (C., Gosport and Fareham), was born in 1911 and educated at Winchester, Oxford, and St. George's Hospital. After taking the L.M.S.S.A. in 1937 he held a psychiatric registrarship at St. Ebba's Hospital, Epsom. He took his B.M. in 1942. During the war he served as a surgeon lieut.-commander in the R.N.V.R. and he was twice torpedoed. He has since held a psychiatric registrarship at the Maudsley Hospital and a registrarship in psychosomatic medicine at King's College Hospital. Well-known as a yachtsman, he was a member of the team which competed last year for the British-America Cup.

A. D. D. BROUGHTON, M.A., M.B. Camb. (Lab., Batley and Morley), who is 47 years of age, was returned as M.P. for this constituency in a by-election in 1949. A native of Batley, where his family have practised medicine for over 70 years, he was educated at the grammar school there and at Rossall School. He studied medicine at the University of Cambridge and the London Hospital where he qualified in 1929. He held the post of medical officer at Rossall School before he settled in practice at Batley in 1932. During the war he served for five years with the R.A.F.V.R. with the rank of squadron-leader.

WALTER ELLIOT, P.C., M.C., M.B., D.SC., F.R.C.P., F.R.S. (C., Glasgow, Kelvingrove), who sat for the Scottish Universities in the last Parliament, has now been once more returned by the Glasgow constituency which he represented from 1924 to 1945. He was born in 1888; he graduated in science at Glasgow University in 1910 and in medicine in 1913; and he holds honorary degrees from five universities. During the first world war he served with the R.A.M.C., and he first entered Parliament in 1918. He has held office as Minister of Agriculture and Fisheries (1932–36), Secretary of State for Scotland (1936–38), and Minister of Health (1938-40).

SOMERVILLE HASTINGS, M.S. Lond., F.R.C.S. (Lab., Barking), is consulting surgeon to the ear and throat department of Middlesex Hospital, London, president of the Socialist Medical Association, and alderman and former chairman of the London County Council. He is also chairman of the board of governors of the Hammersmith, West London, and St. Mark's Hospitals. He was born in 1878.

CHARLES HILL, M.A., M.D. Camb. (C. and L., Luton), who is 46, is secretary of the British Medical Association. He was educated at St. Olave's School and Trinity College, Cambridge, where he obtained first-class honours in the natural sciences tripos in 1925. In 1927 he qualified from the London Hospital. He was deputy M.O.H. for Oxford before he joined the staff of the B.M.A. He is president of the World Medical Association. He is already known far beyond the medical profession by the talks on health which he has given as the Radio Doctor; and his mastery of this modern technique was shown to advantage in his election address.

Dr. A. D. D. BROUGHTON

Dr. CHARLES HILL

Mr. WALTER ELLIOT

Dr. BARNET STROSS

Dr. EDITH SUMMERSKILL

Dr. H. B. MORGAN

Dr. S. W. JEGER

Mr. SOMERVILLE HASTINGS

Dr. R. F. B. BENNETT

Colonel STODDART-SCOTT

S. W. JEGER, M.R.C.S. (Lab., Holborn and St. Pancras South), who is 51, was educated at University College, Cardiff, and the London Hospital. After qualifying in 1923 he settled in general practice in East London and the West End. A former mayor of Shoreditch, he was one of the founders of the Socialist Medical Association.

H. B. MORGAN, M.D. Glasg. (Lab., Warrington), represented Rochdale in the last Parliament. He is medical adviser to the Trades Union Congress and several trade unions. Born in 1885, he was educated in the West Indies and Glasgow University, where he qualified in 1909.

Colonel **MALCOLM STODDART-SCOTT**, O.B.E., M.D. Leeds (C., Ripon), sat for Pudsey and Otley in the last Parliament. He is 49 and qualified in 1926. During the late war he was A.D.M.S. of the 48th division. A member of the executive committee of the British Social Hygiene Council and of the West Riding Fitness Council, he is also a vice-chairman of the British Rheumatic Association.

BARNET STROSS, M.B., M.SC. Leeds (Lab., Stoke-on-Trent, Central) who was elected for Hanley in 1945, is medical adviser to the North Staffordshire Miners' Federation and the National Society of Pottery Workers. He was born in 1899 and he qualified in 1925. The following year he settled in practice in Stoke-on-Trent.

EDITH SUMMERSKILL, P.C., M.R.C.S. (Lab., Fulham West), has been parliamentary secretary to the Ministry of Food since 1945. She was appointed a privy councillor in 1949. Born in 1901, she qualified from Charing Cross Hospital in 1924. She is the wife of Dr. E. J. Samuel and has two children.

Dr. Bennett's photograph is by the *Evening News & Hampshire Telegraph*, Dr. Hill's by Elliot & Fry, Colonel Stoddart-Scott's by Navana. The remainder are reproduced by courtesy of Press Portrait Bureau.

CONFERENCE IN WELLINGTON

FROM OUR NEW ZEALAND CORRESPONDENT

The biennial conference of the New Zealand branch of the British Medical Association was held in fine weather in Wellington from Feb. 14 to 17, under the presidency of Mr. E. H. M. Luke. There was an enjoyable programme of social and sporting events, including a dinner and ball. Each day, combined and sectional meetings were held in Victoria University College. The chief subjects were congenital heart-disease, amœbiasis, cancer of the breast, the fenestration operation, aviation medicine, hypertension, hiatus hernia, gastric surgery, carcinoma of cervix, the anticoagulants, and medicolegal problems.

Special addresses were given by Mr. Arthur Porritt, of London, in memory of New Zealand medical men lost in war, and by Dr. R. S. Aitken, vice-chancellor of Otago University, on standards in medicine. This was a valuable and critical survey, with an eye to the future, of possible methods of raising and maintaining standards in practice. Mr. Porritt also participated in the discussion on gastric surgery. The president's address was on the Doctor and the Patient in 1950 and dealt with contemporary modes in practice. Mr. J. T. Watts, the minister of health, addressed the conference on the same occasion. Both the minister and high officers of the B.M.A. expressed readiness to coöperate towards the common good during necessary revision of social-security legislation.

AUCKLAND UNIVERSITY COLLEGE

Mr. K. J. Maidment, formerly of Merton College, Oxford, has arrived and taken up duty as first principal of Auckland University College. His colleagues in the other three centres have already assumed office, and joined the senate. Mr. Maidment begins at a time of lively discussion of university policy in general and in New Zealand in particular. In only twenty-five years the college has badly outgrown its site and buildings, and eyes are cast towards Tamaki, five miles from the centre of the city, where an empty site of 120 acres has been acquired; there are still no definite plans for building.

Points of View

WAR

ITS ORIGIN IN THE MINDS OF MEN

RANYARD WEST

M.D. Lond., D.Phil. Oxfd; M.R.C.P.

I. Minds, Ideas, and War

Do wars arise in the minds of men? The preamble of the UNESCO charter says they do.[1] Why did its authors think so? The draftsmen of that document may have thought of evil minds corrupting good minds—with a side glance at the Nazis. Or they may have thought of the acquisitive and aggressive passions of normal men flaming up spontaneously or when played upon by the winds of chance. They may have been impressed by the curious fact that, when everything is laid out after a war, nobody seems to have wanted what everybody actively took part in: and thus they may have been drawn to the deduction that Grotius made early in the 17th century, that war is "a madness driving men to all kinds of crime." They clearly did not accept the doctrine to which professional students of politics most often adhered before the recent war—that wars arise from inevitable economic necessities.

It is not a simple task to examine the accuracy of the UNESCO preamble in this matter of the mental origins of war. One difficulty arises from the imprecision of the term "mind." To many people the mind is something quite distinct from the body, a spiritual entity: to others it is "just mechanism." In using this term I shall mean the higher functions of the brain in respect of thought and feeling—our intellectual processes and our emotions, conscious and unconscious.

For all higher functions, however, psyche and soma are wrapped up together, in that motor responses of the mind are influenced by somatic health—neural and humoral—and in their turn influence the health of the soma wherever they reach it. It would seem then that if wars can arise in the minds of men they may also arise in their bodies. Moreover, since the interrelation between the external and the internal environment of a person is continuous, whether in respect of mental function or somatic function, the environment modifies the responses of that person in endless ways. Hence, philosophically speaking, all that it seems possible to say about our inquiry is that wars, like every other human activity, may find predisposing and exciting causes in the constant interaction of human persons with their human and non-human environment.

But the challenge that "wars arise in the minds of men" is clearly intended to mean something more precise than that men have something to do with the start of wars. And since UNESCO was intended to diminish the risks of war by the ardent use of the human brain, let us see whether we can help UNESCO with its task a little better than by dousing its initial tenets with destructive criticism. Let us therefore take another tack.

IDEOLOGIES

While the interrelationships of mind, body, and soul have been and will continue to be the subject of much varied philosophy, ardour, faith, and scepticism, we know that the politics of men remain passionately and continuously in conflict, though the scene of conflict frequently shifts. Is there any demonstrable connection between the two spheres—between our diverging fundamental philosophies and our political quarrels? In other words, how far are diverging philosophies of life, systems of ideas, or ideologies a fundamental cause of human strife?

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[1] See also the article on International Tensions by Otto Klineberg, *Lancet*, 1949, ii, 851.

Again it is not easy to answer. Ostensibly quarrels are often due to ideological conflict. But is the ideological difference the primary one? Are there not often long-established cultural, vocational, climatic, and racial traits behind the different ways of men's lives and thoughts, including their political thoughts? For example, hundreds of years of rich pasture seem to have left their mark on southern British character, contrasting with that of the hard-striving, potato-shortage economy of the north. In Ireland, again, more Celts and fewer Norsemen have combined with a mild damp air, and heaven knows how many other indigenous differences, to produce a very different response to potato shortages from the determined and anxious foresight of the Scots. When to ancient race and perennial soil and climate we add social history—pastoral, agricultural, urban, industrial—we can see how they all contribute their quota to ideology before we get to the experience which each individual extracts from the times he lives in. The psychoanalyst then demands that we look deeper than the obvious, as well as further back than the obvious, for the raw material of character and personality, be it individual or racial.

Any system of ideas held by individuals or groups must thus depend on very many factors, past and present. But in the outcome political ideas can be seen clustering in certain places, particularly among organised and coherent social groups and notably today among social classes and sovereign nations. Here they cluster and cause strife. The French proletariat revolted ideologically in 1789, the Russian in 1917, that of nearly all Europe abortively in 1848. On the other side of the Atlantic a few centuries of different general climate, and an initial difference of structure of society, developed in the North and South a different general psyche which seemed to contribute its quota to the bitter tragedy of the American Civil War.

Such historical conflicts seem parochial today as we stand on our suddenly widened 20th-century stage and look over our shoulders at the rapid ascendancy and eclipse of *Deutschtum*—with its peculiar economic pressures, its peculiar history, and its racial traits of body, mind, and soul—and forwards to possible conflict between the once "united" victors in that struggle. Today we see on the one hand "Russian Communism" with its peculiar psychosomatic-economic-racial history, so near in much of its experience the history of half the peoples of the world, and on the other the organised, and powerfully successful "individualists" of the North Atlantic shores. How, one may well ask, can anyone see such a threatened world and not regard the politics of mankind as in the largest sense environmental in origin, and its wars as due to an inevitable mixture of economic and philosophical differences?

If that be so, why not be content to speak of "ideological conflict" and turn this article over to the economists and political scientists? The answer I believe to be that such an analysis is wrong; nor does it even touch the proper contribution for a medical philosopher to make to sociology today.

Let us look again at our ideologies, noting how political and economic theories alike appear to be at the mercy of something else. Ten years ago the English Socialists still held that the Marxian analysis was broadly right, though national ownership, gained through the ballot-box, would do more for the welfare of the proletariat than revolutionary Communism. But today the party whose banners used to proclaim "Hands off Russia" leads the anti-Communist crusade. Political history is full of such changes, suggesting that ideology—a system of consistent political ideas—is seldom an overriding element in the political behaviours of peoples. Ideologies consist of ideas, and these are shouldered out by new ideas, the product of new circumstances. It is not ideology that we see surviving, but nationalism. And whether we look at victorious nation or defeated nation, at the first world war or the second world war, it is nationalism that fights and it is nationalism that remains.

One may hazard the guess that since nations became the universal effective units of power three or four centuries ago every war that has been fought has been a nationalist war, excepting only where the power of the nation became divided in the faction of civil war. It is, in fact, not ideology but the *power-group unit* that primarily excites the effective loyalty of war-making mankind.

II. Nationalism, Loyalty, and War

The nation State requires that wars should be national. However great their urge to war, religious groups, political groups, the devotees of ideal and ideology, the protagonists of the right to atheism, free speech, primitive Socialism, or antivivisection, all have to grin and bear with each other so that only the nation shall retain the right to strike its enemies.

It was not always so. In the 17th century the Huguenots were able to have their wars both within and across the national boundaries of France. At the same time French Catholics did not know whether to be Frenchmen first or Catholics first; and that sort of problem continued to a comparatively late date. Even quite recently some of us expected good Germans to repudiate the national government of Hitler while it was both in power and at war! Americans could fight each other about slavery, cotton, and other matters until Abraham Lincoln gave them a national government organised as such. German princes enjoyed the same right before the creation of the German Empire. What makes the difference is probably simply the centralisation of power. Overriding power to levy taxes, the sole control of the armed forces, the exclusive claim to represent its people as a whole at home and abroad—these were the discoveries that made the difference because they *established one Power transcending all others within the State.* From the time that autocrats, parliaments, and bureaucrats discovered and seized these essentials of control, theories might come and theories might go, but the de-facto national government alone declared and conducted the wars that arose in the minds of men.

But the government of the nation only took over this function of controlling and expressing group power from its various predecessors, feudal barons, Continental princelings, clans, city States, the leaders of tribes and herds. As for us subjects of government, it looks as if the powerful organisation of our group interest (or seeming interest), aggressive and defensive, still fixes the loyalty of our minds in a primitive, unquestioning, biological sort of way. A demonstration of overriding power in our name, in the presence of external threat or imagined danger, works the magic of obedience in our minds. Obedience and something more. The power we accept, with varying degrees of enthusiasm, as ours. The enemy we see, with varying degrees of distaste or fury, as evil. Our leaders lead us in judging, with varying degrees of prejudice, our own cause. Their means of publicity portray selected facts with varying allegiance to truth. And, though we can never see it so at the time, every other national government and people does exactly the same thing with just the same result. It is not a case of power corrupting; but of power—the only remaining repository, for good or ill, of the group force of mankind—hypnotising us in an entirely primitive and old-fashioned way. In national loyalty and enthusiasm do we not witness a long-established reflex involving the mind? The thought process which accompanies the reflex may be broadly expressed as: "We are a power-group, successfully surviving because we have previously stood together against competing enemy groups. There must be enemies: there always have been. Where are they? What are they already up to? Ah! . . ."

LOYALTY

Next it is worth remembering—indeed it is essential to remember—that as gregarious human animals we can only be efficient if we are loyal *to the death*. Our high valuation of loyalty in war-time is probably far more instinctive than intellectual, though intellectual reasons for being loyal to a good cause can always be found. It is important to note what a strong basic emotional response this requires of the self-centred, pleasure-loving, and life-loving normal human being. That he should be able, at comparatively short notice, to find his group's cause worth dying for, whatever that cause may be, is not the least remarkable feature of the body-mind of *Homo sapiens*. It has become a sublime tragedy of the race.

Loyalty may be more effective if it is entirely "voluntary." In general it is probably weakened by compulsion, though psychology can show mental mechanisms that provide for the exception. In the case of modern man it may have been weakened by universal State conscription. But conscription has by no means killed voluntary individual self-sacrifice to the welfare of the human herd by its members. Faced with the alleged motives and the actual moves of the enemy—and, whether in private fisticuffs or international tensions, every defensive movement of the enemy looks offensive from the other side of the ring—faced with the war that passes from the inconceivable and unlikely to imminence and the actuality of our fellows' dying for the cause, conscience pricks the man who cannot show at least a fairly active acquiescence in his own extinction then.

> Have *I* the right to whisper "I remember"?
> I was not with them when they marched away.

The theory of Socialism and the theory of Communism should each of them have tended to counter our present national biological trend to war. But the political parties that adopted these doctrines were able to counter it only while they remained in opposition and themselves separate from and devoid of national power. With the advent of Communism to power in a single State, the idea of the workers of the world uniting became converted (slowly, and it may yet prove incompletely) into the idea of the workers in enemy countries undermining the national forces arrayed against the Russian State. And, with the door opened by modern war and the State Socialism it seemed to necessitate, Socialist Britain has surprised many observers, and disappointed some inveterate pacifists, in its demonstration that, with the best will in the world in certain places, Socialism in power becomes National Socialism.

The fault here, if fault it be, does not seem to lie in the Socialism or the Communism, each of which is a doctrine of a way of living and of organising society alternative to liberal democracy in the present, monarchic autocracy or feudalism in the past. National Socialism is not Hitlerism, though the horrid elements of tyranny and persecution easily creep into any power system which works under great stress. National Socialism is Socialism wholly limited by national blinkers, and seeking first of all the prime welfare, and in the end (as I think must always happen) the desperate survival, of its own nation State in a world of competing nation States which are the logical and emotional heirs to the tribe and the clan.

We can hardly find that wars arise in the minds of men because there are ambitious tyrants about. We are dealing with the modern world, and no modern State would long tolerate a tyrant in quiet times. Our times are unquiet, not because tyrant faces tyrant—or even because tyrant faces freeman—but because nation faces nation in competition, fear, dislike, and conflict. The quality in the mind is a basic human quality. Wars arise because the minds of ordinary persons of every nationality react in certain definite and constant ways to certain recurring circumstances in the tensions between power-groups.

We must consider further the universal circumstances which determine war, and how those circumstances can be controlled.

(To be concluded)

Disabilities

46. THROMBOANGIITIS OBLITERANS

I JOINED the Army in the early days of the late war, at which time I was organically sound, though, like many general practitioners, in a constant state of jadedness owing to some 20 years of overwork, hurried meals, late nights, and heavy smoking (I usually smoke some 20–30 cigarettes a day).

Whatever the drawbacks of Army service, it at least enables one—unless one's rank is exalted—to cast the familiar cares aside, and so within ten days I found myself, though no chicken, being then aged 42, in very good health indeed. As a subaltern in a rather strenuous field ambulance, where the C.O. insisted on a training as rigorous as that of a fighting unit, I found I could hold my own with fit young men in their early twenties, march 30 miles well laden, and play strenuous games without being more tired than anyone else.

This agreeable state continued for about two years, until 1942. By that time I had passed the subaltern stage and was commanding a convalescent depot, the main function of which is to toughen men up again to a high standard of fitness. Here my duties were largely sedentary, but with bursts of what was to me violent exercise, when I personally tested batches of men who were fit to return to their units. These tests included the usual strenuous games, cross-country runs, and a very quick forced march of 12 miles.

My first symptom appeared on one of these marches, when soon after setting off I felt as though my left gaiter was too tight. I fell out and loosened it, doubled up and rejoined the column, and completed the march without further trouble, except that my gaiter still felt slightly uncomfortable.

In the next twelve months my leg gave me little inconvenience, but in 1943 I was posted to a unit standing by for the coming campaign in Europe. This year of waiting was passed mainly in physical exertion of one sort or another, cross-country runs and marches predominating, with a weekly climb at top speed over two or three of the summits of the Pentland Hills near Edinburgh. These marches were often done in cold weather, through some inches of snow. I thoroughly enjoyed these exertions, and it was mainly of my own choice that I participated in them. By now, however, I was having the "tight gaiter" feeling on every march, and rather more severely. It would pass off if I ignored it, and by developing a technique of walking which spared my calf muscles I was able to keep up with the others.

Curiously enough, even at this stage, I remained blind to the fact that I was having intermittent claudication and I attributed my pain to muscular strain or fibrositis of some kind. It was not until nine months later, when I was in Normandy and no longer taking strenuous physical exercise, that, in addition to the now easily induced pain in the left calf, I began to have a very troublesome coldness in both feet, mainly in bed at night, which resisted all attempts to warm them up by rubbing, &c.

Gradually I diagnosed my own condition. By now it was clear enough, for I had no pulsation in either the dorsalis pedis or posterior tibial artery of my left foot. My toenails were assuming an exaggerated curve from side to side and were slightly ingrowing and more brittle than before. When I got into a hot bath, especially after previous exertion, my left foot would become peculiarly numb, and pale, with purplish mottled lines and patches. I had my blood-pressure taken at this stage and it was normal at 125/90 mm. Hg. An X-ray film of the arteries of my legs showed no calcification.

I could still get about remarkably well, and I returned to general practice in August, 1945. Here I was hardly aware, except for cold feet at night, that anything was amiss, until one day my car broke down 200 yards from home. I set off walking to my house rather quickly and in some anxiety, for I had a big round to do and little time to spare. Within 50 yards I was pulled up with the most severe pain in the leg I had yet experienced and was only able to reach my house with difficulty and grotesque limping. I afterwards noticed that exertion plus mental unrest always produced the pain more quickly than exertion alone.

I now developed what was to me the most distressing feature of the complaint. The full significance of the disease became suddenly apparent to me and in a very short time this led to a feeling of the utmost depression. The future seemed gloomy, forbidding, and hopeless. Out-of-door pleasures—sport, gardening, and the like—and even indoor ones such as dancing were no longer for me. Work, though still well within my capabilities, became a grievous burden, unleavened by even the previous short episodes of relaxation and pleasure. I became morose and short-tempered towards those who least deserved this treatment. Even thoughts of eventual suicide began to lurk not very far back in my mind. Finally I realised that I could not go on like this much longer and I put myself in the hands of a very competent surgeon who was also a good friend of mine; though I had no great hopes of deriving much benefit from treatment.

A bilateral lumbar ganglionectomy was performed, under spinal anæsthesia, in March, 1946—i.e., about five years after the appearance of the first noticeable symptom. The improvement in the warmth in my feet was striking as soon as the anæsthetic had worn off, but the first fortnight of convalescence from the operation was very unpleasant. The operation was done by the transperitoneal route from the front of the abdomen, and an over-abundance of veins round the ganglia made it difficult and entailed more handling of the bowels than usual. This presumably led to a mild paralytic ileus.

After the first three weeks I was conscious of a vast improvement in my mental outlook, and within four weeks I could walk several hundred yards, though rather slowly because I was cowardly of testing myself too severely in case I found that the operation had failed. This fear was based on a paper I had read during my stay in hospital; it summarised the results of ganglionectomy in Buerger's disease and made very depressing reading. However, such was the improvement in my spirits that I felt that I was to be an exception to the rule, and further tests of my capabilities confirmed my optimism.

In two months I was trout-fishing again. I spent a good part of one afternoon wading, without waders, in a very cold upland stream, and, though the water felt cold, my feet got warm again as soon as I regained the bank—so much so that I looked at my bootlace holes half expecting to see steam issuing forth. In another two months I was playing 18 holes of golf without trouble, though I found it a great help then and now to take two sticks with me to take the weight off my toes when walking. I can manage without if I am content with 2 miles an hour, but with walking-sticks I can go almost any reasonable distance at full walking pace.

This state of affairs has continued until the present day and I trust that it may continue—though perhaps I am hoping for too much.

As the result of the mental upset through which I passed, before and immediately after the operation, I decided that I must get a little more leisure and pleasure out of life than can be got in a busy practice. God's countryside and the quiet places, and the leisure to enjoy them, had never seemed more desirable than in my period of black depression. So I have edged out of the struggle and come to a remote but beautiful island in the Hebrides.

Here, with only 250 patients to tend, I can do the slight amount of work easily and without fret or hurry. Taking my own time I can reach my most distant crofter, or the most distant trout lock over rough moor, without trouble. Once, without sticks and carrying a 12-bore gun, I walked 6 miles over sand dunes after wild geese. I gather my own peats, care for a biggish garden, catch my own fish and lobsters, and do the rougher household chores—so I have no time for boredom. At the end of my day I feel at peace with the world and most grateful to my good friend the surgeon.

* * *

To summarise, these are the outstanding points of Buerger's disease as it has come to my notice:

(1) The very gradual onset of symptoms, increasing irregularly with intervals of less severity. The appearance of cold feet is of much import, because after that the condition can no longer be laughed off.

(2) The significance of really strenuous exertion, especially of a semicompetitive type, as a causative factor in those no longer young. This was strikingly illustrated in the unit in which I latterly served. Out of a permanent staff of 90 men, many of whom, though fit, were above the usual Army age and yet had at least attempted the exertions I have described, no fewer than 3 developed well-established Buerger's disease. An incidence of $3^1/_3\%$ surely cannot be ascribed to chance.

(3) The tendency to severe depression.

(4) The good results of a thorough bilateral lumbar ganglionectomy. The results might well be better if the operation were done before irreversible changes had taken place. (I still have no dorsalis pedis pulse, and in fact cannot feel my left popliteal artery.)

(5) The value of escape to peaceful surroundings.

(6) The suspected influence of heavy smoking. Some people smoke 60–70 cigarettes a day with no apparent effect, whereas others lose their appetite and get dyspepsia, headaches, or tremors of the hands on 15–25 daily. I belong to the second, more vulnerable, class, but whether this had anything to do with my trouble is hard to prove.

(7) The possible contributory effect of faulty posture. I always sit with my knees crossed at a sharp angle; is it unreasonable to suppose that the popliteal artery may be damaged by years of this attitude?

Medicine and the Law

Professional Privilege

PRIVILEGE in connection with medical records under the National Health Service Act has lately been discussed by Nokes.[1] Ever since the end of the 18th century the courts have declined to recognise any privilege for communications by a patient to a medical practitioner in private practice. Many States treat medical confidence as privileged, but England remains an exception.

In the National Health Service the confidential relationship of doctor and patient has been further breached; for general practitioners are required to forward records of patients to executive councils; and Nokes observes that "it can hardly be anticipated that documents will not pass from one office to another." However, the National Health Service Act (sect. 13(2)) refers expressly to the right of the Crown "to withhold or procure the withholding from production of any document on the ground that its disclosure would be contrary to the public interest," and this State privilege has been claimed from time to time by various Departments, including the War Office.[2] Nokes concludes that—

> "the nationalisation of medical service produces the anomalous situations that disclosure in Court is dependent upon the will of the Minister; that even if the Ministry does claim privilege the previous liability for disclosure in Court is merely exchanged for disclosure to officials; *and that if the Ministry does not claim privilege there may be disclosure both to the officials and the Court.* . . . Thus it would seem that the new service may have a very limited effect upon the normal obligation of disclosure in Court by a medical adviser. But if Crown privilege is widely exercised, it may obstruct litigation in almost any sphere."

Blood Tests in Paternity Dispute

In a recent action concerning the legitimacy of two children, Mr. Commissioner Grazebrook, K.C., found himself unable to accept medical evidence of blood tests as conclusive.

A husband had obtained a divorce and his former wife had remarried. She applied to the court for maintenance for two children, aged 4 and 2, born before the marriage was dissolved; he denied paternity. A doctor gave evidence that in the case of one child ordinary blood-grouping showed that the first husband could not have been its father; four other tests, it seems, were inconclusive.

The Commissioner said that only one of the two children was affected by the evidence. After the husband had separated from his ex-wife in 1944 he had occasionally visited her, in order to see the children, until he obtained a decree nisi (in July, 1948) in an undefended divorce petition. The Commissioner observed that there were opportunities for marital intercourse at the material time; there was no evidence which he could accept to establish that relations did not take place.

This was stated to be the first case to be decided since the Law Reform (Miscellaneous Provisions) Act, 1949, had come into force. It may be recalled that in 1924 the House of Lords held in Russell *v.* Russell that neither spouse could give evidence tending to show that he or she did not have marital intercourse, if such evidence would tend to bastardise a child prima facie born in wedlock. This ruling was the more surprising because there was a long-standing practice in the Divorce Court to admit a spouse to give evidence of non-access. The trial judge had held this practice to be right and the Court of Appeal had confirmed his view; but the House of Lords, by a majority of 3 to 2, held that the evidence was inadmissable. The consequent position caused great inconvenience. If the wife of someone serving in the forces overseas during the war went off with another man at home and children were born of which the husband could not possibly have been the father, cumbrous arrangements had to be made to call evidence from some other source (from the regimental depot, for example, or the commanding officer) to prove that the husband was abroad at the material times. The rule in Russell *v.* Russell had already been abolished by statute in South Africa and in several of the provinces of Canada. The 1949 Act abolished it in England. If this change of the law was not decisive, in the recent case referred to above, *it is a reminder of the reluctance* of the English courts to investigate the marital relations of husband and wife during a subsisting marriage.

Public Health

Influenza in England and Wales

A YEAR ago the number of deaths due to influenza in the 126 great towns rose from 66 in the week ended Feb. 5 to 171 in the week ended Feb. 19. This rise was the first clear sign of an increase in incidence which might reach epidemic proportions. Subsequently mild influenza became widespread, and deaths reached a peak of 379 in the week ended March 19. The outbreak, due to virus A, appeared to be part of a wave of infection spreading across the Continent.

This year, although from many areas there are reports of a high prevalence of respiratory disease, there is no sign of a continent-wide spread in Europe. In this country specimens received by the Virus Reference Laboratory from patients suffering from influenza-like *diseases have not been numerous, and influenza* virus has been recovered from less than half a dozen localities. Such evidence as there is from virus and serological examinations suggests that these local outbreaks are due to virus B. Virus A has so far this year not been recovered in England and Wales.

The figures for influenza deaths and for pneumonia cases and deaths are as follows:

Week ended	*Pneumonia* *Cases*	*Pneumonia* *Deaths*	*Influenza deaths**
Dec. 24, 1949	384	299	27
Dec. 31	496	310	28
Jan. 7, 1950	639	299	52
Jan. 14	550	300	47
Jan. 21	487	233	39
Jan. 28	198	305	47
Feb. 4	594	354	61
Feb. 11	582	378	80
Feb. 18	630	353	76

*Including deaths from influenzal pneumonia.

In the first seven weeks of the past three years the figures for the great towns have been as follows:

Year	*Pneumonia* *Cases*	*Pneumonia* *Deaths*	*Influenza deaths*
1948	3362	1935	145
1949	4217	2516	486
1950	3980	2222	402

The incidence in England and Wales of primary and *influenzal pneumonia in corresponding weeks of* 1949–50 and 1948–49 was as follows:

Week ended	*1949–50*	*1948–49*
Dec. 24	634	792
Dec. 31	842	1050
Jan. 7	1120	1184
Jan. 14	991	1184
Jan. 21	890	1050
Jan. 28	902	935
Feb. 4	1187	1016
Feb. 11	1228	1139
Feb. 18	1189	1469

Up to the week ended Feb. 18 there is nothing to suggest that the incidence will reach epidemic proportions. The United States Commission on Acute Respiratory Diseases[1] suggested that virus B might be endemic and only occasionally erupt in an explosive form. In this country, *too, virus B appears to be endemic and outbreaks due* to it strictly localised.

Population of England and Wales

The Registrar-General's latest estimate[2] of the populations of each local-government area in England and Wales shows that at June 30, 1949, the total population was 43,595,000, of whom 9,497,000 were under 15 years of age.

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[1] Nokes, G. D. *Law quart. Rev.* 1950, 66, 89.

[2] See *Lancet*, Jan. 28, p. 186; *Ibid*, Feb. 11, p. 273.

[1] *Amer. J. Hyg.* 1948, 47, 290.

[2] The Registrar-General's Estimates of the Population of England and Wales: Populations of Each Administrative Area at 30th June, 1949. H.M. Stationery Office. Pp. 15. 4*d*.

In England Now

A Running Commentary by Peripatetic Correspondents.

English pronunciation has undergone remarkable changes through the centuries. One striking, but not to my mind euphonious, result has been the transformation of the long "i" from the sound it represents in most European languages, and which we now render by the letters "ee," to the rather Cockney diphthong pronounced just as the word "eye." I became strikingly aware of this during war service in Italy, when contrasting the native with the current English versions of such familiar adjectives as Pontine, Capitoline, or Apennine. Similarly I realised that the pronunciation of Latin which I was taught at school must have rendered it as unlike the Mediterranean tongue as it could possibly be. Years ago, Latin was an international language for an educated European, but now we have to give our many medical words of Latin derivation unfamiliar Italianate values if we want them to be understood by visitors from the Continent. I was amused to hear an eminent visiting Italian professor baffled by the words "culture positive" until they had been changed by alteration of the vowel sounds into the "*cultura positiva*" of his own language.

Our American friends still refer to the "Philipp-EE-*n*" Islands, thus keeping nearly to the Spanish usage. Nevertheless, I rubbed my eyes the other day when, in an American article on neoplasms arising near the bifurcation of the trachea, I saw the word "coryna." I thought at first it was a mistake, but it was repeated several times. It is exactly thus, of course, that many of us habitually pronounce "carina" when referring to the sharp ridge separating the orifices of the two main bronchi. The word originally meant the keel of a ship, and it passed into English usage in former days, with its vowel sounds faithfully preserved, as the verb "to careen." This will be familiar to readers of history and boys' adventure stories as meaning to clean the fouled hull of a sailing ship. But we moderns have forgotten this and have changed the pronunciation in our vulgar way until now "coryna" can pass the proof-reader.

"Coryna" looks like a word with a Greek ancestry, and an Athenian friend tells me that there is a modern Greek word which would be so rendered in English. It signifies an article of gymnasium equipment, resembling an Indian club. I have, however, looked down my bronchoscope many times since learning this interesting fact and am bound to say, albeit with some regret, that the ridge between the bronchi resembles more the sharp keel of a ship than the rounded surface of an Indian club. I am afraid the standard spelling must stand.

* * *

When my wife demands cough medicine for our obviously healthy young son I reflect ironically that cobblers' children are traditionally ill-shod. The weight of opinion in my practice forces me to prescribe barrelfuls of expectorant mixtures daily though all the recent literature questions their rationale. It is strange that my patients should be the arbiters rather than the pundits whose words I so reverently accept. For a pharmacologically incompatible blunderbuss like mist. expect. is far more popular than the scientifically respectable linctus codeinæ. But my wife is as persistent as my most insatiable patient, and as I docilely fill in an E.C.10 I wonder whether the cobbler is as doubtful of the virtues of boot-leather as I am of the value of expectorants.

* * *

Let it not be said that a despairing cry in these columns (Feb. 18, p. 323) went unanswered. These innumerable calls to the front door by people who merely want to know the surgery hours and seem blind to notices on the gate can be stopped if one is willing to spend about £30. This is the cost of a microphone-loudspeaker system attached to the front door, with a relay microphone in each living-room. This system has worked extremely well at a colleague's house, once the patients got over the shock of a bodyless voice answering their ring at the door. It is worth £30 just to talk to a night caller shivering on the mat without moving from one's bed; though of course one always has to get out in the end.

* * *

The sanitary inspector, like the policeman, may well claim that his lot is not a happy one; it would be difficult, I imagine, to find romance or glamour in the abatement of offensive trades and the removal of nuisances. But there are compensations in his work which seem to foster the more prosaic and solid virtues, for in my experience sanitary inspectors as a class have more than their fair share of respectability, tact, reliability, and common sense. Judging by the following letter, received recently at the Health Department, the S.I. must also possess patience and courage.

> Dear Sir,
>
> Lavatory made up at above address. Sorry to cause you this trouble. Will leave back door open on Friday morning. Just call dog by name Rex and pet him for a few minutes and he is all yours.
>
> Yours truly, ...

I remember, as a student, being conducted through the horrors of tenement slumdom by an admirable member of the sanitary staff, as part of the course in—of all things—Public Health. The life of the poor was public enough, but there was little or no health, and the more cynical members of the class altered its designation to Public Filth. It was then I found out that the inspector was expected not only to cope with dampness, defective drains, and dry rot but also to discourage drunkenness, debauchery, and divorce, on information supplied chiefly by anonymous letters. Adulteration and adultery were all in the day's "darg," and the annals of the poor were not so short and simple as Gray thought.

But a very large part of the work of the S.I. is made up of "made up" lavatories, and he may agree with Mrs. Humphrey Ward when she says "In my youth people talked about Ruskin. Now they talk about drains." Here is a sample of the many letters the S.I. gets on this perennial subject.

> Sir,
>
> Please will you send a man down to look at the lavatory being made up. Wife in bed ill, cannot do with smell and having five children kindly oblige,
>
> Yours . . . .

More excretory unrest can be seen in the following:

> Dear Sir,
>
> May I draw your attention to the Ladies Toilet in the Main Street, it is used very often but after leaving that we have no other till B——d and the next N——n. I have a baby of three months so I have to use my pram as the baby cannot be carried or travel by bus. When I have come in town for my National milk, etc., my walk back is a very good stretch and many times have been in need of a Toilet very badly and felt really ill by holding myself, which is not very good for Man or Woman. We have many lovely walks but always the snag of no Toilet. I would like you to put it in front of the Health Committee and ask them to study a while how many the Gentlemen have on the roads to the Ladies. I would be very obliged and it would make many a Lady happy to know the Health Department think about them.
>
> Yours truly . . . .

The sanitary inspector may also have to brush up his psychiatry.

> Dear Sir,
>
> Will you please see to the way the maniac at No. 75 The Crescent, is acting. She is a proper nuisance to the street what with shouting and insulting strangers passing by and now she has started keeping pigeons in her bedroom, also hens and ducks and we think it about time she was put in her place.
>
> We remain,
>
> The People Round About.

In this case, however, it would be the medical practitioner who might empty some dull opiate to the drains.

* * *

My Missus (to George, aged 7): "No, no. It's 'a pocket full of posies,' not a pokker fuller posies. What are 'posies,' anyway?"

George (rather to my surprise): "Flowers, aren't they? But why does it end with afishoo?"

M.M. (inspired): "I don't know. Perhaps it's about hay-fever."

Letters to the Editor

RESISTANT STAPHYLOCOCCI

SIR,—I have read with interest the reports by Rountree and Thomson[1] and of Dr. Mary Barber and her associates[2] concerning the parasitisation or infection of staff and patients in the Royal Prince Alfred Hospital, Sydney, and St. Thomas's Hospital, London, with strains of penicillin-resistant *Staphylococcus aureus*.

I would judge from observations made in the United States that the incidence of penicillin-resistant strains of this organism in infections is definitely increasing. This poses a problem in therapy. While many of the penicillin-resistant strains are sensitive to streptomycin, these may rapidly become resistant to this antibiotic in the course of therapy. Also, the treatment of serious infection with this latter antibiotic is not without risk from the rather frequent toxic reactions.

Our experience has convinced us that 'Aureomycin' is a highly effective antibiotic agent in staphylococcal infection. Hitherto its toxic effects, other than nausea, vomiting, and looseness of the bowels, have been minimal. Because of its effectiveness in relatively modest doses and its lack of toxicity, it is our belief that aureomycin is now the antibiotic of choice for the treatment of staphylococcal infection. I feel that physicians would do well to keep this point in mind, because only too frequently large amounts of penicillin are wasted in attempts to control a staphylococcal infection which would respond promptly to therapy with aureomycin.

Department of Preventive Medicine,
The Johns Hopkins University,
Baltimore.

PERRIN H. LONG.

TRICHLORETHYLENE IN OBSTETRICS

SIR,—Recently we witnessed one of the regularly recurring instances of lay interest in obstetrical analgesia. This coincided with correspondence in the medical press on the same subject; and the matter was finally referred to a committee. Meanwhile it appears to me that there is a general impression that we have but to await the invention of the perfect apparatus so that the midwife can administer trichlorethylene, instead of gas-and-air, and the problem of obstetrical analgesia will be finally solved. May I make a plea that gas-and-air shall not be too readily discarded?

When properly administered, gas-and-air gives a good degree of analgesia for the greater part of the average labour. When it fails adequately to cover the actual birth, it does so for one or more of the following reasons: (*a*) the administration has not been thoroughly explained to the patient (the extent of success with gas-and-air is frequently in direct ratio to the attention given to its administration); (*b*) however well the administration is supervised, gas-and-air, per se, is not always adequate for this stage of labour; (*c*) the strength of the analgesic agent has remained fixed while the strength of the pain stimuli has been steadily increasing, so that after some time the patient may acquire quite a fair degree of tolerance.

What is the case for replacing this régime by the inhalation of a fixed concentration of trichlorethylene? I believe that trichlorethylene is an outstandingly good analgesic for midwifery, its optimum usefulness being towards the end of the second stage when it frequently gives good relief where gas-and-air has failed to do so. But I also believe that it has two disadvantages. The first is that when it is given as the sole inhalational agent and at a constant strength, the patient can acquire, as in the case of gas-and-air, sufficient tolerance to render it not quite adequate for the delivery. On the second disadvantage I speak with great caution. There are so many factors influencing the course of labour that it is very difficult to judge accurately and justly the effects of one drug. Nevertheless I have gained the definite impression that where trichlorethylene has been inhaled over a long period, the uterine action sometimes tends to become increasingly sluggish. On the other hand, I have never had reason to regret reserving trichlorethylene for the last part of labour and then giving it in adequate strength.

Are we, then, going to gain much from this possible switch-over? It has always seemed to me that we are rather optimistic to expect that the pains of the various phases of labour, varying as they do not only in intensity but also in nature and in the way in which they impinge on consciousness, shall be adequately covered by an unvarying concentration of one drug. Surely the answer lies in the correctly timed application of both of these valuable drugs.

I would suggest as the ideal, that the patient delivered by a midwife should be given gas-and-air, starting as the first stage nears its end, and continued until the head is starting to pass over the perineum. Trichlorethylene should then be substituted, given by an inhaler the safety of which is determined by limitation of the total quantity of the drug as well as by constancy of concentration. Thus we should realise the advantages of each drug without incurring the shortcomings of either.

Objections may be raised on two grounds: difficulty of transport, and lack of simplicity. The former has been largely answered by the introduction of light-weight cylinders: a portable model working on the jet-and-venturi system, which I have found very satisfactory, weighs just on 20 lb. when fitted with a 100 gallon light-weight cylinder. As regards lack of simplicity, I feel that this disadvantage will be outweighed by the advantages to the patient.

London, W.8.

G. C. STEEL.

INCIDENCE OF PEPTIC ULCER

SIR,—Substantial differences in the proportions of duodenal to gastric ulcer are being reported in perforation series from different parts of the country: for instance, 6½ : 1 in Glasgow,[1] almost 9 : 1 in Newcastle,[2] and about 3 : 1 in London.[3] There is no obvious explanation for these discrepancies, and so little is known of the causes of ulcer and its increase in recent years that no clue should be neglected. We are therefore following it up in a small investigation.

The Ministry of Food have kindly agreed to send a communication from the Medical Research Council to the certifying doctor for each occasion on which priority milk and/or eggs were claimed on form R.G.50, class 1 (D), in Glasgow, Newcastle, Willesden, and Acton during a period in December, 1949. This communication will contain an explanatory covering letter, a form for entering facts about the patient, such as sex, age, and situation of ulcer, and a stamped addressed envelope for its return to us. When the information is analysed it should be possible for the first time to work out rates for different types of ulcer in different areas of the country, and to know whether some areas have a particularly high or low incidence of gastric or duodenal ulcer.

A serial-number system will be used whereby the confidential nature of medical information will be faithfully preserved. No names will pass from the doctors to us; no information will be passed back by ourselves to the Ministry of Food. We have consulted the chairman of the central ethical committee of the British Medical Association, and he assures us that there can be no ethical objection to the completion of the forms.

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[1] Rountree, P. M., Thomson, E. F. *Lancet*, 1949, ii, 501.
[2] Barber, M., Hayhoe, F. G. J., Whitehead, J. E. M. *Ibid*, p. 1120.

[1] Illingworth, C. F. W., Scott, L. D. W., Jamieson, R. A. *Brit. med. J.* 1944, ii, 617, 655.
[2] Houston, W. *Ibid*, 1946, ii, 221.
[3] Jones, F. A., Parsons, P. J., White, B. *Ibid*, Jan. 28, p. 211.

We hesitate to trouble doctors, and in particular general practitioners, with yet another form to fill, but there is no other practicable way of getting this necessary information. National Insurance certificates cannot help us since they are concerned with absence from work among the insured section of the population. We should therefore be most grateful for the assistance of practitioners in this inquiry.

Social Medicine Research Unit,
Medical Research Council,
and Central Middlesex Hospital,
London, N.W.10.

J. N. MORRIS
F. AVERY JONES
RICHARD DOLL.

PURIFICATION OF VACCINE LYMPH

SIR,—In his letter of Feb. 18 Dr. Rao compares the phenol and chloroform-vapour processes for the purification of vaccine lymph, and concludes that the latter method when used in the manner described by him is much quicker while being efficacious and harmless.

When using the phenol method, however, he added "phenol in a concentration of 0·5% to the diluent—a 50% solution of glycerin in water." The final concentration of phenol was therefore presumably less than 0 5%. He stored the mixture at − 11°C. It is known that glycerol reduces the bactericidal action of phenol. If Dr. Rao had tried the method described by me,[1] which involves the addition of two volumes of 1% phenol to the crude vaccine pulp followed by 48 hours' incubation at 22°C, he would have found the reduction in the bacterial content to be greater after this period than that achieved with chloroform vapour; the reduction in viral potency of the lymph is negligible. The final concentration of phenol is reduced to 0·4% by the addition of glycerol.

We have considerable experience of the chloroform-vapour process, which, as Rao mentions, was developed by Green[2] in these laboratories. Our experience of the relative simplicity and efficacy of the phenol method, which avoids the necessity of bubbling chloroform vapour through the lymph and then removing it with a stream of sterile air, led us to abandon the chloroform-vapour process in 1941. The antiseptic action of a final concentration of 0 4% phenol in the lymph is also of value.

DOUGLAS MCCLEAN.

The Lister Institute of Preventive Medicine,
Elstree, Herts.

SUPERINFECTION IN TUBERCULOSIS

SIR,—We read with great interest your report (Jan. 28) of the British Tuberculosis Association's debate on infection. We believe that the experience of recent years with sensitivity studies on streptomycin-treated cases of pulmonary tuberculosis is important in evaluating the rôle of superinfection in tuberculosis.

Streptomycin has been used at this hospital for over three years. The cases in which resistance of the organisms to this antibiotic developed during or after treatment have not been separated from other positive cases on the hospital wards. Despite this intimate exposure, in none of the patients (368) was initial resistance of the bacilli to streptomycin encountered—which certainly would not have been the case if superinfection played a major part in the development of tuberculosis. Furtos's[3] experience with 385 cases is identical with ours.

Infection of hospital employees with streptomycin-resistant bacilli could be expected if superinfection were of major importance. Three of our employees have developed active pulmonary tuberculosis during the past three years. One of them, an initially tuberculin-negative, recently employed, young man, was infected with streptomycin-resistant organisms (this case will be published). This was, however, a case of primary tuberculosis. The two others were middle-aged, long-time employees who developed reinfection-type disease; and their very favourable personal and environmental circumstances have not changed for many years, except for one factor—their recent exposure to patients harbouring streptomycin-resistant bacilli. Despite this, the organisms isolated from the sputa of these two men were found to be sensitive both to streptomycin and to *para*-aminosalicylic acid.

The existence of superinfection is beyond any doubt; its relative importance, however, is a different question. The above experience seems to speak against a great practical significance of superinfection in tuberculosis.

Veterans Administration Hospital,
Walla Walla, Washington.

L. S. ARANY
W. G. LEWIS.

THE FORGOTTEN SWAB

SIR,—As a theatre sister in a provincial teaching hospital, I was interested to read the leading article in your issue of Feb. 18.

May I, as a result of personal experience, put forward the following suggestions. Whilst thoroughly endorsing all you say, I feel that there are still one or two ways of making quite sure that the swab-check is thoroughly foolproof. In the case of intraperitoneal operations, the point at which swabs should be checked is very evident —it is at the commencement of closure of the peritoneum. There are, however, many major operations where the point for swab-checking is not so evident, particularly in bladder and prostatic surgery. It would seem that the best moment for swab-checking in these operations is on closing the bladder or prostatic capsule. However, even after that point there are still many crevices into which a swab might be tucked and overlooked. Therefore I think that in any operation, no matter at what stage the swabs are first checked, no swab should be removed from the swab-horse until the surgeon is actually inserting the skin-sutures; and at this point the nurse in charge of the case should again ascertain that they are correct. The nurse in charge of the case should always be asked by the floor-nurse if she can remove the swabs from the theatre; the over-anxious floor-nurse, often new to theatre technique, often tends to remove the swabs after the first check, not realising that there is still a possibility of one becoming mislaid.

Another source of error is encountered when a surgeon using a tiny gauze swab on a hæmostat, for blunt dissection, encounters sudden, unexpected hæmorrhage. The swab is released from the hæmostat, which is used to check the hæmorrhage, and in the heat of the moment the very existence of the tiny swab is forgotten by all except the nurse in charge of the case; her duty is to remove it if easily accessible, or to remind the surgeon, when the hæmorrhage is controlled, if she cannot find it.

I regard a swab-book as absolutely essential in every theatre, and feel that even in the most unlikely cases swabs should be checked; in a radical mastectomy I have known a large swab, saturated with blood, to be almost overlooked as it nestled in the dissected axilla.

As you state, it does seem surprising that instruments can be left inside a patient. Occasionally, however, a patient requires an emergency transfusion during an operation. Hæmostats are hurriedly removed from a spare set in the instrument cupboard for use on the "drip" trolley. These hæmostats are almost invariably identical with those used for the operation in progress; and at the end of the operation, it has been known for one of these hæmostats to be counted in with those used for the operation. It is not until the spare sets of hæmostats are counted, perhaps that evening or even next morning, that it is realised that one is missing.

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1. McClean, D. *Lancet*, 1949, ii, 476.
2. Green, A. B. Report of the Medical Officer, Local Government Board, 1900–01, p. 639; *Ibid*, 1901–02, p. 575; *Ibid*, 1902–03, p. 659.
3. Furtos, N. C., Doane, E. A. *J. Amer. med. Ass.* 1949, 140, 1274.

Even then, it may not be understood how this occurred ; and all the patients operated on that day have to be X-rayed. Thus time and money are wasted. This may be avoided by keeping a permanent set of intravenous transfusion instruments in which the hæmostats differ from those in general use in the theatre.

In conclusion, I never “ take ” an operation without the coroner's court at the back of my mind—a pessimistic outlook, perhaps, but it makes me careful, and it helps me to teach my staff to be careful, too.

Birmingham. PATRICIA KENT.

THE CARNAGE ON THE ROADS

SIR,—I read with interest Dr. Learoyd's article last week. The remedy is to allow anyone to drive ; but anyone involved in an accident must come before a special court (Road Fund Court) for a permit to drive. Thus people would drive in such a manner as to avoid accidents and would learn how to avoid accidents before driving. Incidentally compulsory third-party insurance *causes* accidents.

Derby. F. W. SCHOFIELD.

THE BODY-IMAGE IN NEUROLOGY

SIR,—I would like somewhat to extend the subject of Dr. Macdonald Critchley's article last week on the part played by the body-image in the brain. I suppose that abdominal visceral activity was originally largely under the control of the primitive brain and is still affected by emotional disturbance in the cerebral cortex (of the neocerebrum) through the corticothalamic connections. I have lately written an article on retrograde peristalsis and vomiting of fæces, enemata, and suppositories in functional nervous conditions.[1] Such disturbances may be, I think, regarded as greatly exaggerated equivalents of ordinary so-called hysterical vomiting, induced by disturbances (especially emotional disturbances) in certain individuals under special conditions. In fact, by a stretch of one's imagination, one might say “ induced by emotional disorders of the body-image in the cerebral cortex.”

London, W.1. F. PARKES WEBER.

CONTROL OF TUBERCULOSIS

SIR,—In his letter of Feb. 18 Dr. Ellman ably stated the gravity and urgency of the national tuberculosis crisis, and indicated some of the means by which it may be fought. If these are properly used there are enough beds, enough physicians, enough surgeons ; everything fails with the lack of nurses. What is the cure ?

The late Miss Nightingale put a stamp of military organisation and Victorian dedication upon nursing which still informs, if not inspires, the Royal College of Nursing, and is a disastrous misfortune in 1950. It is perfectly obvious that young trainees, under 21, to whom hospital authorities stand more or less *in loco parentis* must live under reasonable supervision and discipline ; it is equally clear that just so long as professional women of adult status are required to live like medieval nuns in a Paraclete, any girl in her right mind will become a typist instead and have a bed-sitter in Bayswater. I know a hospital where, until recently, wardmaids had separate bedrooms but sisters “ doubled up.” Enough of the latter have now left to solve this problem. *Of course* nurses must be allowed, and encouraged, to live out if they wish ; and the concern of matrons and hospital committees should begin and end with their nursing efficiency.

If you want people, whether nurses or miners, to do jobs you cannot, or will not, do yourself (or let your daughter do), you must pay them enough to make it worth while—not appeal to their sense of “ vocation ” to do it cheaply. The salaries, and derisory “ bonus,” to be paid to tuberculosis nurses show just how far the country is from dealing with this horrible, and growing, spectre.

London, N.W.3. GEOFFREY FLAVELL.

RESPIRATORY OBSTRUCTION

SIR,—I read with interest Dr. Boyd's article of Feb. 18.

I have had a young hæmophiliac who was admitted to hospital with moderate respiratory obstruction due to an effusion of blood behind the mylohyoid muscle. The picture resembled Ludwig's angina. Blood could be seen through the mucous membrane of the undersurface of the tongue. The respiratory obstruction became more distressing and tracheotomy was contemplated. However, improvement rapidly followed the transfusion of a pint of fresh blood.

The patient, a mental defective, is in the habit of rocking his teeth until he loosens them and probably started the hæmorrhage in this way.

Grays, Essex. R. N. HERSON.

SIR,—Dr. Boyd's article reminds me of a case I was asked to see some two years ago at the Cumberland Infirmary.

A middle-aged woman was admitted *in extremis* to a medical ward. She was unconscious, and her colour was grey. She was obviously suffering from severe respiratory obstruction, and despite full exertion of her accessory muscles of respiration she was unable to achieve any discernible respiratory exchange.

There were no external signs to indicate the cause of obstruction. Inspection of the larynx with a Macintosh laryngoscope revealed that the cords opened normally during the expiratory phase but appeared to close completely during attempted inspiration. An endotracheal tube with analgesic lubricant was easily passed, through the nose, during expiration, and the patient's condition improved rapidly. In about half an hour she was apparently normal, and soon afterwards the tube was removed without a recurrence of spasm.

The patient gave a history of several previous attacks of spasm, but none had been so severe as this. After full investigation the attacks were attributed to pressure on the recurrent laryngeal nerve by very extensive dilatation of the œsophagus.

This case, I think, offers further evidence of the value of timely intubation as an alternative to tracheotomy.

FRANK L. ROBERTSHAW
Royal Hospital, Sheffield. Senior Anæsthetic Registrar.

APPROACH TO THE UPPER THORACIC SYMPATHETIC GANGLIA

SIR,—I agree with Mr. McCurrich (Feb. 4) that honour should be given where it is due. In regard to the anterior approach to the upper thoracic sympathetic chain the first name that should come to mind is that of Prof. E. D. Telford, who has enriched the field of sympathetic surgery more than any other man in Britain. He was the first to carry out section of the upper thoracic chain, as opposed to stellate ganglionectomy, and so avoided the disfiguring Horner's syndrome while securing an equally good sympathetic release in the hand. Moreover, his various modifications have rendered the operation by the anterior approach one of the easiest and safest of all interventions on the sympathetic chain. I know that he has done over 300 of these operations without mishap of any kind, and I have myself done his operation on many patients. It can be done bilaterally at one sitting, and patients have gone home four days later free from pain and with their wounds healed. The posterior approach causes more upset to the patient, and those who have had Telford's operation on one side and Smithwick's on the other state that the latter is much more painful and for a longer period.

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[1] *Med. Pr.* 1950, 223, 120.

In view of such results I cannot regard the peraxillary route, advocated by Mr. Atkins (Dec. 17 and Jan. 14) as anything but a retrograde step. Why should one, without adequate reason, expose a patient to the risks of an opened pleura and to the prolonged and painful convalescence inevitable to resection of rib? By the anterior approach the chain can always be cut below the 3rd thoracic ganglion, and the sympathetic release in the arm is at least as complete as can be secured by more tedious and risky routes.

Manchester. H. A. HAXTON.

POSTOPERATIVE PARALYSIS IN THE UPPER EXTREMITY

SIR,—I have noticed with interest your leading article of Jan. 21 and the correspondence concerning brachial palsy following operations, chiefly gynæcological and on the gall-bladder.

I myself first met with this condition in about 1922, when open prostatectomy by the transvesical route was first being extensively practised. In these cases the patient was held on the table by the usual shoulder-rests, and the legs were commonly flexed at the knee. None the less, inasmuch as a considerable tilt of the table into the Trendelenburg position was often required, the conditions were favourable to the production of injury to the lower cord of the brachial plexus. We had several such cases at St. Peter's Hospital, notably affecting the ulnar nerve. It appeared to me that the mechanism was simply that, the shoulder-girdle being fixed, the tilting of the table caused the conical thorax to slide up into the shoulder-girdle as a result of gravitation, and it thus compressed the plexus.

I therefore, in 1925, got Messrs. Allen & Hanburys to design for me what have since been called the "St. Peter's pattern iliac-crest supports," or "pelvic rests." These fix on to the St. Bartholomew's table manufactured by Allen & Hanburys, and support the patient when tilted by fixation against the iliac crests. Since that time I have never seen another case of this condition, either at St. Peter's, or at the Royal Masonic Hospital, or at the London Clinic, where these appliances are used. I learned afterwards that Mr. J. B. Macalpine had designed a similar method of supporting the patient when a head-down position is required.

A little knack and training are needed by the theatre orderlies to fix the supports correctly; but this is quickly learned, and when correct the position is absolutely secure. I myself was, for purposes of a catalogue, photographed on the table in the extreme Trendelenburg position, held by these supports only and without my legs being dropped. It was an interesting experience, and I recommend it to all surgeons and anæsthetists who are not trained gymnasts and therefore are not in the habit of standing on their heads. The cerebral congestion produced is, of course, considerable, and ever since then I have been vary cautious in the amount of tilt that I permit for bladder and prostatic operations, particularly in elderly patients—not because there is any risk of slipping or of nerve injury, for, as I say, with the iliac supports properly adjusted, this is quite impossible, but because I think the Trendelenburg position throws a great strain upon the circulatory arrangements of elderly people. There is of course also to be remembered the compression of the diaphragm by the abdominal viscera gravitating towards the thorax.

London, W.1. R. OGIER WARD.

SIR,—I have read with interest the various articles and letters on this subject, and I would like to support Mr. Lee's contention (Feb. 11) by quoting two cases which I anæsthetised last year.

In the first case the lesion (a left arm palsy) occurred in an elderly woman following Smith Petersen nailing for a pertrochanteric fracture of the left femur. The anæsthetic consisted of intermittent thialbarbitone and gas-and-oxygen, and no relaxant drug was used. During the operation, in order to keep the left arm out of the way of both the surgeon and the portable X-ray machine, it was hyperabducted, flexed, and externally rotated, and was anchored in this position to the top of the Hawley table.

In the second case the lesion (a right arm palsy) occurred in a middle-aged man following partial gastrectomy. The anæsthetic consisted of thiopentone, curare, and cyclopropane. During the operation, in order to give the surgeon more room, the right arm was hyperabducted whilst fixed to an arm-board in extension and external rotation.

It would appear that relaxants and the gall-bladder and Trendelenburg positions of themselves are not important factors in the production of postoperative brachial palsy, but rather the position of the arm itself in hyperabduction and external rotation, particularly in those patients who have a post-fixation brachial plexus.

Hull. W. N. ROLLASON.

FLATULENCE IN INFANCY

SIR,—In his letter of Feb. 11, Dr. Tizard suggests that the perambulator is in part responsible for windy colic in the baby. May I suggest that the clock also is often to blame? It helps to maintain an arbitrary duration for the feed, and interval between feeds, which may not be suited to the temperament and appetite of the individual baby.

I have found that the technique used in dislodging an air-bubble from a syringe is useful when applied to my babies; if tapping in the vertical position will not release the bubble, a beautiful belch will often result when the vertical is resumed after half a minute in the prone position.

London, W.8. NORMA MACLEOD.

REGISTRARS

SIR,—It seems to me that senior registrars in non-teaching hospitals stand practically no chance of obtaining a consultant appointment. Yet in many ways the experience gained in a good non-teaching hospital fits a man better for consultant status than experience gained solely in teaching hospitals.

Most senior registrars, and many registrars, in non-teaching hospitals are doing consultant work and taking great responsibility; but when they come to be considered for a consultant post the stigma of the non-teaching hospital is upon them—they do not fit the conventions of the selection committee. Should they apply for a consultant post at the hospital where they are working, the chiefs and those who know them will have a minority representation on the selection board. Should they apply for a consultant appointment in the region in which their hospital lies, their chiefs will often have no representation at all on the selection board. On their own regional hospital board and regional selection board most of the medical representatives will be from hospitals completely independent of the regional board. These registrars will be unable to rely on the fruits of patronage; these are for others. Should they apply for a consultant post in another region, they will normally have no celebrity to back them, though their chiefs may be good and capable doctors.

Registrars should be appointed by a committee representing equally the hospital concerned, the other regional hospitals, and the teaching hospital of the region; the casting vote should be with the consultant under whom the registrar will work.

Many registrar posts are being made where the need is not for more registrars but for more consultants. An attempt is being made to get work on the cheap. Before the health service started, it was estimated that the number of consultants should be at least twice as great as before the war; and the large number of ex-Service postgraduate appointments was based on this. Now

Even then, it may not be understood how this occurred; and all the patients operated on that day have to be X-rayed. Thus time and money are wasted. This may be avoided by keeping a permanent set of intravenous transfusion instruments in which the hæmostats differ from those in general use in the theatre.

In conclusion, I never "take" an operation without the coroner's court at the back of my mind—a pessimistic outlook, perhaps, but it makes me careful, and it helps me to teach my staff to be careful, too.

Birmingham. PATRICIA KENT.

THE CARNAGE ON THE ROADS

SIR,—I read with interest Dr. Learoyd's article last week. The remedy is to allow anyone to drive; but anyone involved in an accident must come before a special court (Road Fund Court) for a permit to drive. Thus people would drive in such a manner as to avoid accidents and would learn how to avoid accidents before driving. Incidentally compulsory third-party insurance *causes* accidents.

Derby. F. W. SCHOFIELD.

THE BODY-IMAGE IN NEUROLOGY

SIR,—I would like somewhat to extend the subject of Dr. Macdonald Critchley's article last week on the part played by the body-image in the brain. I suppose that abdominal visceral activity was originally largely under the control of the primitive brain and is still affected by emotional disturbance in the cerebral cortex (of the neocerebrum) through the corticothalamic connections. I have lately written an article on retrograde peristalsis and vomiting of fæces, enemata, and suppositories in functional nervous conditions.[1] Such disturbances may be, I think, regarded as greatly exaggerated equivalents of ordinary so-called hysterical vomiting, induced by disturbances (especially emotional disturbances) in certain individuals under special conditions. In fact, by a stretch of one's imagination, one might say "induced by emotional disorders of the body-image in the cerebral cortex."

London, W.1. F. PARKES WEBER.

CONTROL OF TUBERCULOSIS

SIR,—In his letter of Feb. 18 Dr. Ellman ably stated the gravity and urgency of the national tuberculosis crisis, and indicated some of the means by which it may be fought. If these are properly used there are enough beds, enough physicians, enough surgeons; everything fails with the lack of nurses. What is the cure?

The late Miss Nightingale put a stamp of military organisation and Victorian dedication upon nursing which still informs, if not inspires, the Royal College of Nursing, and is a disastrous misfortune in 1950. It is perfectly obvious that young trainees, under 21, to whom hospital authorities stand more or less *in loco parentis* must live under reasonable supervision and discipline; it is equally clear that just so long as professional women of adult status are required to live like medieval nuns in a Paraclete, any girl in her right mind will become a typist instead and have a bed-sitter in Bayswater. I know a hospital where, until recently, wardmaids had separate bedrooms but sisters "doubled up." Enough of the latter have now left to solve this problem. Of course nurses must be allowed, and encouraged, to live out if they wish; and the concern of matrons and hospital committees should begin and end with their nursing efficiency.

If you want people, whether nurses or miners, to do jobs you cannot, or will not, do yourself (or let your daughter do), you must pay them enough to make it worth while—not appeal to their sense of "vocation" to do it cheaply. The salaries, and derisory "bonus," to be paid to tuberculosis nurses show just how far the country is from dealing with this horrible, and growing, spectre.

London, N.W.3. GEOFFREY FLAVELL.

RESPIRATORY OBSTRUCTION

SIR,—I read with interest Dr. Boyd's article of Feb. 18.

I have had a young hæmophiliac who was admitted to hospital with moderate respiratory obstruction due to an effusion of blood behind the mylohyoid muscle. The picture resembled Ludwig's angina. Blood could be seen through the mucous membrane of the undersurface of the tongue. The respiratory obstruction became more distressing and tracheotomy was contemplated. However, improvement rapidly followed the transfusion of a pint of fresh blood.

The patient, a mental defective, is in the habit of rocking his teeth until he loosens them and probably started the hæmorrhage in this way.

Grays, Essex. R. N. HERSON.

SIR,—Dr. Boyd's article reminds me of a case I was asked to see some two years ago at the Cumberland Infirmary.

A middle-aged woman was admitted in extremis to a medical ward. She was unconscious, and her colour was grey. She was obviously suffering from severe respiratory obstruction, and despite full exertion of her accessory muscles of respiration she was unable to achieve any discernible respiratory exchange.

There were no external signs to indicate the cause of obstruction. Inspection of the larynx with a Macintosh laryngoscope revealed that the cords opened normally during the expiratory phase but appeared to close completely during attempted inspiration. An endotracheal tube with analgesic lubricant was easily passed, through the nose, during expiration, and the patient's condition improved rapidly. In about half an hour she was apparently normal, and soon afterwards the tube was removed without a recurrence of spasm.

The patient gave a history of several previous attacks of spasm, but none had been so severe as this. After full investigation the attacks were attributed to pressure on the recurrent laryngeal nerve by very extensive dilatation of the œsophagus.

This case, I think, offers further evidence of the value of timely intubation as an alternative to tracheotomy.

FRANK L. ROBERTSHAW
Royal Hospital, Sheffield. Senior Anæsthetic Registrar.

APPROACH TO THE UPPER THORACIC SYMPATHETIC GANGLIA

SIR,—I agree with Mr. McCurrich (Feb. 4) that honour should be given where it is due. In regard to the anterior approach to the upper thoracic sympathetic chain the first name that should come to mind is that of Prof. E. D. Telford, who has enriched the field of sympathetic surgery more than any other man in Britain. He was the first to carry out section of the upper thoracic chain, as opposed to stellate ganglionectomy, and so avoided the disfiguring Horner's syndrome while securing an equally good sympathetic release in the hand. Moreover, his various modifications have rendered the operation by the anterior approach one of the easiest and safest of all interventions on the sympathetic chain. I know that he has done over 300 of these operations without mishap of any kind, and I have myself done his operation on many patients. It can be done bilaterally at one sitting, and patients have gone home four days later free from pain and with their wounds healed. The posterior approach causes more upset to the patient, and those who have had Telford's operation on one side and Smithwick's on the other state that the latter is much more painful and for a longer period.

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[1] *Med. Pr.* 1950, 223, 120.

Obituary

GEORGE RICHARDS MINOT

A.B., M.D., S.D. HARVARD, F.R.C.P., F.R.C.P.E.

George Minot died at his home in Boston last Sunday. History will always remember him as the man who received the Nobel prize for his discovery of the cure for pernicious anæmia, and as one of the company of great physicians—Harvey, Jenner, Addison, Harvey Cushing, Thomas Lewis—whose work was the starting-point for a sudden leap forward in our understanding of disease. Until Minot and Murphy published in 1926 a short paper suggesting that patients with pernicious anæmia could be relieved of their anæmia by eating large quantities of liver, hæmatology had been a subject that chiefly interested those morphologists who were fond of devising elaborate tables describing the slightly apocryphal development of the blood-cells. Minot's work, linked with that of Whipple at Rochester, stimulated a new physiological approach to the problems of hæmopoiesis, and through them to the closely related problems of gastro-intestinal function. Not content to cure his patient, he went on in collaboration with William Castle to analyse the significance of his findings, to express as far as he could the ætiology of the disorders of hæmopoiesis, and to devise quantitative measures for assessing the response of the body to the newly discovered hæmopoietic factors. His use of the reticulocyte response will always be a fine example of the value of accurate measurement in checking clinical assessment.

New York Times

J. V., who worked in the Thorndike Laboratory in 1929–30, writes: "His standards of work were, one often felt, unattainable. Two days before I was to read a paper at Atlantic City I showed him the graphs I was to use. A blue pencil went through them all because of small imperfections of style. Again and again he would go through the same paper with his junior staff, writing and rewriting in order to get the meaning crystal clear, the English to his liking. In the same way he rehearsed us all with much personal advice before we read a paper to a learned society. Whatever work we have done since has instinctively been measured against his standard. Once a week the whole laboratory staff at the Thorndike used to meet and discuss research problems; usually if Minot was there we ended up in the ward to see how the particular patients were 'getting along' or to clarify some point in their history that seemed to him relevant. He always said that it was a constant study of his patients' histories that first led him to suspect the efficacy of liver. I have beside me a great file of his letters, comments on work both here and in the States, news of his holidays on the coast of Maine, of the flowers and birds in his garden, and of American politics. During the war years these letters came frequently and always in the worst moments, full of quick understanding of our problems and a warm anxiety to help, but bringing also news of a saner world which was in itself a tonic.

"The vastly expanding literature, in every language, on problems associated with hæmopoiesis, in journals devoted to biochemistry, biophysics, medicine, and pharmacology, are a measure of Minot's gift to his own and succeeding generations. To those of us who had the privilege of working with him, he will always remain a great scholar, a great gentleman, a most beloved physician, and a friend."

A further tribute comes from L. S. P. D., who recalls how young graduates of every nationality journeyed to Boston to obtain the training and mental stimulation which were inseparable from an association with Minot, and speaks of the human qualities of modesty, courtesy, and kindliness, with which he was so richly endowed.

George R. Minot was born at Boston in 1885, the son of Dr. James Minot. He took his degree in arts from Harvard University in 1908 and graduated in medicine in 1912. For a time he held a resident appointment at the Johns Hopkins Hospital in Baltimore, and later he held a research fellowship in the physiological laboratory of the medical school. In 1915 he returned to Boston to join the staff of the Massachusetts General Hospital. In 1921 he was found to be suffering from diabetes and he became seriously ill, but the discovery of insulin by Banting and Best in 1922 came in time to restore him to full-time work. In 1928 he was appointed to the chair of medicine at Harvard, which he held till he retired in 1948. A Nobel laureate of 1934 and a fellow of the Royal Colleges of Physicians of London and Edinburgh, Dr. Minot had been honoured by his colleagues all over the world. He had received the Kober gold medal of the Association of American Physicians, the Mickle fellowship of the University of Toronto, the Cameron prize of the University of Edinburgh, the Moxon medal of the Royal College of Physicians, the John Scott Medal of the City of Philadelphia, and the gold medal of the Humane Society of Massachusetts.

He married in 1915 Miss Marian Weld, who survives him with a son and two daughters.

SAMUEL ERNEST WHITNALL

M.A., D.M. OXFD, F.R.S.(C.)

As we announced last week, Dr. S. E. Whitnall, formerly professor of anatomy at McGill University, Montreal, and the University of Bristol, died on Feb. 19, at the age of 73.

Samuel Ernest Whitnall was born in Lancashire on March 30, 1876. He received his early education at Radley College, Abingdon, and Owens College, Manchester. In 1897 he went up to Magdalen College, Oxford; and he took his clinical training at St. Thomas's Hospital, London, qualifying in 1908. The next year he graduated M.D.

From 1908 to 1914 he was university demonstrator of human anatomy at Oxford. During the years of the first world war he served, as a captain, with the R.A.M.C. in this country and in France; and in 1918 he was administrator of the Orthopædic (Military) Hospital, Oxford. In 1919 he went to Canada as Robert Reford professor of anatomy at McGill University. He returned to this country to occupy, in 1935, the chair of anatomy at Bristol University; and he retained this appointment until he retired in 1941.

"S. E. Whitnall," writes J. S. B., "was perhaps best known to anatomists and surgeons for his contributions to ophthalmological anatomy. During his early years as a demonstrator of human anatomy at Oxford, he published a number of papers on the topographical anatomy of the orbit. These established his reputation as an expert on this region of the human body which was further enhanced by the appearance in 1921 of his monograph *The Anatomy of the Human Orbit.* This book quickly became a standard work of reference both in this country and in Canada and the U.S.A.

"Whitnall's experiences as a teacher of anatomy in Oxford and McGill University prompted him to set down his ideas on the relation of anatomy to the medical curriculum in a book called *The Study of Anatomy.* This book was intended to be read by undergraduate students as an introduction to their preclinical studies but contains much upon which teachers of the subjects concerned could afford to ponder. The views expressed are as true in the present days of an overcrowded medical curriculum as when they were first written in 1923.

"Whitnall excelled as a lecturer. He was a master of the spoken word; his ideas were put forward in simple form with the emphasis always on what he regarded as fundamental, while the whole was enlivened by the flashes of his scintillating wit. Only those who knew him understood how much time and care were devoted to the preparation of these lectures.

"He was considerate and kind to his subordinates, allowing them much freedom in working out their own methods of teaching; but he always insisted on a high sense of their duty towards the student."

Professor Whitnall married Zoë, daughter of the late C. C. Wyllie. There were two sons and one daughter by the marriage.

even the *Times*[1] has commented on the apparent haphazard appointment of consultants; there is no doubt that an inadequate number of consultant posts is being made. Here the interests of the Treasury and of many established consultants coincide, though for different reasons: the Treasury must cut the cost, and the established consultant does not want more competition. Furthermore, the Ministry of Health has not been overactive in trying to secure an agreed basis for the establishment of consultants.

To the Spens Committee the registrar was a trainee specialist; but now the name has been changed and with it the status. A registrar can be employed for all manner of purposes: a trainee specialist cannot be so cynically used. This twisting of nomenclature has also taken place with the compound term "consultants and specialists"; the specialist half has been quietly dropped. The average trained man does not expect consultant status at the age of 32, but he does expect specialist status.

There is no hope of obtaining agreement on consultant establishments until there is agreement on the amount of work and responsibility the average consultant should take and on the amount of junior help he should have. Consultant establishments must be based on the unit of a consultant with one houseman. (I include in the term "housemen" house officers and junior registrars, and in the term "registrars" registrars and senior registrars.) The establishment of registrars should be decided on a regional basis, and should depend on the number of consultant posts likely to be vacant in the region during the next five years. Allowance for wastage should not exceed 10% over three years for senior registrars, and 10% over two years for registrars. In non-teaching, but not in teaching, hospitals a consultant with a registrar would be able to manage a few additional beds.

Such a scheme would ensure proper distribution of consultants, and would give scope to the large number of trained men now out of work or labouring under the threat of dismissal.

Εἶδον.

"SUFFOCATION" IN INFANCY

SIR,—With the report and the leading article in your issue last week, the "suffocated" infant is in the medical news again and one's years-old doubts and queries about it come out for spring-cleaning. Bacteriology and histology may be completely unconvincing as to the cause of death. Can spasmophilia, due to altered biochemistry, play the trigger part in some cases?

Dr. F. B. Smith found palpably soft skull-bones in about one-third of his series. The pædiatricians will presumably agree that this proportion is far higher than that found in living infants of up to six months old, even if palpable denting is ever "normal" at this age—which I doubt. These infants are not seen by the pædiatricians. They go straight from their—usually humble—cots or prams to the mortuary. But the degree of craniotabes can be an eye-opener to hospital residents invited thither; either they have never seen it as students, or never such a degree of it.

What is the present consensus of pædiatric opinion on the significance of craniotabes at this age? (I realise that biochemical analysis in infants necessitates jugular, scalp-vein, or anterior-fontanelle puncture, and that X rays are unhelpful in the first year.) A few years ago, I was told that the general opinion in Scotland was judged to be that craniotabes was a sign of rickets; but a few weeks ago a consultant pædiatrician said that he would not treat it so, without other evidence in support, and, further, that he was seeing very little rickets at his clinics.

Another point: if craniotabes is acceptable as evidence of rickets, can the biochemical upset of rickets (and so the risk of laryngospasm) be present without palpable skull softening? If evidence is present of natural disease, capable of causing sudden or rapid death (and the books say that laryngospasm can kill rapidly), then most convincing evidence would be needed to support an opinion that death was unnatural. I can recall carrying a coroner with me in recording a natural death in an infant found with a pillow over its face.

Mark you, Sir, I have found craniotabes in an infant dying after a short illness in hospital, and then even more convincing meningococci in an early exudate on the brain within.

Department of Pathology,
General Hospital, West Hartlepool.

R. T. COOKE.

DIPHTHERIA IMMUNISATION

SIR,—There are just two points in Miss Barr's letter last week which require comment.

Miss Barr fears that, with the decline in the incidence of diphtheria infection, the Schick standard may prove inadequate to guarantee protection against the disease. I can only say that for many of the years during which my faith in the post-Schick negative result has been built up, adventitious stimuli, due to contact with infection, have been almost lacking. My opinion was not lightly formed, and it has been tested repeatedly by contact of my subjects with all grades of diphtheria infection. Such cases of the disease as have occurred in my previously post-Schick negative children have nearly always been mild and non-paralytic. Thus I do not share Miss Barr's apprehension on this point.

I should like to make it clear that when I referred to the consideration of single-injection prophylaxis I meant exactly what I said. In the past, one-shot immunisation had no more bitter opponent than myself, as manufacturers of such preparations may recollect. With the advent of ever-improving prophylactics, I certainly do not despair of the elaboration of a single-injection method which will control diphtheria adequately. I welcome the opportunity of boldly making a prophecy that this will happen.

Insistence on the necessity for an *orthodox* secondary response may well be a definite bar (sorry—no pun!) to progress. There is more in this remark than meets the eye, but I am working at the problem at the present time, and can only say that my results, so far, are more than encouraging.

Public Health Laboratory Service,
134, Denmark Hill, London, S.E.5.

GUY BOUSFIELD.

PERMANENT WAVING AT HOME

SIR,—It is now widely recognised that the home permanent-waving outfits which are on sale throughout the country depend for their action on ammonium thioglycollate, which is applied for a variable time and then neutralised by the application of potassium bromate.

The bromate is normally supplied in powder form which the user makes up into the neutralising solution by mixing with water. The resulting solution is colourless, odourless, and almost tasteless; and it is, therefore, possible that in spite of warnings issued by the manufacturers someone may drink it. Accordingly, it may be useful to note the instructions which have been issued in the United States for treatment of these cases:

> If the neutraliser has been swallowed, an emetic should be given: the stomach may be washed out. One level teaspoonful of sodium thiosulphate should be given after the patient has been sick. Demulcent drinks, such as milk and thin gruel, may then be taken. If shock is a feature, treat the patient for shock but avoid central nervous stimulants. Pain may be relieved with morphine. Intravenous therapy with sodium thiosulphate has been employed, either by the injection of 10–50 ml. of a 10% solution or by an intravenous drip using 100–500 ml. of a 1% solution.

R. M. B. MACKENNA.

London, W.1.

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[1] *Times*, Dec. 31, p. 5.

University of Edinburgh

The Cameron prize for 1950 has been awarded to Dr. R. A. Peters, F.R.S., Whitley professor of biochemistry, Oxford, in recognition of his discovery of BAL (dimercaprol) and its application in practical therapeutics.

Harveian Society of London

Sir Henry Cohen will deliver the Harveian lecture at 26, Portland Place, London, W.1, on Wednesday, March 22, at 8.45 P.M. He will speak on Harvey and the Scientific Method.

Pharmaceutical Society of Great Britain

On Thursday, March 9, at 7.30 P.M., at 17, Bloomsbury Square, London, W.C.1, Mr. J. O. Irwin, D.SC., a member of the statistical research unit of the Medical Research Council, will speak on Statistics and Biological Assay.

Society of Chemical Industry

At a meeting of the microbiological panel to be held on Wednesday, March 8, at 6.15 P.M. at 11, Chandos Street, London, W.1. Dr. G. Pontecorvo will read a paper on the Impact of Genetics on Microbiology.

Royal Microscopical Society

On Wednesday, March 15, at 5.30 P.M., at B.M.A. House, Tavistock Square, London, W.C.1, Mr. G. H. Bourne, D.SC., will speak on Golgi Apparatus and Mitochondria and their Significance in Cellular Physiology.

Chadwick Public Lecture

On Tuesday, March 14, at 2.30 P.M., at Westminster Medical School, Horseferry Road, London, S.W.1, Dr. C. A. Boucher will speak on the Maintenance of Health by the Prevention of Accidents in the Home. At 2.15 P.M. the Chadwick prize of £100 and a medal is to be presented to Brigadier A. E. Richmond, M.R.C.S.

Rumania Withdraws from W.H.O.

Like the U.S.S.R., Byelorussia, the Ukraine, and Bulgaria, Rumania has withdrawn from the World Health Organisation. Announcing his country's withdrawal, the Rumanian minister of health alleges that W.H.O. has " been transformed into a bureaucratic institution which does not correspond to the tasks assigned it by its constitution." The decision of the five governments to discontinue participation will be submitted to the third World Health Assembly, which is to open at Geneva on May 8.

Liverpool Regional Hospital Board

At a meeting on Feb. 2, this board decided that for a trial period of twelve months the works and buildings committee should be authorised to delegate to hospital management committees the execution of individual capital works estimated to cost not more than £1000, in appropriate cases recommended by the board's officers.

Belmont Road Hospital, Liverpool, has been renamed Newsham General Hospital, and the Widnes Isolation Hospital has been renamed Widnes Convalescent Hospital.

Remuneration of Medical Civil Servants

As we announced a fortnight ago (*Lancet*, Feb. 18, p. 333,) the Treasury has rejected a claim by the Civil Service Medical Officers' Joint Committee for an immediate increase in salaries. The Treasury's letter of refusal states: "We intend, of course, in the case of medical officers employed on rates of salary above £1400 a year, to apply increases proportionate to those recommended by the Chorley Committee for the Administrative Class, such increases to take effect on an equal footing with the other improvements recommended by the Committee, and similar arrangements for postponement and title to superannuation will be made."

In his reply to the Treasury, Mr. Stanley Mayne, secretary of the joint committee, remarks that the committee's concern is twofold: (1) that the Treasury's letter makes no reference to the Spens reports, which, the committee holds, should be applied to medical officers in the Civil Service; and (2) that continued refusal to increase salaries will speed " the denigration of the medical Civil Service," which already has less than its full complement.

The joint committee was meeting Treasury officials last Wednesday.

National Association for Maternity and Child Welfare

Princess Elizabeth, president of the association, will open the annual conference on June 28, at Friends House, Euston Road, London, N.W.1. The conference will continue on June 29 and 30, and the general theme will be the Child and its Environment. Further information may be had from the secretary of the association, 5, Tavistock Place, London, W.C.1.

World Federation for Mental Health

The federation's executive board last week concluded a four-day meeting in London. At the end of the meeting Prof. H. C. Rumke (Holland), the president, told representatives of the press that the new movement for mental health was characterised by close integration between psychologists and psychiatrists; and the members of the team included sociologists, ecologists, anthropologists, philosophers, clergymen, and educationists. Dr. J. R. Rees, director and ex-president of the federation, reported that the membership included 62 societies from 33 countries; and associations in Eire, the Phillipines, and Iceland were expected to join soon. The annual meeting is to be held in Paris at the end of August.

French Government Exchange Scholarships

The Medical Research Council invite applications from British workers in medical science, excluding clinical medicine, for two scholarships tenable at research institutions in France during 1950–51. The scheme, which is part of a reciprocal arrangement with the Centre National de la Recherche Scientifique, is intended for young graduates in medicine or science who have already had some experience in a branch of medical science. Candidates must be of British nationality and have at least a working knowledge of French. The stipend will ordinarily be within the range of 30,000–60,000 francs a month, and married men will receive a supplementary allowance. Forms of application may be had from the secretary of the council, 38, Old Queen Street, London, S.W.1, to whom applications must be sent by March 31.

War Memorial for Nurses

Lord Moran is to broadcast at 8.45 P.M. on Sunday, March 12, in the Week's Good Cause in aid of the British Commonwealth and Empire Nurses War Memorial Fund, of which he is chairman of appeals. The fund, which was launched in 1946, now stands at over £71,000. It is hoped to reach £250,000 to form a fund to establish postgraduate travelling scholarships for nurses. The furnishing of a war memorial chapel in Westminster Abbey, the second object of the fund, has been already provided by the gifts of the nursing profession. At least £16,000 is needed to found a scholarship of not less than £350 per annum, although some donors, including the Royal College of Physicians, are giving 7-year scholarships under deed of covenant. An interim award of scholarships given outright in this way is being made this year, and candidates are being selected from the United Kingdom, Canada, Pakistan, Ceylon, Hong-Kong and Singapore, and Malaya. Gifts to the fund can be sent to Lord Moran, Appeals Office, 12, Whitehall, S.W.1.

Scottish Health Services Council

The following doctors have been appointed or reappointed to the Scottish Health Services Council and the standing advisory committees in place of those who retired on Dec. 31, 1949. Reappointments are indicated with an asterisk.

Scottish Health Services Council: Dr. R. W. B. Ellis, professor of child-life and health, University of Edinburgh; Mr. W. W. Galbraith, visitor, Royal Faculty of Physicians and Surgeons of Glasgow; Dr. I. D. Grant, chairman of Scottish committee of the British Med [illegible] . M. McAlister, medical superintendent, [illegible] W. R. Snodgrass, president of the Royal [illegible] and Surgeons of Glasgow, *Dr. David [illegible] ry, Pharmaceutical Society in Scotland; * [illegible] ast president, Royal College of Physicians, Edinburgh.

Medical advi [illegible] Cuthbertson, director, Rowett Resear [illegible]

Nursing and [illegible] *Dr. W. L. Burgess, M.O.H. Dundee.

P [illegible] M. Macleod, Inverness.

R [illegible] *committee:* *Dr. R. Ball [illegible]

L [illegible] *Dr. Kate Harrower, Glasgow.

Health-centres advisory committee: Dr. A. C. Blair, Kilsyth.

Highlands and Islands advisory committee: *Dr. A. J. Macleod, Lochmaddy, North Uist.

Notes and News

APPROVAL OF HOSPITAL MANAGEMENT COMMITTEES' ESTIMATES

THE Ministry of Health states that "in the light of the experience of the past twelve months it is apparent that no effective purpose is served by reserving to the Minister the formal approval of the estimates of individual Management Committees. It has therefore been decided to delegate this duty to Regional Hospital Boards subject only to the prior approval by the Minister of the total estimates for all the Committees in each Regional area." The revised procedure will operate for the year 1950–51 onwards, including revised estimates where necessary.

U.S.A. AND FOREIGN MEDICAL SCHOOLS

THE American Medical Association's council on medical education and hospitals, and the executive council of the Association of American Medical Colleges, report that they "are of the opinion that medical institutions and medical organizations in the United States would be justified in considering current and past graduates of the following foreign medical schools on the same basis that they consider graduates of approved medical schools in the United States":

Denmark.—University of Copenhagen.

Finland.—University of Helsinki; Turku University.

Netherlands.—University of Amsterdam; Royal University of Groningen; Royal University of Leiden; Royal University of Utrecht.

Norway.—University of Oslo.

Sweden.—Royal Charles University, Lund; Charles Medico-Surgical Institute, Stockholm; Royal University of Uppsala.

United Kingdo[illegible] Birmingham, Bristol, Cambridge, [illegible] ds, Liverpool, London, Manchest[illegible] and Wales; Queen's University, Belfast.

This list, to which additions will be made as further information becomes available, appears in the *Journal of the American Medical Association* of Feb. 25.

ARMY HEALTH FILMS

TWO additions to the War Office series of films on health education for the soldier have recently been produced for the Army Kinema Corporation.

Personal Hygiene (28 min., black-and-white) is designed, with commentary and animated diagram, to tell the soldier almost all he needs to know about his body. Kaleidoscopic snapshots of everyday physiology are humorously, simply, and attractively explained. Reasoned emphasis is laid on the value of fresh air, exercise, sensible food, and regular bowel habits in the "daily maintenance" of the body ("its your *own* property") to make each day feel manifestly worth living. Respiration, blood circulation, peristalsis, food hygiene, body odour, barrack-room ventilation, slumberwear, and droplet infection are among the topics described in some detail. Photography is very good and the camp settings realistic.

Health in Our Time (33 min., black-and-white) is a two-piece film. The first half, enriched by the pursuasive voice of the Radio Doctor, describes and illustrates civilian public-health activities. An account of the importance of proper water-supply, sewage disposal, and street cleansing (public services aptly referred to as "organised common sense") is followed by details of the measures taken at airports and seaports against the importation of infectious disease and bad food. Certain unhygienic sins of barmen and waitresses, grocers, gobblers, and gamblers are memorably photographed and convincingly deplored by Dr. Hill. Group radiography, diphtheria immunisation, and new houses are given their due place in the maintenance of health. This half of the film makes good showing to any adult audience, civilian or military. The second half, with comments to the soldier voiced by an Army medical officer, illustrates important points of military hygiene in temperate and tropical climates. Among the subjects portrayed are the preparation and use of vaccines, health education at the Army School of Hygiene, design of military uniforms for special purposes, and assessing the soldier for the job to which he is best suited. A moving articulated skeleton does "P.T." with the squad to demonstrate the purpose behind each exercise. Throughout this half of the film, the accent is on the importance of each and every soldiers' health contribution to the military efficiency and success of an army.

Copies of both films (16 mm.) may be hired from the Army Kinema Corporation, 36, Dover Street, London, W.1.

NEIGHBOUR'S FARE

MANY of us are the sons and grandsons of doctors, but few can, have started so early in the calling of medicine as Dr. Donald McI. Johnson: at eighteen months, he tells us in his autobiography,[1] he went out on his father's rounds. An only child with a lovable and dominating father and an anxious depressed mother, he was, as it were, trapped into the service of his fellow men. Small wonder then that this book is a record—a very moving record—of his struggles to find himself while doing justice to others. His voice is that of the general practitioner of today; and though some of the dissatisfaction it expresses may be discounted as personal, much of it cannot, for the author is capable of being objective, and has understanding of his own and his patients' limitations and frustrations.

It would be wrong, however, to consider this book solely in relation to the practice of medicine. It is a personal story honestly and lucidly told. Childhood, unhappy school-days, Cambridge, London hospitals, and general practice in a London suburb—all these are passionately remembered and soberly described. The chapter on his excursion into politics at a by-election is funny, true, and simply set down. The illustrations include some lovely photographs of the Arctic seas and mountains.

THE INDEX-CATALOGUE

SOME weeks ago we referred[2] to the rumoured discontinuance of the *Index-Catalogue* of the U.S. Army Medical Library. Major-General R. W. Bliss, the surgeon-general, has now confirmed that publication is to cease with the completion of volume eleven of the fourth series. Thereafter the Army medical library plans to publish a volume or volumes to complete the record of its monographic holdings up to the mid-century mark; and beyond that to publish selectively the most useful portion of the subject-references (numbering over 1,750,000) that have not yet been recorded. Provision for a continuing record of the library's monographic holdings has been assured in the form of an annual supplement to the *Library of Congress Catalog of Printed Cards*. At the same time the library's *Current List of Medical Literature* will be augmented and improved; an author-index will be added, a standard list of journals to be covered regularly introduced, classification by broad journal groupings abandoned, and a cumulative subject-index provided; the format and frequency of publication may be altered.

University of Oxford

An election of one member of the board of the faculty of medicine in place of Mr. E. A. Crook, who is eligible for re-election, will be held on May 31. Nominations should reach the secretary of faculties at the university registry before 10 A.M. on May 3.

University of London

Dr. D. D. Reid has been appointed to the readership in epidemiology and vital statistics at the London School of Hygiene and Tropical Medicine.

Dr. Reid, who is 35 years of age, was educated at the Royal Academy, Inverness, and the University of Aberdeen, where he graduated M.B. in 1937. After [illegible] the Royal [illegible] in London, Northern I[illegible] Command. he joined t[illegible] esearch staff of the *Directorate*-Later he w[illegible] General of [illegible] is the author of three chapters in *Psychologic*[illegible] *Personnel in the R.A.F.* and of papers on r[illegible] *British Journal of Social Medicine*. In 1946 h[illegible] with commendation and appointed lecturer i[illegible] he London School of Hygiene and Tropical [illegible] eceived the PH.D. Lond., and while holding a [illegible] ellowship he was visiting associate professor [illegible] School of Public Health of the University of California.

Dr. A. E. W. Miles, F.D.S. R.C.S., has been appointed to the chair of dental pathology at the London Hospital Medical College.

The title of professor emeritus of chemistry has been conferred on Mr. C. S. Gibson, F.R.S., on his retirement from the chair of chemistry at Guy's Hospital Medical School, which he has held since 1921. The title of professor emeritus of physiology has been conferred on Dr. Hamilton Hartridge, F.R.S., who held the chair of physiology at St. Bartholomew's Hospital Medical College from 1927 to 1947.

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[1] A Doctor Regrets. London: Christopher Johnson. 1949. Pp. 242. 12s. 6d.

[2] *Lancet*, Jan. 28, p. 172.

Usually the patient has no difficulty in swallowing the tube. Having swallowed it, he is taught how to regulate the rate of the drip and to estimate the correct rate. He is allowed to discontinue the drip to wash or visit the toilet.

While on the drip he has a routine gastric diet, as follows:

6.30 A.M.	Cup of weak milky tea.
8.15 A.M.	Breakfast.
10.15 A.M.	Cup of hot milk.
12.15 P.M.	Lunch.
2.15 P.M.	Cup of weak milky tea.
4.15 P.M.	Tea.
6.15 P.M.	Supper.
9.00 P.M.	Hot milk drink.

This diet excludes gross roughage, chemical irritants, and fried foods.

During meals the patient is allowed to discontinue the drip and remove the Ryle's tube. After the meal he washes, cleans, and swallows his tube and starts the drip again. If, as occasionally happens, the tube becomes blocked, the patient withdraws it, syringes it clean with water, and immediately swallows it again.

The more seriously ill patients—for example, those who have had a recent hæmorrhage—are confined strictly to bed on a milk drip without additional nourishment.

The patients on a milk drip are given gr. 1 of phenobarbitone twice daily, to ensure mental rest; those on the magnesium-bicarbonate drip also receive 15 minims of tincture of opium to combat the tendency to diarrhœa. All are given 50 mg. of ascorbic acid daily, and if anæmia is present ferrous sulphate is given.

After the first week in bed patients who are fit enough take part four times weekly in a ward class of physical exercises similar to those recommended by Dr. Geoffrey Evans (1945). For these the patient lies outside the bedclothes with his drip still running.

The drip is continued for three weeks, which is the maximum period which most patients can comfortably tolerate. Thereafter the patient spends a further week in bed and then, if symptom-free, he is allowed up gradually.

Where there is reason to expect relapse, the patient is advised to set up a drip at home, for use during the night, or continuously over a week-end, or for longer periods, if there is any recurrence of pain. Many man-hours in industry could be saved in this way by the early prevention of true relapses. Many hospital beds could also be saved if patients with a peptic ulcer who have suitable home conditions were treated at home by the continuous-drip method, using magnesium bicarbonate solution when enough milk is not obtainable.

In my experience the drip is most likely to benefit the "low grumbling" type of ulcer case. In chronic cases it is usually disappointing.

The Drip and Hæmatemesis

Opinion on the best treatment of recent hæmatemesis and melæna now generally supports Meulengracht in his advocacy of immediate liberal feeding; but some acutely ill patients are unwilling or unable to take so full a diet. A constant milk drip fulfils the principles of Meulengracht by providing adequate fluid and calories. If there has been much vomiting, salt can be added to the milk in the reservoir; extra vitamin C can also be added. If the patient wishes to take anything by mouth, sips of glucose saline are allowed; five to seven days after the bleeding has ceased, semi-solid milk feeds are given in addition to the drip; and three weeks after bleeding has ceased nearly all patients should be on full convalescent gastric diet.

In these cases the drip affords the stomach maximal rest with minimal distention.

Rate of Flow

During the 24 hours the drip is out of action for about 3 hours, on the average, owing to interruption by meals, toilet, and cleansing of the tube. Occasionally, while asleep, the patient stops the flow by lying on the tube or clenching his teeth on it; and it is the duty of the ward staff to rectify such stoppages without disturbing the patient unduly.

The aim is to give, in the 24 hours, 100 oz. of milk, citrated by the addition of gr. 40 of sodium citrate to the pint, or 80 oz. of magnesium bicarbonate solution (Dinneford's fluid magnesia) diluted 1 in 3 with water. The milk is allowed to flow at 50 drops per minute, which will supply 105 oz. in 21 hours; for the magnesium bicarbonate solution the rate of flow is 40 drops per minute, giving 84 oz. in 21 hours.

RESULTS

With one exception (a serving soldier) every patient in this series is a man receiving a disablement pension, which means that the ulcer is either due to service in the Forces or was aggravated by such service. Of the 35 patients, 5 were admitted to hospital after either a hæmatemesis or the start of a severe melæna.

The most notable feature was the almost instantaneous relief of abdominal pain. In every case, no matter how severe the pain, relief was obtained within 36 hours, of the start of the drip. In no case were ancillary drugs required. This relief was equally remarkable with both milk and the magnesium bicarbonate solution.

During the three weeks on the drip 4 patients, all over-weight for their size, lost weight; in 2 the weight remained stationary; and the remaining 29 gained an average of just over $5\frac{1}{2}$ lb., the maximum gain being 15 lb.

The drip was a great emotional stimulant, especially in patients who had had medical treatment elsewhere. No patient had previously been treated by the drip method; and any lack of confidence was soon rectified by the rapid relief of pain with the resulting sense of well-being, and also by the discovery that having a tube in situ all day was not so unpleasant as had been anticipated. This more cheerful outlook, coupled with the improved general condition, was an asset in preparing patients for surgical treatment.

Of the 35 patients, 33 were examined radiologically before the drip was begun. In 29 an ulcer was demonstrated; in the remaining 6 the diagnosis was made on the history and clinical findings.

Of the 29 radiologically positive cases, 19 showed no radiographic evidence of an ulcer one to sixteen weeks after the drip had ended. One of this group was not symptom-free, and in view of his age and his five-year history, surgical intervention was advised; this he refused.

A further 5 cases, examined up to two weeks after the drip had ended, showed either a small residual ulcer or an ulcer in which well-marked healing had taken place.

The remaining 7 cases at periods of one to four weeks after the drip had ended still had an active ulcer, judged either clinically or radiologically. In most of these surgery was advised and all but 1 of the cases operated on were found to have a large chronic ulcer with multiple adhesions, the 1 exception having a gastric carcinoma.

The only clinical disadvantage was the tendency to diarrhœa with the magnesium bicarbonate drip. In only 1 case was this so severe that the solution had to be replaced by milk: all the remaining patients settled down after the first two or three days to an average of two bowel actions daily, provided 15 minims of tincture of opium was added to the reservoir twice a day.

BIOCHEMICAL INVESTIGATIONS

In order to make a satisfactory comparison between the value of milk and magnesium bicarbonate solution as neutralising agents, samples of the gastric contents were withdrawn from patients on the drip for estimations of free acid and pH. The samples were withdrawn at two-hourly intervals between 10 A.M. one day and 8 A.M.

Visit of French Medical Specialists

Ten French doctors are visiting this country at the invitation of the British Council to study recent developments in British medicine. The Royal College of Physicians, the Royal College of Surgeons, and the Royal Society of Medicine are arranging functions in honour of their colleagues.

Sir Cecil Wakeley, P.R.C.S., has been appointed chevalier of the Legion of Honour of the French Republic in recognition of services rendered during the war.

The latest annual report of the Pest Infestation Research Board has been published for the Department of Scientific and Industrial Research by H.M. Stationery Office. The report is entitled *Pest Infestation Research, 1948* (pp. 32. 1*s.*).

CORRIGENDA: *The Iron and Steel Industry.*—In this article (Feb. 4) by Dr. Catherine Swanston, in the table of deaths from silicosis on p. 195, the last entry under "Industry" should read "All others" (*not* "All other metal-workers").

Small-pool Plasma.—In our account last week of the discussion on hepatitis by the Royal Society of Medicine Dr. W. d'A. Maycock was reported (p. 356) as having said that enough small-pool plasma is now being produced to meet the needs of hospitals. Actually, Dr. Maycock expressed the hope that enough to meet these needs will be produced in the next twelve months.

Appointments

ALMOND, H. G. A., M.B., M.CH. (ORTH.) Lpool, F.R.C.S.: orthopædic surgeon, orthopædic clinics of school health service, Liverpool.

AYOUB, J. E. M., B.A., B.M. Oxfd, F.R.C.S.: part-time consultant surgeon, Moorfields Westminster and Central Eye Hospital (Moorfields branch).

BORTHWICK, J. B., M.B.E., M.D. Edin., F.R.C.P.E.: asst physician, Scottish Borders hospitals group.

CAMPBELL, J. A., M.A., M.B. Camb., M.R.C.P., D.T.M. & H.: consultant physician, Norfolk and Norwich area.

CUNNINGHAM, R. C., M.B. Glasg., D.P.H., D.P.M.: senior M.O., mental-health section, Essex.

DAVIES, I. J., M.D., B.SC. Wales, D.P.M.: consultant psychiatrist and medical superintendent, St. Audrey's Hospital, Melton, Cambs.

DOWNES, C. E. P., M.R.C.P.: consultant chest physician, Huntingdon and Isle of Ely area.

FINE, WILFRED, M.D. Lond., M.R.C.P.: consultant non-resident deputy physician-superintendent, Newsham General Hospital (previously Belmont Road Hospital), Liverpool.

FRANK, J. R., M.B. Edin., F.R.C.S.E.: asst. surgeon, Scottish Borders hospitals group.

GREEN, DORA, B.SC. Lond., M.R.C.S., D.C.H.: asst. M.O.H. and asst. schools M.O., Luton.

HAY, C. P., M.D. Edin., M.R.C.P.E., D.P.H.: consultant chest physician, West Suffolk area.

HINGSTON, ETHELINE, B.A., M.B., Dubl., D.C.H.: asst. M.O., combined health and schools service, Leeds.

HOWARD, STANLEY, M.B. Lpool.: senior asst. M.O.H. for duties in connection with care and aftercare scheme, Bradford.

HUDSON, J. R., M.B. Lond., F.R.C.S., D.O.M.S.: assistant in ophthalmic outpatient department, Middlesex Hospital, London.

MINTO, W. H. P., M.B. Aberd., D.P.H.: district M.O.H., and asst. county M.O., Brixworth, Northants.

MORRISON, J. B., M.D., B.SC. Glasg.: medical superintendent, Abergele Sanatorium.

MOSELEY, J. H., M.A., M.B. Camb., M.R.C.P.: consultant pædiatrician, Portsmouth and Isle of Wight.

O'MALLEY, A. G., M.B., M.CH. (ORTH.) Lpool, F.R.C.S.: consultant orthopædic surgeon, St. Helens Hospital.

O'MALLEY, C. J. S., C.B.E., M.B. Lond.: director of rehabilitation, Garston Manor.

PEARCE, R. D., M.R.C.S.: asst. county M.O.H., for duties in Grays, Hornchurch, and Brentwood areas, Essex.

RICHARDSON, H. J., L.R.C.P.E., D.A.: consultant anæsthetist, Peterborough area.

RIVLIN, LILY, M.R.C.S.: asst. M.O., county health department, Middlesex.

ROE, P. W., B.A., B.M. Oxfd: physician, Watford Chest Clinic and Shrodells and Harefield Hospitals, Herts.

ROGERS, W. F., B.A., M.D. Dubl.: medical registrar, White Lodge Hospital, Newmarket.

RYAN, J. J., M.B., B.SC. N.U.I., D.P.H., D.P.M.: consultant psychiatrist and deputy medical superintendent, Little Plumstead Colony.

STEPHEN, MARGARET, M.B. Glasg., D.P.H.: asst. M.O., area no. 8, Middlesex.

SWERDLOW, MARK, M.B., B.SC., Manc., D.A.: anæsthetist, hospitals in St. Helens and Warrington areas.

YOUNG, I. M., M.B. Glasg.: consultant chest physician, Great Yarmouth and Lowestoft area.

St. Thomas's Hospital, London:

CHURCHILL-DAVIDSON, H. C., M.A., M.B. Camb., D.A.: senior registrar, anæsthetics department.

COLE, J. G. L., M.B. Birm.: senior registrar, X-ray diagnostic department.

PIERCE, J. W., M.D. Lond., M.R.C.P., D.M.R.D., radiologist, X-ray diagnostic department.

SUTCLIFFE, JOHN, M.B. Camb., M.R.C.P.: senior registrar, X-ray diagnostic department.

Diary of the Week

MARCH 5 TO 11

Monday, 6th

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Mr. A. Dickson Wright: Surgical Aspects of Hyperpiesia. (Last Lettsomian lecture.)

NATIONAL HOSPITAL, Queen Square, W.C.1
5 P.M. Prof. J. A. Barré (Strasbourg): Formes cliniques actuelles des troubles extenso-progressifs d'origine traumatique et de nature réflexe.

Tuesday, 7th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. R. S. Murley: Postoperative Venous Thrombosis and Embolism. (Hunterian lecture.)

INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5 P.M. Dr. F. R. Bettley: Seborrhœic Dermatitis.

Wednesday, 8th

ROYAL COLLEGE OF SURGEONS
5 P.M. Prof. Milroy Paul: Blood and Lymph Pathways in the Spermatic Cord. (Hunterian lecture.)

UNIVERSITY OF GLASGOW
8 P.M. (Department of Ophthalmology.) Dr. S. Galbraith: Evolution of the Ophthalmoscope.

Thursday, 9th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. J. B. Oldham: Renal Denervation. (Hunterian lecture.)

INSTITUTE OF DERMATOLOGY
5 P.M. Dr. L. Forman: Drug Eruptions.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Desmond Curran: Psychiatry lecture-demonstration.

ADLERIAN SOCIETY OF GREAT BRITAIN
8 P.M. *Medical Section* (11, Chandos Street, W.1). Dr. Ethel Dukes: Psychological Aspects of Marriage Guidance.

Friday, 10th

NATIONAL HOSPITAL, Queen Square, W.C.1
5 P.M. Prof. A. G. Weiss (Strasbourg): Operative Treatment of Hypertension.

MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. Helen Dimsdale: Neurological demonstration.

WEST KE [illegible] OCIETY
8.30 P. [illegible] .) Dr. Robert Forbes: Legal [illegible]

Saturday, 11th

SOUTH EAST METROPOLITAN REGIONAL TUBERCULOSIS SOCIETY
10.30 A.M. (Guy's Hospital, S.E.1.) Dr. E. R. Boland: Minimal Tuberculous Lesions and their Treatment.

Births, Marriages, and Deaths

BIRTHS

BARLOW.—On Feb. 16, the wife of Dr. T. G. Barlow—a son.

BENSON.—On Feb. 12, in London, the wife of Dr. Robert Benson—a son.

COPEMAN.—On Feb. 23, the wife of Dr. H. Copeman—a daughter.

COX.—On Feb. 22, in London, the wife of Dr. A. G. Charlton Cox—a daughter.

COXON.—On Jan. 17, at Oxford, to Dr. Mary Coxon, wife of Mr. R. V. Coxon—a son.

DANBY.—On Feb. 23, the wife of Dr. Anthony Danby—a son.

FITCH.—On Feb. 23, at Bishopsbourne, the wife of Lieut.-Colonel Keith Fitch, O.B.E., F.R.C.S.—a daughter.

GIFFORD.—On Feb. 19, the wife of Dr. L. A. Gifford—a son.

HARVEY.—On Feb. 18, in London, the wife of Dr. R. M. Harvey—a daughter.

HAWKINS.—On Feb. 18, the wife of Dr. L. A. Hawkins—a son.

H[illegible]—On Feb. 20, at Dorchester, Dorset, the wife of [illegible]—a daughter.

[illegible] Cold Ash, Newbury, the wife of Captain A. Paton, R.A.M.C.—a son.

ROBINSON.—On Feb. 18, the wife of Dr. G. A. Robinson—a daughter.

TEMPLE.—On Feb. 19, in London, the wife of Mr. J. L. Temple, F.R.C.S.—a son.

MARRIAGES

HOLROYD—TWOMEY.—On Feb. 4, in London, F. Lister Holroyd, major, R.A.M.C., to Kathleen Twomey.

SPRUELL—BROWN.—On Feb. 18, at Sale, Cheshire, George Kerr Spruell, M.B., to Joan Bruce Brown.

DEATHS

BRISTOW.—On Feb. 21, at Bournemouth, William Moss Bristow, L.R.C.P.E.

FISON.—On Feb. 25, at Salisbury, Edmund Towers Fison, O.B.E., B.A., M.D. Camb., F.R.C.S.E., D.P.H., aged 80.

FLEWITT.—On Feb. 26, in London, Charles York Flewitt, M.B. Birm., aged 73.

HARVEY.—On Feb. 23, William John Saundry Harvey, D.S.O., M.R.C.S., lieut-colonel, R.A.M.C. retd, aged 79.

LASLETT.—On Feb. 20, at Farnworth, Lancs, Thomas George Laslett, M.R.C.S., aged 90.

SHELDON.—On Feb. 18, Harold Sheldon, M.D. Manc.

THOMAS.—On Feb. 24, Hugh Arwel Thomas, M.B. Lpool, M.SC. Wales, D.P.H.

WHITE.—On Feb. 21, at Saltcoats, Ayrshire, John Allan White, M.B. Glasg.

WHITNALL.—On Feb. 19, Samuel Ernest Whitnall, M.A., D.M. Oxfd, F.R.S. Canada.

Usually the patient has no difficulty in swallowing the tube. Having swallowed it, he is taught how to regulate the rate of the drip and to estimate the correct rate. He is allowed to discontinue the drip to wash or visit the toilet.

While on the drip he has a routine gastric diet, as follows:

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12.15 P.M.	Lunch.
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4.15 P.M.	Tea.
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This diet excludes gross roughage, chemical irritants, and fried foods.

During meals the patient is allowed to discontinue the drip and remove the Ryle's tube. After the meal he washes, cleans, and swallows his tube and starts the drip again. If, as occasionally happens, the tube becomes blocked, the patient withdraws it, syringes it clean with water, and immediately swallows it again.

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The patients on a milk drip are given gr. 1 of phenobarbitone twice daily, to ensure mental rest; those on the magnesium-bicarbonate drip also receive 15 minims of tincture of opium to combat the tendency to diarrhœa. All are given 50 mg. of ascorbic acid daily, and if anæmia is present ferrous sulphate is given.

After the first week in bed patients who are fit enough take part four times weekly in a ward class of physical exercises similar to those recommended by Dr. Geoffrey Evans (1945). For these the patient lies outside the bedclothes with his drip still running.

The drip is continued for three weeks, which is the maximum period which most patients can comfortably tolerate. Thereafter the patient spends a further week in bed and then, if symptom-free, he is allowed up gradually.

Where there is reason to expect relapse, the patient is advised to set up a drip at home, for use during the night, or continuously over a week-end, or for longer periods, if there is any recurrence of pain. Many man-hours in industry could be saved in this way by the early prevention of true relapses. Many hospital beds could also be saved if patients with a peptic ulcer who have suitable home conditions were treated at home by the continuous-drip method, using magnesium bicarbonate solution when enough milk is not obtainable.

In my experience the drip is most likely to benefit the "low grumbling" type of ulcer case. In chronic cases it is usually disappointing.

The Drip and Hæmatemesis

Opinion on the best treatment of recent hæmatemesis and melæna now generally supports Meulengracht in his advocacy of immediate liberal feeding; but some acutely ill patients are unwilling or unable to take so full a diet. A constant milk drip fulfils the principles of Meulengracht by providing adequate fluid and calories. If there has been much vomiting, salt can be added to the milk in the reservoir; extra vitamin C can also be added. If the patient wishes to take anything by mouth, sips of glucose saline are allowed; five to seven days after the bleeding has ceased, semi-solid milk feeds are given in addition to the drip; and three weeks after bleeding has ceased nearly all patients should be on full convalescent gastric diet.

In these cases the drip affords the stomach maximal rest with minimal distention.

Rate of Flow

During the 24 hours the drip is out of action for about 3 hours, on the average, owing to interruption by meals, toilet, and cleansing of the tube. Occasionally, while asleep, the patient stops the flow by lying on the tube or clenching his teeth on it; and it is the duty of the ward staff to rectify such stoppages without disturbing the patient unduly.

The aim is to give, in the 24 hours, 100 oz. of milk, citrated by the addition of gr. 40 of sodium citrate to the pint, or 80 oz. of magnesium bicarbonate solution (Dinneford's fluid magnesia) diluted 1 in 3 with water. The milk is allowed to flow at 50 drops per minute, which will supply 105 oz. in 21 hours; for the magnesium bicarbonate solution the rate of flow is 40 drops per minute, giving 84 oz. in 21 hours.

RESULTS

With one exception (a serving soldier) every patient in this series is a man receiving a disablement pension, which means that the ulcer is either due to service in the Forces or was aggravated by such service. Of the 35 patients, 5 were admitted to hospital after either a hæmatemesis or the start of a severe melæna.

The most notable feature was the almost instantaneous relief of abdominal pain. In every case, no matter how severe the pain, relief was obtained within 36 hours, of the start of the drip. In no case were ancillary drugs required. This relief was equally remarkable with both milk and the magnesium bicarbonate solution.

During the three weeks on the drip 4 patients, all over-weight for their size, lost weight: in 2 the weight remained stationary; and the remaining 29 gained an average of just over 5½ lb., the maximum gain being 15 lb.

The drip was a great emotional stimulant, especially in patients who had had medical treatment elsewhere. No patient had previously been treated by the drip method; and any lack of confidence was soon rectified by the rapid relief of pain with the resulting sense of well-being, and also by the discovery that having a tube in situ all day was not so unpleasant as had been anticipated. This more cheerful outlook, coupled with the improved general condition, was an asset in preparing patients for surgical treatment.

Of the 35 patients, 33 were examined radiologically before the drip was begun. In 29 an ulcer was demonstrated; in the remaining 6 the diagnosis was made on the history and clinical findings.

Of the 29 radiologically positive cases, 19 showed no radiographic evidence of an ulcer one to sixteen weeks after the drip had ended. One of this group was not symptom-free, and in view of his age and his five-year history, surgical intervention was advised; this he refused.

A further 5 cases, examined up to two weeks after the drip had ended, showed either a small residual ulcer or an ulcer in which well-marked healing had taken place.

The remaining 7 cases at periods of one to four weeks after the drip had ended still had an active ulcer, judged either clinically or radiologically. In most of these surgery was advised and all but 1 of the cases operated on were found to have a large chronic ulcer with multiple adhesions, the 1 exception having a gastric carcinoma.

The only clinical disadvantage was the tendency to diarrhœa with the magnesium bicarbonate drip. In only 1 case was this so severe that the solution had to be replaced by milk: all the remaining patients settled down after the first two or three days to an average of two bowel actions daily, provided 15 minims of tincture of opium was added to the reservoir twice a day.

BIOCHEMICAL INVESTIGATIONS

In order to make a satisfactory comparison between the value of milk and magnesium bicarbonate solution as neutralising agents, samples of the gastric contents were withdrawn from patients on the drip for estimations of free acid and pH. The samples were withdrawn at two-hourly intervals between 10 A.M. one day and 8 A.M.

the next day, from consecutive patients until 50 groups of samples had been obtained in respect of both milk and bicarbonate solution. Some 600 samples of gastric contents were therefore obtained for each type of treatment. The patients were not selected, except that each had an ulcer which was held to require drip therapy. Whenever possible, a fractional test-meal was done before the drip was begun; but the selection of cases was not influenced by the result.

The patient was allowed nothing to eat or drink in the 90 minutes preceding the aspiration, with the exception of the 10 P.M. sample when the period was 60 minutes. Thus the aspirations could be regarded as carried out on an empty or resting stomach.

When the time for aspiration was reached, the Ryle's tube was disconnected from the drip system and swallowed another 4 inches, or more if necessary, so that it rested in the stomach. Then 30–40 c.cm. of air was blown through the tube to eject any drip solution remaining in it and to intermix the gastric contents. A sample of about 10 ml. of gastric contents was now withdrawn and saved; and if possible a further sample was withdrawn for the estimations. The patient then resumed his drip, withdrawing the Ryle's tube so that its tip rested in the œsophagus.

The samples were stored in a refrigerator until all twelve aspirations had been done. To determine whether this storage affected the findings, one set of samples was estimated immediately after withdrawal and again after 60 hours' refrigeration; no significant variation was found.

An attempt was made to obtain a representative sample of the whole gastric contents by blowing air down the Ryle's tube to aid mixing, and by discarding the first sample taken.

On being passed into the stomach, the Ryle's tube acts as a foreign body and therefore irritates and stimulates the gastric mucosa, with possibly a resulting outpouring of acid. This would not favour the results, which would thus tend to have a higher free-acid content.

Statistical Analysis of Findings

The aspirations covered a total of 101 24-hour periods. With 12 tests per 24-hour test period there should have been 1212 acidity and pH determinations; but on 10 occasions no sample was available and only 1202 tests were analysed.

For statistical analysis the results were placed into four groups, according to the composition of the drip: (1) citrated fresh milk containing gr. 40 of sodium citrate per pint; (2) Dinneford's fluid magnesia diluted 1 in 3; (3) citrated milk followed by Dinneford's fluid magnesia; and (4) Dinneford's fluid magnesia followed by citrated milk.

The conclusions drawn from the analysis are as follows. There is a good linear correlation between the pH value of the stomach contents and the logarithm of the stomach acidity. The experimental results are best represented by the equation: $\text{pH} = (3{\cdot}6 - 1{\cdot}3 \log_{10} F) \pm 0{\cdot}25$. There is no correlation between the mean stomach acidity over the 24-hour test period and the duration of the drip before testing. The use of a 1-in-3 solution of magnesium bicarbonate at a rate of flow of 80 oz. per 24 hours, followed by citrated milk at a rate of flow of 100 oz. per 24 hours, or vice versa, gives rise to lower stomach acidities than either of these agents used alone; considered as a whole, however, the differences are no greater than could be accounted for by normal variation, and the evidence is insufficient for the separation of the four groups into any order of merit.

CONCLUSIONS

The continuous intra-œsophageal drip is a satisfactory method for the medical treatment of acute and subacute peptic ulcer under present-day conditions, especially when there is considerable pain associated with gastric and pyloric spasm.

This form of treatment requires the least attention from the nursing staff and thus enables a small staff to care for more patients.

The constant drip keeps the gastric contents neutral throughout the 24 hours better than intermittent feeding methods, and affords the stomach maximal rest.

This method is suitable for the treatment of recent hæmatemesis, and where the general condition is poor or the patient needs "building up" before operation.

The best solution for the drip is fresh milk citrated with gr. 40 of sodium citrate to the pint, delivered at a rate of 100 oz. in 24 hours.

The next most satisfactory solution is magnesium bicarbonate in a 1-in-3 dilution of the *B.P.* solution, delivered at 80 oz. per 24 hours. This has the disadvantages of being laxative and not having the nutritive value of milk. Usually its laxative action can be effectively combated by adding 15 minims of tincture of opium to the drip reservoir twice daily.

There is no danger of alkalosis developing with either milk or the magnesium bicarbonate solution.

Patients have no difficulty in accommodating themselves to the constant drip, provided the Ryle's tube is swallowed by mouth, the end resting in the œsophagus just above the cardia.

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PHÆOCHROMOCYTOMA OF THE ADRENAL

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PHÆOCHROMOCYTOMA or chromaffinoma is commonly considered a rare condition. Such tumours have been described arising from chromaffin tissue throughout the body, but it is when they arise from the medulla of the adrenal gland that the dramatic symptom-complex known as the adrenal sympathetic syndrome (Mac Keith 1944) is produced. Most of these tumours are pathologically benign, but the syndrome they produce is inevitably fatal unless the tumour is removed. Improved methods of diagnosis and treatment have developed from recent biochemical and physiological investigations.

The first reported case was probably that of Frankel (1886) who found bilateral adrenal tumours in a girl of 18 who for three years had had attacks of palpitations, headaches, and vomiting. In 1917 Volhard removed a kidney and adjacent tumour in 2 patients with hypertension and albuminuria, but the characteristic clinical picture of paroxysmal hypertension was first described by Labbé et al. in 1922. Mayo, in 1927, successfully extirpated a retroperitoneal tumour in a case showing the typical syndrome, but without recognising the exact nature of the neoplasm; however, in 1929 cure followed operation by Shipley in a case accurately diagnosed by Pincoffs. Chromaffinomata in other sites, occasionally multiple (Kipkie 1947), have been widely reported. The carotid body, sacrococcygeal region, retroperitoneal tissues, and intestinal wall have been implicated in addition to the adrenal.

In all, about 194 cases have been reported, of which less than a third have shown hormonal activity (Calkins and Howard 1947); the latter have all been found arising from the adrenal or from the retroperitoneal tissue nearer the midline (Mac Keith 1944). In one of the cases reported by Espersen and Dahl-Iversen (1946), the tumour appeared to arise from retroperitoneal tissue, but it was connected by a narrow pedicle to the left adrenal gland; and possibly many of the similar retroperitoneal tumours reported may have originated in this way. Eighteen bilateral adrenal tumours appear to have been reported, the last by Reid and Salm (1949).

That the condition is not so rare as was once thought is suggested by the number of cases recorded in the last few years (Roth and Kvale 1945, Espersen and Dahl-Iversen 1946, Washington et al. 1946, Blacklock et al. 1947, Brunschwig 1947, Goldenberg et al. 1947, Gutmann 1947, Mandl 1947, Schneider 1947, Spalding 1947, Alwall and Wulff 1948, Guarneri and Evans 1948, LaDue et al. 1948, Spear and Griswold 1948, Reid and Salm 1949). This increase is undoubtedly due to improved methods of diagnosis, but the difficulties which must still abound are well demonstrated in the review of Green (1946), who found that, of 51 cases, 37 had persistent chronic hypertension, sometimes with complete lack of fluctuation. Further, Smithwick, in a personal communication to Goldenberg et al. (1947) reported that in 1000 cases operated on for essential hypertension, the incidence of phæochromocytoma was 0·5%.

INCIDENCE

The disease occurs equally in the two sexes, and most often between the ages of 20 and 30 (Mac Keith 1944) or 25 and 45 (Biskind et al. 1941), though several cases have been reported in children (e.g., Holst 1938). Often a familial incidence has been noted (Hyman and Mencher 1943) and also an association with other endocrine disturbances, such as thyrotoxicosis, in the family (Hyman and Mencher 1943, Espersen and Dahl-Iversen 1946, Reid and Salm 1949). Mac Keith (1944) has noted an association with neurofibromatosis in some cases.

PATHOLOGY

The great majority of the tumours are benign, but up to 1944 there had been 15 clearly malignant cases recorded. Many of the malignant tumours are indistinguishable by their symptomatology from the simple ones, but for no apparent reason those which give rise to metastases do not produce the typical syndrome (Washington et al. 1946). The tumours have been shown to produce their effect by means of a pressor substance, akin to adrenaline, which is found in excess in the circulating blood. An increase of adrenaline in the peripheral blood during an attack of paroxysmal hypertension was first demonstrated by Beer et al. in 1937; and this was confirmed in 1939 by Strombeck and Hedberg, who found the blood-adrenaline content increased 30 times between attacks and 1000 times in an attack, though Volhard (1944) was unable to confirm these high figures. Assays of the adrenaline content of these tumours have given varying findings. Formerly adrenaline itself was regarded as the pressor agent responsible for the typical symptom-complex; but Holton (1949) suggests that noradrenaline, of which she found large quantities in three typical tumours, may be the causal agent.

CLINICAL PICTURE

The clinical picture falls into one of the following categories: (1) paroxysmal hypertension, (2) persistent hypertension, (3) malignancy, (4) Addison's disease due to compression of adrenal cortex, and (5) asymptomatic.

The asymptomatic group is of no clinical importance unless the tumour becomes large enough to encroach on important neighbouring structures. Cases belonging to the *third* and *fourth* categories are very rare; *it is in* fact questionable whether these tumours have ever been observed to give rise to Addison's disease. Of the 15 *malignant cases mentioned by* Mac Keith (1944), the majority were without metastases and had produced the well-recognised clinical picture of the first category —paroxysmal hypertension—and it was only at operation or even on histological examination of the tumour that its malignancy was recognised. Cases in the first category, with their attacks of paroxysmal hypertension, have been exhaustively reported, and of recent years a high proportion have probably been diagnosed on clinical criteria alone. It is in the second group—where there is persistent hypertension—that the new diagnostic tests, to be reviewed below, may prove of special value in revealing cases which would otherwise have gone unrecognised, except perhaps at autopsy.

In the typical paroxysm there is a sudden generalised vasoconstriction, together with other symptoms pointing to overactivity of adrenergic nerve-fibres. Usually because of the generalised action of the pressor substance —whether it be adrenaline or noradrenaline—symptoms and signs arise in many parts of the body, but more occasionally the main features are localised symptoms such as epigastric pain, vomiting, diarrhœa, headache, vertigo, paræsthesiæ, cramps, or anginal pain. The attack may be preceded by an aura, *often in the form* of one of these localised symptoms. In some cases the paroxysms are mild, with fatigue, lassitude, and anxiety as the salient features; but more commonly the patient develops palpitations, followed rapidly by nausea, profuse perspiration, a feeling of fullness in the neck, "goose-flesh" and coldness of the extremities, throbbing in the temples, dizziness, and finally a severe headache which persists as the other symptoms subside. This rapid march of symptoms in a restless, anxious patient gives a dramatic and revealing picture. The pulse is usually rapid and often weak and small, but varies from case to case and even from attack to attack; the heart-beat is extremely forcible, and the second sound in the aortic area increased in intensity. Within a few moments the systolic blood-pressure may increase from 120 to 300 mm. Hg with a corresponding rise in the diastolic level, though the *reading* may vary widely during a single attack. Acute pulmonary œdema, retinal congestion, and hæmorrhages have been described, and the pupils are usually widely dilated; there may be hyperglycæmia and glycosuria, and the sugar-tolerance curve may be diabetic in character.

The duration of attacks varies widely. Commonly they last one to two hours and leave the patient relieved but prostrated; but Hyman and Mencher (1943) described a paroxysm lasting thirty-six hours, and van Goidsenhoven and Appelman (1934) one continuing for three days. Between attacks the patients usually feel well, though lassitude, loss of weight, and slight œdema have been reported; and in some the resting blood-pressure is high. Indeed it seems likely that many cases, if undiagnosed, progress to continuous hypertension (Green 1946).

Precipitating Factors

Attacks may arise spontaneously or in relation to the normal adrenaline-production mechanism of emotion, such as fear, anger, excitement, and have also been produced by hyperventilation or change in posture, the latter being probably the most common exciting factor; in the case reported below attacks often developed when the patient lay down at night. Sharp blows on the abdomen, pressure in the renal area, and immersion of the extremities in cold water have all been described as producing attacks.

Death

The common causes of death in these cases are a cerebral vascular accident, during a paroxysm, acute pulmonary œdema, or, in undiagnosed cases, collapse after a minor operation. Less common causes are hypertensive cardiac failure or renal failure, while malignant cachexia and possibly Addison's disease are much rarer terminations.

Electrocardiographic Findings

These are varied, left axis deviation being the most usual single finding. The T waves may be inverted for some weeks after an attack, and the ST interval is commonly prolonged.

DIAGNOSIS

When there are typical attacks the diagnosis is self-evident, but in the absence of paroxysms or a typical history the problem is more difficult. Widely varying blood-pressure readings have been noted in essential hypertension, particularly at the menopause, lead poisoning, eclampsia, tabes dorsalis, angina pectoris, and many other conditions (Mac Keith 1944). The disorder may also resemble thyrotoxicosis, nephritis, migraine, intracranial tumour, angina pectoris, anxiety state, or the vasovagal attacks of Gowers (1907). Cases with persistent hypertension are hard to distinguish from essential hypertension. However, serial blood-pressure readings and pulse records and careful clinical observation, particularly for other signs of sympathetic overactivity, will usually yield, if not a positive diagnosis, at least suspicion; and when his suspicion is aroused the physician may apply one of the following diagnostic tests.

Diagnostic Tests

The diagnosis of phæochromocytoma is proved if increased adrenaline in the circulating blood can be demonstrated; but this increase is not always found (Biskind et al. 1941). Perhaps a more reliable indication is the rise in serum-potassium during the paroxysms (Blacklock et al. 1947).

The test developed by Roth and Kvale (1945) is said to be infallible; it was evolved by means of experiments on 51 subjects, of whom 4 were believed to have a phæochromocytoma.

> The patient lay down and the blood-pressure was read repeatedly. After about half an hour 0·025–0·05 mg. of histamine diphosphate in 0·025–0·05 ml. of physiological saline was injected *intravenously. In normal or hypertensive* subjects this produced a slight rise in blood-pressure, less than that produced by the cold pressor test; whereas in a case of phæochromocytoma the blood-pressure rose about 100 mm. Hg within five minutes and a typical paroxysm was provoked.

The main disadvantage of this test is that it induces a further attack in an already ill patient.

A similar test has been evolved by Guarneri and Evans (1948) on the basis of one case in which subcutaneous injection of 25 mg. of 'Mecholyl' (acetyl-β-methylcholine chloride) caused a sharp rise in blood-pressure, in contrast to a fall in normal persons.

Goldenberg et al. (1947), as a result of tests on 58 subjects, have recommended the use of '933F' (piperidyl-methyl benzodiozane), an adrenolytic agent which, when injected in a dosage of 0·25 mg. per kg. body-weight, caused a fall of at least 50 mm. Hg in blood-pressure during a paroxysm. This test is specific for an increase of adrenaline in the circulation, is very sensitive, and is negative in essential hypertensives. It enabled Goldenberg and his colleagues to suspect a second tumour in a patient from whom one had already been removed. The test is not likely to work, however, where noradrenaline is the pressor agent concerned (Holton 1949).

More recently Spear and Griswold (1948) have evolved a further test with another adrenolytic agent, dibenamine hydrochloride (dibenzyl-β-chlorethylamine hydrochloride), which is given intravenously, over an hour, in a dosage of 7 mg. per kg. body-weight diluted in 300 ml of 5% glucose in physiological saline. This produced a fall of over 50 mm. Hg in blood-pressure during a paroxysm; the fall lasted for twenty-four hours and symptoms were relieved for seventy-two hours. The histamine test was negative six hours after the injection and was still not strongly positive thirty and forty-eight hours afterwards. As with 933F, this test gives no reaction in patients with essential hypertension, or between paroxysms if the resting level of blood-pressure is low.

Yet another test has been described by LaDue et al (1948). The effect of the tetraethylammonium ion in blocking autonomic ganglia is now well recognised, and among others Fisher (1949) has shown that in patients with essential hypertension the injection of 300–500 mg. of tetraethylammonium chloride causes a fall in blood-pressure. LaDue et al. found that in their case of phæochromocytoma the histamine test precipitated an uncontrollable paroxysm; the intravenous injection of 400 mg. of tetraethylammonium bromide produced an identical paroxysm, but the reaction disappeared when the patient stood up. Probably 40 mg. of pentamethonium iodide intravenously (Arnold and Rosenheim 1949) will give a comparable reaction. The mechanism by which these substances produce a paroxysm is presumably *the same as in the histamine test—namely,* generalised dilatation of arterioles and capillaries, increased vascularity of the tumour, and consequent liberation of pressor substance into the circulation. Because the attack produced is controllable, this test appears to be safer than the histamine test.

Localising the Tumour

In about a third of the cases the tumour is palpable, and pressure on it may then provoke a typical paroxysm. Even where no tumour is palpable pressure may still help in localisation; the test is more likely to succeed if the tumour is on the left side. In fact, however, the tumour seems to have a slight predilection for the right side (Strombeck and Hedberg 1939).

In one case tomography revealed the presence of a growth (Mandl 1947); and intravenous pyelography, followed if necessary by retrograde pyelography, is of great value, since it may show displacement or distortion of one renal pelvis (Biskind et al. 1941).

Perirenal insufflation of air has been recommended, particularly in America (Heath et al. 1941); Hyman and Mencher (1943) has carried out this procedure well over 100 times without ill effect but in view of the possible hazards the method is not generally favoured in this country.

When physical and radiological examinations are negative, an exploratory laparotomy is probably advisable, despite the danger of provoking a severe paroxysm. By laparotomy it is possible not only to *localise* the tumour, but also to determine the condition of the other adrenal.

TREATMENT

The treatment of choice is undoubtedly extirpation of the growth, which despite the dangers of operation should always be attempted; for otherwise the prognosis is poor. Radiotherapy usually has only a palliative effect; but it has been successful in a recurrence after operation (Borras and Meyer Mota 1938). The observations of Espersen and Dahl-Iversen (1946) on the disappearance of symptoms after administration of methylthiouracil have not yet been corroborated. Dibenamine (Spear and Griswold 1948) seems to hold out hope for a palliative medical treatment provided the difficulties in administering it can be overcome: at any rate it is likely to be of great value as a preoperative treatment. Dihydroergocornine (Goetz 1949) also appears to have a future in this field.

In the preparation for operation sedation and avoidance of undue excitement are all-important. For the operation basal bromethol anæsthesia has been recommended (Hyman and Mencher 1943), and Mac Keith (1944) suggests that spinal anæsthesia should be avoided: Biskind et al. (1941), however, could find no evidence that the type of anæsthesia had any bearing on postoperative collapse. Parkins et al. (1938) showed that adrenal cortical extract and salt are of value in combating the circulatory collapse of adrenaline shock; and Biskind et al. advise the use of deoxycortone acetate and salt both before and after operation, though in moderate doses so as to avoid pulmonary œdema.

After preliminary laparotomy (if required), lumbar exploration on the appropriate side, with excision of the 12th rib, is the usual procedure. The tumour should be handled as little as possible: for undue handling has been known to produce a hypertensive paroxysm which may be fatal (Holst 1938). It seems wise to have an intravenous saline infusion running from the start of the operation, since this is a convenient vehicle for intravenous medication. A careful watch should be kept on the blood-pressure and pulse-rate throughout. Immediately after removal of the growth the blood-pressure may fall precipitately, presumably because the arterioles have become accustomed to a high concentration of circulating pressor substance from the tumour, and its sudden removal finds the chromaffin tissue elsewhere (e.g., in the opposite adrenal), which has probably been functionally depressed for some time, unable to answer the demand. Yet almost half the recorded cases have shown no postoperative hypotension.

On general principles the most efficient pressor agent for use after operation seems to be adrenaline, and the injection of this substance intravenously or intramuscularly in oil, is strongly advocated by Biskind et al. and others. Prescott (1944), in his search for the most efficient substance to combat postoperative shock in other conditions, has recalled the work of Freeman et al. (1941). This showed that continuous intravenous infusion of adrenaline causes at first a sharp rise of blood-pressure, followed a few minutes later by a fall to below the original level; ephedrine gives a similar rise for some 10–20 minutes. Of the pressor agents Prescott tested, 'Methedrine' proved the most efficient; in 18 out of 20 subjects an intramuscular injection of 20 mg. produced a rise in blood-pressure lasting for two hours. Thus, if adrenaline and ephedrine fail, methedrine might well be used. Blood-transfusion is also of value in the treatment of postoperative shock (Mac Keith 1944). If hypotension does not develop, or if it responds to treatment, convalescence is uneventful.

Of some 50 cases treated surgically, less than a third have died; and those surviving have shown no untoward sequelæ. Of 27 successful cases reported up to 1944, 24 remained quite well, several having been operated on some years previously. The hazards which may be met in treating this condition are amply demonstrated by the 3 cases described by Holst (1938): one of these patients died of cerebral hæmorrhage before operation; the second died as soon as the tumour was handled; and the third, after successful removal of the growth, succumbed with postoperative hypotension.

CASE-REPORT

A married woman, aged 31, was admitted to the Royal Victoria Infirmary under Dr. A. G. Ogilvie as a medical emergency on July 26, 1949. Her history was vague, since she was a poor witness and made light of what few symptoms she admitted. She had suffered from very severe attacks of asthma until three years before admission, since when she had been completely free. (There was no family history of asthma or other allergic disorders or of endocrine disturbances.) For three years she had had frontal headaches, at first mild and infrequent but recently more severe and occurring almost daily. She had had occasional night sweats, but on the whole had felt reasonably well until three months before admission when she had first noticed swelling of the ankles each evening, disappearing with rest; six weeks before admission she had noticed slight puffiness of the eyes on waking, which subsided during the day. She would not admit to any breathlessness or cough, nor had there been any visual disturbance or urinary symptoms. For four days before admission she had been confined to bed and her œdema had largely disappeared.

On admission she was well developed and did not look acutely ill but was slightly dyspnœic at rest. She had an occasional moist but unproductive cough. Her colour was good, and the skin cool and moist. There was minimal œdema of the ankles, but no puffiness of the face. Her pulse-rate was 110 per min., regular; blood-pressure 170/110 mm. Hg. The neck veins were somewhat distended. The heart was evidently enlarged, the apex-beat being in the 6th interspace $4^{1}/_{2}$ in. from the midline. The cardiac impulse was forcible but there was no thrill; the heart-sounds were loud but normal except for a blowing systolic apical murmur. Examination of the abdomen revealed neither tenderness nor a palpable mass: the liver and spleen could not be felt. The retinæ showed no hæmorrhage or exudates and no pathological changes in the vessels. There was a small pleural effusion on the right side and a few crepitations could be heard at the base of the left lung; there was no evidence of emphysema or of bronchial spasm.

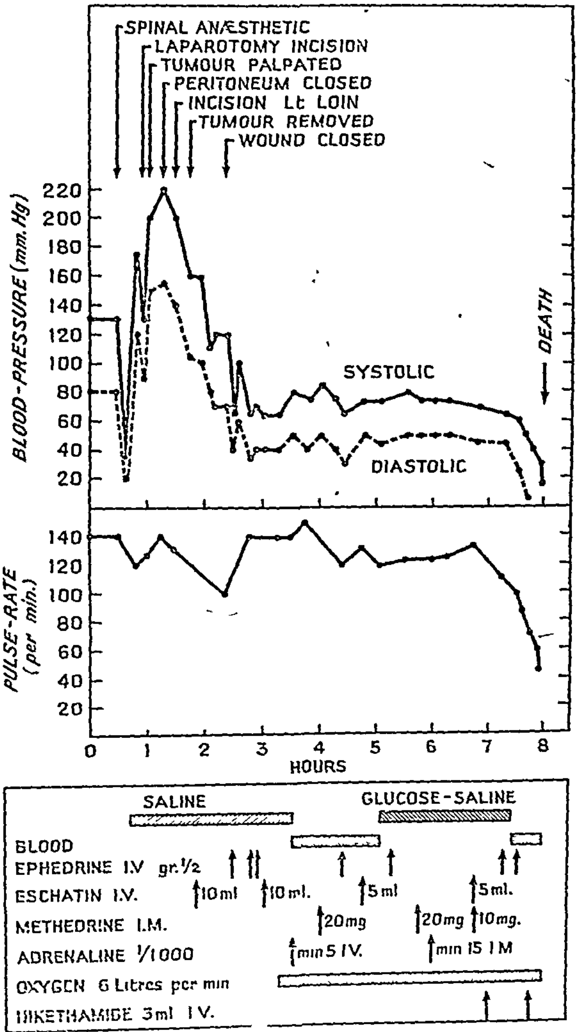
Investigation.—On the clinical findings hypertensive cardiac failure was provisionally diagnosed, and in view of the patient's age a renal basis for the hypertension was sought. Surprisingly, however, the urine contained no albumin or pathological deposit; there was no glycosuria and the blood-urea was 25 mg. per 100 ml. The history of night sweats suggested the possibility of an infective condition, but she was apyrexial on admission; two blood-cultures were sterile: the erythrocyte-sedimentation rate was 8 mm. in one hour (Westergren); and agglutination tests against the enteric organisms, *Brucella abortus* and *Br. melitensis* were all negative. Radiography of the chest confirmed the clinical findings of left ventricular enlargement, right basal effusion, and left basal congestion, and showed no evidence of tuberculosis or other parenchymatous disease. An electrocardiogram showed left axis deviation and inversion of T_2. Hb 83% (12·3 g. per 100 ml.); white-cell count 15,500 per c.mm. on day of admission and 11,000 next day, when the differential count was normal.

Progress.—Investigations had almost reached an impasse, when on July 30, four days after her admission, the patient had a sudden attack in which she perspired profusely, with "gooseflesh," and complained of severe palpitations, followed by a severe "throbbing" frontal and bitemporal headache. Her blood-pressure was not recorded in the attack, but next morning it was 130/80 mm. Hg. In the evening, when she lay down, she had another exactly similar attack; and it was noted, in addition to the features described, that her pupils were widely dilated, her pulse-rate was 140 per min., and her blood-pressure was 280/160 mm. Hg. The blood-sugar in each of two specimens taken during this attack was 130 mg. per 100 ml.

On this clinical picture a diagnosis of phæochromocytoma was made. Further observation of similar attacks left no doubt of the diagnosis, so there was no need to apply the histamine diagnostic test; unfortunately neither the benzodioxanes used by Goldenberg et al. (1947) nor dibenamine were obtainable. Repeated abdominal examination did not reveal any mass, and firm pressure over each renal area in turn did not provoke a paroxysm. Straight X-ray examination of the abdomen and intravenous pyelography gave no definite indication of the side of the lesion. Because of the risk of air embolism, perirenal insufflation of air was not undertaken.

With strict rest in bed and diuresis the patient improved somewhat. The peripheral œdema and chest signs cleared up completely, but she continued to have frequent attacks, usually lasting between half an hour and two hours; these often occurred when she lay down to sleep at night, but occasionally they were provoked by emotion. On Aug. 13 typical gallop-rhythm was heard at the apex, and the left ventricular enlargement was even more pronounced. In view of the uniformly poor prognosis without treatment, and despite the cardiac failure, it was decided that the abdomen should be explored.

Operation.—On Aug. 18, Mr. T. A. Hindmarsh operated. A spinal anæsthetic of·15 ml. of light 'Nupercaine' was given by Dr. M. H. Armstrong Davison through the 2nd–3rd lumbar intervertebral space, after which the patient was kept sitting for a minute before lying down. An intravenous drip of normal saline into the right internal saphenous vein was set up, and light cyclopropane general anæsthesia was begun. The abdomen was explored through a left paramedian incision, and a tumour was found lying in relation to the left adrenal gland and in front of the upper pole of the kidney; the right adrenal gland looked normal. The wound was closed and the patient was turned on to her right side. A further incision was then made in the left lumbar region; the tip of the 12th rib was excised and the kidney exposed. The tumour was found lying in front of the kidney with a bright yellow band of tissue passing across the front of it. It was well encapsulated, and was separated from the left adrenal gland and removed; it was dark brown, spherical, and $2^1/_2$ in. in diameter. The patient's blood-pressure and pulse readings during and after the operation and the drugs given are recorded in the accompanying figure.



Pulse and blood-pressure readings and supportive treatment from the start of operation until death eight hours later.

Unfortunately, despite transfusion, intravenous ephedrine and suprarenal-cortex extract ('Eschatin'), intramuscular methedrine, and small doses of adrenaline, the patient developed postoperative hypotension, which appeared to be irreversible. Peripheral circulatory failure ensued, and she died seven hours later.

Pathology.—Dr. R. Schade reported on the tumour as follows:—"A tumour nodule 5 cm. in diameter and encapsulated. The cut surface shows a rim of yellowish tissue and a hæmorrhagic-looking core. Histological appearances are those of a typical phæochromocytoma."

Autopsy, done by Dr. W. Jack, twelve hours after the patient's death, confirmed that the right adrenal gland was normal. There was no hæmorrhage in the operation site, and no pulmonary œdema. The only finding of note was in the heart, where there was gross dilatation and hypertrophy of the left ventricle.

DISCUSSION

In this case severe postoperative hypotension developed and did not respond to the remedies employed. A point which does not seem to have been noted previously was that the patient, who had suffered severely from asthma, had been completely free from attacks during the development of symptoms of paroxysmal hypertension, presumably owing to autoinoculation with an adrenaline-like substance.

Spinal anæsthesia has been condemned in these cases (e.g., by Mac Keith 1944) because it may cause a fall in blood-pressure; but light spinal anæsthesia has been used successfully (Alwall and Wulff 1948, LaDue et al. 1948), and recommended on the ground that paralysis of the splanchnic nerves during operation might help to prevent an unduly severe paroxysm. It was used in this case because it seemed particularly important to prevent such a paroxysm in a patient who already had advanced cardiac failure. It is doubtful whether the spinal anæsthesia had any bearing on her sustained postoperative hypotension, since she was moving her legs freely and full sensation had returned in them four hours before her death.

Biskind et al. (1941) recommended that adrenaline should always be given if the blood-pressure falls after operation, since this simply replaces the chemical substance to which the body has become accustomed and which has been suddenly withdrawn. In recent years however, it has been questioned whether the pressor agent concerned is always adrenaline. Holton (1949) found large quantities of noradrenaline in 3 typical tumours. West (1947) has shown that noradrenaline is a more efficient pressor agent than adrenaline, and Swan (1949) has confirmed its prolonged pressor effect in healthy males when given intravenously in a dosage of 0·005 mg. per minute. Moreover experimentally, unlike adrenaline, noradrenaline produces a reflex bradycardia; and whereas adrenaline acts by increasing cardiac output (Goldenberg et al. 1949), noradrenaline produces its pressor effect through peripheral vasoconstriction. It may be that some phæochromocytomata produce adrenaline and others noradrenaline, or a combination of the two, as their active principle. This view is supported by the fact that some cases show hyperglycæmia and glycosuria whereas others do not; West (1947) has pointed out that as a hyperglycæmic agent adrenaline is eight times as active as noradrenaline. Thus it may be possible to determine during life which agent is at work, by assaying the substance in the circulating blood or by studying blood-sugar curves, but whatever the answer, it seems that noradrenaline is likely to be a safer and more efficient postoperative agent than adrenaline. Methedrine, as already noted, may be a valuable supplement.

In the present case adrenaline was not used as the mainstay of postoperative treatment because its effect of increasing cardiac output might be dangerous in a patient with severe cardiac failure. Unfortunately noradrenaline was not obtainable; so it was decided to use ephedrine, which had proved successful in the hands of LaDue et al. (1948), and which has a more gradual and prolonged effect than adrenaline (Jackson 1939).

In the reported cases no exact correlation has been found between the severity of the preoperative symptoms and the degree of postoperative shock; but generally the shorter the history the less likely is postoperative shock to develop; so early diagnosis appears to be important in its prevention. The tetraethylammonium-bromide test may prove the safest method of diagnosis where the symptoms are vague or the paroxysms infrequent; dibenamine is likely to be most useful in diagnosing cases where there is persistent hypertension, and in preoperative treatment.

SUMMARY

A fatal case of phæochromocytoma of the left adrenal gland in a woman, aged 31, gave rise to the typical adrenal sympathetic syndrome.

The recent development of several diagnostic tests, which are described, has led to the recognition of many more examples of this condition during life.

Dibenamine is likely to be of value as a preoperative agent.

Some of the tumours may produce their symptoms and signs by the secretion of adrenaline, whereas others secrete noradrenaline or a combination of the two; but it is suggested that noradrenaline rather than adrenaline should be used for the treatment of postoperative hypotension.

I am grateful to Dr. A. G. Ogilvie for permission to publish the case; the late Mr. Hindmarsh for allowing me to use his operation notes; Dr. Armstrong Davison for the record of anæsthesia; and Dr. Schade and Dr. Jack for pathological data. I am also indebted to Dr. H. G. Miller and Dr. I. O. B. Spencer for advice; and to Dr. J. D. Sinson and Mr. J. Andrews for assistance.

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TUBERCULOUS SINUSES TREATED WITH STREPTOMYCIN LOCALLY

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THE tragedy of secondarily infected tuberculous sinuses is a familiar one to surgeons, and fifteen years or more ago, in pre-sulphonamide days, most large surgical wards had their quota of emaciated pyrexial patients with profusely discharging sinuses. Death was the usual outcome, especially when the lower spine or sacro-iliac joints were affected. Free drainage was the only applicable treatment at the time, and even with this many cases continued to go downhill. The sulphonamides effected healing in the odd case and some improvement in others, but the problem was by no means solved. With the advent of penicillin the prognosis was further improved, but a disappointing number of cases still showed little or no response.

I describe here the results obtained in 25 cases of bone and joint tuberculosis with sinuses which were treated by the local instillation of streptomycin. In some cases the antibiotic was also given intramuscularly for short periods. The primary object of streptomycin treatment was to combat the secondary infection, and no direct effect on the underlying tuberculous infection is claimed. It may well be, however, that the bacteriostatic action of streptomycin on tubercle bacilli had an important bearing on the results, since it is otherwise difficult to explain why penicillin therapy had no effect in some of these cases where the organisms were penicillin-sensitive and where penicillinase was unlikely to be present.

The patients treated can conveniently be divided into the 8 who were critically ill, as a result of either a severe toxæmia with profuse discharge and high temperature or long-standing suppuration lasting two years or more with the attendant risk of amyloid disease; and the remaining 17, who had sinuses associated mostly with the joints of the extremities and could not be regarded as seriously ill. Of the critically ill group, 7 cases are described here in detail.

Case 1.—A man, aged 20, admitted to Heatherwood Hospital on July 19, 1948, responded so favourably to local instillations of streptomycin that this treatment was adopted in all subsequent cases.

On admission the patient had a profusely discharging sinus in the right iliac fossa, and evening pyrexia of 100–102°F. Radiography revealed a variable amount of narrowing of the intervertebral discs from D6 to L1 and slight erosion of the anterior surfaces of vertebræ D11 and 12. A minute area of tuberculous infiltration showing evidence of healing was seen in the upper zone of the left lung. Culture of pus from the sinus gave a growth of *Staph. aureus* and a few diphtheroids. The staphylococci were penicillin-sensitive and coagulase-positive, yet there was no response whatsoever to repeated courses of penicillin and sulphonamides.

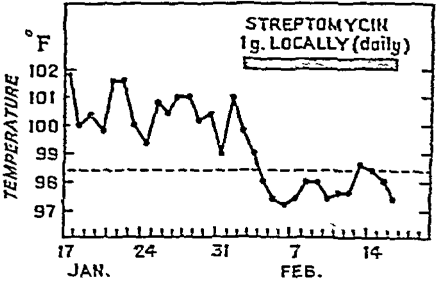

Fig. 1—6 p.m. temperature chart of case 1, showing immediate response to daily instillation of streptomycin into sinus.

Induration, thickening, and tenderness were noted in the left iliac fossa in September, 1948, and a cold abscess developed in the right loin in November, 1948. A course of streptomycin was begun on Dec. 3, 0·5 g. being given intramuscularly b.d. for twenty days. The dosage was increased to 1 g. b.d. for a further five days and was then discontinued because no improvement was observed. On Jan. 21, 1949, abscesses in the left iliac fossa and right loin were incised, but still there was no improvement; the man had lost 22 lb. since admission, and a bad prognosis was given.

The local application of streptomycin was begun on Feb. 2, 1 g. dissolved in 5 ml. of physiological saline solution being instilled with a fine catheter into the sinuses once daily. The result was dramatic and unexpected. Within twenty-four hours the patient's temperature dropped to within normal limits and never rose subsequently (fig. 1).

This treatment was continued until April 9, and all three sinuses were healed by April 12. The patient volunteered that he felt a new man from the first instillation, and it is worth noting that subsequent patients of a similar type all commented on their sense of well-being from the very start of treatment.

On June 6 the scars in the left iliac fossa and right loin again broke down, and another course of local streptomycin was begun on the 14th. On the 15th right-sided epididymectomy was done for tuberculous disease. By Aug. 3 all the sinuses were soundly healed, streptomycin having been discontinued three days before. There had been neither pyrexia nor deterioration in the patient's general condition throughout this latter period. His weight had increased by 34 lb. between January and July, 1949, and he was discharged on Aug. 14. The erythrocyte-sedimentation rate (E.S.R.) before discharge was 4/200 mm. (Westergren) in the 1st hour.

The patient was seen as an outpatient on Oct. 1, 1949, when his general condition was excellent and all his sinuses had soundly healed.

Case 2.—A man, aged 24, was admitted to Heatherwood Hospital on March 11, 1949, with erosion of the fourth and fifth lumbar vertebræ and a right psoas abscess which had already tracked into the thigh and involved the skin. A sinus formed here early in April, and towards the end of the month the discharge had much increased and the patient's evening temperature was 101°F. Culture of the pus on May 3 gave a heavy growth of *Staph. aureus* coagulase-positive and sensitive to penicillin and streptomycin.

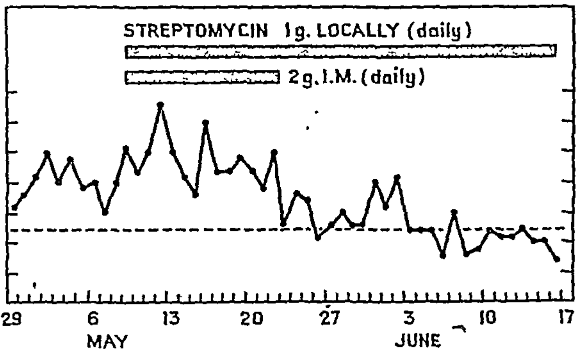

Fig. 2—6 p.m. temperature chart of case 2, showing delayed response, probably because of defective drainage.

No improvement followed two weeks' penicillin therapy. Streptomycin was given from May 9 onwards; 0·5 g. was given intramuscularly six-hourly for a fortnight, and 1 g. was instilled once daily into the sinus until July 23. The sinus healed by July 26. The temperature was slow to settle and did not reach normal limits until twenty-five days after the start of treatment (fig. 2); this was probably because drainage was not entirely adequate.

Absorption from the sinus track was rapid, a blood-streptomycin level of 64 µg. per ml. being attained an hour after the instillation of 1 g. Culture from a swab taken shortly before healing gave a pure growth of diphtheroids.

On Oct. 31, 1949, the patient's sinus was still healed. The E.S.R. was 2/200 mm. in the 1st hour.

Case 3.—A woman, aged 28, underwent protracted conservative treatment at Heatherwood Hospital from March, 1945, to July, 1949, in the first instance for a lesion of her first and second lumbar vertebræ, and for tuberculous arthritis of the right hip which developed in January, 1947. Tubercle bacilli were grown repeatedly from pus aspirated from cold abscesses. A sinus formed in the right loin in May, 1947, and in the right groin in August, 1947. Increased discharge and evening pyrexia of 99–101°F were noted from August onwards. No improvement took place with penicillin or sulphonamides.

On Feb. 14, 1949, streptomycin treatment was begun by local instillation into the sinuses, 0·5 g. being given b.d. This was changed to 1 g. once daily from March 1 onwards. A five-day course of intramuscular streptomycin was also given from Feb. 17. An abscess in the left loin was incised on Feb. 23, and on March 3 and 4 a very copious discharge was noted, presumably from a pocket which had not been drained at the time of the incision. On March 3 pus from the sinus gave a growth of coagulase-positive *Staph. aureus*. The improvement subsequently was dramatic. All three sinuses were healed by April 1, three days after streptomycin had been discontinued.

The patient was discharged home on July 14, and when she was seen as an outpatient on Oct. 1 her sinuses were still soundly healed.

Case 4.—A man, aged 28, first developed a sinus in the right iliac fossa in 1935. Spinal fusion was done in 1936 for a lesion of vertebræ L4–S1 some time after the sinus had healed. Soon after this operation sinuses formed in the right iliac fossa and left loin and persisted. The patient was admitted to hospital on Nov. 5, 1948, with increased discharge from the sinuses and diarrhœa with pus and blood in the stools. Culture of pus from the sinuses gave a growth of coagulase-positive *Staph. aureus*. Radiography after barium enemata and instillation of an opaque dye into the sinuses showed a track leading towards the fifth lumbar vertebra but no connection with the gut. On Jan. 3, 1949, the sinus in the right iliac fossa was explored and found to lead to an abscess cavity in the right flank which extended towards the fifth lumbar vertebra and did not communicate with the pelvis or gut. Healing did not take place with protracted penicillin therapy from November, 1948, to March, 1949.

On admission to Heatherwood Hospital, on March 13, 1949, he was apyrexial. There was a moderate amount of purulent discharge from the sinus in the right iliac fossa and slight discharge from the sinus in the left loin. Healing followed local instillations of streptomycin 1 g. once daily into the sinuses for eight weeks. The E.S.R. was 2/200 mm. in the 1st hour on the patient's discharge from hospital on May 19, 1949.

Follow-up.—The patient re-attended as an outpatient on June 26, 1949, because the scar in the right iliac fossa had broken down. No deep track could be found. A patchy urticarial type of skin reaction was present, especially round the sinus. Culture from a swab showed a heavy growth of hæmolytic streptococci and coagulase-positive *Staph. aureus*. Both organisms were streptomycin-sensitive. The skin reaction abated and the sinus healed within two weeks with a course of 'Benadryl.'

When the patient was seen as an outpatient on Oct. 1 both sinuses were soundly healed.

Case 5.—A man, aged 29, with tuberculosis of the right sacro-iliac joint since 1942, underwent two long periods of conservative inpatient treatment at Heatherwood Hospital from August, 1942, to June, 1945, and from September, 1945, to March, 1947. Erosion of the left sacro-iliac joint was noted in August, 1943. A sinus first formed in April, 1943, in the right thigh, and on the patient's readmission in September, 1945, multiple sinuses were present in both thighs and iliac fossæ. The response to sulphonamides and penicillin was disappointing, and the sinuses persisted. The patient continued to be seen at aftercare clinics, and in October, 1948, his liver was found to be extended two finger-breadths below the costal margin. In March, 1949, the general picture was that of moderately advanced amyloid disease, and the liver had enlarged still further.

The patient was readmitted to hospital in April, 1949, for streptomycin therapy. Pus from a sinus showed gram-positive cocci, and culture gave a growth of coagulase-positive *Staph. albus*. Intramuscular streptomycin 0·5 g. was given six-hourly from April 21 to May 17. Local instillations of 1 g. once daily were started at the same time and continued until final healing took place on July 5, 1949.

In this case, however, a sinus persisted in each thigh and seemed unlikely to heal under streptomycin therapy alone. On May 30 these sinuses were explored. The entire track, about 4 in. long, on the left side was excised. The wound healed by first intention. The sinus on the opposite side communicated with a large pocket in the buttock. This was curetted and left open, and streptomycin instillations were continued until healing took place. The E.S.R. fell from 80/200 to 26/200 mm. in July. Albuminuria was occasionally present up to the patient's discharge from hospital in August, 1949.

When the patient was seen as an outpatient on Nov. 15, 1949, *all the sinuses* were *soundly healed.*

Case 6.—A man, aged 26, underwent twenty-three months' conservative treatment from 1943 to 1945 for caries of the fourth and fifth lumbar vertebræ and the right sacro-iliac joint. A sinus was present in the left buttock when the patient *left hospital in 1945*, and more sinuses formed in 1946 and 1947. The patient was readmitted to Heatherwood Hospital in September, 1947, with multiple sinuses. He was mildly pyrexial. The amount of discharge decreased considerably with a twelve-day course of penicillin. In November, *1947, the discharge became very offensive and a communication* with the lower bowel was suspected. Radiography after instillation of iodised oil into the sinuses was inconclusive. *Staph. aureus* was grown from the pus in April and June, 1948, the organisms on each occasion being non-sensitive to penicillin. A slight improvement, however, followed a week's course of penicillin in June, 1948. Sigmoidoscopy on Sept. 24, 1948, did not reveal any abnormality. A course of *p*-aminosalicylic acid started on Dec. 1, 1948, led to some improvement but had to be discontinued after eighteen days because of nausea and vomiting.

On Feb. 12, 1949, streptomycin therapy was begun, by the instillation of 1 g. once daily into the sinuses. By May 5 the sinuses were reduced to two at the back, and the treatment was discontinued because of effusions into the knee-joints and ankle-joints. At the time the patient was up and about. No cause for the effusions was found, and they rapidly subsided with rest. Streptomycin treatment was begun again on June 11. One sinus healed in four days and the other was curetted on June 23, 1949. The instillations were continued, and healing took place by mid-July. The *patient gained* 28 *lb. in weight* between *February and* July. The E.S.R. was 7/200 mm. in the 1st hour shortly before the patient's discharge from hospital on July 24, 1949. Two sinuses re-formed about 6 weeks later, and a further course of streptomycin was started, with the patient as an inpatient, on Oct. 3, 1949, both by *intramuscular injection* of 0·5 g. six-hourly and 1 g. once daily into the sinuses. The intramuscular streptomycin was discontinued on Nov. 1. By Nov. 10 both sinuses were healed.

Case 7.—A man, aged 35, was admitted to Heatherwood Hospital on May 4, 1948, with reactivated disease of vertebræ D10–12. A sinus formed in the right lumbar region a month later. Early in August there was evidence of secondary infection, with a rise of temperature and increased purulent discharge from the sinus. Penicillin was ineffective. On Aug. 9 culture of the pus gave a growth of coagulase-positive *Staph. aureus* insensitive to penicillin. On Aug. 14 tenderness and deep fluctuation were noted in the left iliac fossa. A large lumbar abscess had formed by Aug. 23. This was incised and gave adequate drainage. Some improvement followed, but the sinuses in both lumbar regions persisted and the *patient continued* to be mildly pyrexial. A course of sulphathiazole had no effect, and on Dec. 20, 1948, intramuscular streptomycin was begun, 0·5 g. being given b.d. for eight days and then 1 g. b.d. until Jan. 11, 1949. On Dec. 20 a course of local streptomycin 1 g. once daily was also begun.

Healing was rapid, but the sinus on the left side broke down twice subsequently. The *streptomycin in this case* seemed to facilitate rapid surface healing, but deep suppuration still continued. Intramuscular injections of 1 g. b.d. were begun on March 26, 1949, and changed to 0·5 g. six-hourly on April 8. By the end of the month the sinus had soundly healed, and treatment was discontinued on May 6.

The sinuses were still soundly healed in October, 1949.

The remaining 18 cases can be dismissed briefly. All were treated with local instillations alone of 0·25–1·0 g. once daily, the dose depending on the extent of the sinus, and the sinuses healed in periods *ranging from* two weeks to four months. Sequestrectomy was done in one patient with disease of a hip-joint and great trochanter on the same side, while streptomycin treatment was also being given; the removal of *two sequestra* seemed to hasten healing. In only one other case was healing aided by surgery. This was in a man with a small lumbar sinus associated with spinal disease; streptomycin alone seemed to have little effect, but healing took place a week after *curettage* of the track. In only 1 of the 18 cases did a sinus break down and persist. This was in a woman with spinal caries who had two sinuses which healed with difficulty after four months' treatment; when she was seen subsequently at an aftercare clinic one sinus had formed again; so far she has not had a second course of streptomycin.

The underlying tuberculous foci in these 18 cases were *as follows:*

Foci	*Cases*
Spine	5
Hip-joint	3
Knee-joint	2
Ankle-joint	1
Shoulder-joint	1
Os calcis	2
Costochondral junctions	2
Hip-joint and great trochanter (same side)	1
Shoulder-joint and ankle-joint	1

DISCUSSION

It is instructive to compare these results with those obtained by others with systemic streptomycin. In the U.S.A. Brock (1948) treated 12 patients with 60 sinuses in this way, and 11 of the 12 cases showed striking *improvement; half the sinuses healed* within ten to twelve weeks and all had healed after twenty weeks. The method of administration was by intramuscular injection of 0·3 g. four-hourly for ninety to a hundred and fifty days. A blood-level of 10–20 µg. per ml. was attained two hours after injection. In another American paper, Bickel et al. (1948) reported on 16 cases of bone and joint tuberculosis treated with systemic streptomycin. Sinuses were present in 11 of the cases and, judging *from the individual reports, the sinuses appear to have* healed in 3 cases as a direct result of streptomycin therapy. Varying degrees of improvements were noted in others, but in 2 cases there was no response. The general line of treatment was intramuscular injection of 0·75–2 g. *daily in 2–4 doses for ninety* to a hundred and twenty days. From the North Wales Sanatorium Davis (1949) lately reported on 11 cases with 28 sinuses, 5 of which had originated in bone and joint. The dosage of streptomycin he adopted was usually 1 g. once a day intramuscularly, the total dose depending on the response. Of the 28 sinuses, 21 healed within three months and the remainder after three months.

With systemic administration the aim is to maintain what *is generally considered to* be an effective bacteriostatic blood-streptomycin level, but a very high concentration of the antibiotic localised to the region where it is most required, even though this is maintained for only a relatively short period in the 24 hours, seems to be at least equally efficacious. The streptomycin introduced into a sinus is rapidly absorbed into the blood-stream, and, as would be expected, the more recent the sinus the more rapid the absorption. Two examples will illustrate this point. In case 2 a blood-level of 64 µg. per ml. was attained an hour after 1 g. had been given locally. Another patient, with tuberculosis of the spine and ribs (a recent admission not included in this series), had had sinuses of the chest wall for more than four years. Blood-levels of 28, 10, and 0 *µg. per ml.* were *attained one, four, and eight* hours after the introduction of 1 g. of streptomycin locally into the sinuses.

Some of the experimental work supports the view that streptomycin may benefit the patient's clinical condition *even though* a bacteriostatic concentration of *the antibiotic is* not maintained during the treatment period. Thus guineapigs infected with tuberculosis after a course of streptomycin lived on an average 29 days longer than animals not so treated.

A strong argument in favour of treating tuberculous sinuses with streptomycin administered locally through a fine catheter is that the treatment is painless and causes no reaction in the surrounding tissues. This is of considerable importance when the antibiotic has to be given for perhaps three months or more.

SUMMARY

The results obtained in 25 cases of bone and joint tuberculosis with sinuses treated by local installation of streptomycin are described and compared with the results of intramuscular injection.

A continuous bacteriostatic blood-level is not essential for a satisfactory clinical result.

An important advantage of local installation is that it is painless; it also seems to be more effective than intramuscular injection.

I wish to thank Mr. L. A. Key for many helpful suggestions, and Dr. F. E. T. Scott for performing all the laboratory investigations.

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PENICILLIN-RESISTANT STAPHYLOCOCCI

INCIDENCE IN RELATION TO LENGTH OF STAY IN HOSPITAL

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Barber et al. (1949) and others have reported an increasing preponderance of penicillin-resistant strains among the pyogenic staphylococci isolated from infections arising in hospital. By carrier surveys and phage-typing, these have been related to penicillin-resistant strains among the doctors and nurses.

We have tried to ascertain how closely infection with penicillin-resistant strains is related to the length of time spent in hospital. The strains investigated were coagulase-positive as tested by the tube method, and for present purposes we divide them broadly into sensitive and resistant categories according to their reaction on a penicillin-gutter plate (Fleming 1942), containing one unit of penicillin per ml. of agar in the gutter. This reaction provides a clear-cut division. In the rare cases where more than one strain was isolated from the same specimen, the most resistant strain was selected for the analysis.

Of 417 inpatients from whom strains of *Staphylococcus pyogenes* were obtained, 326 had records showing how long they had been in hospital before the organism was isolated, and (in the case of the 139 who were receiving systemic penicillin) the duration of penicillin treatment before its isolation. These 326 patients were divided into the following groups:

1. Infections arising in hospital.
2. Open infections, present on admission and susceptible to cross-infection.
3. Closed abscesses, present on admission.
4. *Cases where the infecting rôle of the staphylococcus was doubtful.*
5. Cases where no infection was present (e.g., routine nasal swabs).

TABLE I—PROPORTION OF PENICILLIN-RESISTANT STRAINS OF *Staph. pyogenes* ISOLATED FROM 326 INPATIENTS

Group of patients	Total strains	% resistant	χ^2	P
Closed infections ..	70	19	11.00	<0 001
Open infections	103	43	0 13	0 72
Possible infections ..	57	46	1·71	0·19
Uninfected	28	61	2 98	0 08
Hospital infections ..	68	78		
Total ..	326	—	—	—

For the table as a whole, $\chi^2 = 51\ 77$, P = <0 001.

TABLE II—PROPORTION OF PENICILLIN-RESISTANT STRAINS AND ITS RELATION TO THE DURATION OF STAY IN HOSPITAL OF 103 PATIENTS ADMITTED WITH OPEN INFECTIONS

Time in hospital	*Total strains*	% resistant	χ^2	P
0–1 day ..	51	25	5·42	0 02
2–7 days ..	27	52	1·41	0 23
8 + days ..	25	68		

For the table as a whole, $\chi^2 = 13\ 63$, P = 0 001.

These five groups show conspicuous differences in the proportion of penicillin-resistant strains isolated (table I). The high incidence of resistance in infections arising in hospital is well recognised (Barber and Rozwadowska-Dowzenko 1948). The difference between the closed and the open infections which were present on admission to hospital is interesting, however, because similar proportions of the two groups had had penicillin therapy of comparable duration. Either poor access of penicillin or the absence of cross-infection could account for the significantly smaller number of resistant strains *isolated from the closed group. Support for the latter* explanation is gained from further study of the open infections. These were made up as follows:

Infected-fingers, hands, &c.	23
Skin infections	19
Otitis media	15
Otitis externa	4
Wound infections (not arising in hospital) ..	9
Cutaneous ulcers	7
Draining abscesses	7
Antral and sinus infections	8
Conjunctivitis	6
Miscellaneous	5
Total	103

Table II shows that, with increasing time in hospital, the proportion of resistant strains rose, so that after the first week in hospital these open cases were almost indis*tinguishable, in respect of penicillin* resistance, from infections arising in hospital (68% and 78% providing resistant strains, respectively). That this effect is not due to treatment with penicillin is shown in table III, where the correlation is seen to be with the time spent in hospital rather than with the presence or absence of previous penicillin therapy.

TABLE III—RELATION BETWEEN PENICILLIN THERAPY, TIME IN HOSPITAL, AND THE PROPORTION OF PENICILLIN-RESISTANT STRAINS (EXPRESSED AS FRACTION OF TOTAL STRAINS IN EACH GROUP) IN 103 PATIENTS ADMITTED WITH OPEN INFECTIONS

Treatment	*Time in hospital*		
	0–1 day	2 + days	Total
No penicillin ..	9/28	12/22	21/50
Penicillin ..	4/23	19/30	23/53
Total ..	13/51	31/52	44/103

CONCLUSIONS

Our results seem to show that, in staphylococcal infections treated with penicillin, resistant strains would rarely emerge if cross-infection were avoided. They also show how rapidly this cross-infection occurs in hospital.

We hope to publish separately the section of this work dealing with the outpatients, who made up the balance *of 1000 cases studied.*

We wish to thank Mr. R. L. Vollum, D.PHIL., for constant encouragement at all stages of the work, and Mr. *D. J. Finney for advice* on the treatment of some of the data.

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PURE ANTI-E ANTIBODY IN THE SERUM OF A Rh-POSITIVE WOMAN

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THIS is a report of a case of icterus gravis with kernicterus in a Rh-positive baby whose parents were both Rh-positive. The cause was a pure anti-E antibody found in the mother's blood.

CASE-RECORD

The mother, aged 26, had been married $5\frac{1}{2}$ years and had one child, a daughter born in 1945, who is alive and well. She had had no miscarriages or blood-transfusions. In December, 1948, she attended the antenatal clinic, being then two months pregnant. At this stage her blood was reported as group B, Rh-positive; Wassermann negative; hæmoglobin 80%. Her health antenatally was good with no toxæmic symptoms.

A female baby was born spontaneously on June 3, 1949 (expected date of delivery June 27). The liquor was normal in colour and the placenta healthy, weighing 26 oz. At birth the baby was vigorous and of healthy appearance and weighed 8 lb. Eight hours after birth the baby was slightly jaundiced, her liver and spleen were not palpable, her hæmoglobin was 140% (Sahli), her red-cell count was 4,000,000 per c.mm., a blood film showed 8 nucleated red cells per 100 white cells and there was no bile in the urine.

June 4.—Jaundice deeper but baby sucking well and quite lively. Hb 134%, red cells 4,000,000 per c.mm. Coombs test weakly positive. Liver and spleen still not palpable. Blood film showed 6 nucleated red cells per 100 white cells.

June 5.—Jaundice very deep and baby more drowsy, with cerebral cry and some opisthotonos. Hb 100%, falling to 82% by the end of the day, red cells 4,230,000 and white cells 8200 per c. mm. Fluids still taken well. Blood film showed 3 nucleated red cells per 100 white cells.

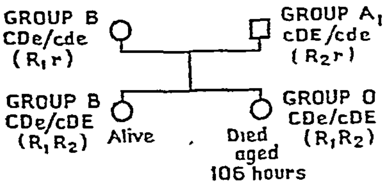
June 6.—Jaundice unchanged. Hb 80%, red cells 3,000,000 per c.mm., icteric index 50 (normal 42. Smith 1946). Baby had high-pitched cry and well-marked opisthotonos.

June 7.—Baby died with signs of severe kernicterus. Hb 94%, red cells 4,260,000 and white cells 10,800 per c.mm. Blood film showed 13 nucleated cells per 100 white cells.

The mother's breast-milk and saliva were tested for Rh antibodies, but none were detected.

Necropsy

The post-mortem appearances were those of a typical case of hæmolytic disease of the newborn (icterus gravis), with enlarged liver and spleen. The meninges and brain showed general yellowish staining, and there was very severe nuclear jaundice. The grey matter of the cervical cord was also intensely stained. A blood film showed 23 nucleated red cells per 100 white cells, all late normoblasts except for one early normoblast. A bone-marrow film showed active cellular marrow with erythropoiesis of average amount and normal type and with no undue proportion of early forms of nucleated red cells.



Genotypes of the family.

The genotypes of this family are shown in the accompanying figure.

DISCUSSION

The interest of this case lies, first, in the presence in the mother's blood of pure anti-E antibody. With the exception of anti-D, single agglutinin anti-Rh sera are relatively rare; about 1% of anti-Rh sera are said to contain anti-E alone (Mollison et al. 1948). I have been able to trace very few published reports of similar cases: two are mentioned by Race et al. (1943), one by Race (1946), one by Diamond and Abelson (1945), two by Wiener et al. (1945) in Rh-positive mothers, and Dick (1947) has recorded a case in a Rh-negative woman.

Since the mother in my case was Rh-positive, antibodies were not looked for antenatally, but subsequent tests revealed a blocking antibody for E agglutinin, with a titre of 1/16, and also a weak saline antibody.

The second point of interest is that there seems to be no reliable means of deciding the form of treatment in such cases, when the baby is clinically normal at birth and the blood picture is within normal limits.

The main evidence that this baby was liable to be severely affected was the early onset of jaundice; but there is no criterion by which one can judge whether the disease will develop simply into a mild anæmia or will proceed to damage of the brain. Jaundice alone is insufficient to justify exchange transfusion in the hope of preventing the possible development of kernicterus. Mollison and Cutbush (1949) suggest that the hæmoglobin and bilirubin of the cord blood may provide the most helpful aids to prognosis, but in this case these data were not known. They also found erythroblastæmia in all their moderate and severe cases, but this did not develop in the present case.

I wish to thank Dr. A. Macgregor, of the Royal Hospital for Sick Children, Edinburgh, for the necropsy findings, Dr. R. A. Cumming for the serological findings, and both them and Dr. M. Martin, of the Elsie Inglis Memorial Hospital, for their interest and advice.

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POTASSIUM DEFICIENCY IN *p*-AMINOSALICYLIC ACID THERAPY

CARDIAC AND PARALYTIC EFFECTS

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IN patients with pulmonary tuberculosis under treatment with *p*-aminosalicylic acid (P.A.S.) the serum-potassium may be dangerously lowered. Two examples are described below, one patient developing cardiac irregularities and the other a symmetrical paralysis of the hands. In a third case (case 1) the serum-potassium level was not estimated but the cardiac irregularities present may well have resulted from the same cause.

CASE-RECORDS

Case 1.—A woman began a course of P.A.S. on June 22, 1949, the dosage in this and subsequent cases being 3 g.

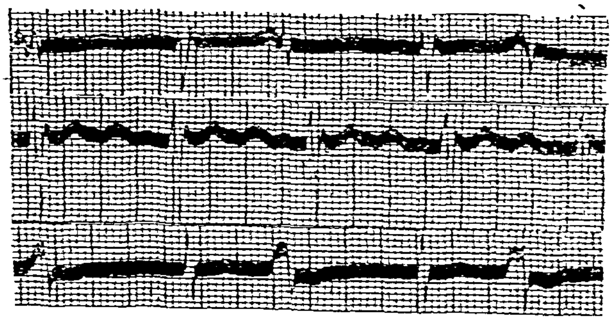

Fig. 1—Electrocardiogram in case 1: alternate normal beats and ventricular extrasystoles.

three-hourly for six doses daily. The only disturbance in the first two months was some vomiting in the evening. On Aug. 9 her blood-P.A.S. level, calculated as the sodium salt, was 10·1 mg. per 100 ml. On Sept. 3, Dr. D'Almero Kok, a registrar, found that the patient had coupled heart beats; and on Sept. 8 an electrocardiogram showed normal beats alternating with ventricular extrasystoles (fig. 1). The blood-P.A.S. level at this time was 9·1 mg. per 100 ml. When P.A.S. was discontinued, on Oct. 1, the coupling of beats ceased. The significance of this was not understood at the time, and the serum-potassium was not estimated.

Case 2.—This woman began a similar course of P.A.S. on Aug. 22. Six weeks later her blood-P.A.S. level was 4·5 mg. per 100 ml. On Sept. 28 her temperature rose to 101°F, and she noticed weakness of her left forefinger, progressing to involve all the fingers of her left hand, and next day her right hand became similarly affected. She was found to have well-marked weakness of dorsiflexion of the left wrist with wrist-drop, and weakness of the extensors of the fingers, interossei, triceps, and deltoid on the left side. The right wrist, fingers, and interossei were more mildly affected. The patient had to be fed. There was no sensory loss, and no cardiac irregularity was observed.

The P.A.S. was discontinued immediately. Because of the resemblance to familial periodic paralysis, the serum-potassium was estimated next day and found to be 13·6 mg. per 100 ml. (normal 16–20 mg.). The blood-count and lumbar-puncture fluid were within normal limits.

The paralysis advanced no further; it began to improve on Oct. 3, and had gone by the 5th. On the 10th the serum-potassium was 20·6 mg. per 100 ml.

Case 3.—This woman started her course of P.A.S. on Sept. 10. A month later she complained of palpitations, and on the morning of Oct. 13 coupled heart beats were felt. An electrocardiogram taken that afternoon, however, showed ordinary sinus rhythm; but there was well-marked depression of the S-T segment in all three leads, with no clear-cut T wave, rather like a digitalis effect (fig. 2). The blood-P.A.S. level at this time was 5 mg. per 100 ml. The serum-potassium was found to be only 11·2 mg. per 100 ml. P.A.S. therapy was *discontinued immediately, and by Oct. 28 the serum-potassium* had risen to 21·5 mg. per 100 ml.

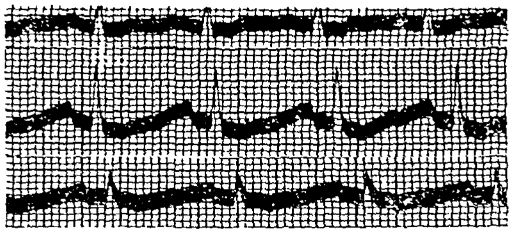

Fig. 2—Electrocardiogram in case 3: *depressed S-T segment with indefinite T wave.*

DISCUSSION

Normal serum-potassium levels have been found in other patients being treated with P.A.S. with no cardiac or neurological symptoms.

The ill effects of potassium deficiency in the blood are fully described by Gass et al.[1] Muscular paralysis from this cause is found in familial periodic paralysis, in patients recovering from diabetic coma, in severe thyrotoxicosis, in chronic nephritis, and after overdosage with deoxycortone. Gass et al. describe the onset of bigeminal rhythm in one of their cases of familial periodic paralysis and have found low T waves in such conditions. The electrocardiographic changes in potassium deficiency resemble those produced by overdosage of digitalis, and it is thought that digitalis affects the intracellular concentration of potassium in the heart. The cause of the muscular paralysis may lie in an inability to release or synthesise acetylcholine at the myoneural junctions.

I wish to thank Dr. A. L. Wingfield for permission to publish these cases and Dr. A. G. Signy for the laboratory findings.

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[1] Gass, H., Cherkasky, M., Savitsky, N. *Medicine, Baltimore,* 1948, 27, 105.

New Inventions

A NEW WARM STAGE FOR THE MICROSCOPE

In our laboratory one of us (T. H. N.) has recently designed a thermostatically controlled warm stage, for the microscopical examination of living cells, which we believe has several useful innovations.

(1) The under-surface of the microscope slide (which carries the specimen to be examined on its upper surface beneath a cover-glass) is flush with the under-surface of the warm chamber. Consequently it is possible to bring the substage condenser into contact with the under-surface of the microscope slide. An oil-immersion objective can thus be used at its full numerical aperture, and if required an oil-immersion substage condenser can also be used. So far as we know, this is impossible with other warm chambers.

(2) The warm chamber is made throughout of 'Perspex.' It is therefore transparent and it is possible to see exactly what part of the specimen one is looking at, while the lowering of an oil-immersion objective into the immersion oil is also greatly facilitated.

(3) The chamber, as made, is designed to fit the built-in stage of the standard microscope made by Messrs. Cooke, Troughton, & Simms Ltd. It will also fit the built-in stages of other microscopes of the same pattern. For other types of built-in moving stages it may be necessary to make minor modifications in the various clips, &c., on the upper surface of the moving stage. The chamber cannot be used with the majority of "attachable" moving stages; it can, however, be used when such a stage has been detached, in which case the movements must be controlled directly by hand.

(4) In the roof of the warm chamber is a large circular hole $1^3/_5$ in. in diameter. Covering this aperture is a circular perspex disc, $2^3/_5$ in. in diameter, containing a central hole through which, fitting quite loosely, the object-glass can be inserted. When the warm chamber is moved about by the moving-stage controls, the circular disc slides about on the roof of the chamber, thus providing complete freedom of movement of the chamber and specimen relative to the object-glass without appreciable loss of heat. The dimensions of these various parts are so arranged as to enable the object-glass to travel transversely from one extreme edge of the slide to the other, and longitudinally over at least $1^1/_4$ in., the two movements sufficing to include easily the whole surface of an ordinary cover-slip.

(5) The microscope slide rests in a rectangular hole in the floor of the chamber, just large enough to take the average microscope slide. On one side of this aperture is a spring clip so that when the slide is placed in the aperture it is held rigidly in position. As a result there is no back-lash between the microscope slide and the chamber when the latter is being moved by the moving-stage controls; further, the slide can be placed in the warm chamber when the chamber is detached from the microscope. The chamber can therefore be taken to the patient's bedside and the slide placed in position immediately after the specimen has been obtained. The chamber is then kept warm with a portable battery until it can be placed on the microscope stage and connected to the mains.

(6) The warm stage is heated by an electrical element wound round a glass rod and everywhere insulated from its perspex supports by glass cuffs or glass beads. The current required is either 6 or 8 volts, which can be obtained either from a battery or, more conveniently, via a 6 or 8 volt transformer from the A.C. mains. The temperature is controlled by a bimetallic thermostat and can be kept approximately constant anywhere in the range from 22 to 45°C. A small knob projecting from the chamber enables the temperature level to be altered at will. A small thermometer projects from the chamber so that the temperature can be watched by the observer. We have found that in general the temperature will remain constant within about ±1°C, but occasionally there may be slightly larger variations, though the observer can prevent these by adjusting the temperature-control knob.

The constancy of the temperature is accurate enough for ordinary microscopical work on living blood-cells—in fact, with this machine we have observed blood-cells under phase-contrast illumination in a healthy condition for at least six hours. The constancy of the temperature control is certainly much superior to that obtained with the ordinary microscope warm box, in which fluctuations of temperature are produced when the observer's hands are inserted from the sides.

(7) The warm stage was designed primarily for use with phase-contrast illumination. Previously we had used a warm box and had found it extremely difficult to control the various adjustments which have to be made so delicately in this type of illumination. All such difficulties are absent with the warm stage described, which in no way interferes with the controls of the microscope.

The warm stage has been made for us by Messrs. Kaylene Ltd., of Waterloo Road, Cricklewood, and we are very grateful to them for the trouble they have taken in perfecting the details of the design.

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Reviews of Books

Malariology

Editor: MARK F. BOYD, M.D., M.S., M.P.H., formerly of field staff, International Health Division, Rockefeller Foundation; Director of the Station for Malaria Research, U.S.A. Philadelphia and London: W. B. Saunders. 1949. 2 vols. Pp. 1643. £8 15s.

IN 1930 Dr. Mark F. Boyd published his *Introduction to Malariology*, a modest volume of some 400 pages. Since that time, particularly under the stimulus of another war in the hyperendemic malarious areas of the world, advances have been great in our knowledge of malaria and its parasitology, of its insect vectors and the factors governing its incidence, of its prevention and control, and of its treatment, particularly with synthetic drugs. When Dr. Boyd wrote his original book the literature of malaria was already voluminous and polyglot, and it has since increased to the dimensions of a tower of Babel.

With the assistance of 64 authoritative collaborators of various nationalities, Dr. Boyd in these two volumes has once more collated modern knowledge of malaria. Recognised authorities from North, Central, and South America, from Britain and her Colonies, from the British Dominions, and from France and Russia contribute to an erudite, comprehensive, and catholic work. But even since this book went to the press English workers have demonstrated the existence of exoerythrocytic cycles of development of *Plasmodium vivax* and of *P. falciparum* in the human liver; so some sections of the book are already partly out of date, and others will soon require modification—as inevitably happens with any published work on a subject growing so rapidly. Most of the opinions expressed will be generally shared; but though, in the chapter headed Treatment of Patent Infections (that is, the treatment of clinical attacks of malaria), the statement may be acceptable that mepacrine by intramuscular injection is safe, effective, and the treatment of choice in grave cases of falciparum malaria, the assertions that there are no indications for the parenteral use of quinine, and that the intravenous use of this drug is attended by "a mortality of 33 per cent. in a preventable and a curable disease" are not in accord with the experience of the past half-century, during most of which there has been no alternative to quinine in the drug treatment of the malaria infections. This chapter is not as well documented as the rest, and the brief list of references is confined to recent work in the United States and personal communications. There is a substantial body of opinion that quinine, given intravenously, is still the best remedy when pernicious signs manifest themselves during the course of a malignant tertian malaria. Admittedly no drug so far has proved entirely satisfactory in the radical treatment of a malarial infection, and opinions must differ as to the virtues and manner of presentation of those available; but such sweeping condemnation of one of them without reference to wider experience is surprising in a work of this nature.

If there is room for differences of opinion there is also no doubt that this book is indispensable to all malariologists. And, though it is not primarily intended for the ordinary practitioner of medicine in the tropics, he will find it an invaluable source of reference.

Mr. Carlyle my Patient

JAMES L. HALLIDAY. London: Heinemann. 1949. Pp. 227. 15s.

ANY dyspeptic man of letters reading this book may well say of Dr. Halliday, as Arbuthnot said of Curll, that he has added another to the terrors of death: psycho-analysis-by-guesswork in this fashion would be a disagreeable post-mortem fate. Psychiatrists have often tried to diagnose the mental ills of the illustrious, their conjectures being of value in proportion to their clinical abilities and the amount of relevant information. Dr. Halliday, who, though an enthusiast for psycho-analysis, is not a psychiatrist, disclaims any attempt to explain Carlyle: he aims only to show that "when we study his life by psychosomatic and psychosocial approaches, certain relations are revealed which enable us to form concepts that are of practical significance." These relations—or these concepts—are mostly expressed by Dr. Halliday in anal metaphors, and those general readers who have never before learnt of the Freudian theory of stages of libidinal development will find this novel way of looking at Carlyle's personality and writings surprising as well as ingenious. The picture of Mr. Carlyle which emerges is not attractive, and we may assume that Dr. Halliday would have no difficulty in understanding Freud's remark, after he had written a study of Dostoievsky, that he did not really like the Russian author and that outside his clinical practice he was intolerant towards men of pathological nature. With a great deal that is suggestive and well written, Dr. Halliday mingles far-fetched guesses expressed in such language as "at last, on that warm afternoon in June, the ego made contact with the Terrible-Father complex. At this encounter, a flash of psychic energy from the complex passed over to the ego." In spite of passages like this, the book is a lively expansion and support of Leslie Stephen's opinion that Carlyle's letters and autobiographical writings "whether they attract or repel sympathy, are at least a series of documents of profound interest to any one who cares to study character"; though Dr. Halliday would probably deny the further statement that they "display an almost unique idiosyncrasy."

Advances in Food Research

Vol. II. Editors: E. M. MRAK, University of California; GEORGE F. STEWART, Iowa State College. New York. Academic Press. 1949. Pp. 558. $8.80.

THE recent report of the Medical Research Council for the years 1945–48 called attention to the increasing sophistication of food, and the appearance of this volume gives some idea of the way in which chemistry, engineering, and the most complicated industrial processes contribute to the preparation of the food that many of us eat without a thought for what has gone before. Who would have supposed for instance, that ingenious men had been using ion exchange resins to remove the bitter calcium malate from apple syrup?

There are nine articles in this volume. The one which deals with thermobacteriology as applied to food-processing is mathematical but reassuring. "During the past 20 years and more not a single case of botulism has been attributable to the consumption of commercially canned foods." This is good; and the article on the quarternary ammonium compounds, which seem to have a great future as disinfectants for containers and utensils, is interesting. So is the one on the spoilage of fish and its preservation by chilling; but the long final article on spray drying, excellent though it may be, is too technical for most people outside the industry. Some of the articles show that nature is not likely to yield up some of her secrets so easily as others. Man has still a lot to learn about the chemistry of fruit and vegetable flavours it seems; and it is difficult to grade or rate food by sensory tests. Yet the tea-tasters do it, and there are men who can forecast the quality of vintage port 25 years ahead. The volume also contains a short article on the pharmacology of D.D.T. and one on the histological changes induced by the processing of vegetables and fruits. Each article carries a considerable bibliography.

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THE LANCET

LONDON: SATURDAY, MARCH 11, 1950

Physical Activity and Paralysis in Poliomyelitis

THE relation between physical activity and the subsequent development of paralysis in anterior poliomyelitis is of both practical and theoretical importance. There has been an impression for many years that severe paralysis may be precipitated by strenuous activity in the preparalytic stage of the disease, but RITCHIE RUSSELL[1] was the first to gather reliable evidence on this point. He studied 44 patients in the 1947 epidemic in England, obtaining detailed histories of their early symptoms and of their activities after the onset of symptoms and in the three days immediately preceding the onset. He found no correlation between physical activity in the three days before the onset and the degree of the subsequent paralysis, but he showed conclusively that physical activity during the 48 hours after the onset predisposed to severe paralysis, whereas patients who rested in bed from the start of their symptoms were unlikely to develop a disabling paralysis. Subsequently[2] he studied a further 56 cases from the same epidemic and confirmed his previous findings, and HARGREAVES,[3] after a comparable study of 30 patients, agreed with his conclusions.

In the United States, HORSTMANN[4] has investigated 411 cases of poliomyelitis in the 1948 epidemic on similar lines. About 20% of these patients had a prodromal stage of mild fever and constitutional symptoms lasting one or two days and then subsiding, to be succeeded three or four days later by a rise of temperature and symptoms of the meningitic phase of the disease. She found no significant difference in the amount of physical exercise taken in this prodromal phase between those who were eventually free from paralysis or only slightly paralysed and those who developed moderate or severe paralysis. But her findings were quite different when the meningitic stage was considered. Physical activity in the three days before the start of meningitic symptoms did not seem to affect the subsequent paralysis, but any physical exertion in the 48 hours after the onset undoubtedly made the patient more likely to develop moderate or severe paralysis. The incidence of paralysis was very much lower in those who rested in bed as soon as symptoms started: and of the patients who in fact developed moderate or severe paralysis, only 9% had stayed in bed or taken only minimal physical exercise during the 24 hours after the onset of symptoms, while 74% had continued with their normal activities. There were 64 cases of bulbar involvement in HORSTMANN's series, of which 9 were only mild; but in this group, in contrast to those with spinal involvement, no correlation was found between physical activity after the onset of symptoms and the subsequent disability.

Isolated case-histories sometimes suggest that individual muscles which are used excessively during the preparalytic phase are likely to be the site of subsequent paralysis, and in this issue (p. 460) a doctor who performed a difficult forceps delivery while he was in the early stage of poliomyelitis gives a good example of this. Usually, however, this possible association is difficult to establish or refute because of the complexity of most physical activities. HORSTMANN found that left-sided paralysis was rather commoner in the 28 left-handed patients in her series than in the 186 right-handed ones, but she could not produce any more detailed evidence.

The practical lesson to be learnt from RITCHIE RUSSELL and HORSTMANN's studies is that patients must be confined to bed at the beginning of the preparalytic phase. In sporadic cases, particularly in adults, this may be impossible. But in the poliomyelitis season the aim should be to keep in bed all children with mild febrile illnesses accompanied by headache and muscle pains. An energetic publicity campaign will be needed to convince parents and school teachers that complete rest is essential. On no account must anyone try to "work off" such symptoms. School sports and the like should so far as possible be held outside the poliomyelitis season. The theoretical implications are not so clear. It is generally agreed that during the preparalytic stage the virus is invading the central nervous system, and the susceptibility of the anterior horn cells to the attacks of the virus probably depends on various factors, including nutrition.[5] It has been shown[6] in experimental poliomyelitis in monkeys that exhausting exercise and chilling increase the incidence and severity of paralysis, and conversely[7] that division of a peripheral nerve a few days before infection will protect the anterior horn cells associated with that nerve from damage by the virus. Thus when the poliomyelitis virus has already invaded the nervous system, one factor which increases the chances of damage to anterior horn cells is physiological activity of those cells.

The Flow of Lymph

To us in the post-Harveian era it seems self-evident that the blood is pumped along by the rhythmically contracting heart. But for the lymph there is no obvious propelling mechanism in mammals. The frog is more fortunate, for it has two pairs of lymph hearts, and as a result of their activity the flow of lymph through the frog's lymphatic vessels in 24 hours may amount to fifty times its blood-volume.[8] [9] The generally accepted view is that the mammalian lymphatic system possesses no intrinsic pumping machinery and that the lymph is moved along by seems; and it is difficult to grade or rate food by sensory tests. Yet the tea-tasters do it, and there are men who can forecast the quality of vintage port 25 years ahead. The volume also contains a short article on the pharmacology of D.D.T. and one on the histological changes induced by the processing of vegetables and fruits. Each article carries a considerable bibliography.

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[1] Russell, W. R. *Brit. med. J.* 1947, ii, 1023.
[2] *Ibid*, 1949, i, 465.
[3] Hargreaves, E. R. *Ibid*, 1948, ii, 1021.
[4] Horstmann, D. M. *J. Amer. med. Ass.* 1950, 142, 236.
[5] Bodian, D. *Ibid*, 1948, 48, 87.
[6] Levinson, S. O., Milzer, A., Lewin, P. *Amer. J. Hyg.* 1945, 42, 204.
[7] Howe, H. A., Bodian, D. Neural Mechanisms in Poliomyelitis. New York, 1942.
[8] Isayama, S. *Z. Biol.* 1924–25, 82, 91.
[9] Isayama, S. *Ibid*, p. 101.

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the propulsion of mammalian lymph. However, where intrinsic contractility of peripheral lymphatics does exist, how is the mechanism controlled? SMITH could not demonstrate any clear-cut effect on the lymph vessels and lymph-flow after either section or stimulation of the femoral and sciatic nerves, though local application of adrenaline or pituitary extract produced definite contraction. His experiments throw no light on the problem which often confronts investigators—the occasional complete "dryness" of a region from whose lymphatics there is usually a fair flow of lymph. But localised spasm of contractile vessels is clearly a possible explanation.

Morbidity in Infancy

THE latest of the social-medicine reports from Luton raises a number of important issues. *Illness in Infancy*[1] is a study by Dr. R. M. DYKES, the medical officer of health, of infant morbidity in this industrial town of 110,000 inhabitants. It is concerned with the infants born there in 1945 who could be observed throughout their first year; these numbered 1498, comprising 79% of the total births.

Disease incidents were established by one of the following criteria: (*a*) confinement to bed for at least 48 hours; (*b*) the calling of a doctor; (*c*) the production of a recognised disability. Among the 1498 infants, there were 564 disease incidents during the first year of life—an average of 1 incident for every 2·6 infants—and more than half of the incidents were concentrated in less than 7% of the infants. Nearly half of the illnesses were respiratory; gastro-enteritis and whooping-cough each accounted for 11%, and measles for 7%; accidents, including burns, accounted for only 1%. The proportionate distribution of the causes of first and second illnesses did not differ greatly. The social class of the father had no significant influence on the morbidity-rate or on the duration of illness. The general belief that the larger the family the higher the incidence of disease in the youngest member during infancy was confirmed; but the advantage enjoyed in the first year by the only child over the youngest of several was only small. In Luton, with its comparatively favourable social conditions, the standard of housing had no important effect on the incidence of illness. The breast-feeding history was illuminating: the age of weaning was independent of family size, social class, and housing standard; and with the notable exception of gastro-enteritis the age of weaning was the same in infants who fell ill as in those who remained well. In those who developed gastro-enteritis weaning took place particularly early.

Of the whole group 90 (7%) with the worst sickness records had an average of 63 days of illness. These were compared with an equal number of infants who had not suffered any illness. The two groups were reasonably well matched for social class, family size, maternal age, incidence of prematurity, birth weight, breast-feeding history, and room-population density. Thus attention came to be centred on constitutional factors and the standard of infant care. Assessment by health visitors showed that the standard of care was similar in the two groups; and since the standard varied directly with the social class, whereas the incidence of morbidity did not, this could not have been important in determining morbidity. While acknowledging that it is "scientifically foolhardy" to attribute the difference to constitutional factors simply because other causes have been excluded, DYKES sees no alternative; and he suggests that the constitutional theory is supported by the disproportionately large number of respiratory and skin diseases in the high-incidence group—a view to which most clinicians would subscribe.

Luton is a prosperous industrial town in south-east England, enjoying a better climate than much of the British Isles; and rightly the report emphasises that Luton's experience may not reflect the experience of other towns or of rural areas. In Luton, which has no social morbidity-gradient, infant morbidity would apparently not be reduced by raising the standard of living of the less well-to-do sections of the community. In cities with congested slums this would almost certainly not hold true. Happily, a few similar studies are being conducted elsewhere in the country, and it will be of great value to compare the results. Clearly, in places with a social morbidity-gradient, if the circumstances of the less favoured groups could be raised to the level prevailing in the prosperous town of Luton, infant morbidity would be reduced. There may be a social level (perhaps already attained in Luton) beyond which further social improvement would have little or no effect on morbidity.

In Luton, as elsewhere, the infant-mortality rate varies with the social class; during the three years 1945–47 the rate was 31 per 1000 legitimate live births in classes I–III, compared with 52 in classes IV and V. This demonstration of a mortality gradient where there is no morbidity gradient confirms the value of the infant-mortality rate as an index of standards of living in the widest sense. It shows that differences between the social classes, which appear to be without effect on morbidity incidence, play a material part in determining the risk of death. There are two possible explanations: either infants in poorer circumstances have a relatively lower resistance to established disease, or else the sick infant needs, for the best chance of recovery, a standard of care which is given in some social groups and not in others. The first of these possibilities is unlikely; the second is much more acceptable, for it is supported by the causes of death. In the 1945 group 36% of the deaths were caused by respiratory and gastro-intestinal infections, many of them regarded as preventable; and in the lower-income groups medical aid was less often obtained than in the higher-income groups. Desire to avoid expense was, it seems, a more important reason for this than less well-developed parental solicitude or judgment: and a possible implication is that the National Health Service, which gives everyone the right to obtain medical assistance without charge, may contribute to a further fall in mortality. In fact the sharp fall in 1949 may be partly explained in this way. The vital rôle of a highly organised and efficient health service in reducing infant mortality has been amply demonstrated in Chicago.

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[1] Illness in Infancy: A Comparative Study of Infant Sickness and Infant Mortality in Luton. By R. M. Dykes, M.D., D.P.H., medical officer of health, Luton: with a foreword by Prof. Fred Grundy, M.D. Published by the Health Department, Town Hall, Luton. Pp. 46. 3*s*. 6*d*.

forces outside the system.[10] The extrinsic forces are effective because of the many valves present in all except the smallest lymph vessels. In thin-walled lymphatics distended with lymph these closely placed valves give rise to a characteristic beaded appearance, and they are a frequent source of trouble in experiments involving lymphatic cannulation. Valves are not found in the lymphatic vessels of fishes, amphibia, or reptiles; they make their first appearance in mammals, concurrently with the extensive development of lymph-glands.

Once valves have developed, any form of extrinsic pressure on the vessels, whether active or passive, will propel the lymph along. Thus, in an anæsthetised dog, if a cannula is inserted into one of the medium-sized collecting trunks near the ankle there is no spontaneous flow of lymph. But if the pad of the foot is squeezed and the foot is massaged a steady flow of lymph usually begins. A similar flow occurs if the animal is allowed to recover from the anæsthetic and then walk or run about.[11] These simple experiments illustrate one of the main ways in which complete immobilisation of inflamed limbs is beneficial: it reduces lymph-flow, and the consequent spread of bacteria along lymphatics, to a minimum. As would be expected if muscular contraction produces lymph movement, the lymph-trunks draining the heart always show a steady flow. The heart is in fact a particularly favourable organ for the study of lymph-flow, because all the lymph leaving it can be collected; and it can readily be shown that if the work of the heart is increased—e.g., with adrenaline—there is a corresponding increase in the flow of lymph. The intestine provides another example of the action of extrinsic pressure. Peristalsis stimulates lymph-flow by compressing the intestinal contents against the mucous membrane, with its rich lymphatic network; and where villi are present their movement has the same effect. The propulsion of lymph by peristalsis has been directly observed in the mouse by Florey [12]: "Each movement was observed to compress the lacteals contained in the gut wall, and as these are furnished with valves the contained fluid was forced along." For the intestine as a whole, this effect of peristalsis can be observed by cannulating the thoracic duct. In the anæsthetised dog there is usually a spontaneous flow of lymph from the thoracic duct, amounting to about 2·4 ml. per kg. of body-weight every hour.[13] Most of this lymph is derived from the intestine, and an injection of pilocarpine, which causes contraction of the intestinal musculature will greatly increase the flow.[14] The pulsation of adjacent blood-vessels has also been invoked as an important extrinsic factor in promoting lymph-flow. Parsons and McMaster [15] perfused the blood-vessels of a rabbit's ear with defibrinated blood, and found that if the pressure became pulsatile there was an active flow of lymph. Cressman and Blalock [16] suggested that pulsation of the abdominal aorta might exert an important action on the adjacent *receptaculum chyli*. However, it is difficult to believe that vascular pulsation plays a large part in normal lymph movement, for cannulation of the main limb lymphatics hardly ever reveals any flow unless the limb is massaged or moved about. In the dog and cat, the same applies to the deep cervical trunk which drains the head and neck, and this is especially significant since it is closely related to the common carotid artery. McCarrell [17] devised an apparatus for producing continued passive movement of the head in anæsthetised dogs, and thereby obtained a steady flow of lymph through the deep cervical trunk. Normally the effect of head and neck movements is no doubt supplemented by the muscular activity of swallowing and the compression of submucous lymphatics by the bolus of food. Moreover, the cerebrospinal fluid may exert an additional vis a tergo. The pressure in the cerebrospinal fluid is some four times that in the deep cervical lymph-trunk, and by the injection of indian-ink particles into the cisterna magna at physiological pressures it has been shown [18] that cerebrospinal fluid can pass readily out of the cranium, along the perineural spaces of the cranial nerves, and so reach the cervical lymphatics. This may have a significant effect on lymph-flow in animals with a relatively large volume of cerebrospinal fluid; and may explain why in the monkey, though the cervical trunk is a much finer vessel than in the cat or dog, cannulation usually produces a steady and spontaneous flow of lymph.[19]

Despite all these extrinsic factors—and others such as diaphragmatic and abdominal wall movements, and pressure changes in the thorax during respiration—there is still occasional evidence of a partial intrinsic mechanism in mammals. There is a certain amount of smooth muscle in the walls of most lymphatic vessels, and muscle has also been described in the capsules of lymph-glands in some species. Rhythmical contraction and relaxation of the smooth muscle of lymphatic vessels may to a varying extent take the place of the lymph hearts of lower vertebrates. The classical papers of Florey and his co-workers [20] contain extensive studies of the properties of lymphatic vessels in a variety of animals. The most favourable site for demonstrating rhythmical contraction seems to be the mesenteric lacteals, and here they observed peristaltic contraction in the guineapig and rat, but not in the cat, dog, squirrel, hedgehog, mouse, pig, or man. They also described contraction of lymph vessels in the thigh, spermatic cord, and diaphragm, and similar observations have been made on the lymph vessels of the bat's wing.[21] Smith,[22] who has lately studied the flow in the afferent and efferent vessels of the popliteal lymph-gland, finds lymphatic contractility in rats, mice, and guineapigs, but none in rabbits or dogs. The fact that such contractility can be readily observed in some animals but not in others suggests that it is not an essential element in

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10. Drinker, C. K., Yoffey, J. M. Lymphatics, Lymph and Lymphoid Tissue Cambridge, Mass, 1941.
11. White, J. C., Field, M. E., Drinker, C. K. *Amer. J. Physiol.* 1933, **103**, 34.
12. Florey, H. *J. Physiol.* 1927, **63**, 1.
13. Yoffey, J. M. *J. Anat., Lond.* 1932–33, **67**, 250.
14. Rous, P. *J. exp. Med.* 1908, **10**, 329.
15. Parsons, R. J., McMaster, P. D. *Ibid*, 1938, **68**, 353.
16. Cressman, R. D., Blalock, A. *Proc. Soc. exp. Biol., N.Y.* 1939, **41**, 140.
17. McCarrell, J. D. *Amer. J. Physiol.* 1939, **126**, 20.
18. Field, E. J., Brierley, J. B., Yoffey, J. M. *J. Anat., Lond.* 1949, **83**, 77.
19. Yoffey, J. M., Drinker, C. K. *Ibid*, 1939, **74**, 45.
20. Florey, H. *J. Physiol.* 1927, **62**, 267; *Brit. J. exp. Path* 1927, **8**, 479. Carleton, H. M., Florey, H. *Proc. Roy. Soc. B*, 1927, **102**, 110. Pullinger, B. D., Florey, H. W. *Brit. J. exp. Path.* 1935, **16**, 49.
21. Carrier, E. B. Physiological Papers dedicated to Professor August Krogh. Copenhagen, 1926; p. 1.
22. Smith, R. O *J. exp. Med.* 1949, **90**, 497.

or the bus queue. Many foreigners coming to this country during and before the war had no such experience behind them; they had rather learnt that to get served at all they must use subterfuge and guile. They really did not believe that if they waited their turn they would get exactly the same as everyone else—no more and no less—of whatever was going. Their queue manners were therefore bad and roused the sharpest antagonism. They learned in time that their fears were groundless: but by that time they had innocently done great harm to their own cause. No initial ill-will is responsible for such clashes of different experience. They are perhaps unavoidable in the sense that we shall be incapable of avoiding them until children are taught, from their earliest years, to look for the reason behind the stranger's strange behaviour, and to withhold judgment in the meantime.

THE IDEAL MEDICAL FILM

Having accepted that the film has a place in medical education, there remain the questions, What place? and What films? At a meeting of the Scientific Film Association in London last month there was agreement that the medical film must be designed with a specific audience in view and that there is a distinct place for the very short film teaching a special technique, or illustrating a process that normally takes a long time or is rarely seen.

At last month's meeting Prof. R. J. S. McDowall was supported by other speakers when he suggested that most medical films are too long; captions should also be short and each new point should be talked about or captioned. These films may be divided broadly into those for premedical, for clinical, and for postgraduate students, those made for recording purposes, and those for education of the public. Among special uses of films in medical education mentioned by Professor McDowall were the demonstration to second-year and third-year students of what goes on in hospital and to senior clinical students of laboratory procedure. Prof. Robert Cruickshank said that in teaching bacteriology he employed films to show the social background. as well as to introduce discussion on a particular subject (for example, inflammation) and to show techniques (such as gram-staining). Mr. C. J. Longland spoke of the value of films in illustrating the developing picture of disease—in acute appendicitis, for instance. As to subjects, Professor McDowall held that films should not replace what the student could see for himself but should show something which otherwise would not be seen; and he gave as examples the movement of villi of the intestine (which had not been believed until it was filmed) and large-scale subjects such as the preparation of penicillin. Other suggestions were for films of isolated clinical signs, where it might not be easy to show a case when wanted, and of single techniques, and for "snippets"—extracts of films to illustrate one point in a lecture after the manner of an animated lantern-slide.

Who should produce a medical film? The need is for doctors who have mastered the mechanics of film-making. Dr. R. G. W. Ollerenshaw remarked that such doubly qualified men are few. and their services should not be misused—in particular, senior medical men should not take umbrage if the school unit turned down their idea. He thought that if the ideal medical film were ever made, it would be by a medical school and its own unit; nevertheless there would always be a place for highly specialised technical assistance. There must be very careful preparation of films, which should not be undertaken merely for prestige purposes; and there should be full coöperation and consultation, including criticism by other teachers. Use should also be made of the Scientific Film Association's advisory service, to avoid unnecessary duplication. In the actual making of the film, recourse should be had to all technical devices—fading and mixing, for example, to avoid showing all the stitching of an incision, and animated-diagrams, because the essential of a film was movement and where, as in a diagram. there was no inherent movement, it must be imparted. Professor McDowall made a plea for the appearance of film publishers, on the lines of book publishers. It was also suggested that the University Grants Committee should contribute to the high cost of medical teaching films.

Although medical films have long been in use—it was in 1897 that Macintyre, of Glasgow, made the first animated X-ray film to show movement of the joints—little is known of audience reaction. Sir Kenneth Goadby, who presided at last month's meeting, called for further observations in this field. Professor McDowall had been horrified to find, when he set an examination question on a film, how little had been learned. Here the question of colour versus black-and-white may be relevant. Some work by Rosenthal,[1] in Melbourne, suggests that while colour gives a more vivid impression for a day or two, the long-term effect of black-and-white may be greater; on the other hand, many feel that colour, being more realistic, is clearer. Bound up with assimilation of content is facility for note-taking. Provided that the illumination on the screen is good, sufficient house-lighting can be retained for rough notes to be made during the showing: but it is clearly best not to take notes under these conditions, while the film presses on its relentless way. There is much to be said for providing a duplicated précis or for projecting on the screen notes to be copied; and another suggestion was that ten minutes of film should be followed by a period for note-making. Then again, the student will often benefit by seeing the same film more than once; he would not expect to assimilate a chapter in a textbook of physiology by reading it once, and it may be if anything rather more difficult to grasp the visual impression of a film, which goes its own pace.

While there are a number of extremely good medical films, there are many which are not so good. The aim should be to succeed where the commercial cinema has failed—to keep the proportion of "not so goods" within bounds.

ODD FEET

Careful of the fit of our clothes and our teeth, we are yet willing—especially the women among us—to accept for our feet the standardised products of a creative and fanciful industry. For women, height of heel or width of toe may vary extravagantly in the course of a season or so; and to every change the bones and ligaments of the foot perforce adjust themselves, paddling through life as humble and gallant as coolies pulling a rickshaw. Only when the years have added their increment to the load does the owner condescend to pamper her feet with the easy heel and the broad toe.

But there is one class of people who cannot afford to drive their feet so hard. and yet who find it peculiarly difficult to get shod. These are they who, for one reason or another, have feet of different sizes. The discrepancy may be due to congenital deformity, old poliomyelitis, or failure of one foot to grow after some injury or operation or because of some trophic disturbance. Whatever the cause, the patient may be quite capable of wearing an ordinary shoe on either foot, but the shoes must differ from each other by as much as one or two sizes or more. The trouble. expense, and annoyance this can cause is considerable. At first glance the solution seems to be to have shoes made; but shoemakers are traditionally obstinate, and it is exceedingly difficult to get them to make anything but a stout

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[1] Rosenthal, H. N. Films, their Use and Misuse. Melbourne, 1945; p. 27.

Annotations

"THE FLU"

DOCTORS in general practice the world over are continually having to deal with transient fevers at all seasons, yet except during an epidemic it is seldom practicable to make a precise diagnosis. At the meeting of the section of medicine of the Royal Society of Medicine on Feb. 28, under the chairmanship of Sir Adolphe Abrahams, Dr. C. H. Andrewes, F.R.S., and Prof. C. H. Stuart-Harris dealt with the laboratory and clinical aspects of these fevers and Dr. C. J. Gavey outlined the clinical problem they present in hot countries. Laboratory investigation can sometimes help to separate off influenza A and B by mouse-inoculation tests, atypical pneumonia by cold-agglutinin tests, and Q fever by complement-fixation tests, but in the individual patient in practice it is virtually impossible to differentiate these from febrile catarrhs, the common cold, and other respiratory infections labelled according to their main anatomical sites, such as laryngitis or tracheobronchitis. Occasionally, enlarged glands or a routine inspection of a blood film will reveal the atypical case of glandular fever. But there remain a host of short fevers with no local or general distinguishing features which are really infections like poliomyelitis, infective hepatitis, or choriomeningitis rendered abortive by the low virulence of the organisms or the patient's high immunity.

Upper respiratory infections of uncertain origin and true influenza account for the majority of short fevers in this country. Most of these entail three days' and the remainder seven days' incapacity. A longer illness is a strong indication for a diligent search for evidences of major diseases such as pneumonia, tuberculosis, undulant fever, urinary infections, or rarer conditions such as infective endocarditis or the leukæmias. The studies made among nurses and factory workers illustrate the importance of respiratory infections, which account for about a third of all the working days lost through illness. Short fevers with diarrhœa should not be called influenza, because Sonne dysentery is usually responsible for them. Vomiting may occasionally be seen in true influenza, but the view of this meeting was that most infections labelled "gastric flu" prove not to be influenza when investigated by laboratory methods but are due to a separate virus. Further study of short fevers is hampered by the difficulty in culturing the various viruses concerned, and by the need for transmission to animals for identification. Moreover, the various clinical features are compressed into a few days and the clinical picture may alter in a few hours. Chronic respiratory catarrh is widespread and any fever tends to aggravate it, thus overshadowing the more characteristic symptoms. The most fruitful study is likely to be on the lines of the Salisbury experiment on volunteers, but such studies are limited by the scarcity of suitable volunteers, especially for the more unpleasant infections. Tropical short fevers are even more difficult to study because the range is made much wider by the inclusion of abortive attacks of endemic diseases such as malaria, amœbic and bacillary dysentery, typhoid, typhus, relapsing fever, and bilharziasis. Malaria is usually proved easily by blood smears but some cases defy diagnosis and so must be included among the short fevers. The incidences of these short fevers and of malaria are roughly equal. Closely following them in incidence are the upper respiratory infections which have much the same features as in this country.

What of treatment? Antibiotics such as 'Aureomycin' have an anti-virus action but are not yet available for minor maladies. Indeed it is questionable whether powerful drugs should be exhibited in short fevers, since they do harm as often as they do good, by obviating nature's demand for rest, though antibiotics may be of crucial value in old people. Vaccination against influenza is disappointing because the immunity so obtained is transient, probably lasting only two months. Should the sufferers from the common cold be isolated? Work at Salisbury has shown that volunteers become infectious 24 hours before the ordinary manifestations appear. It is perhaps desirable for school-children to be isolated but isolation is not practicable in industry.

ANTAGONISM TO STRANGERS

THE last time our islands had a big influx of strangers was in 1066. The war has brought a more peaceable but quite large invasion, and has made us, as Prof. W. J. Rose suggested to the Institute of Sociology on Feb. 28, almost as much of a melting-pot as the New World. He quoted the view of Gorer that the British have shown xenophobia for years. Strangeness implies the existence of *nostri et alieni*; but what are the qualities of "otherness" which rouse antagonism towards *alieni*? Superficially they are mainly differences in appearance or behaviour—feeding differences, differences of speech, dress, colour, or occupation (the caste system in India still rests on differences of occupation). But Professor Rose endorsed Zanietski's view, expressed thirty years ago, that these differences are not in themselves causes of antagonism. In other words, antagonism is not inherent in the facts of the situation. This is clear enough from the readiness with which American white children accept their coloured companions at school—up to a certain age. They feel no inherent antagonism about colour: they acquire it later. When a mob acts in concert, he said, its members are ashamed next morning, and feel a sense of strangeness and antagonism to those with whom they had been in accord the night before. Strangeness, then, is a purely subjective thing; and "strangers," to a given individual or horde, are only those who are experienced as such at the time. Unless there is contact of some sort—even contact at a distance—there can be no antagonism. The stranger always appears as an intruder on our thoughts or designs or activities.

In the discussion which followed, some spoke of the mechanism of unconscious projection, by which we foist on to others the qualities we have repressed—as too bad to be borne—in ourselves. We are thus able to endow strangers with attributes which we can conscientiously dislike. The word scapegoat was not specifically used, but examples were ready to hand of cases where the stranger, or the stranger race, has been made to bear the blame on behalf of the rest of the community. An even commoner mechanism was not mentioned—that by which we endow the stranger with powers of intellect or capacity for success far beyond our own, and resent him accordingly; from there it is but a step in simple projection to credit him with ill-will or even malice towards ourselves. The subtle and malevolent stranger is a most dismaying concept—father of all the mysterious Chinamen, clever anarchists, and mad professors of adolescent literature.

These various explanations may throw some useful light on British xenophobia. Certainly we are apt to suspect foreigners of being a bit too clever, partly because they learn to talk our language so quickly, so fluently, and so much. But this after all is a convenience to us, and should be valued accordingly. Differences of custom or behaviour may not be inherently causes of dislike, but it must be remembered that some customs are associated with strong traditional emotions. The infringement of these by some counter-custom is indeed an invasion, and will at once be interpreted as an aggressive act. Thus the British public are well conditioned to the ethics of queueing; we resent keenly the behaviour of anyone, British or not, who tries to get ahead of his turn, whether in the grocer's, the doctor's waiting-room,

Points of View

WAR

ITS ORIGIN IN THE MINDS OF MEN

RANYARD WEST

M.D. Lond., D.Phil. Oxfd, M.R.C.P.

(Concluded from p. 416)

III. Universal War versus Positive Law

THE suggestion that wars arise in the minds of ordinary men just because they are men is hardly surprising when we consider the almost universal disposition to warfare shown by the human race. When we hear of very primitive aborigines who do not resort to war habitually, we are inclined to ask what is wrong with them, or whether they were not, perhaps, on their very best behaviour for Mr. Malinowski's visit. Because, until "positive law" was pragmatically discovered and introduced, there was no solution to any serious quarrel except by fighting about it. Given the quarrel, the fight followed—though the fight might be no more than a threat, or result perhaps in a "moral" victory.

Some men, of course, have learnt to avoid—often with wonderful skill—the personal quarrels which they know will gall their lives and ruin their happiness. But only some men can do that; and it is improbable that any of us could be trusted to conduct ourselves through a wholly peaceable lifetime in the total absence of external restraint.

It so happens that none of us is called upon to try. When a man avoids a given quarrel today he does so under many restraining influences. Let him pursue his quarrel to an open broil and he will hardly find that society awards him high marks for virtue. He is not free and primitive but a socially trained animal. The most selfish and ruthless of men still operates within a rigid framework of control by external and internal "sanction."

The three-year-old has already made most of the essential discoveries. Susan Isaacs found that the only reason why her nursery children accepted justice from grown-ups was their fear of losing the fight with each other. Similarly, to get as nearly as possible what we think we want, without the risks of mortal combat, is the idea underlying all litigation. And to get as much as we can allow ourselves to want, without incurring the expense of litigation, or the stigma of arraignment, or the penalties of social ostracism, has long been established as the aim of civilised man.

PSYCHOLOGICAL RÔLE OF LAW IN HUMAN ORDER

Long ago, in a thousand different situations of tribe and race, the more able and ambitious among men must at some time have begun to note the following points:

(1) If you want people to work for you, you must stop them fighting among themselves.

(2) The obvious way to stop them fighting is by force.

(3) A great economy of force can be exercised by checking outbreaks of violence before they occur.

This last the wise ruler proceeded to do in two ways. First he paraded his forces: a large foreman with a whip, sentries with guns, and a policeman with a telephone are all in the same straight line here. Next he provided alternative means of settling disputes. The method was that of the modern nursery: "Bring it to me (or take it to Nanny!") and we'll tell you whose it is."

The sort of justice dispensed by primitive man varied: much of it must have been rough. Apparently the Greeks sought absolute justice—for a few. The Romans, pressed upon by the necessities of empire and by common sense, sought primarily a solution—for everyone. Right on throughout the medieval world "justice" had to be provided, not between ruler and subject but between subject and subject for the peace and welfare of the ruler. But in the end the blessings of law came to benefit its subjects more than their tyrants. Judiciously combined with force, it has in most places enabled them to overthrow their overlords, setting up much new legal machinery and many new rules but also taking over much of both from their one-time masters. Thus has mankind come by what is probably the greatest defensive weapon of civilisation—the rule of positive law administered impartially enough for the common man to applaud its rulings in general and therefore to accept, however reluctantly, its ruling in his own particular case.

INEVITABLE PREJUDICE

It has often been said that litigation should be made easier. In many cases it might well be made cheaper. But possibly it is a sign of normal health in a modern community that most of us will go a long way to avoid litigation, cheap or dear. Why? The problem of a house, a rent, damages for trespass, neglect, failure to exercise due care and attention—whatever it be—who among us faces legal action with sang-froid? Why do we get hot and bothered about any case of ours coming into the courts? Is it not because our case may be "misunderstood"? Our solicitor does not find it quite so strong legally as we know it to be morally. It becomes a bit of a gamble, a gamble we fondly think between the truth of the facts and the folly of the law.

Actually, however, the law is not inclined to folly or easily misled. After a long history and many approximations it does now seek to preserve a proper balance between rights and obligations, to secure peace, and to do justice; and under normal conditions it does them all very well. Actually, therefore, in our particular case, in our own little brush with the law, the issue is not, as we suppose, between the truth we know and the law's capacity to err, but between our prejudice and the truth as it is discoverable by the skilled application of the long experience of a legal rule. A chief function of the law is to correct our prejudicial judgment applied to facts. The law of the land has gained our support because we believe ourselves to be inevitably on the side of the angels: that which protects the "good" man protects us. But the task of the law, in civil and in criminal cases alike, is to correct the inevitable prejudices of the parties and discover a just verdict somehow between or amongst them. In civil cases (and in many criminal cases too) it is a matter of holding up a mirror of established principle, and well-grounded public opinion, before the face of a man who has hitherto been good in his own eyes. So good that, given ordinary courage and a sporting chance, he is ready to fight another good man for his rights.

RESPONSE, EXPERIENCE, AND JUDGMENT

How do we come by the prejudices that make us judge our own cause with partiality and fight for our own hand whenever the blessed restraint of law is absent? The answer comes from a glance back at the way the human person attains experience of the world in which he lives.

Experience comes to him from bodily contact and sensory stimuli—the afferent side of an appropriate reflex. But the main object of the reflex is an appropriate motor response. If the infant is about to fall on its head, its hand goes out to protect it. If the fall is sufficient or the hands don't go out quickly enough, that may be the end of the story for that particular infant. If the hands go out successfully, one of many defensive pathways is established, and repetitions will quicken and improve the response. Whether the infant can then be said to be "remembering" the desirability of protecting its head with its hands is not very important: that it shall "understand" the physical principles involved in its action is totally unimportant.

reliable shoe of exquisite workmanship, weighing about as much as the iron shoes of the fairy tales. This is all very well for the larger foot of the two, but the smaller foot is often—for one reason or another—weak and tender. It is not fit to lug a great walking shoe about: it needs something as soft, light, and pliable as a ballet-dancer's boot. Yet it is quite impossible, it seems, for the ordinary person to get such footgear made. Theatrical shoemakers are off-hand with customers not in the profession; and to the hand-maker of shoes the whole notion seems to be repugnant.

The other solution at present open to the person with odd feet is to go into an ordinary shop, buy two pairs of shoes, and discard the two shoes he cannot wear. This expensive and wasteful practice could be avoided with a little help from the trade. Before the war some firms were willing to take back the two odd shoes and send them to the factory to be paired up. They charged the buyer the price of a single pair of shoes plus a small fee—half a crown or so—for the trouble entailed. This arrangement was very reasonable, and might well be revived by the more progressive firms today. The number of people who would be benefited, though not large, is probably greater than is generally supposed.

It would be even better, of course, if some hand-makers of shoes would specialise in light-weight pliable footgear—not only for cases of this kind, but for paraplegics and others with motor disorders of the legs and feet. Heavy shoes are so fatiguing to the partially paralysed limb that some patients—even on their walks abroad—discard their beautifully finished surgical boots and shoes in favour of bedroom slippers, which give them no support of any kind. In their view the value to be derived from springs, callipers, and suchlike gear, is completely offset by the weight of the whole contrivance, and particularly of the shoes. Surgical bootmakers might think this over.

THE ART AND SCIENCE OF WASHING-UP

THE campaign for cleaner food has led to a close scrutiny of current methods of handling food and equipment in restaurants and canteens; with, of course, disquieting results. Our alimentary juices have, in the main, a short way of dealing with pathogens; otherwise none of us would be alive to study the question. American work [1] reported during the war has shown that crockery and cutlery are liable to be heavily infected after being washed; and it was even suggested that the presence of atypical coliform *Bact. aerogenes* might be used to indicate the quality of dishwashing, just as typical *Bact. coli* is used as a measure of water contamination. In 1945, Sydney Linfoot,[2] in a letter to our columns, reported that he had examined 20 cracked cups from public restaurants and had found various pathogenic bacteria in the cracks. In a study of current practice in eating-places, Marcella Higgins and Betty Hobbs,[3] working at the Central Public Health Laboratory at Colindale, have found that tableware is often contaminated by the method of drying. Bacterial counts may rise more than a hundredfold after crockery has been dried with a used cloth.

They visited some thirty different representative establishments, including school and factory canteens, cafés, public houses, and exclusive restaurants. Visits were made in the rush-hour and every kitchen was visited at least twice. The methods of washing-up in these kitchens were classified according to the equipment used: some had one sink only; some had twin sinks, allowing for washing and rinsing; some had a washing sink plus a sterilising sink maintained at a constant temperature; and some had dishwashing machines. Yet in the end it was not the equipment so much as the washer-up that mattered: "even if the equipment is satisfactory, failure on the part of the operatives can completely neutralise any advantage that might be expected." Rinsing water quickly becomes contaminated unless it is very hot (not less than 180°F) and often changed. A really hot final rinse almost sterilises the crockery, and it will then dry quickly, in a rack in the air, without the need for drying with a cloth. Hypochlorite added to the water will sterilise utensils so long as the rinsing water is free from carried-over protein matter; but it leaves an objectionable taste on glasses and cups, and thus needs to be rinsed off. The United States Public Health Service have suggested a standard of less than 100 organisms per utensil as a measure of satisfactory washing-up, but none of the establishments visited could have passed this test. The group which came nearest were those in the third class, equipped with a sterilising sink maintained at a constant temperature: more than two-thirds of the utensils in these kitchens would have reached the U.S. standard.

Surprisingly, these workers found no special dangers in cracked crockery: "cracked cups washed under the same conditions as whole cups can have bacterial counts of the same order." And both cracked and whole cups which had counts in the hundreds before cleaning gave counts of less than 10 organisms per cup after immersion for two minutes in rinsing water at 180°F and air-drying. The battered homes of England will be glad to get this news.

TERRAMYCIN

SINCE 1939, when Dubos isolated gramicidin from the common soil organism, *Bacillus brevis*, the soil has been a prolific source of new antibiotics. Dubos foresaw that it would be, for he worked on the hypothesis that the relative absence of pathogenic bacteria in normal soil—with a few notable exceptions, such as anthrax, tetanus, and other clostridia—was due to the inhibiting substances elaborated by non-pathogens. The order of actinomyces, and particularly its streptomycetes family, has proved specially rich in useful antibiotics, though it has needed a vast amount of searching to produce streptomycin, 'Aureomycin,' chloramphenicol, 'Neomycin,' and some half a dozen others with more restricted fields of activity.

The new antibiotic, 'Terramycin,' reported in the U.S.A., also comes, as its [illegible] a soil actinomycete—a new one call[illegible] *osus* because of the cracked appearance of the surface growth on agar. So far as can be gathered from the brief account by Finlay and his colleagues,[1] of Messrs. Pfizer & Co.'s research laboratories in Brooklyn, terramycin has valuable properties in common with aureomycin and chloramphenicol, particularly that of being active by mouth as well as by injection. Preliminary studies in the chick embryo show activity against rickettsias and, in high concentration, against a strain of influenza A virus. Being amphoteric, terramycin can form a hydrochloride and a sodium salt. Its solubility in water at 25°C is about 0·25 mg. per ml., and the aqueous solution keeps well at room temperatures. Its toxicity to animals is low: in mice there were no deaths after an intravenous dose of 103 mg. of the hydrochloride per kg. of body-weight, and the L.D._{50} was 192 mg. per kg. Both in vitro and experimentally in mice it is highly active against *Strep. hæmolyticus*, *Strep. pneumoniæ*, *Bact. pneumoniæ*, and *S. typhi*. In an agar streak, *Ps. pyocyanea* was 100 times and *Proteus* more than 1000 times as resistant to terramycin as *Staph. aureus*; but these are notoriously tough nuts.

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[1] See *Lancet*, 1945, i, 245.
[2] *Ibid*, p. 259.
[3] *Mon. Bull. Min. Hlth, P.H.L.S.* 1950, 9, 38.

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[1] Finlay, A. C., Hobby, G. L., P'an, S. Y., Regna, P. P., Routien, J. B., Seeley, D. B., Shull, G. M., Sobin, B. A., Solomons, I. A., Vinson, J. W., Kane, J. H. *Science*, Jan. 27, 1950, p. 85.

back and forth among the nations. In the same period again the intellect has evolved, and the emotions have seized, weapons able, we hear, to destroy us all. We have already witnessed the destruction of much of our existing civilisation by men who still lead us; and we are the peoples whom they were so easily able to lead only five years ago.

On two scores war is outdated: it has become unnecessary, and it has become suicidal to the more sapient trends of our species. But still wars arise in the minds of men—as the ski-ing pupil leans inward towards the slope—from instinct and habit. We are unable to install a cooler, more objective intellect in the place of the emotion-ridden intellect that huddles round the camp fires of yesterday.

LAW AND THE POWER-GROUP

Wars arise, and must continue to arise, in the emotional minds of ordinary men. In personal relationships and within the State those wars are checked by law: throughout history and throughout the world the spheres of law and order run concurrently and coterminously. But the law is given to man by his power-group and it is maintained by his power-group. Right up to now, power-groups themselves have had to be combative: there has been no law for them.

A hundred years of Europe show that the nation State is true to its inheritance. Once France was beaten (said the English) Europe would have peace. Then Russian barbarity had to be somehow settled in the costly and futile Crimean War. Palmerston's feint against the Federal States of America just failed to come off as a trans-Atlantic war in 1861. But behind France and Russia and the U.S.A. was Germany (twice), and behind Germany is Russia again. Behind Russia, if the impact comes and nation States survive it, will be China or America, or something perhaps to balance and attack that United States of Europe which has become the end rather than the means among the more gradualist internationalists of today.

If our argument is sound, no form of United States is big enough for the task in hand. Our human need is not to enlarge the group but to abolish the group. The power-group is no longer necessary. Its inescapable claim of "sovereign" decision of its own cause is anarchic. The one thing the human intellect cannot do is to judge its own cause—a fortiori its own group cause. International tensions and even "internationalism" must give place to world citizenship; national and federal government have to be converted into World Government. Then only will the minds of men cease from creating endless wars. For then the set-up is shifted to the already familiar framework of overriding law which protects us even against ourselves.

WORLD GOVERNMENT

Here we take our deep breath and make our mental jump: only to find that lots of people are over that fence before us! I am credibly informed that among advanced students of economics and political science everyone everywhere is in favour of World Government. The trouble in their minds, I am told, is that A (say, Russian National Communist leaders today) wants World Government on A's theory of government and B (say, Britain's National Socialist leaders today) wants World Government on B's theory of government. And so on.

It is something to know they want World Government, or even to grasp that here and there able men in high places in all countries are beginning to see its need as the single alternative to the chaos of our world. The final problem to be resolved is this: Do A's and B's theories of government differ as much as they each think they do? Do the requirements of the good life for A's people and B's people differ materially at all? Ideologies comprise ideas. Ideas can be pooled and they can be modified. Human nature is essentially one in its needs of food, shelter, work, leisure, inspiration, love, and peace. War is what the nursery accepts till a grown-up enters with a better way, introducing positive law and the elements of good government to the inmates. The world requires a World Council of wise men to find the common denominator of the good life as seen and as wanted by A, B, C. and D.

A recognition by all parties that the actual needs of their peoples are the same only requires an inhibition by enough higher intellectual centres of the reflex arc which still makes wars arise in the minds of men. The process required is that Philip sober shall arrange for the treatment of Philip drunk, which is what all good democrats and Communists already have to do in approving the restrictive legislation of their own States.

One topical word to us all as potential world citizens. "Seek out thine *adversary* and agree with him!" Try to find out what A really wants, just supposing you are B. If you find you are angry with Stalin, what you most need is to enter into a common legal system with him. You will never be quite safe till you do!

If that really is "quite impossible" then it looks as if we shall have to let our minds go on raising wars. That it is natural for us to *think* it impossible, without its necessarily being so, is the main burthen of my argument: our emotionally directed intellects are so conditioned. But if it is impossible for us even to try, there is still just one thing we can do, apart from being "strong" nationally which (though being weak seemed to lead the same way in 1939) has always been a royal road to war. It is to use our 1950 intellects to set up a pooled authority of *all the rest of us*, temporary friend and temporary suspect alike—a system of law into which Russia can come when she will. If it is stronger demonstrably and beyond a peradventure than anything that can attack it, it will keep the peace till she does.

This is the same system that would have kept the peace in the wasted '30s. It is not the same as having a screen of League or United Nations behind which each nation is nationally "strong." That method only frees the conscience of your adversary and spurs him to become stronger still, to detach your wavering allies, and to hit you off your guard. It means a legal order establishing the system of positive law for which Hobbes pleaded in England in 1651, and which, thank God, we got in England in 1688—a system that keeps us all in order.

Only conventional thinking makes so many of us think it impossible to set up the World Government for which the present situation so urgently calls.* It must presumably be some sort of democracy; it must plan to become world-wide; and it should be characterised by all possible tolerance for ideologues of Left or Right, of East and West. But there must be no nonsense at all about its legal system. Since of their very nature men need a power to keep them all in awe the system of World Law must secure the world against group violence from anywhere, and it must place the force of a constant majority of power behind that law. In respect of World Law national armies are private armies, national navies and air forces private navies and air forces. The British Army and the United States Air Force, pleasant and goodly in their ways, are anachronisms of world order, and, though their friends find this difficult to believe, they frighten away just as many neighbours as they rally to their side. What is needed is World force behind World Law guaranteed by a world democracy—excluding Russia if she dislikes and distrusts your previous systems and policies too much to accept anything you do. It

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* That may be why more minds in less conventional America have now reached the point of thinking calmly and practically about world government and World Law.

With adults as with infants, in balancing, righting, or whatever the reflex, the matter of first importance is the appropriate response; of next importance is the storing of the experience to facilitate further and better responses in future; of least importance is a correct evaluation of the events in train, their significance, their "truth." This *applies to all biological* "*instinctive*" responses, which are firmly grounded in the race and only to be slightly modified in the individual.

THE RÔLE OF INTELLECT

But though it may have been originally a mere by-product of sensation, *Homo sapiens* has greatly developed the human intellect, into an aid to quicken effective response in certain situations. As a function it has become of great importance in adjusting the organism to situations that are not susceptible to instinctive reflex response because they are new and require new responses rapidly arrived at. Such situations have met us in the past history of our race, and our ancestors have secured their survival—as individuals, as groups, and perhaps even as race and species—by intellectual processes such as logical inference, inventive skill, and endless "taming of nature."

Changing circumstances assail mankind today. We could cower and take cover "instinctively" against bow-and-arrow attacks; we have to learn intellectually how to take cover in modern warfare. We instinctively cling to a steepening slope with all four limbs; but that is not the response that brings us safety when we go on skis. Intelligence is a late development of man, introduced, as I see it, to aid his appropriate motor responses, but not necessarily to tell him the truth.

Once we adopt this view of intelligence we seem to understand more easily many patterns of the mind. For instance, an intellectual appraisal accompanies all loving and hating; but it is the loving and the hating that are the appropriate responses; the intellectual appraisal merely sustains them, and it is often false.

There is a difference here between individual and group response. In our individual lives our biased judgments may find some useful correction in respect of objective truth from the less passionate judgments of our fellows. But in group relations this is not usually necessary, nor does it often occur. For group safety depends upon passionate devotion in a way that individual safety does not. *There is traditionally no very obvious use for the* truth in group relations.

When we consider how much ardent loving and hating are necessary to induce adequate responses of loyalty and self-sacrifice from individuals to groups, we begin to understand why our judgments of, say, the French, German, Russian, or American nations fluctuate, in the way they do, in terms of how those nations stand in relation to our national family and its hopes and fears of the moment. There is very little objective about war-time judgments; but, though they are the more strikingly absurd, they partake of the same qualities as our judgments of those we love and hate, of ideas we trust or fear in our intimate daily life. It is the same thing, writ large because shared and uncorrected by any *cross-currents of different* experience. All judgments are emotional; all emotional judgments are biased; and power-group political judgments are peculiarly and fantastically biased.

Since some emotion enters into every judgment we can begin to speak of prejudice in judgment as universal and inevitable. Our judgment is not there to give us the truth but to help us to achieve something. In group relations that something has through age-long history required from us passionate loyalty, fear, hatred, and greed. It has required hot enthusiasm from the heart: cool and logical intellectualism were nothing but a menace to group security in the days that are past. The group still makes these demands, and that is why group judgments and conduct, even more than individual *judgments and conduct, need the* control of positive law today.

IV. A Present Use for the Intellect

In a previous section I said that in this our era of the nation State every war between nations is caused by nationalism and fought in patriotism, and that if a war starts under any other guise it is never fought *for long* before that guise is stripped off. Ideologies flit and hover: they may flit in and out of a political party within ten years; they may hover for fifty years, but seldom, unmodified, for more. I have further suggested that it is not any divergence of structure of the human mind, or even any difference of content of the human mind, that causes wars to arise, but their similar pattern and their similar content. This common combat-inducing quality of the mind of man is loyalty to his power-group.

To establish such a proposition it is necessary to cite good evidence of the common content of the human mind in respect of basic group emotion, and to be able to point to the common behaviour resulting. Each of these heads could reasonably receive far fuller and more convincing *treatment than is accorded it in this article,* which contains a mere outline of an argument which I believe to be valid.

GROUP LOYALTIES AND A NEW SITUATION

I have thought it fair to assert that in respect of group loyalty we do behave in a common way, and that we do so instinctively rather than intelligently. We do so without realising it. And, in the sense that we foster upon our temporary enemies all the evils we can *think* of—before feeling ourselves forced to fight them—*war-mindedness is indeed a form of intellectualisation* so falsifying as to amount to insanity. Like other lunatics, we rave, we wreck, we kill, believing in our frenzy that there is no other way.

One would like to find a name for the insanity that leads prejudiced human beings to death in a group cause which was once a good cause but which is so no longer. Perhaps "fanatical loyalty" will serve: terms borrowed from individual psychiatry tend to be misleading.

Both this furious emotional antagonism and its accompanying intellectual processes were designed by *nature to nerve us for one purpose only*—to fight loyally for our allotted group against its enemies. Loyalty to the death needed a powerful mechanism to excite it and maintain it. We still see that powerful mechanism ready *to go into operation automatically* today.

But it so happens that such loyalties, such *routine* group emotions, have suddenly become out of date and hideously inappropriate. Again we seem to be for the most part totally ignorant about what has happened or where we stand. For æons our group response to competing groups has been hostility and attack. We are used to that. The accompanying mental state in such fanatical loyalty has been compounded of hostility *and fear:* hostility to aid the attack, fear to aid the withdrawal or surrender which may be needed to secure a limited survival—responses each of which may suddenly become *appropriate.*

What is the appropriate response today? A new set of achievements by that one-time paraphenomenon the human intellect has suddenly presented us in half a century with a world in which other groups need not menace us, nor we them, because there is food enough (though only just) for us all. The human intellect can organise the production and distribution of that food. Humanity has resources which enable the world *to* be run at last as One World. But the fearful, old-fashioned mind of man has filled this same half-century with wars *inspired by fears and jealousies knocked like shuttlecocks* every day. This is a great help to all of us and we take a proprietary interest in each other's progress, with very stimulating results, physical as well as psychological.

I am full of admiration for the way in which preservation of body function, including balance, has been worked out, and am very proud of my first attempts to stand without support in bilateral calliper splints. It is clear that all measures taken with total function in mind will save time in the long run.

Two points about nursing have impressed themselves on my mind as of great importance to the patient. First, it is not always realised how extremely painful paralysed muscles can be, nor that the natural reflex protecting muscles against a pinch or knock by increase of tone is abolished. Thus, the not uncommon practice of picking up a limb by a muscle between finger and thumb is very painful. Limbs should be raised wherever possible by the hard bony points. Secondly, when there is upper limb paralysis, on no account must an attempt be made to hoist the patient by any form of traction in the axilla. This common practice inevitably stretches paralysed muscles, is excruciatingly painful for the patient, and cannot be too good for the muscle itself. The right way to raise such a patient is by passing the hand round the whole back and using the vertebral column itself, supporting the shoulders meanwhile. Similarly, the whole body must be raised by two people making a cradle.

RELATION BETWEEN PARALYSIS AND PREVIOUS ACTIVITY

The present condition of my muscles is of considerable interest when one considers which of them bore the greatest strain during that confinement now nearly three months ago.

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Left side Day 67	Day 39	*Muscle action*	*Right side* Day 39	Day 67
Lower limb—				
4	4	Dorsiflexion	0	0
3	3	Inversion	0	1
4	2	Eversion	0	1
3	3	Plantar flexion	0	1
4	3	Intrinsics	0	0
2 +	2	Hamstrings	1	1
2	2	Quadriceps	1	1 +
1 +	1	Abduction	1	1
2	1	Adduction	1	1 +
2	2	Glutei	2	2
Upper limb—				
4 +	4	Flexors of fingers	4	4 +
4 +	3	Opposition of thumb		5
4 +	3	Flexors of wrist	3	4
5		Extensors of fingers		1 −
4		Extension of thumb		1
4	3	Extension of wrist	1	1
4	3	Pronation	2	3
1 −	0	Supination	0	1 −
2	2	Biceps	1	1
1	1	Triceps	1	1 −
1	1	Deltoid	0	1 −
Trunk—				
5	4	Abdominals	4	5
1 +	1 −	Pectorals	1	1
5	4	Trapezius	4	5
4	3	Erector spinæ	3	4
4		Rhomboids		4

The *left leg* has slowly but progressively improved, though none of the muscles can as yet act against gravity. The weakest muscles are the gastrocnemius/soleus and the internal rotators of the thigh. It was the plantar flexors of this leg which had most to do at the confinement.

The *right leg* is much weaker than the left, and so far there is no recovery below the knee. The thigh and hip muscles all show some signs of life, the weakest appearing to be the rotators of the thigh. The weakness of gluteus maximus is surprising; but when the use of the right leg for countertraction is remembered everything again fits in.

The *left arm* is much stronger than the right. The power in the left hand is very good, and I am, in fact, correcting this typescript with it. The chief difficulty is not the unusual task of writing left-handed but the weakness of supination and the tendency of the hand to fall on to the thumb. The wrist, too, is good and can act against resistance. Biceps and triceps are improving; but the weakest muscle of the whole limb is the deltoid, which has only shown some real flickers of contraction in the last fortnight.

In the *right arm* the only muscles with any power are the flexors of the fingers and wrist and the lumbricals. There are now slight flickers in the extensors of the wrist and the biceps, while triceps and deltoid are doubtful. The right shoulder-girdle muscles are weaker than the left though in fairly good condition.

The *trunk muscles* have recovered very well and I can now easily sit up without support.

The clear parallel between muscular activity in the early stages of the disease and the resultant paralysis and paresis seems worth recording.

Another question that occurs to me concerns the vague cerebral symptoms which occurred in my preparalytic and early stages—feeling of nystagmus, difficulty in swallowing, inability to purse the lips for whistling, and the one transient sign, ptosis. To what extent had these anything to do with the infection?

I am indebted to Mr. K. F. Hulbert, orthopædic surgeon to the Southern Hospital, Dartford, Kent, for permission to use the muscle power-charts.

Medicine and the Law

Blood Donor's Claim for Damages

A LADY who, five years ago, joined the local blood-transfusion service as a donor, unfortunately contracted a septic arm after her ninth donation, the previous eight occasions having had no ill effects. Alleging negligence in the operation, she claimed damages from the Ministry of Health (as statutory successor of the legal liabilities of the hospital concerned) and also from the doctor who performed the extraction.

Her evidence was that on the ninth occasion the doctor seemed to take a long time in finding the place in her arm in which to insert the needle; after her ten minutes' rest she noticed that there was bleeding from the puncture; she said that she reported this to the hospital sister (though this was denied) but was assured that all was well. She said she went home as usual but her arm subsequently swelled; she was admitted to hospital and remained there for about a month. Her own doctor gave evidence that he found an infected clot in the region of the right elbow. He agreed in cross-examination that it would be prudent and careful on the part of a doctor, in dealing with a plumpish patient, to take a little time before making the incision; he found no sign that the incision had been made otherwise than carefully and properly.

Doctors and hospitals, needless to say, do not guarantee patients against all ill effects of medical treatment; they cannot be made to pay damages unless some act of negligence is established. The allegations of negligence here were twofold—first that the hospital staff failed to take adequate antiseptic measures, and secondly that, when bleeding was reported to the hospital sister, there was a failure to examine the puncture and to replace the sodden bandage which would form a culture-medium. On behalf of the defendant doctor his counsel submitted that there was no case of negligence against his client for the jury to consider. Mr. Justice Hilbery deferred decision until the case against the hospital had been heard.

For the hospital the sister testified that there was nothing unusual about this blood extraction. Evidence must, however, be Russia excluded because she won't come into the scheme when it is fully prepared, published, and operable, and not Russia excluded because somebody on our side says she won't come in.

With or without the adherence of every single Great Power—though better with than without—a pooled world order to which all national sovereignty gives pride of place will secure what no national diplomacy can possibly secure—a clear and safe majority of world power for peace. Since Russians too are human, I think the sound psychologist can foretell that it will also secure them.

Special Articles

A SUBJECTIVE VIEW OF ACUTE POLIOMYELITIS

This account of his own case has been compiled from the dictation of an experienced general practitioner, aged 40, who is now in hospital recovering from extensive paralysis.

* * *

I had been working fairly hard in a busy south-east London practice, but had arranged with my assistant to attend a week's refresher course in midwifery at Brighton. On Friday, Oct. 28, during the course, I was not feeling well, with general malaise and tiredness. During the morning a strange feeling of giddiness in the eyes developed. It was as if my eyes were moving from side to side, as in nystagmus. This was a horrible sensation which made me dizzy, and, in spite of the uselessness of doing so, I found myself repeatedly looking in the mirror to see if I could detect any nystagmus.

This eye symptom continued during Saturday, and I drove home from Brighton very slowly and with some difficulty because of my visual discomfort. There was no impairment of visual acuity. On Sunday, the 30th, I consulted an ophthalmologist colleague because, although the symptom had practically disappeared, I was concerned about it; however, there was nothing wrong with my eyes at the time of the examination.

My main symptom on the Sunday was weakness, and I went to bed in the afternoon. Precisely 10 minutes later I had an urgent call to a confinement, and had to dress and go out again. Fœtal distress was obvious on my arrival, so I had to apply forceps at once and attempt to deliver the baby as soon as possible.

I am almost ambidextrous, with a slight right-hand dominance. With my patient in the lithotomy position I exerted traction mainly with the right arm but using my left arm when tired. Counter-traction was provided by my right leg pressing on the bar at the foot of the bed while I was standing on the ball of my left foot. It will be seen that the muscles used mostly in this $1^1/_2$ hours of vigorous exertion were: in both arms, though the right more than the left, the deltoid, both biceps and triceps as "fixers" of the arm, and the extensors of the wrist; in the right leg, the extensors of the thigh (glutei) and quadriceps and all muscles below the knee as fixers; in the left leg, the plantar flexors.

On Monday morning I felt very ill, with nausea and vomiting and a severe headache. My temperature was normal. I tried to get up but had to return to bed. The severe headache, and the generalised limb and body pains which began later, persisted for four days. On the Tuesday the superintendent of a London fever hospital was called in consultation, but apart from the general malaise there was no other sign of illness. There was, however, at that time, a slight right-sided ptosis which passed away after a few hours; and a difficulty in swallowing solid food which lasted for about a week but was associated with no diminution in movement of the uvula.

My temperature rose to about 100°F for the first time on Wednesday. Having been constipated since the Saturday, I was given an enema that evening; and later in the night, feeling extremely ill, I went to the toilet where I discovered that my right arm was almost completely immobile and my left arm was very weak. From that moment I was convinced that I had poliomyelitis, yet for the next three or four days the pain from piles which had prolapsed under the influence of the enema and had partly thrombosed because I had been unable to reduce them, occupied my mind almost to the exclusion of my more serious trouble. Such is the constitution of the human mind.

I was admitted to a fever hospital on Thursday afternoon, Nov. 3, six days after the first symptom. Subjectively, on admission my right arm was completely paralysed but on the left side slight hand movement remained. For the first two nights in hospital I could ring the hand push-bell placed in my bed, but on the third day even this power in my left hand disappeared. My impression is that the functions disappeared in the upper arms before the lower arms and in the right arm before the left. I had no incontinence and no loss of sensation at any time. I became aware of slight neck-rigidity, on examination, causing severe pain which radiated right down the back, and of a positive Kernig's sign.

In parenthesis, the prospect of a lumbar puncture was frightening but a thorough infusion of local anæsthetic was made and I did not realise when the actual puncture was performed. It was completely painless, and I found it trying only because of my impatience to have it finished. The only noticeable after-effect was a severe head pain for some hours on the slightest movement of my head. The elicitation of a positive Kernig's sign—i.e., stretching of the hamstrings—is the most painful sensation I have ever experienced. May I recommend tenderness?

My temperature returned to normal on Nov. 4, and has remained so ever since.

On Sunday, Nov. 6, a week after I attended the confinement, my legs became weak, the right before the left side, and by Tuesday both were completely paralysed from the hips downwards except for slight movements in the left foot which have been present throughout.

A little symptom, which is almost laughable in retrospect but was worrying at the time, was that, with my almost complete loss of self-expression except for talking (and I had a distaste for a surfeit of talking to myself), I resorted to whistling to keep my courage up, only to find to my dismay that this was impossible during my first week in hospital. I was unwilling to bring this new worry to the notice of my medical attendants in case they found out something still worse about me. At the end of the week my whistling powers returned, much to my relief. These little details may loom very large in the patient's mind when he has little else to do but meditate on his condition. I had no respiratory involvement at any time, I am thankful to say.

As soon as my confidence began to return I discovered that the lumbrical muscles in both hands seemed to be working, stronger on the left side.

REABLEMENT AND NURSING

At the time of writing, on Jan. 20, six weeks after my transfer to a general hospital for physiotherapy, I am getting much satisfaction from the rehabilitation routine and am taking great pride in each new return of function. I take it that preoccupation with minute details of recovering muscular power is inevitable, and so long as improvement is progressive this is a good thing.

Here all the adult patients of both sexes recovering from poliomyelitis join together in a class for exercises every day. This is a great help to all of us and we take a proprietary interest in each other's progress, with very stimulating results, physical as well as psychological.

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2	2	Quadriceps	1	1 +
1 +	1	Abduction	1	1
2	1	Adduction	1	1 +
2	2	Glutei	2	2
Upper limb—				
4 +	4	Flexors of fingers	4	4 +
4 –	3	Opposition of thumb		5
4 +	3	Flexors of wrist	3	4
5		Extensors of fingers		1 –
4		Extension of thumb		1
4	3	Extension of wrist	1	1
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1	1	Triceps	1	1 –
1	1	Deltoid	0	1 –
Trunk—				
5	4	Abdominals	4	5
1 +	1 –	Pectorals	1	1
5	4	Trapezius	4	5
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4		Rhomboids		4

The *left leg* has slowly but progressively improved, though none of the muscles can as yet act against gravity. The weakest muscles are the gastrocnemius/soleus and the internal rotators of the thigh. It was the plantar flexors of this leg which had most to do at the confinement.

The *right leg* is much weaker than the left, and so far there is no recovery below the knee. The thigh and hip muscles all show some signs of life, the weakest appearing to be the rotators of the thigh. The weakness of gluteus maximus is surprising; but when the use of the right leg for counter-traction is remembered everything again fits in.

The *left arm* is much stronger than the right. The power in the left hand is very good, and I am, in fact, correcting this typescript with it. The chief difficulty is not the unusual task of writing left-handed but the weakness of supination and the tendency of the hand to fall on to the thumb. The wrist, too, is good and can act against resistance. Biceps and triceps are improving; but the weakest muscle of the whole limb is the deltoid, which has only shown some real flickers of contraction in the last fortnight.

In the *right arm* the only muscles with any power are the flexors of the fingers and wrist and the lumbricals. There are now slight flickers in the extensors of the wrist and the biceps, while triceps and deltoid are doubtful. The right shoulder-girdle muscles are weaker than the left though in fairly good condition.

The *trunk muscles* have recovered very well and I can now easily sit up without support.

The clear parallel between muscular activity in the early stages of the disease and the resultant paralysis and paresis seems worth recording.

Another question that occurs to me concerns the vague cerebral symptoms which occurred in my preparalytic and early stages—feeling of nystagmus, difficulty in swallowing, inability to purse the lips for whistling, and the one transient sign, ptosis. To what extent had these anything to do with the infection?

I am indebted to Mr. K. F. Hulbert, orthopædic surgeon to the Southern Hospital, Dartford, Kent, for permission to use the muscle power-charts.

Medicine and the Law

Blood Donor's Claim for Damages

A LADY who, five years ago, joined the local blood-transfusion service as a donor, unfortunately contracted a septic arm after her ninth donation, the previous eight occasions having had no ill effects. Alleging negligence in the operation, she claimed damages from the Ministry of Health (as statutory successor of the legal liabilities of the hospital concerned) and also from the doctor who performed the extraction.

Her evidence was that on the ninth occasion the doctor seemed to take a long time in finding the place in her arm in which to insert the needle; after her ten minutes' rest she noticed that there was bleeding from the puncture; she said that she reported this to the hospital sister (though this was denied) but was assured that all was well. She said she went home as usual but her arm subsequently swelled; she was admitted to hospital and remained there for about a month. Her own doctor gave evidence that he found an infected clot in the region of the right elbow. He agreed in cross-examination that it would be prudent and careful on the part of a doctor, in dealing with a plumpish patient, to take a little time before making the incision: he found no sign that the incision had been made otherwise than carefully and properly.

Doctors and hospitals, needless to say, do not guarantee patients against all ill effects of medical treatment; they cannot be made to pay damages unless some act of negligence is established. The allegations of negligence here were twofold—first that the hospital staff failed to take adequate antiseptic measures, and secondly that, when bleeding was reported to the hospital sister, there was a failure to examine the puncture and to replace the sodden bandage which would form a culture-medium. On behalf of the defendant doctor his counsel submitted that there was no case of negligence against his client for the jury to consider. Mr. Justice Hilbery deferred decision until the case against the hospital had been heard.

For the hospital the sister testified that there was nothing unusual about this blood extraction. Evidence was given that the instruments were sterilised with the most modern apparatus and that the standards of practice were high. A surgeon supported the latter point and told the court that it was impossible absolutely to sterilise the skin; even in the most hygienic conditions, with a clean operation conducted in a perfectly sterilised theatre, there was always some risk of sepsis.

The learned judge ruled that there was no case against the defendant doctor; the claim against him was dismissed with costs. As regards the hospital, on whose behalf it was urged that there was no proof either of an omission to employ proper antiseptic measures or of any breach of duty on the part of the staff, the jury (after a three hours' retirement) awarded £200 damages. The judge granted a stay of execution with a view to an appeal. He expressed sympathy with the plaintiff, who had met with this unusual and disagreeable experience in voluntarily performing her act of service to the community.

Burns from Domestic Fires

The deaths of three women who were burned in their nightclothes were investigated by the Battersea deputy coroner on March 2. "Fire brigade officers," he stated,[1] "say it is possible to be as much as 18 in. away from an electric stove and still start a fire. Nightwear is often so flimsy that it can be alight before the heat is actually felt."

At the end of last year the Manchester coroner observed that within a few months he had investigated seven fatalities from electric fires; "it is time somebody woke up and did something about it."[2] The perils of electric and gas fires have been discussed in these columns by Dr. and Mrs. Colebrook.[3]

Burn From Hot-water Bottle

At Bristol Assizes on Feb. 13 a jury awarded £650 damages against a nursing-home on a claim alleging that a newborn baby had been negligently placed in a cot with a hot-water bottle and had thereby suffered disfiguring burns on the thigh and leg. The sum awarded included £150 as the estimated cost of a future skin-grafting operation. A claim against a doctor was dismissed. One of the questions in the case was whether a nurse or the doctor placed the baby in the cot. The accident occurred in January, 1947; apparently it was not until May, 1949, that any allegation of blame was made against the doctor.

The matron of the nursing-home was questioned about an entry in her register. It ran as follows: "On bathing baby, right leg badly marked, possibly by excessive heat during or immediately after resuscitation." In cross-examination she agreed that the register was kept for the medical officer of health; the entry was intended to make him believe that the baby was burned or injured while in the labour ward. The doctor gave evidence that, to resuscitate the child, she had placed it in a warm bath and carried out artificial respiration. The entry in her own records was "baby had burn right thigh." She denied a suggestion that she had dictated the entry in the matron's register. She did not know who placed the child in the cot.

Mr. Justice Lynskey told the jury that doctors and nurses are trained to deal with crises, but, though there is an emergency, they are liable if they are guilty of carelessness. It was understandable if they made a mistake, but it was not excusable in law; they must take reasonable precautions at all times. The nursing-home was directed to pay the costs of the doctor as well as those of the plaintiff.

In England Now

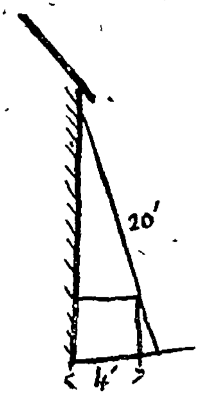
A Running Commentary by Peripatetic Correspondents

AMONG the maxims decorating my desk is one which reads "Have I got toothache, earache?" intended to combat the blackest moments of depression. Now I am thinking of adding a new one, inspired by not seeing my face in your noble portrait gallery of medical M.P.s. Poor chaps: twenty letters a day, each asking an apparently insoluble question which must be answered for fear a vote is lost. Every other Saturday and Sunday off to the constituency to spout or be spouted at. Then the dreary hours in that Chamber of Little Ease, the House of Commons. The certain knowledge that every easy chair in the Library has already been pinched. The great speech one waits three days to make, immortalised in the *Times* with "Dr. So-and-so also spoke." The endless heartiness and good fellowship. The daily cost of meals. The parties of school-children to be shown around the House. The clock-tower to be climbed once a month with the Boy Scouts. The smell of a division lobby at four in the morning. The boredom when one sticks out the late debate; the pangs of conscience when one cuts it. The visitors to be found seats, the deputations to be listened to, the never-ending stream of papers to be read. The thousand pounds a year that goes nowhere and leaves no time or energy for earning anything else.

And yet, on second thoughts, I doubt if I dare add that maxim yet. I have the awful feeling that before long I may again be inviting the suffrage of the electors of Eatanswill. Afterwards, I shall certainly commiserate with the victors and congratulate the defeated on their lucky escape.

* * *

Do you know the problem of the twenty-foot ladder, the house, and the box in the shape of a four-foot cube? The box is on the ground against one wall of the house and the ladder is leaning against it and the wall, as per diagram. How high up the wall can the ladder reach?



We first met this problem at Christmas when visiting my relations, who had got it out of one of the intelligent weeklies. An evening or two of trigonometry, algebra, and trial and error (especially error) produced various solutions like $0=0$, or $1=1$, and equations like $x^4-4xy=y^3-384$; but at last, with the aid of the baby's bricks, we got the answer. After our holiday I felt it was only fair to tell my colleagues about it. Their keenness was astonishing. Usually they said: "Well, it's simple enough. *This* angle equals this. . . . Well, anyway, *this* side is x, and $y-4$ is the height from here to here . . . and, no, that won't do . . ." and they would then retire to work it out in private. The real zenith of keenness was reached by the four registrars, who went at it till 2 A.M. on two successive nights. The surgical staff produced pages of careful calculations, but no solution. In a week or two, people were showing it to me as a problem I might like to try, but their manner did not encourage me to reveal that I had instigated the whole thing. Even now several blotting pads in different parts of the hospital still show the diagram, with fragments of calculation, and it can also be seen on the wall in one of the corridors. Only last Friday the pædiatrician produced two entirely new solutions by an uncle of his who had just decided to retire from his very promising political career and give his whole time to the problem.

* * *

I am fortunate in having two lady friends who are physiotherapists (they are still old-fashioned enough to be proud of the name "masseuse"). We have a mutual agreement concerning our personal attacks of fibrositis, if one may still use that term—I charm theirs away with Novocain while they rub mine away with Great Gusto.

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[1] *Evening Standard*, March 2, p. 3.

[2] *Lancet*, 1949, ii, 1204.

[3] Colebrook, L., Colebrook, V. *Ibid*, p. 181.

The other day I was foolish enough to voice a hidden fear that I am becoming fat and flabby. The effect was electric. Their heads shot up, their eyes glistened, and their nostrils quivered like a dog's when it is on the track of some particularly revolting scent. An invisible message passed between them and with one accord they uttered the magic word "HORNIBROOK'S." This, I learnt to my increasing horror, is the eponymous classification of a series of fiendish exercises designed for people of my incipient size, and in the best of spirits they proceeded to initiate me into the mysteries of their art.

I will not describe the voyage of impossible and indecent contortions on which I embarked. To them I was but a bundle of levers, prime movers, and antagonists, and did I raise but the slightest whimper I received in return a relentless glance and a muttered "Hornibrook." At last it was over, and I was led gently out into the cold air and placed in the driving seat of my car. As I put down the clutch pedal, the younger and kinder of the two leant in at the window, whispering, "I shouldn't repeat these for a few days, if I were you. You *might* cause a hernia."

I have gained 6 lb. in the past month and I still have nightmares in which a fiend answering to the name "Hornibrook" carelessly ties me into a surgeon's knot.

* * *

My seven year-old daughter and I set off the other day to deliver invitations to a party. Most of them were to medical colleagues living in our street. We found to our disappointment that the invitation cards were too big for the letter-boxes. But when we reached a black door with a huge plate and unhappy memories of a dental drill the card went in with no trouble at all. "Mummy, do you think the door's been listening at key-holes? Uncle K always tells me to 'open a little wider' even when I stretch so hard it hurts." Maybe it had; who knows? The child's habit of giving human attributes to inanimate objects opens up delightful possibilities. When my husband picked up his bag at 2 A.M. the other morning I swear I heard the bag say: "Have a heart: I'm closed for the night."

* * *

The influence of the recent election even extended to our gynæcological clinic. One patient, questioned about the state of her leucorrhœa, replied: "It's much better now, but it's changed its constituency." Our offer to treat her in a different ward was refused.

* * *

LAMENT OF A LABORATORY LIBRARIAN

When a doctor's not engaged on his dissections and injections,
Or in chasing little microbes up a sewer,
He will delve into the mysteries of recondite case-histories
With references exotic and obscure;
A symposium in Spanish about mumps in Machrihanish
With a footnote from Guadeloupe on glands,
A report on sudden death by a lady called Macbeth,
With the title "Don't forget to wash your hands."
Through labyrinths of literature on frailties of the flesh
I search from crack of dawn till set of sun.
Ah, who would be a handmaid of the medical profesh?
The librarian's lot is not a happy one.

"An infection found in beavers was transmitted to retrievers,
And carelessly contracted by a vet,
While the organism, injected in a toad in Timbuktu,
Was recovered from a tadpole in Tibet.
Now, was it in the *Lancet* in 1892?
Or the *B.M.J.* in 1923?
Or maybe *Path. & Bact.*? No. I can't be more exact,
And I think the name was Smit, or Smut, or Smee."

Good sons of sage Hippocrates and Galen's gallant heirs,
May your battle with the bugs be timely won,
But spare a pang of pity for the writer of this ditty.
The librarian's lot is not a happy one.

Letters to the Editor

EXPERIMENTAL PRODUCTION OF MALIGNANT TUMOURS BY BERYLLIUM

SIR,—In 1946 Gardner and Heslington[1] reported the production of bone sarcoma in rabbits by the injection of suspensions of zinc beryllium silicate and beryllium oxide. Few details were given in their paper and nothing more has yet been published on this observation.

In 1947 the experiments of Gardner and Heslington were repeated by the Toxicology Unit of the Medical Research Council. A total of 28 rabbits survived a course of intravenous injections of zinc beryllium silicate and beryllium silicate. Of these 28 rabbits, 7 have developed bone sarcoma and 5 remain alive $2^1/_2$ years after receiving the injections. The tumours have all the histological characteristics of bone sarcoma seen in man. In this they resemble the tumours produced in rabbit bones by radium (Ross[2]). A full account of this experiment, written in collaboration with Dr. F. A. Denz and Dr. H. A. Sissons, is ready for submission for publication.

In March, 1949, a washed suspension of finely divided beryllium metal in water was received from the Atomic Energy Research Establishment, Harwell. A group of 24 young rabbits were given what was to be the first of a series of intravenous injections of this metal suspension. Each rabbit received 40 mg. of metal. Within seven days 9 rabbits died with acute liver necrosis and all the typical signs of acute poisoning by a soluble Be compound.[3] During the next month 10 more rabbits died and all showed a considerable degree of liver necrosis and fibrosis. Of the remaining 5 rabbits, 2 have died from pulmonary infections while 2 have developed characteristic bone sarcomata. There is a single survivor.

All the materials injected have been examined and found to be free of significant radioactivity.

There seems little doubt that beryllium itself can produce neoplasms in the rabbit, and the purpose of this letter is to draw attention to what might possibly be another industrial hazard.

Toxicology Research Unit,
Carshalton Beeches, Surrey.

J. M. BARNES.

DEOXYCORTONE ACETATE AND ASCORBIC ACID IN RHEUMATOID ARTHRITIS

SIR,—The preliminary communication by Lewin and Wassén[4] prompted me to try this treatment on some of my outpatients. I treated two patients with rheumatoid arthritis, two with advanced osteo-arthritis, and one with rheumatic fever.

CASE 1.—A man, aged 77, with polyarthritis, of 6 years' duration, involving both shoulders, the neck, and both hands. Ten minutes after the first intramuscular injection of deoxycortone acetate 5 mg. ('Cortiron,' Schering) followed in five minutes by an intravenous injection of ascorbic acid 5 ml. (1 ml. = 200 mg.), the patient felt better and thought that he could move his arms more freely. Thirty minutes later he was able to move his head and arms with great ease, so far as the anatomical changes in the joints would allow. This improvement lasted eighteen hours, during which time the patient was able to put on and take off his hat with comparative ease—which he had not been able to do for the past 3 years. After this period the patient promptly relapsed and exhilaration was replaced by depression.

On the next day he had an intravenous injection of ascorbic acid and an intramuscular injection of strychnine sulphate 2 mg. as control injections; but the pains, the spasm, and the joint movements remained unchanged.

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1. Gardner, L. U., Heslington, H. F. *Fed. Proc.* 1946, 5, no. 1, pt. II.
2. Ross, J. M. *J. Path. Bact.* 1936, 43, 267.
3. Aldridge, W. N., Barnes, J. M., Denz, F. A. *Brit. J. Exp. Path.* 1949, 30, 375.
4. Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.

On the fourth day he had another intramuscular injection of deoxycortone acetate 5 mg. and ascorbic acid intravenously, and the result was exactly the same as on the first day; the improvement lasted this time 17 hours. On the fifth day the same procedure gave the same good result; improvement lasted 17–18 hours.

CASE 2.—A woman, aged 40, suffering for the past 18 years from rheumatoid arthritis involving almost all joints. She also had the same treatment but the ascorbic acid had to be injected intramuscularly, because of obesity. One hour after the injections the pain in the joints decreased slightly and she was able to close both fists for the first time in a year. The improvement lasted 8 hours. The next day she received the same injections with the same results.

CASE 3.—A woman, aged 50, suffering from severe osteo-arthritis of the neck and lumbar spine; X-ray examination showed that the disease was very advanced. On the day of treatment she had a very severe headache, from which she suffered frequently. Twenty minutes after the injections the headache had gone, but the pain in the neck was still very bad. Five hours later the headache returned; pain in the neck and back were slightly better. Twelve hours later the pain in the neck and back was still relieved and she could move more freely. This very slight improvement lasted twenty hours, after which all the symptoms returned.

On the third day she had another course of injections, and this time the headache cleared after ten minutes. She stated that all pains had disappeared; and for the first time in years was able to sleep without discomfort, being able to place her head in any position on the pillow. This very good effect lasted twenty hours.

CASE 4.—A man, aged 69, suffering for the past 30 years from osteo-arthritis of the lumbar spine. X-ray examination showed very advanced disease, with huge osteophytic spurs. He had the same course of injections, and pain was relieved for eight hours. The next day he had the same injections and this time the result was even better; pain was eased for thirty-six hours.

CASE 5.—A woman, aged 30, suffering from rheumatic fever, under treatment with salicylates. No effect whatever was noticed after the first or the second course of injections.

No toxic effects were noted in any of the 5 cases; nor was there apparently any change in the blood-pressure or in the laboratory findings.

Nicosia, Cyprus. GEORGE J. SPANOPOULOS.

THE CHEST PHYSICIAN

SIR,—The correspondence on the tuberculosis services has continued now for some time, and is serving a very useful purpose in bringing to light the difficulties in this period of change.

It had appeared that the long fight for recognition of the chest physician as a specialist had been won, and that the service could now compete on equal terms with other specialties for the most able consultants. Now, however, it seems that the service dealing with our most urgent health problem is to be handicapped permanently by an inferior status, reflected in a lower scale of remuneration, as the result of separate contracts with the regional board and the local authority. That this would be fatal to future standards in the service is only too obvious.

It is difficult to understand why it was necessary to divide the two aspects of the work. In fact, no division is possible. What is the chest physician supposed to do for the local authority at the proposed lower rate? Is it the examination of contacts, or others, with the object of securing early diagnosis; and is this "clinical" medicine if carried out for the benefit of the individual, and "preventive" medicine when a possible source of infection in the community is in mind? Or is it the promised scheme of B.C.G. vaccination that carries lower remuneration? If so, then skilled clinical work is to be rewarded at one rate by the regional board and at another and much lower rate by the local authority.

Perhaps it is the time spent by the chest physician in investigating the tuberculous patient's social background that is to be paid at this lesser rate. Yet time may have to be spent similarly by the chest physician working in a hospital or sanatorium, and indeed by physicians in other fields, if they take a proper interest in the social aspects of illness. It has not so far been suggested that the principle of the divided contract shall apply to them.

Whatever may have been the origin of this unfortunate suggestion, it should be dropped. At a time when the social aspects of disease are being more clearly understood, it is a most serious error to single out preventive and general care work, in tuberculosis particularly, as an inferior occupation.

Theydon Bois, Essex. HUGH RAMSAY.

THE CONCEPT OF GENETOTROPHIC DISEASE

SIR,—I cannot resist the impulse to comment on the article by Professor Williams and his colleagues in your issue of Feb. 18. The writers claim that a fundamental concept has been recently added to medicine by the study of the genetical basis of biochemical differences. The subject of biochemical genetics is indeed rapidly growing at the present time. Its contact with medicine, however, is of at least fifty years' standing. I find it astonishing, therefore, that the writers, who now propose to add a new name, "genetotrophic," to our overburdened medical vocabulary, appear to be unaware of the work of A. E. Garrod. In an article on alkaptonuria subheaded "a study in chemical individuality," and published in THE LANCET in 1902,[1] he discussed the inherited chemical diversities, which could account for individual reactions to common diseases, as well as those rare chemical specificities whose genetics could be more easily studied. Unlike the nebulous concept of "genetotrophic" disease, Garrod's ideas were clear and really fundamental.

The Galton Laboratory,
University College, Gower Street,
London, W.C.1. L. S. PENROSE.

BACTERIAL CONTAMINATION OF AIR IN UNDERGROUND RAILWAYS

SIR,—Your issue of Jan. 21 contained an interesting survey, by Dr. Williams and his colleagues, of the bacterial flora in the air in underground trains.

During the late war some investigations were made on the flora in the throats of shelterers on the four underground platforms at Waterloo station. At the height of the Blitz some 1500 people slept each night on these platforms. In addition, some 80,000 were disgorged daily from the trains; and during the rush hours many thousands picked their way past these shelterers. The latrines were below the sewage level and were supplied with buckets which had to be manhandled to a central point and evacuated by suction-pumps from an open cistern. Every three minutes a train, arriving or leaving, acted as a pair of bellows, sucking the air from every nook and cranny, and spraying it over the occupants.

The authorities, fearing the spread of infectious diseases, had each cot numbered and each shelterer given a corresponding ticket; ticket-holders had to attend the Red Cross hut on the platform, where they were card-indexed and medically examined as regards lungs, throats, and general cleanliness.

The Minister of Health and the medical officer of health visited this centre and suggested that a cross-section of the occupants should have their throats swabbed periodically. Every night two occupants from each platform had their throats swabbed; to make the result as uniform as possible we started alternately from the centre and the ends of the long line of cots. These swabs were collected about midnight each night and taken to St. Mary's Hospital laboratory.

The experiment was discontinued after 52 consecutive weeks (March, 1941, to March, 1942) because the laboratory reported no variation from the flora obtained from the throats of pre-war Londoners.

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[1] *Lancet*, 1902, ii, 1616.

It was thought at the time that the piston-like action of the trains pushed and pulled the contaminated air through the entire tube system, evacuating it through the air-shafts and so preventing mass accumulation of pathogenic bacteria.

London, W.C.2. J. R. M. COLLIE.

PNEUMOCONIOSIS AFTER EXPOSURE TO SULPHUR DIOXIDE FUMES AND DUST FROM COKE FIRES

SIR,—Dr. Dunner and his colleagues (Feb. 11) have misunderstood the purpose of my letter (Jan. 14) commenting on their article of Dec. 31. I was concerned only to point out that their conclusions should be taken as tentative until more and better evidence is forthcoming. I am glad to see that they have now written to emphasise the same thing. I certainly do not seek to claim that pneumoconiosis could in no circumstances be caused by coke ash; indeed I wrote: "It is, of course, possible that pneumoconiosis can arise in exceptional circumstances." I am not yet convinced that in fact it does occur at all. I am still less convinced that it appears in anything like the proportion of cases they claim.

Medical Department,
South Eastern Gas Board,
589, Old Kent Road, London, S.E.15.
R. E. W. FISHER.

THE CARNAGE ON THE ROADS

SIR,—I heartily endorse the views expressed by Dr. Learoyd in his article of Feb. 25. The question, it seems to me, is this: who is to start a vigorous national campaign to give effect to these proposals, which, in my opinion, are by no means unduly severe?

Dr. Learoyd contends that the strict training of drivers would halve the death rate; and certainly a large proportion of drivers have never been properly trained, are almost totally ignorant of correct driving procedure, and have never been called upon to undergo the driving test, for what it is worth. Yet often these people do their best to spread their own disability by attempting to teach others, who may not at first pass the driving test but career along with a couple of "L" plates as the only safeguard.

Nobody but a properly qualified driving instructor should ever be allowed to put another new driver on the road; and the candidate for a test should have to produce a certificate showing that he or she has undergone a proper course of instruction.

I would go further than Dr. Learoyd, and propose that every driver ought to be subjected to a driving test every five years, irrespective of his record or qualifications.

Wyatt's School of Motoring,
Winton, Bournemouth
D. T. WYATT.

FERTILITY AND FAMILY PLANNING

SIR,—In the report on family limitation,[1] prepared for the Royal Commission on Population by the Royal College of Obstetricians and Gynæcologists, it was stated that 23% of all children born to parents who practised birth-control were unplanned. This is a high failure-rate. The experience of family planning clinics is that the "unaccountable" (and possibly inevitable) failure-rate is from 1 to 3%. Medical advice on methods best suited to the individual case and educational propaganda are essential before the recommendation of the Royal Commission, that "public policy should assume and seek to encourage the spread of voluntary parenthood," can be fulfilled.

It is a great pity that the investigation carried out by the Royal College did not cover larger numbers. Only 3120 out of the 13½ million women who married between 1910 and 1947 are included. Even these are not representative since 64% came from London and Glasgow and there was admittedly "a greater proportion of the less well-to-do sections of the population."

In addition to the questionaries on which the report is based, about 7000 were completed from a "maternity" group and general-practice contacts, and other such sources. Had these been included, the survey would have been far more comprehensive, and some valuable data about women in the present child-bearing group would have been obtained.

Family Planning Association,
64, Sloane Street, London, S.W.1.
M. A. PYKE
Hon. Secretary.

SOCIAL SIGNIFICANCE OF SYMPTOMS

SIR,—Dr. Gooddy has done a service in bringing this question to light in his article of Feb. 11. His solution, though it may superficially satisfy some doctors, will not satisfy the patient.

Undoubtedly the inadequate structure of the society in which we live plays a prominent part in the ætiology of many diseases. At one time such illnesses in the wealthy, especially if without organic involvement, formed a remunerative field in medical practice: but in "State" patients they become a nuisance. The National Health Service has given to poorer people a greater chance to bring their symptoms to the doctor; and in many cases the doctor, in caution or desperation, passes the patient on to the hospital clinic. At the same time basic social difficulties are increasing and therefore "social illness" is becoming more rife and also taking up more of the doctor's time. Palliation by voluntary societies, National Assistance, housing priorities, sedatives, and so on, should be regarded as only an emergency measure. In a civilised community the degree of palliation required should be used as an index of the shortcomings of society as a whole.

The "socially" sick are a nuisance to their doctors and their friends, but they come to us for advice and we are in as good a position as anyone to see their difficulties clearly. We would be shrinking from our duty to the individual, who requires to be cured, and to the community, which requires to be protected, if we did not face this problem and advise and assist society, through individuals and organisations, to put itself right.

Kilcot, Glos. AUBREY KAGAN.

ARTERIAL CALCIFICATION

SIR,—Last week's contribution by Sir Adolphe Abrahams should clarify some nebulous ideas about the significance of arterial calcification. He shows that this can occur in the young, be present for many years, and during this time produce no evidence of impaired efficiency. No doubt you will now receive many letters substantiating this by quoting other examples.

I have before me an X-ray film of the pelvis and upper parts of the femora of a young woman who, when the film was taken, was aged 26 and a member of the W.R.N.S. Her complaint was appendicitis and complications and she had no symptoms referable to the legs. In this film the femoral arteries, both superficial and deep, on each side can be clearly seen throughout their courses because they are outlined by a thin layer of radio-opaque material, presumably calcareous. In addition, on the right side the internal iliac, and on the left the internal circumflex arteries are similarly outlined. Wondering what the significance was in such a young person, I have kept this film for some years.

We must be indebted to Sir Adolphe Abrahams for clearly demonstrating that calcification in certain arteries may be present at an early age and have little or no significance over the course of many years.

Surgical Unit, the Royal Infirmary,
Cardiff.
LAMBERT ROGERS.

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[1] Family Limitation and its Influence on Human Fertility During the Past Fifty Years. H.M. Stationery Office, 1949; see *Lancet*, Jan. 14, p. 78.

THE BODY-IMAGE IN NEUROLOGY

SIR,—Dr. Critchley's striking article of Feb. 25 reminds us that the ancients held that the seat of the soul was in the pineal body. This belief may well have arisen through some philosopher's subjective speculations leading to a dissection which disclosed the central and unique organ which corresponds in position with Claparède's "cyclopean eye." The suggestion of a similar belief is embedded in our language in the expression "the mind's eye." But at least one woman, otherwise normal, whom I have questioned on this matter refers the consciousness of her bodily parts to a region not within the skull, but to somewhere in front of the nasal bridge, thus making all her body-image posterior.

As to monsters, a serial ran in the *Berliner Zeitung* some fifteen years ago relating the strange lives of Chang and Eng, the Siamese twins.

By that account, if I remember rightly, they shared little else than their income from exhibiting themselves, their inseparability, and their blood-stream. The latter indeed proved a bone of contention, since Eng was studious and Chang was drunken. Eng therefore suffered the torments of an involuntary intoxication consequent on his brother's excesses, and at last for that cause went to law with Chang. The case was settled by a compromise in which two apartments were furnished in their house, one as a library for Eng and the other as something like a saloon bar for Chang, in each of which they divided their time equally. But, though Eng's blood-stream was still at the mercy of Chang, the latter had a mind and nervous system of his own, which did not learn by Eng's studies; and the latter continued to suffer by his brother's proximity even to death, when the decease of Chang left him irrevocably attached to a corpse, and with the knowledge that where his brother had gone he was shortly to follow.

Wallasey, Cheshire. R. L. WYNNE.

TREATMENT OF TUBERCULOUS MENINGITIS WITH STREPTOMYCIN

SIR,—I read with much interest the excellent article by Dr. Russell and Dr. MacArthur in your issue of Jan. 14.

A relapse took place in seven of their young patients who had been expected to progress satisfactorily. So far as can be judged, Dr. Russell and Dr. MacArthur based a good prognosis in the early stages on clinical observation only. This is often insufficient evidence. I have seen children apparently moribund who in 2–3 days became quite alert; and the temperature can drop immediately. But there was no change in the cerebrospinal fluid (C.S.F.). In none of the cases reported by Russell and MacArthur had the C.S.F. returned to normal; and in three cases the sugar content had been low in successive specimens for some time before relapse.

The question is: is it right to speak about relapse where the child shows clinically favourable response but in the C.S.F. there are the characteristic signs of tuberculous meningitis? We were told by Hinshaw, Feldman, and Pfuetze [1] that exceptionally tuberculous meningitis can be cured in six weeks. But in 4 cases of tuberculous meningitis treated with streptomycin, who died after 16, 32, 45, and 76 days of illness, Péro [2] found a thick exudate over the entire base of the brain. Debré et al.[3] found thick exudate over the base of the brain after 2, 3, 21, and 45 days' treatment. Levinson [4] found that it often took 3–3½ months for the C.S.F. cells to reach normal, and the C.S.F. protein level gradually tapered off to normal in 4–5 months if the patient recovered; so it is perhaps best to avoid the term "relapse" when the child has been treated for less than three months and the C.S.F. is still abnormal.

Most workers hold that if the C.S.F. cells and protein decrease they may expect the child to recover. I have often found that when the child progressed satisfactorily, the C.S.F. in the cells and protein content decreased, while the sugar-level was low showing that the tuberculous meningitis was in the active stage. A low C.S.F. sugar-level may not indicate liability to deteriorate clinically, but it does indicate that the tuberculous meningitis is in the active stage; and the condition may thus respond immediately to streptomycin.

The prognosis in tuberculous meningitis depends on three factors:

1. Improvement of the primary tuberculous complex so that no new spread takes place.
2. Healing of the tuberculous meningitis, shown by clinical investigations and laboratory data.
3. Freedom of the brain from tuberculomata or tuberculous abscess, which often develops during the healing of tuberculous meningitis. The patient can be cured of tuberculous meningitis and die of tuberculosis cerebri.

This last feature is not surprising, because streptomycin cannot penetrate into the brain. However, the streptomycin content of the blood offered to the brain can be augmented. For this reason I have undertaken procaine block of the stellate ganglion; and we want next time to infiltrate with procaine the superior cervical ganglion. We must think more of cerebral tuberculosis if we are to cure tuberculous meningitis more often.

Bródy Children's Hospital, Budapest. BÉLA STEINER.

MECKEL'S DIVERTICULUM

SIR,—Mr. Ward-McQuaid's article of Feb. 25 prompts me to raise the question of when to interfere with a healthy Meckel's diverticulum found *incidentally* in the course of an operation for some other complaint. The following tragedy is perhaps illustrative:

A trooper was admitted to a field surgical unit eleven hours after sustaining a shell wound of abdomen. At laparotomy there was severe general peritonitis from a through-and-through wound of the cæcum. A healthy Meckel's diverticulum was noted, but no action was taken. The cæcum was exteriorised.

He developed an infection of the laparotomy wound. My unit moved forward shortly afterwards, and a follow-up note records that his general condition was excellent 22 days after operation, except for bouts of abdominal colic. On this day he had to be evacuated owing to circumstances beyond anybody's control, and he died in a C.C.S. the next day. Autopsy revealed the Meckel's diverticulum fixed to the left side of the posterior abdominal wall, and coils of small intestine strangulated through the loop thus made—a common enough picture.

Since then I have made a practice of removing a healthy Meckel's diverticulum when general peritonitis is present. Although the resulting suture-line may be liable to adhere to some other structures, there seems less possibility for the formation of a strangulated hernia of small intestine.

Hartley, Plymouth. D. VELLACOTT.

SIR,—Mr. Ward-McQuaid, in his article of Feb. 25, has once again reminded us of the dire consequences which may befall a patient with a Meckel's diverticulum which has undergone pathological change.

He rightly emphasises the importance of examining the last few feet of the ileum when the appendix is found to be normal in a case of suspected appendicitis. I would go further and suggest that the last few feet of ileum should always be examined at laparotomy. It takes but a few seconds to ascertain the presence of a Meckel's diverticulum, and a decision to remove it may be taken. It has always been my practice to make this examination and to remove the diverticulum, provided that the main operation has not been one of extreme severity and that

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1. Hinshaw, H. C., Feldman, W. H., Pfuetze, K. H. *Amer. Rev. Tuberc.* 1946, 54, 191.
2. Péro, Cs. *Orv. Hetil.* 1948, 89, 449.
3. Debré, R., Thiefry, S., Brissaud, H. E. La Streptomycin. Paris, 1948.
4. Levinson, A. *Amer. J. Dis. Child.* 1949, 77, 709.

the patient's condition will permit of a little extra operating-time. This surely is as sound a practice as routine removal of the appendix, for neither structure is a respecter of age or person. It is not uncommon to find a band running from the apex of the diverticulum to some other part of the abdominal cavity; and even if the diverticulum is not removed this band can be quickly divided and a dangerous source of intestinal obstruction removed. General peritonitis from a perforated Meckel's diverticulum has, in my experience, been an extremely lethal complication, since the "walling off" is flimsy, and the peritoneal cavity is rapidly infected with the contents of the small gut.

My old chief, the late Cecil Joll, always looked for a Meckel's diverticulum at laparotomy. He often quoted the case of a colleague's son upon whom he operated for acute appendicitis. He found not only an inflamed appendix but also an inflamed Meckel's diverticulum.

The removal is not difficult, provided that narrowing of the lumen of the ileum is avoided by repair of the bowel-wall in its transverse axis. Resection of a length of ileum is rarely necessary—a fact which may comfort the "occasional" surgeon who has to perform emergency laparotomies.

Aylesbury, Bucks. RALPH H. GARDINER.

TUBERCULOUS MENINGITIS IN CHILDREN

SIR,—Dr. MacCarthy and Dr. Mann state in their important article of Feb. 25 that the relapse of one of their cases was likely to have been precipitated by a pneumo-encephalogram which had been done ten days previously. Of their 43 cases, 20 are stated to have shown no initial response to treatment and all died. Of the remaining 23 recrudescence or relapse of the infection occurred in 12—over half the cases. In only 1 of these did pneumo-encephalography precede the relapse; and therefore it is more than doubtful whether it had anything to do with it, especially as the intervening period was rather long. It is impossible to prove that this relapse would have occurred without this intervention, but it seems reasonable to suppose that it could easily have happened, in view of the high relapse-rate in their series.

In my experience of over sixty pneumo-encephalograms and ventriculograms in tuberculous meningitis I have not yet seen a relapse as a result of this procedure.

Department of Child Health,
University of Sheffield.

JOHN LORBER
Research Assistant.

SIR,—Dr. MacCarthy and Dr. Mann are to be congratulated on the comprehensive account (Feb. 25) of their cases of tuberculous meningitis in children. We are particularly interested in the cerebrospinal fluid (C.S.F.) findings, and would like to comment on the fact that the C.S.F. chloride is not once mentioned. We have found chloride estimations helpful in prognosis, though this experience does not accord with that of others.

From a smaller series of cases, some of whom are still under active treatment, it has been noted that: (1) no case has died with the C.S.F. chloride above 660 mg. per 100 ml.; (2) every survivor, after initial fluctuations during the first two months of intrathecal streptomycin treatment, has shown a gradual but steady rise in chloride content towards, and beyond, 700 mg. per 100 ml.

One patient during the last eighteen months has four times been treated and discharged clinically well, and has then suffered a recrudescence; and she is now undergoing a fifth course of treatment. On the four occasions of discharge the C.S.F. chloride was 583 mg., 625 mg., 550 mg., and 710 mg. per 100 ml. In the present state of our knowledge, these values suggest that she should not have been discharged on any of these occasions, because on the first three the chloride was well below 700 mg. per 100 ml., and on the last this value was only just attained.

Furthermore, the C.S.F. chloride value is not significantly affected by slight delay in making the estimation; and the result is more accurate than that from estimation of glucose content, which may be misleading if delayed more than ten minutes after withdrawal of the fluid.

In our experience estimation of C.S.F. chloride has been of some prognostic value in cases of tuberculous meningitis treated with streptomycin.

W. MESTITZ
Pædiatrician.

Royal Alexandra Hospital for
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D. PULLEN
Clinical Pathologist.

RHEUMATIC FEVER AND MILK

SIR,—In an interesting article on Diet and Disease in the Subarctic, Duncan[1] refers to the absence of rheumatic fever in a semi-closed community in the Yukon. For fourteen years, he says, he tried to find a typical case, but without success, although there were at least 350 children under fourteen years of age in his care during this time. His statement is of particular interest in view of the fact that the ætiology of rheumatic fever is still a puzzle. There is a considerable amount of evidence that the disease is a manifestation of allergic hypersensitivity to the streptococcus or its products, and I would like to draw attention to some further evidence in support of this claim.

We know that the original sensitising dose of antigen, in any allergic disease, need only be minute, and that in the experimental animal 0·000001 ml. is sufficient to produce the anaphylactic state.[2] If we include rheumatic fever in the allergic category, a small original dose of streptococcal antigen will be enough to induce the state of sensitisation which is, presumably, a prerequisite of the disease. We know also that in infancy the ability of the gut to absorb foreign protein—e.g., B.C.G. vaccine —is high. *The possibility of sensitisation to the streptococcus* being produced in infancy from occasional doses of streptococci or their products in the feeds should therefore be remembered. Such doses may occur in cow's milk. Gunnison et al.[3] examined a series of milk samples and obtained strains that were potentially dangerous to man, though only from less than 1% of the samples. If supplies are bulked, however, the distribution of potentially dangerous milk will be wide. An official leaflet[4] points out this possibility. It states that milk from cows infected with mastitis should never be mixed with the bulk of clean milk, but as most cases are subclinical a considerable amount of such milk is, in practice, inevitably present in the bulk. It is possible that the streptococcus responsible for this condition has antigenic properties in man, but, whether this is so or not, it has been found that human strains of streptococci can infect the udder.[5] With this in mind I inquired of Dr. Duncan as to the extent to which raw milk was used as an infant food in his community. His reply was as follows:

> "Practically all the milk used in this country is of the canned condensed variety. There is some powdered milk used, but it is not as convenient as the canned type. There is only one small dairy in the Yukon and it sells a small amount of raw milk to Dawson. I don't allow my patients to feed it to the local babies."

This answer, then, provides a possible clue to the ætiology of rheumatic fever. It is a clue which harmonises with many of the known epidemiological features of the disease. Geographically it is confined mostly to temperate climates, being rare in the tropics, where fresh milk must be boiled in order to improve its keeping qualities, and in subarctic regions, where it is not widely available.

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1. Duncan, A. C. *Lancet*, 1947, ii, 919.
2. Rosenau, J. F., Anderson, M. J. *Arch. intern. Med.* 1909, 3, 519.
3. Gunnison, J. B., Luxen, M. P., Marshall, M. S., Engle, B. Q. *J. Dairy Sci.* 1940, 23, 447.
4. Ministry of Agriculture and Fisheries: Advisory leaflet no. 258.
5. Little, R. B. *J. exp. Med.* 1938, 68 905.

If the hypothesis suggested is well founded, the practice and maintenance of breast-feeding of infants or, alternatively, the use of dried-milk preparations or sterilised liquid milk in infant feeding would constitute an important preventive measure. In addition to the Yukon, two other semi-closed communities which enjoy relative freedom from the disease will be mentioned, and in both the incidence of breast-feeding is high. The first consists of two districts in Shetland; the second is Iceland.

The medical officer of health for Shetland, who has records extending over several years, states that a comparison of his statistics with those relating to places on the mainland of Scotland or England leads him to conclude that breast-feeding is more widely practised in his area than elsewhere.[6] In two districts—namely, Burra Isles and Unst—which, it will be shown, have a low incidence of rheumatic fever, the percentage of infants wholly breast-fed at three months was about 64. The corresponding figure for the mainland has been variously stated. In a mining community it was below 41 [7]; for England and Wales generally, about 50 [8]; while in Scotland, according to an official report, "it does not at once appear that the incidence of breast-feeding is less, or that lactation is less well maintained, than in England," and for some well-to-do communities high rates are quoted.[9] But Shetland differs from the mainland in one important respect. Cow's milk was never widely used when bottle-feeding was resorted to, because in many places it was not available. This is illustrated in the Burra Isles, where, at December, 1948, according to the records of the local food office, permits for tinned milk in lieu of fresh milk were in force on behalf of 149 households out of a total of 170. And here rheumatic fever is uncommon. The medical practitioner has seen only 4 cases in twelve years.[10] With an estimated population during this time of 725, the incidence is found to be 0·46 per 1000. The incidence for Scotland as a whole, calculated from the crude death-rate for rheumatic fever and the general mortality-rate given by Glover,[11] is 4·5 per 1000. On the island of Unst the practitioner has seen not more than a dozen cases in the whole course of his fifty years in practice there.[12] This gives the phenomenally low incidence of 0·12 per 1000, taking the average population during the period as 2000.

The other example of the association of high breast-feeding rate with low incidence of rheumatic fever is Iceland. In Reykjavik, with a population of just over 37,000, 97% of the infants are wholly breast-fed when the midwife leaves, and "until recent years all infants were breast-fed 6 to 10 months." [13] For the island as a whole (population 114,000) the corresponding percentage is 90.[14] Strand,[15] who collated his own estimates with those of three general practitioners, states that at three months 60–65% of infants in the towns and 75–80% in the country are breast-fed. Of the rarity of rheumatic fever in Iceland there seems to be no doubt. There were only 9 deaths from it in the decennium 1929–38—a crude rate of only 0·8 per 100,000, as opposed to 4·5 per 100,000 in Scotland. In the same decennium, 1533 cases were notified. The mortality-rate accordingly is 0·59 per 100 cases—a low value which confirms the observations made by a correspondent [16] in THE LANCET that the disease in Iceland is of a mild type. The incidence is also low, the rate from these figures being 1·34 per 1000 of the population.

It may be objected that, because the incidence of breast-feeding in the United Kingdom has been declining, rheumatic fever should, by this hypothesis, have tended to rise in recent years—which it has not done. Several points go far to meet this objection—namely, the improving standard of milk quality, the growing practice of boiling milk which is being prepared for the feeding-bottle, the use of dried milk as baby-food, and, finally, pasteurisation. If the pasteurisation of milk reduces the incidence of rheumatic fever—and some milk-borne streptococci are known to be destroyed by this measure—then mortality from rheumatic heart-disease will fall in those areas where it is widely employed. The administrative county of London is such an area. In 1939 nearly 93% of the milk was pasteurised under licence, and over 98% was heat-treated in some way or other. In the rural districts of England and Wales probably only a small proportion of the milk was pasteurised in 1939. This situation was reflected in the death-rates from non-respiratory tuberculosis.[17] It is known that a proportion of deaths from this cause are the result of milk-borne infection and that the danger of this infection is removed by adquate pasteurisation or other form of heat treatment of the milk. Wilson [17] has shown that the fall between 1911 and 1937 in the 0–4 and 5–14 age-groups has been far greater in London than in the rural districts, though during these years the respiratory-tuberculosis death-rate fell to almost the same extent in the rural districts as in London. There are grounds for believing that mortality from rheumatic fever behaved in the same way. It cannot be directly investigated, but there are good reasons for adopting as a measure of its extent the 5–14 age-group death-rates from heart-disease.[18] This rate fell 63% in London, while in the rural districts the fall amounted to only 32%, as is shown by the following figures for the death-rate from this cause per million persons aged 5–14:

	1911		*1937*
London administrative county	281	..	103
Aggregate rural districts..	91	..	62

Knowelden [18] showed that between the years 1920–22 and 1936–38 in both the 5–14 and the 15–24 age-groups the death-rates from heart-disease for both males and females fell much more in London than in the rural districts. He called it a curious local phenomenon with no obvious explanation. The present hypothesis, however, supplies one. Further study of the geographical distribution of rheumatic heart-disease and non-respiratory tuberculosis both in this country and in the U.S.A., provides additional support for such a view.

Milk-borne streptococcal outbreaks have frequently been recorded. Occasionally these have been followed by outcrops of rheumatic fever. It may be that a milk-borne allergen is a fundamental factor in the ætiology of the disease, and if so, withholding of raw milk from the diet during treatment will have a favourable effect. This is a practicable line of further inquiry, and I hope sufficient interest will have been aroused to encourage someone to adopt it.

I am grateful to Mr. Daniel Lamont, Gilbert Bain Hospital, Lerwick, for issuing the questionnaire, and to the medical practitioners for coöperating; to Dr. S. A. B. Black, medical officer of health, Shetland, Dr. A. C. Duncan, Yukon, Dr. K. Strand, London, and Dr. Brian Roberts, Cambridge, for relevant information; and to Prof. C. H. Browning and several colleagues in the Department of Health for Scotland, for guidance in the presentation of this material.

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T. W. BUCHAN.

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[6] Black, S. A. B. Personal communication.
[7] Hughes, E. L. *Brit. med. J.* 1948, ii, 597.
[8] Ministry of Health: Reports on Public Health and Medical Subjects, 1943, no. 91.
[9] Department of Health for Scotland: Report on Infant Mortality, 1943.
[10] Durham, J. R. Personal communication.
[11] Glover, J. A. *Lancet*, 1930, i, 499.
[12] Saxby, T. E. Personal communication.
[13] Ofeigsson, O. Personal communication.
[14] Public Health in Iceland, 1937–44. Reykjavik, 1940–47.
[15] Strand, K. Personal communication.
[16] *Lancet*, 1929, ii, 748.
[17] Wilson, G. S. The Pasteurisation of Milk. London, 1942; p. 155.
[18] Knowelden, J. *Brit. J. soc. Med.* 1949, 3, 29.

"SUFFOCATION" IN INFANCY

SIR,—Leading articles by THE LANCET have come to achieve the weight of legal pronouncements, for they usually have the strength of authority and reason—and are well informed. But the article in your issue of Feb. 25 is wholly illogical and grossly misleading. It has caused no small disquiet among forensic pathologists and it is not far short of libellous to coroners.

F. B. Smith, whose sound arguments it so misrepresents, pleads for honesty at autopsy and for recourse to the laboratory when in doubt. He suggests "unknown" as "preferable" to guessing, not "more accurate," and he certainly did not suggest that coroners "are usually interested only in the legal aspects" of infant deaths from suspected suffocation. Coroners have a duty to ascertain the facts, and there is no limit to the trouble or expense they may entertain to achieve this end. It is quite untrue to say that "necropsy is seldom ordered, and the doctor's opinion of the cause of death is accepted"—not true, that is, except in some rural districts where advance is slow. It is certainly not true in London, where every such case is subject to the revealing light of autopsy and laboratory test where desirable.

To caution the doctor against a casual acceptance of suffocation in infants found asphyxiated in bed, as I[1] and others have, is apparently to convince some that suffocation must be suspect, not suspected. This is an elementary illogicism, and Smith has not made it, as your article asserts.

Children found dead on their faces *may* have suffocated; let us ascertain the real truth, as Smith says, by every means at our command without bias, and we shall then have facts which *might* enable THE LANCET to say that 40% of such children are, in fact, undoubtedly suffocated—not that "most of the infants supposed to have died from accidental suffocation really died from natural causes." This is a bare majority and it is grossly misleading to quote it so; it would be fairer to say that coroners are anxious to ascertain the truth of this everyday disaster, willing to cooperate with the pathologist in his efforts to do so, and cognisant with him of the established fact that about a half *are* suffocated and a half are not. The rough truth is better than dangerous misrepresentation.

Guy's Hospital, London, S.E.1. KEITH SIMPSON.

*** Our remark about coroners was not quoted from F. B. Smith: it was a paraphrase of W. H. Davison's comment that "as over 70% of coroners have no medical qualifications their interest is mainly confined to the purely legal aspect of each case" (*Brit. med J.* 1945, ii, 251). We gladly accept Dr. Keith Simpson's assurance that, where suffocation is suspected, post-mortem examination is nowadays ordered more than "seldom." It is true that, of the 233 cases of asphyxia in infants covered by Dr. Simpson's survey, 93 (40%) were attributed to suffocation (*Lancet*, 1947, ii, 745); but in view of the lower figures of other observers we doubt whether his rough truth that "about half *are* suffocated" is any less rough than our own statement that "it seems probable that most of the infants supposed to have died from accidental suffocation really died from natural causes."—ED. L.

FÆCAL UROBILINOGEN IN SULPHONE THERAPY

SIR,—In his article of Jan. 28, Dr. Lowe wrote: "The Schlesinger test for urobilin in the urine is useful in cases of suspected toxicity, for the test with Ehrlich's reagent does not work when sulphones are present in the urine." We have had the same experience with 'Sulphetrone' and would like to add some observations on the determination of fæcal urobilinogen in the presence of this drug.

During the treatment of tuberculous patients with sulphetrone at St. Andrew's Hospital, London, E.3, routine analyses of fæcal urobilinogen were carried out in an attempt to assess the degree of hæmolytic anæmia caused by the drug; we were working on the arbitrary assumption that sulphetrone did not inhibit the bacterial synthesis of urobilinogen.

Ehrlich's quantitative *p*-dimethylaminobenzaldehyde reagent was used according to Maclagan's[1] procedure. As distinct from the usual practice, it was found necessary in these cases to read the colour intensity in a photo-electric colorimeter immediately after mixing with saturated sodium-acetate solution. The colour faded rapidly, reaching about a third of its original intensity within 10 sec. The reaction between urobilinogen and the aldehyde proceeded normally before the addition of sodium acetate, and the reaction-time of 10 min. was found to be essential for full colour development.

To ascertain whether fading was due to the presence of sulphetrone or of a metabolic product, the urobilinogen content of normal fæces was determined with and without the addition of the drug (using 9 ml. of a solution containing 100 mg. per 100 ml. to triturate 1·5 g. fæces). The normal test solution contained 76 mg. urobilinogen per 100 g.; that containing added sulphetrone had 79 mg. per 100 g. on immediate reading, followed by rapid fading. Similar experiments adding sulphanilamide, sulphadiazine, and succinylsulphathiazole in the same concentrations showed no interference with normal urobilinogen estimations.

In the stage preceding the addition of sodium acetate, the strongly acid solution should contain the drug in the free diaminodiphenyl sulphone form. This does not seem to prevent the interaction of urobilinogen and the aldehyde reagent. Subsequent interference by the sulphone may be due to the formation of an azomethine (possibly the known N-(*p*-dimethylaminobenzylidine)-*p,p*-sulphonyldianiline[2]) which would be unstable in strong acid but stable in a weakly acid acetate buffer.

The trial of sulphetrone in tuberculosis was later discontinued, and this subject was not pursued. No publication of these findings was intended until it appeared that they might be of use to workers in the leprosy field.

A. L. TÁRNOKY

London, E.3. V. ANNE L. BREWS.

PERSONALITY AND NURSING

SIR,—It is always unwise to be too optimistic about the results of an experiment until it is completed, particularly when the data are inadequate. In their article of Feb. 25, Mrs. Petrie and Miss Powell suggest that their battery of tests should be used for the selection of candidates for nursing; but the preliminary tests, as stated in the summary, were done on student nurses who had already done over six months' training. The "switch-over" from students to candidates can only be justified if it can be assumed that six months' training as a nurse—for example, at 19 years of age—has no effect on personality test scores. Such an assumption is probably not correct, although it may be.

The deduction that the use of tests would enormously reduce the number of unsatisfactory nurses is unwarranted. The tests were applied to those who had already been selected, to pick out the best three-quarters, since a quarter are unsatisfactory. To compensate for the elimination of these, the original interviews will have to pass about 10% more candidates. Now if the interviews have any effect at all, it is clear that, as a greater proportion of candidates is passed, the quality of the additions will tend to fall. The best 10% are included in the best 20%, which are included in the best 30%, and so on. The essential point is that it is invalid to argue from a sample group to the population from which it has been selected, until the basis of selection is known and the efficiency with which it has been carried out. For those not statistically minded, an example will make this clearer.

We will consider the two extreme situations, and assume for the moment that the selection committee is perfect.

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[1] *Lancet*, 1947, ii, 745.

[1] Maclagan, N. F. *Brit. J. exp. Path.* 1946, 27, 190.

[2] Jain, B. C., Mirchandani, P., Iyer, B. H., Guha, P. C. *Science and Culture*, 1946, 11, 567. See also Freedlander, B. L., French, F. A. *Amer. Rev. Tuberc.* 1947, 56, 360.

This implies that only $22^{1}/_{2}$% of the candidates will make good nurses. The committee selects this $22^{1}/_{2}$% plus another $7^{1}/_{2}$% to make up the 30% of acceptances. Of those selected, a quarter will not make good nurses. In such a case, the use of the tests will not make any difference to the final results, assuming that the tests are going to pick out the good three-quarters. Now let us assume that the selection committee has zero efficiency, so that its efforts are equivalent to picking names out of a hat. This implies that 75% of the candidates will make good nurses. The committee selects 40% of the candidates and the tests then pick out the good three-quarters. In this case, all failures will be eliminated, and the tests do all the work. It is reasonable to assume that the present situation lies between these two extremes, but until the exact state of affairs is known it is impossible to estimate what the tests will do.

Both of these points are of minor importance in comparison with the next. The investigation is essentially one concerned with prediction: is it possible to predict, by means of tests, which candidates will make good nurses? The only way to find out is to use the tests for prediction. Apparently this has not been done. It can be demonstrated on theoretical grounds that the correlation between obtained results and predicted results is much less in a check sample than in the original sample, when the best tests are selected according to the data of the original sample. "No matter how well the criterion and the weighted prediction scores correlate for the sample, this correlation will tend to drop materially on successive samples."[1] Actual experience confirms this.[2–4] A multiple correlation of 0·6 may seem very high, but the figure is likely to be only 0·3 when the tests are applied to the next batch. If so, it will not be of great value for individual prediction.

It is not my intention to decry the value of scientifically validated tests against the amateur selections of untrained interviewers. A very strong case could be made that most interviewers do not know what they are selecting and why—i.e., they are unable to define the characters they are looking for, or the relation these characters have to the demands of the job. On the other hand, the use of tests in this country is very new, and one that is still greeted with some suspicion. It will only be a hindrance to the development of scientific methods of selection if enthusiastic supporters make exaggerated claims for them; for such claims are bound to fall short of the facts when they are finally put to the test. The old methods will be continued, and social waste and individual disappointment will remain undiminished.

London, W.4. MAX HAMILTON.

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1. Horst, P. Editor of The Prediction of Personal Adjustment." New York, 1941, p. 87.
2. Edgerton, H. A. Academic Prognosis in the University. Baltimore, 1930.
3. Sanders, B. S. Testing parole prediction. Proceedings of 65th Annual Congress, American Prison Association. 1935.
4. Burgess, E. W. In The Prediction of Personal Adjustment. New York, 1941.

Public Health

Arsenic in Food

IN a report issued last week the metallic contamination subcommittee of the Food Standards Committee recommends amendment of the standards laid down in 1903 by the Royal Commission on Arsenic. The Royal Commission's recommendations have never been given statutory force (except that in the Edible Gelatin Order, 1948, the Ministry of Food prescribed a limit of 1·4 parts per million [p.p.m.] arsenious oxide in edible gelatin equivalent to gr. $^{1}/_{100}$ per lb.); but the Commission's findings have served as standards in commercial practice and have been accepted as recognised limits in the Courts. The limits adopted by the Royal Commission was gr. $^{1}/_{100}$ per lb. (1·4 p.p.m.) of arsenious oxide for solid foods, and gr. $^{1}/_{100}$ per gallon (0·14 p.p.m.) for liquid foods.

The subcommittee proposes that arsenic contamination should be expressed in terms of the element arsenic (As) and not, as hitherto, in terms of arsenious oxide (As_2O_3); and the arsenic content should be expressed, as with other trace elements, in terms of parts per million.

Water and milk should not, says the report, contain arsenic; but if inadvertently arsenic has gained access to either, it should not be consumed if the arsenic content is more than 0·1 p.p.m. The following limits for arsenical contamination should, it is proposed, be prescribed statutorily:

Beverages, ready-to-drink, 0·1 p.p.m. As (0·14 p.p.m. As_2O_3)
Foods not otherwise specified, 1 p.p.m. As (1·4 p.p.m. As_2O_3).
Foods in a schedule as follows:

	p.p.m.	
	As	*As_2O_3*
Food colourings containing more than 10% of colouring matter	5·0	6·6
Beverage base:		
Total solids up to 35%	0·1	0·14
,, ,, between 36% and 69% ..	0·5	0·7
,, ,, over 70%	1·0	1·4
Edible gelatin	2·0	2·7
Dried herbs, spices, dried liquorice extract ..	5·0	6·6
Dehydrated onions, phosphatic constituents of raising powders, hops and hop concentrate	2·0	2·7

The report suggests that the sale of fresh or processed fish, sea-fish, crustacea, and shell-fish containing arsenic in excess of 1·0 p.p.m. shall not be forbidden provided that such arsenic is natural to the fish.

Fluorine Investigation in Children

Last week the Ministry of Education announced that over 3000 school-children in various parts of England are to take part in a test of the effectiveness of fluoride applied locally to the teeth to prevent caries. The following bodies are participating:

Eastman Dental Clinic with the L.C.C.);
Newcastle Dental Hospi ation authority;
Leeds local education local education
authority; Sheffield D local education
authority; Birmingham Dental Hospital; Bristol local education
authority; and, possibly Middlesex local education authority.

No child will be included in the investigation without the parents' consent. The teeth of the children who are included will be examined annually.

Third Quarter of 1949 in Eire

A report[1] on the third quarter of 1949 in Eire shows that the birth-rate was 22·1 per 1000 of the population. Deaths were at the rate of 10·8 per 1000 per annum. The death-rate from all forms of tuberculosis was 0·8 per 1000 (pulmonary 0·6, all other forms 0·2); the corresponding rates for the third quarter of 1948 were 0·9 (0·7, 0·2). The infant-mortality rate was 44 per 1000 births registered, compared with 38 in the same quarter of 1948. The population at the middle of the year 1949 is estimated at 2,991,000 (1,513,000 males and 1,478,000 females).

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1. Quarterly Return of the Marriages, Births, and Deaths Registered during the September Quarter, 1949. Government Publications Sale Office, 3/4, College Street, Dublin. Pp. 14. 6*d*.

Infectious Diseases in England and Wales

Disease	Week ended Feb.			
	4	11	18	25*
Diphtheria	75	71	80	74
Dysentery	217	325	344	445
Encephalitis:				
Infective	4	2	3	4
Postinfectious	4	2	..	..
Food-poisoning	32	32	16	68
Measles, excluding rubella	3530	4270	4526	4980
Meningococcal infection	33	59	59	31
Ophthalmia neonatorum	22	34	24	55
Paratyphoid fever	3	6	6	6
Pneumonia, primary or influenzal	1187	1228	1190	1098
Poliomyelitis:				
Paralytic	27	29	24	29
Non-paralytic	11	8	15	9
Puerperal pyrexia and fever ..	66	124	80	86
Scarlet fever	1925	1898	2133	2064
Smallpox	..	..	..	..
Typhoid fever	5	3	10	16
Whooping-cough	1588	1657	1652	1679

* Not including late returns.

Obituary

JOHN ALFRED RYLE

M.A. OXFD. M.A., HON. M.D. CAMB., M.D. LOND., HON. D.SC. MCGILL, F.R.C.P.

We have already announced, with deep regret, the death of Prof. John Ryle at his home in Sussex on Feb. 27 at the age of 60. The talents that made him one of the finest clinicians of his time were devoted in his last years to social medicine, in which he attained a world-wide influence. In searching for new techniques and in trying to promote a change of attitude among doctors he encountered the trials of the pioneer; but he achieved much, and his influence will continue.

Son of the late R. J. Ryle, M.D., of Brighton, and grandson of Bishop Ryle, he was educated at Brighton College and at Guy's Hospital, where he was awarded the London University gold medal in medicine and qualified in 1913. From resident appointments at Guy's he went to the war and served with the R.A.M.C. in Belgium and France from 1914 to 1918. Returning to his hospital on demobilisation, he became assistant physician in 1920 and demonstrator in morbid anatomy and medical pathology. The period which followed was one of fruitful investigation, in which Ryle's balanced judgment found a fitting complement in the enthusiasm of Arthur Hurst, both at Guy's and at New Lodge Clinic. His Goulstonian lectures to the Royal College of Physicians in 1925 dealt with Gastric Function in Disease, and he became known for his work on the gastro-intestinal tract; but his studies of cardiovascular disorders are scarcely less valuable. He had been brought up in a school which taught that the way to learn the art of healing was by careful note-taking at the bedside and by a detailed clinical examination of the patient. It was natural that he should become interested in the meaning of symptoms, and he contributed valuable papers on such clinical phenomena as heartburn, "acidity," anorexia nervosa, and spasm of the colon. In his search for the explanation of such symptoms he had perfected (with Izod Bennett) the method of fractional test-meal analysis, and the "Ryle's tube" which formed the means of taking gastric samples is known the world over.

Ryle's wide range and his interest in people made him outstanding as a consultant in difficult cases. But he was also outstanding as a teacher of elementary clinical medicine. He was not spectacular, and never attempted to be a showman; but he brought knowledge and sense to bear on everything he touched. It is a great asset for a teacher to be also a clear thinker, for then he can impart his knowledge to others to the best advantage: possessed of a pleasing voice, which was never raised even in admonition of a careless clinical case-record, he made a deep impression on those he taught.

> "To my generation of Guy's men," writes a former student, "Ryle was supreme. His teaching was exemplary, though at first we did not realise the effort that it cost him. His opinion that 'full notes, frequently perused, are the essence of clinical education,' coupled with his dictum that 'teaching must be fertilised by research,' explains much of his success. He knew all his ward clerks and delivered his message t them, realising that 'postgraduates' wanted differen teaching. His clinical lectures were a stimulus and a joy his perfect diction and choice of words enhanced the unfoldin of a difficult problem. In the post-mortem room his knowledg of morbid anatomy made him a pathologist true to hi school."

It was not only the subject matter of his teaching which will be remembered, but also the method of hi approach to patients; he gave confidence to every patien to whom he ministered, and was adored by many Such was his success that his consulting practice becam larger and more exigent than his physique could bear. The only way to circumvent the limitations it imposed was to leave London, and in 1935, at the age of only 46, he accepted the regius chair of physic at Cambridge. His academic fitness for such a post was shown by his collected lectures and essays appearing in the following year under the title *Th Natural History of Disease*, and it was hoped that he would create at Cambridge a new school of clinical investigation. The early establishment of a university department of medicine, whose members should work closely with Addenbrooke's Hospital, gave high hopes of a flourishing centre of research and teaching. Yet, sad to say, the dream faded as Ryle's enthusiasm met the delays and pinpricks inseparable from the introduction of a new venture into an academic system suspicious of sudden change. The pace was too slow, and it seemed that perhaps he took this too much to heart. Finally in 1939 the war broke up his cherished department: he went back to Guy's, and to work for the E.M.S. and Ministry of Health, and Cambridge saw him less and less. But those who had the privilege of working with him retain the memory not only of a great clinician but also of a transparently honest idealist and of a chief whose friendship and encouragement were invaluable.

His war activities, including a survey in the north-east, and his brave return to Guy's during the time of devastation, told heavily on Ryle's constitution; and it was in this dark period that he turned his thoughts to the problems of fear and pain, of life and death. His book of essays, published in 1941 under the title of *Fears may be Liars*, was directed primarily towards those who were exposed to the stress and sorrows of ruthless war; but they were more widely drawn to include all who suffer in the actuality of pain or the anticipation of death. His philosophy contains no element of escape; the physician is comforter and he instils a brave belief in death. As we put it at the time:

> "Between the purely materialist and devoutly religious philosophies, Ryle stands intermediate, as a naturalist and humanist. For him, man has an allotted task to fulfil—that of using his gifts of body and mind to the utmost and the best of which they are capable. Ryle finds implicit in nature and human society a principle of mutual aid, which should be an important ingredient of effective living, and should teach modern science that it has social and moral as well as academic functions."

In these essays also he begins to lay more emphasis on the scientist's duty to the community, to give expert guidance in the preventive field. Instruction in the art of living healthily, he says, must become a more important concern than that of discovering new treatments for preventable diseases.

In 1943 Ryle was appointed Nuffield professor of social medicine at Oxford. The chair itself represented in a very real sense the fruition of his own experience in London and of the ideas which matured during his professorship in Cambridge: he had transferred his energies—to use his own words—from work in the field of clinical and personal medicine to new ventures in the field of social medicine—from studies (in a more academic regard) in individual pathology to studies in social pathology. After five years of work in Oxford he was able to write, with his characteristic sincerity:

> "Some of my friends have rebuked me for leaving the clinical fold. I reply in effect that I have merely taken the necessary steps to enlarge my field of vision and to increase my opportunities of ætiological study. My allegiance to human medicine is in no whit broken. I wish I could convey to them and to others some of the sense of stimulation and rejuvenation that my close association with statisticians and medical social workers and with men and women in the public health and industrial health services has brought to me. Thirty years of my life have been spent as a student and teacher of clinical medicine. In these thirty years I have watched disease in the ward being studied more and more thoroughly—if not always more thoughtfully—through the high power of the microscope; disease in man being investigated by more and more elaborate techniques and, on the whole, more and more mechanically. . . . With ætiology—the first essential for prevention—and with prevention itself the majority of physicians and surgeons have curiously little concern." (*Changing Disciplines.* London, 1948.)

It will be seen here that Ryle is still a pathologist, but his deepest interest is in the *social* post-mortem examination and the science of causes. Indeed his book, the first (and unhappily the last) of his gathering, is described as "lectures on the history, method, and motives of social pathology." He used to say that social medicine had increased rather than diminished his love of clinical medicine. He had witnessed in his time at Guy's great changes in the symptomatology of rheumatic fever: at Oxford he tried to elucidate its social pathology. Peptic ulcer, with all its complications, was perhaps the disease for which he was consulted more than anything else: in his *Changing Disciplines* he leads us to consider whether gastric and duodenal ulcers are different entities, with nervous trauma as the more dominant factor in duodenal ulcer and mucosal trauma in gastric ulcer. He had been one of the few general physicians who thoroughly understood the clinical picture of angina pectoris and coronary disease, and one of his last publications was a statistical paper based on the Registrar-General's statistics and his own experience of the increasing incidence of coronary disease. He had keen vision of the human side of all problems: he knew what lay behind a graph.

It is difficult for men who knew Ryle well to speak dispassionately of his personality and character. He could not have been such a success in practice without a great understanding of people, even if his own high standards left him less familiar with some of their frailties. To many who knew him he never seemed quite so much at home in writing of patients in the mass—in his last appointment as professor of social medicine—as when writing about the individuals for whom he cared so much. But if he could not easily be replaced as a consultant, and if he ceased to instruct hospital students directly, he remained a teacher; and his last six years displayed a remarkable capacity for leadership, while his travels abroad showed his young and eager spirit. Conscientious to a fault himself, he did not willingly lay burdens on others; yet he was often an outspoken critic when he felt there was an error to be set right or slovenly thinking to be corrected. He had the reputation of being somewhat olympian and aloof; but his interest in simple things and in the ways of nature prevented him from becoming formidable to the young, with whom he had an unforced sympathy. Even at Oxford, his life was very far from smooth: he had thought out what might be done by a new approach to medicine, but he did not yet know *how* to do it, any more than anyone else; and he was therefore an easy target for criticism. He had one amiable weakness—all his geese were swans. But the reverse side of this was that in his own department he got the best out of everyone. All knew that he would never tolerate a quarrel on small issues but was prepared to go to the stake on big ones.

Despite disappointments, he had in the end a sense of fulfilment: in a letter to a friend written only a few weeks before his death he said:

> "I have had such a varied, interesting, and happy innings in Medicine during the 37 years since qualification that I should be churlish to complain. In a measure the last six and a half years have been among the most satisfying of all, in that I have been helping to create and reorientate; and to build a bridge . . . between the more strictly clinical and the more broadly social components of Medicine as a whole."

This happiness was enhanced by the peace and serenity of his home, and by the books and the birds which were all about him.

We conclude by printing two personal notes from colleagues at the Institute of Social Medicine which he founded.

* * *

I only came to know Professor Ryle personally after he came to Oxford in 1942. Before that I used to wonder why he had such a remarkable reputation amongst the people whom he had taught and worked with, which seemed to me to amount almost to idolatry. Something much more than could be accounted for by the fact that he was generally recognised as being in the top flight of clinicians and teachers of medicine.

After he had been in Oxford three years, he asked me if I would join the staff of the Institute of Social Medicine because he knew that I was interested in the research aspects of industrial medicine and had some experience of survey work. At the time I had no clear idea of what was meant by social medicine and I had a sneaking feeling that if I went into the department I should have to give up medicine for almoning. But I had already learnt from my experiences in South Wales and the Midlands, that there was far more interesting medicine outside a hospital than ever came into it. After some hesitation, therefore, I agreed to come. Looking back, I realise that I was already under the influence of Professor Ryle's personal magnetism.

I soon found that I need have no fears about social medicine not being sufficiently academic, and quickly learnt that my rudimentary training in logic, mathematics, and sociology was quite inadequate to cope with this new subject, which was far more than "a series of follow-up studies of patients after leaving hospital" and turned out to be a study in the development of techniques for identifying the pattern of disease in the community ("social pathology"), which requires the stern discipline of statistics and a knowledge of many things that never come the way of a practising doctor.

We have all been learning the hard way. But I have never enjoyed working with anyone as much as I enjoyed working with Ryle, and much as I used to love clinical medicine nothing would induce me to return to it. (I too have joined the band of idolaters!)

The complete absence of any sense of friction between different groups of workers struck me as soon as I entered the department, and I soon learnt that it all came from the top. I suppose we were all subconsciously aware of Ryle's integrity and singleness of purpose, and knew that he had given up position, money, and even reputation to devote the last years of his life to what he was trying to do.

Professor Ryle may have been 60 years old when he died, but if age was measured by mental eagerness, he died very young. He was learning right up to the last moment and was always prepared to put himself into the position of an ignorant student anxious to sit at the feet of the learned. It was almost naive the way he would tell us what he had learnt from dipping into the Registrar-General's statistics and would ask us whether we could explain some simple statistical point. He never interfered with the day-to-day work of the different sections of the department, but we always knew that he was there to turn to for advice, and that he would never allow a thing to start unless he appreciated the purpose for which it was designed and had decided that there was a reasonable possibility of the objective being achieved.

A. S.

When I came to Oxford to start the Nuffield Bureau of Health and Sickness Records, the Institute of Social Medicine consisted of John A. Ryle, W. T. Russell, and a secretary. It was in the long vacation and Ryle was down in Sussex. I had his room for a month, one day he walked in, tall, bronzed, smiling. I can see that smile now and I remember how delighted I was to meet a man who was honestly glad to make a new acquaintance. Many hundreds of visitors to Oxford have seen that welcoming smile, and have been made to feel as I did. During the past seven years, people from every part of the world visited Ryle at 10, Parks Road. Most of them were still writing to him for help and encouragement long after he was unable to give it to them.

For years I used to explain to him that if he wanted to talk to me all he had to do was to ring a bell and I would come down to his room. For years he walked up the stairs to my room, and smiled when I expostulated. I tried to persuade him to use an "intercom," but he thought it an impersonal way of talking to people and went on walking in search of those he wished to chat with. It was the same with visitors: Ryle's standard of courtesy demanded that he walk round with them, introducing them to "the colleagues" (he never spoke of his "assistants" or his "staff") and making sure that they got the information for which they had come. He had an arrangement with his secretary for an "exhibit" of the institute's various projects to be assembled at a few minutes' notice (it was a collection of charts, forms, statistical tables, and photographs) so that he could demonstrate his points more easily. I have seen him take the same pains to explain his exhibit to a preclinical medical student as he did for a visiting Minister.

All the junior staff loved him. He would walk round the building on Christmas Eve, or on the eve of any holiday, or before he left on a trip abroad, and talk to everyone. When he came back, he went round again. But when we did anything which showed that we liked him he was surprised. Once someone had the idea of sending fresh flowers to his flat to greet him on his return from the U.S.A. He was quite moved.

Everyone, at some time or other, was asked round to the flat. He would talk about anything and everything, but sooner or later the talk came round to birds, flowers, nature. One year, I remember, his concern was all for a family of kestrel hawks down in Sussex. Natural history, archæology, philosophy, he talked well and compellingly on these and other topics. The conversation would rapidly shift to one of these whenever he detected gossip in the air. I never knew him talk about people unkindly: in fact, one almost knew that he did not care for a particular individual by his reticence. If he could not speak well of anyone, he said nothing.

More than anything else, birds, bees, flowers, everything, Ryle loved people. If they were unsuccessful, in misfortune, oppressed, sick, he loved them the more. His visits to India and South Africa, where he saw for himself the state of public health as affecting Indians and Africans, moved him terribly. Social conditions as affecting the physical well-being of the world were his abiding concern. That is why he felt such a strong compulsion to take up the Oxford chair. He believed that nations, populations, industries, groups, were as much pathological as individuals: that they are subject to special ills simply because they are organic. His thoughts were never long away from the problem that beset his intellect: how to find ways of highlighting these ills and, later, remedying them. The pathology of "Homo socius" was Ryle's consuming private and professional interest. It is an odd, but chastening, thought that his invariable kindness and charitableness was in fact the expression of his physician's outlook on the affairs of every day.

H. C.

Dr. Ryle was physician to H.M. Household from 1932 to 1936 and had since been physician extraordinary to the King. He was a member of the Medical Research Council from 1935 to 1939. He married in 1914 Miriam Power Scully and they had two daughters and three sons, one of whom is Dr. J. C. Ryle, medical officer of Shrewsbury School.

Prof. G. R. MINOT

George Richards Minot was a Bostonian in the proper sense. His ancestor, George Minot, of Saffron Walden, in Essex, emigrated to the new Bay State and was admitted a freeman of Dorchester, Mass., in 1634. A former George Richards Minot (1758–1802) was a distinguished jurist and one of the earliest historians of the colony. Minot was also descended from Dr. James Jackson, professor of medicine in Harvard University at the beginning of the 19th century.

He was known throughout the world as one of the discoverers of the liver treatment of pernicious anæmia, but it was perhaps as director of the Thorndike Memorial Laboratory that he made his greatest contribution to medicine. This experiment in using the brains and resources of a university medical school for the study of disease in a municipal hospital (the Boston City Hospital) was inspired by Francis Weld Peabody, a kinsman of Minot's, and one of Harvard's most brilliant medical teachers. When Peabody died at the age of 45, in 1927, Minot succeeded him as director of the "Thorndike."

This remarkable place occupies three unassuming floors in a small building in the huge City Hospital. There is a metabolic ward of about 20 beds and, above that, two floors of laboratories. It is not graced by polished benches, glittering furniture, or numerous assistants in sterile white coats, such as we often erroneously associate with American medical science. Under Minot's direction no funds were dissipated on non-essentials: everything went into equipment and staff. The equipment—crowded out from the rooms in each of which a number of workers amicably disputed a few inches of bench space—often overflowed into the corridors. Most British visitors felt instantly at home. But it was in choice of staff that Minot excelled. In 1937, in these cramped quarters, there were working Soma Weiss, William Castle (who excellently succeeds him as director), Chester Keefer, Maxwell Finland, Henry Jackson, Laskey Taylor, Hale Ham, Eugene Stead, Lowell Rantz, all of whom have contributed importantly to contemporary medical thought. There were others besides, and especially a steady turnover of about a dozen young men, of registrar status, from every part of the U.S.A., who came for one or two years to learn the scientific approach to medicine and return to preach the gospel in their native State. The Thorndike at this time played a leading part in the ferment of thought which has made Boston a famous medical centre in the great tradition of Padua, Leyden, Edinburgh, London, Dublin, Paris, Baltimore, Berlin, and Vienna.

Minot was a natural aristocrat, both by birth and feeling. The modern competitive struggle for success did not disturb him. In a land where hustle and snap-decisions often pass for efficiency, he was never in any hurry to come to the point. His conversation was discursive: thinking aloud would bring him slowly round to the point at issue, by which time the hustlers had often left: but those who waited for his final thought, learned wisdom. His tall, spare, lanky figure—a pile of books under his arm, and on his head a shapeless hat of the kind beloved by New Englanders—did not mark him out, among the present polyglot population of Boston, as one of that city's most distinguished citizens.

His industry was amazing. Besides directing the Thorndike Memorial Laboratory and the Harvard medical services in the Boston City Hospital, he was one of the full professors of medicine at Harvard and played a prominent part in the direction of its famous medical school. Yet he found time to read, and annotate with marginal notes, a great variety of medical journals. Often his staff would find on their desks on Monday morning a scribbled note on a scrap of paper drawing their attention to a recent article which they should have found for themselves, but had not. His own room in the Thorndike, with its library of journals and the fellowship diplomas of the British Royal Colleges hung on the walls, was constantly open to his staff, and in looking up a reference one was often rewarded by finding a marginal comment by G. R. M., expressing his views on its merits. He believed strongly that a medical scientist should be aware of developments in fields of science outside his own specialty and even outside medicine, and this was a discipline which he firmly imposed on himself. His advocacy of social medicine was disturbing to some of his contemporaries.

He was a master of detail. No letter ever went unanswered; a note from him, if not acknowledged in 24 hours, was usually followed by another, asking if it had been received. His secretary was once handed a notice to put up on the board. A pencilled spot, at the top of the paper, surrounded by a circle, was indicated by an arrow from a written directive: "Put thumb tack here." This was not his only eccentricity. A member of his staff, having made an appointment to see him, would often be greeted by the production of his watch. "Now let's see," he would say, "I can give you just 45 seconds—no, let's say, at a guess, 1 minute and 15 seconds." An hour later the young man would emerge, his head dizzy with the wide range of topics that had been brought to his attention.

Minot's keenest recreational interest was in plants. A British visitor, before the late war, remarked on the beauties of the American flowering dogwood that stands outside the hospitable Minot home in Brookline, and expressed surprise that the tree was so seldom seen in British gardens. Some months later, on returning to England, he was amazed to receive a consignment of three young dogwood trees.

In many ways Minot was detached from contemporary American life—a survival of the great cultural tradition of the 19th-century Harvard. It was in keeping with this 19th-century character that he maintained the almost dead art of correspondence with friends, and many in this country as elsewhere will feel with personal sorrow the passing of this remarkable man.

A. P. M.

BERNARD EDWARD GRANVILLE BAILEY

M.R.C.S.

Dr. Bernard Bailey, who died at his home in Midhurst on Feb. 4 at the age of 76, qualified in 1899 from St. Bartholomew's Hospital. He held house-appointments at the City of London Hospital for Diseases of the Chest, the East London Hospital for Children, and the Shoreditch Infirmary before he settled in practice at Midhurst in 1902. His partner writes: "Dr. Bailey loved the country and country people, and it was not only for his professional work and skill that he was loved there, but also for his willingness to help anyone, rich or poor, when they were in trouble. He was a keen supporter of the many activities of village life, and it is largely to his energy that we owe our cottage hospital."

Parliament

The King's Speech

THE opening sentences of the speech from the Throne, which the King delivered at the opening of Parliament on March 6, pointed out that the economic difficulties of the country have emphasised the need to expand the production of food from our own soil, and His Majesty's Government will continue to encourage the agricultural population to increase output by every efficient means and to make better use of marginal land. Legislation will be introduced to improve water-supplies, especially in rural areas. For the present session the Government propose only a limited programme of legislation, but it includes at least one Bill of importance to the medical profession. Amendments to the Medical Acts are to be introduced to raise the standard of medical education and to modify the constitution and disciplinary procedure of the General Medical Council. Legislation will also be proposed to vary the constitution of the Central Midwives Board and to make other alterations in the law relating to midwives.

Medical Peer

In the House of Lords on March 1, Lord Haden-Guest was introduced, took the oath, and subscribed the roll on his elevation to the peerage. His sponsors were Lord Webb-Johnson and Lord Shepherd.

Appointments

BACKUS, A. B., M.B. Lond., M.R.C.O.G.: senior registrar in gynæcology and obstetrics, Peterborough area.

CLARKE, P. J. H., M.B., B.SC. N.U.I., D.P.H., T.D.D.: asst. senior M.O., East Anglian Regional Hospital Board.

GRANGE, HELEN B., M.B. Lond.: asst. M.O., Essex county council, in dept. of area M.O. in borough of Ilford.

HASTILOW, IRENE M. D. F. C., M.B. Birm., D.OBST. R.C.O.G., D.C.H.: asst. county M.O. in the district of Bexley, Kent.

HODGSON, M. C., M.B. St. And.: appointed factory doctor, Aldershot district.

MCLEAY, CHRISTINA J., M.B. Edin.: medical adviser in mental health on the staff of the county M.O., Devon.

WATSON, W. A., M.R.C.S.: appointed factory doctor, Chatteris district.

Diary of the Week

MARCH 12 TO 18

Monday, 13th

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Prof. A. M. Boyd, Dr. Geoffrey Evans: Peripheral Arterial Disease.

Tuesday, 14th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. E. E. Pochin: Investigation of Thyroid Function and Disease by the Use of Radioactive Iodine. (First Oliver-Sharpey lecture.)
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. M. R. Ewing: Villous Tumours of the Rectum. (Hunterian lecture.)
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: *Fungus Diseases of the Skin.*
CHELSEA CLINICAL SOCIETY
7.30 P.M. (South Kensington Hotel, 47, Queen's Gate Terrace, S.W.7.) Mr. R. C. Brock, Dr. Paul Wood: Modern Intrathoracic Surgery.
CHADWICK LECTURE
2.30 P.M. (Westminster Medical School, Horseferry Road, S.W.1.) Dr. C. A. Boucher: Maintenance of Health by the Prevention of Accidents in the Home.

Wednesday, 15th

INSTITUTE OF DERMATOLOGY
5 P.M. Dr. C. W. McKenney: X-ray Technique.
INSTITUTE OF PSYCHIATRY, Maudsley Hospital, Denmark Hill, S.E.5
4.30 P.M. Dr. E. Stengel: Postgraduate lecture-demonstration.
ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
3.30 P.M. Lieut.-Colonel E. F. W. Mackenzie: Provision and Maintenance of a Safe Water-supply for the Consumer.
UNIVERSITY OF GLASGOW
8 P.M. (Department of Ophthalmology.) Dr. J. D. Fraser: Glioma of the Retina.

Thursday, 16th

ROYAL COLLEGE OF [illegible]
5 P.M. Dr. Poch[illegible] Thyroid Function and Disease by [illegible] Iodine. (Last Oliver-Sharpey lecture.)
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. E. M. Nanson: Respiratory Responses to Operative Trauma. (Hunterian lecture.)
UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL, Gower Street, W.C.1
4.30 P.M. Prof. F. G. Young, F.R.S.: The Experimental Approach to the Problem of Diabetes Mellitus. (Sydney Ringer lecture.)
ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE
7.30 P.M. (Royal Army Medical College, Millbank, S.W.1.) Laboratory [illegible]
NATIONAL HOSPITAL, [illegible]
5 P.M. Dr. J. Hagu[illegible] Forms of Disseminated Sclerosis.
LONDON ASSOCIATION OF THE MEDICAL WOMEN'S FEDERATION
8.30 P.M. (B.M.A. House, Tavistock Square, W.C.1.) Dr. Alice Stewart: Recent Work of the Institute of Social Medicine, Oxford, on the Epidemiology of Pulmonary Tuberculosis.

Friday, 17th

FACULTY OF RADIOLOGISTS
2.15 P.M. *Therapy Section* (Royal College of Surgeons). Mr. D. S. Poole-Wilson, Dr. J. M. W. Gibson, Dr. J. L. E. Millen: Carcinoma of the Bladder.
MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. P. H. Sandifer: Neurological demonstration.
WEST LONDON MEDICO-CHIRURGICAL SOCIETY
7.30 P.M. (South Kensington Hotel.) Sir George Thompson, F.R.S.: Atomic Energy.

Saturday, 18th

MIDDLESEX COUNTY MEDICAL SOCIETY
3 P.M. (Shenley Hospital.) Dr. B. M. C. Gilsenan: Demonstration of cases. Dr. S. T. Hayward, Miss Darby (*psychiatric social worker*), Miss E. Macdonald (*psychologist*): Three Aspects of One Voluntary Admission.

Notes and News

GUY'S HOSPITAL DENTAL SCHOOL

THE annual clinical meeting of Guy's Hospital dental school was held on Saturday, March 4. This event, the largest of its kind in the Commonwealth, was attended by about 500 Guy's men, to whom it provided an opportunity of seeing new developments in dentistry, and of renewing old friendships. In the comparatively short time since the last clinical meeting, great changes have been made in the dental school; the foot-engine has become a thing of the past and the students work with equipment equal to the best in private practice. An extension to the conservation room is to be opened in May, and the old pathology block is being re-equipped for the use of students in the preclinical period. At present, some 70–80 students qualify each year from the hospital.

The outstanding feature of this year's meeting was the demonstration of colour television, arranged by Messrs. Pye, of Cambridge. This was the first occasion on which colour television of surgical operations had been demonstrated in public. The principle underlying colour television is simple; but at the moment technical considerations, such as the great band-width required, preclude its use except over a closed circuit. The number of lines—405—is the same as that of the B.B.C. system, but the frame-frequency of 75 per sec. is three times as great. A disc, with red, blue, and yellow sectors, rotates in front of the camera, and is synchronised with a similar disc in front of the screen so that one frame of each colour is seen in $^1/_{25}$ sec., thus building up a fully coloured image. The colour rendering is good, but the major problem to be overcome is that of providing adequate illumination at the back of the mouth or in a deep wound cavity. The use of colour photography for both record and teaching purposes has increased in the past year, and a special deep-focus camera for oral photography has been developed by Mr. J. M. Dyce, director of the photographic department. Mr. D. J. Anderson, of the dental research laboratory, demonstrated the use of the strain-gauge—already well known in heavy engineering—for determining the biting pressures exerted by natural teeth. In the department of preventive dentistry the experiments to determine the efficacy of a 2% solution of sodium fluoride in the control of caries are being continued; and further experiments are being carried out with vitamin K in chewing-gum.

PROTECTION AGAINST MIDGES

A NEW formula for a protective midge cream has been worked out by the subcommittee on midge control of the Scottish Scientific Advisory Committee. This formula, said to be an advance on that devised in 1946,[1] is the outcome of investigation at the Royal Technical College, Glasgow, by Prof. J. P. Todd and Mr. A. B. Gilmour. The formula is: dimethyl phthalate 200 g., magnesium stearate 30 g., zinc stearate 70 g. In preparation dimethyl phthalate is first levigated with magnesium stearate, then zinc stearate is gradually incorporated. Like the 1946 preparation, this cream does not harm the skin, although there may be some slight tingling when it is first applied and afterwards when washing the face. It should not be allowed, however, to get into the eyes, nor should it come into contact with tortoise-shell or plastic spectacle frames. This new cream is alleged to ward off midges for at least three hours; and it is not washed off by perspiration.

CONTRIBUTORY SCHEMES

IT is more than eighty years since workpeople first systematically collected contributions in support of voluntary hospitals. The difficulties which the hospitals experienced during the 1914–18 war led to a wider organisation of this form of support. The corporate spirit of provincial cities was enlisted in these schemes, but nobody expected that the movement could have the remarkable success which was attained in London by the Hospital Saving Association. The provincial contributory schemes, largely owing to the need for reciprocity in their benefits, combined in 1930 in the formation of the British Hospitals Contributory Schemes Association. Mr. A. T. Page has provided a record of its establishment with an account of the proceedings at conferences and a copy of the new constitution rendered necessary by the passing of the National Health Service Act. The book (*Pennies for Health*, published by the Association[1]) provides a useful though somewhat biased chapter in the history of a remarkable movement in the social life of this country; the end of which is not yet. There are signs that public opinion, growing in the reorganised bodies, will press for more attention to health and the measures to promote it.

HARVEY IN HIS PORTRAITS

William Harvey's images are the happy study of Mr. Geoffrey Keynes. His Thomas Vicary lecture of 1948 has already been published by the Royal College of Surgeons,[2] and now the Cambridge University Press[3] have given us his Linacre lecture—*The Personality of William Harvey*—delivered at St. John's College, Cambridge, in May, 1949. Here there are fewer pictures but more text; and the character of the penetrating irascible active little doctor comes lively from the page. A few months before giving the lecture Mr. Keynes had the felicity of identifying a long-ignored portrait of Harvey, one of a set of family portraits, in a derelict house—Rolls Park, near Chigwell in Essex. These portraits are now safely housed in the National Portrait Gallery—a treasure trove we all can share.

University of Manchester

Dr. H. G. B. Slack has been appointed senior research assistant in the chronic rheumatism centre.

University of Glasgow

On Feb. 25 the degree of M.D. was conferred in absentia on Oliver Gray.

University of St. Andrews

On April 20 the honorary degree of doctor of law will be conferred on Mr. A. E. Porritt, a surgeon to the King and surgeon to St. Mary's Hospital, London, and on Mr. H. B. Stallard, ophthalmic surgeon to St. Bartholomew's Hospital.

International Congress of Radiology

The 6th International Congress of Radiology will be held in London under the presidency of Dr. Ralston Paterson in the week beginning July 24. A scientific exhibition and a technical exhibition will be held in connection with the congress.

British Medical Students Association

On Tuesday, March 14, at 5.30 P.M., at the London Hospita E.1, Dr. Alice Stewart will speak on Social Medicine.

University Grants Committee

Prof. G. W. Pickering, who lately completed his original term of office on this committee, has consented to serve for a further five years from Nov. 1, 1949.

Royal Medical Foundation of Epsom College

Applications are invited for the following scholarships and pensions:

St. Anne's scholarships for girls attending Church of England schools. Candidates must be fully 9 years of age and the orphan daughters of doctors who have been in practice in England or Wales for not less than 5 years.

Pensions for necessitous medical men fully 55 years of age, and for the widows and spinster daughters of doctors.

Scholarships and grants for boys or girls, not necessarily orphans, who are of public-school age.

Further information may be had from the secretary, Epsom College, Surrey.

World Health Organisation

Major-General Sir Sahib Singh Sokhey, director of the Haffkine Institute, Bombay, has been appointed assistant director-general of W.H.O.

Major-General Sokhey, who was born in 1887, qualified at the University of Edinburgh in 1911. Two years later he joined the Indian Medical Service, and in the first world war he served in Europe, Mesopotamia, and Egypt. He has been associated with the Haffkine Institute since 1925, and was appointed to the directorship in 1931. He was knighted in 1946.

Dr. G. Brock Chisholm, the director-general, left Geneva on March 2 for a five weeks' visit to the U.S.A., New Zealand, and Australia.

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1. See *Lancet*, 1946, ii, 571.

1. British Hospitals Contributory Schemes Association (1948). Royal London House, Queen Charlotte Street, Bristol, 1, 1949. Pp. 91. 13*s*. 3*d*.
2. See *Lancet*, 1949, ii, 922.
3. Pp. 48. 5*s*.

British Health Resorts Association

A meeting of this society will be held today, Friday, March 10, at 4 P.M., at 11, Chandos Street, London, W.1.

Congress of the International Academy of Forensic and Social Medicine

This congress, which was to have been held this month in Cairo, has been postponed for the time being.

Conference on Amœbiasis

The spa of Châtel-Guyon in Auvergne is holding an international congress on Sept. 15 and 16 on amœbiasis and other intestinal parasitoses in the adult and child. Further information may be had from the general secretary, Grands Thermes, Châtel-Guyon (Puy-de-Dôme).

Birmingham and Midland Obstetric and Gynæcological Society

Dr. A. T. Hertig, professor of pathology at Harvard University, will speak on Wednesday, March 29, at 4.30 P.M., in the Medical School, Birmingham, on the Genesis of Cervical and Endometrial Carcinoma with respect to the In-situ Stage.

European Congress on Allergy

The first European Congress on Allergy will be held on May 31 and June 1 at the Hôpital Broussais, 96, rue Didot Paris XV, under the presidency of Prof. Pasteur Vallery-Radot. Sir Henry Dale, O.M., is honorary president. Further particulars may be had from the secretary-general, Dr. Blamoutier, 5, rue de Luynes, Paris, VII.

Biological Assays

The Biometric Society (British Region) and the biological methods group of the Society of Public Analysts and Other Analytical Chemists at 2.45 P.M. on Tuesday, March 14, at 11, Chandos Street, London, W.1, will hold a symposium on the Design and Evaluation of Biological Assays. Dr. J. W. Trevan, F.R.S., will be in the chair.

Research into Leukæmia

The Robert Roesler de Villiers Foundation, of 417, Park Avenue, New York, 22, are offering a prize of $500 (or in special circumstances $1000) for the most significant contribution to the knowledge of the nature, causes, origin, treatment and cure of acute leukæmia and allied conditions.

The work must be published, or accepted for publication, by a reputable journal in or outside of the United States of America, between Jan. 1, 1950, and Oct. 20, 1951. In exceptional circumstances the publication requirements may be waived. The prize has been instituted in memory of Robert Roesler de Villiers, who died of acute leukæmia at the age of 16 in 1944. Further particulars may be had from the foundation, from Dr. Sven Moeschlin, Kantonsspital, Zurich, or from Dr. S. Haberman, 3301, Junius Street, Dallas, Texas.

Peckham Health Centre Closes

On March 4 the Pioneer Health Centre at Peckham closed. Founded in 1926 by Dr. Scott Williamson and Dr. Innes Pearse, it has been supported by voluntary contributions. Each year it cost £25,000 to maintain and last July there was a deficit of £12,000. The centre was really a family club where parents and children could each find the recreation that suited their age and taste. Members were only accepted on a family basis and each family paid 2*s.* a week. Each of its members had an annual medical examination. Suggestions have been submitted to the London County Council that it might be used as a National Health Service experimental centre, research institute, and family club.

Doctors' Lists

At the end of 1948 the Ministry of Health proposed that doctors with an excess list should be asked not to accept additional patients (see *Lancet*, 1948, ii, 913). Executive councils have now been advised by the Ministry to " consider availing themselves where necessary of the powers of the Allocation Scheme to require practitioners within a reasonable time to take appropriate action so as to bring their lists within the prescribed limits." It is suggested that, to allow for inflation in executive-council registers and to give some margin against possible withdrawals, councils should allow a tolerance of, say, 5% above the permitted limits. Some executive councils have already taken advantage of the provisions of the allocation scheme, but " the number of practitioners with lists in excess of the prescribed limits remains substantial."

Joint Tuberculosis Council

Dr. Norman England has lately resigned the honorary secretaryship of the council. Dr. R. L. Midgley succeeds him in this office. Dr. Midgley's address is Hawkmoor Sanatorium, Bovey Tracey, S. Devon.

Photography and Cinematography by Invisible Radiation

The scientific and technical group of the Royal Photographic Society and the sciences committee of the Scientific Film Association are holding a discussion on this subject on Saturday, April 15, at the London University Institute of Education. Further information may be had from the association, 4, Great Russell Street, London, W.C.1.

Dr. C. H. Andrewes, F.R.S., director of the Medical Research Council unit working on the common cold at Salisbury, is visiting Italy to give some lectures for the British Council.

Copies of *Spas in Italy*, a short descriptive booklet of the Italian thermal stations, may be had post free from the Italian State Tourist Department, Kendal House, 1, Conduit Street, London, W.1.

The proceedings of the first post-war congress of the International Hospital Federation, held last summer in Holland (see *Lancet*, 1949, i, 1063), have now been published. The book may be obtained (non-members £1 1*s.*, members 10*s.* 6*d.*) from the federation, c/o King Edward's Hospital Fund for London, 10, Old Jewry, London, E.C.2.

Careers Guide: Opportunities in the Professions and in Business Management is the title of a handbook issued by the appointments department of the Ministry of Labour and National Service in conjunction with the Central Youth Employment Executive (H.M. Stationery Office. Pp. 132. 2*s.* 6*d.*).

The *South African Journal of Clinical Science*, which is at first to be published quarterly, will supplant *Clinical Proceedings*. The new journal, of which the first issue appears this month, is sponsored by the South African Medical Association, the Cape Town Post-Graduate Medical Association, and the South African Institute for Medical Research. Subscriptions (25*s.* per annum) should be forwarded to P.O. Box 643, Cape Town.

CORRIGENDUM: *The Systemic Collagenoses.*—In the 11th line from the end of this annotation last week (p. 409) the word " hypoergy " was given wrongly as " hyperergy."

Births, Marriages, and Deaths

BIRTHS

BLACK.—On Feb. 28, the wife of Dr. D. A. K. Black—a son.

CAYLEY.—On Feb. 26, in London, the wife of Dr. F. E. Cayley, M.B.E.—a son.

CUTHBERT.—On Feb. 27, at Ruislip, the wife of Dr. O. D. Cuthbert—a daughter.

DIXON.—On Feb. 25, at Cheltenham, the wife of Dr. D. G. Dixon—a son.

ROGERS.—On Feb. 25, at Newick, Sussex, the wife of Dr. Anthony Rogers, of Hamilton, New Zealand—a daughter.

SIMPSON.—On March 2, in London, the wife of Mr. John F. Simpson, F.R.C.S.—a daughter.

STORMONT.—On Feb. 28, at Ilfracombe, the wife of Dr. A. Stormont—a daughter.

WADDY.—On March 2, at Winchester, the wife of Dr. Broughton Waddy, Medical Service, Gold Coast—a daughter.

WILSON.—On Feb. 25, at Ludham, Norfolk, the wife of Dr. P. R. Wilson—a daughter.

WYMAN.—On Feb. 26, in London, the wife of Dr. J. B. Wyman—a son.

MARRIAGES

CAMPBELL—KENNEDY.—On Feb. 25, at Aldershot, Ronald Wilson Campbell, captain, R.A.M.C., to Margaret Mary Kennedy, M.B. St. And.

KAY—BARKER.—On Feb. 25, at Selsdon, Surrey, Mark S. Kay, B.M., to Ann Barker.

DEATHS

BECKETT-OVERY.—On Feb. 27, in London, Harry Beckett-Overy, M.D. Edin., F.R.C.S.

DUIGAN.—On March 2, Victor John Duigan, M.R.C.S., of Gorleston, aged 73.

GIBBS.—On Feb. 26, at Woking, Andrew Armstrong Gibbs, L.R.C.S.I., major-general, I.M.S.

GIBSON.—On March 2, at Petersfield, Percy Lemprière Gibson, D.M. Oxfd, surgeon captain, R.N. retd.

HODGE.—On March 2, at Glasgow, Ronald Dingwall Hodge, M.B. Glasg.

RYLE.—On Feb. 27, John Alfred Ryle, M.D. Lond., F.R.C.P., aged 60.

UNDULANT FEVER

A NEGLECTED PROBLEM*

Sir WELDON DALRYMPLE-CHAMPNEYS
Bt., M.A., D.M. Oxfd, F.R.C.P., D.P.H.
DEPUTY CHIEF MEDICAL OFFICER, MINISTRY OF HEALTH

(Concluded from p. 435)

CLINICAL TYPES

Many patients, as I have said, go to their doctor with a history of increasing tiredness, perhaps with headache, and are found to have a temperature of 102–104°F. However, the commonest symptom, sweating, usually occurs early in the disease, and by its persistence, diurnal regularity of onset, intensity, and sometimes characteristic odour constitutes a valuable diagnostic indication. The onset may on the other hand be extremely sudden and even alarming, especially when accompanied by hæmorrhages from the lungs or bowel, under the skin, or in the joints, or by severe thoracic or abdominal pain simulating pleurisy or peritonitis.

Many different authors have tried to classify their cases on the basis of general severity, character of the temperature chart, preponderance of certain symptoms, duration, &c. When dealing with so variable a disease, no classification can be entirely satisfactory, and I have therefore adopted, in table VIII, a mixed classification which gives a general idea of the commonest variations encountered in my series, whilst side by side—but not always corresponding to their opposite numbers—I have placed the commonest types of temperature charts.

TABLE VIII—CLINICAL CLASSIFICATION

Types of case	Types of fever
Ambulant	
Undulant	Undulant
Moderate continuous or daily remittent	Daily remittent
Moderate relapsing	Irregular or indeterminate
Nervous and toxic	
Malignant and hæmorrhagic	

Ambulant

When first seen by their doctors many patients are either still ambulant or give a history of increasing weariness, headache, and sometimes anorexia some weeks previously. But there are also cases in which the patient remains ambulant throughout, or nearly throughout, his illness. These must often be missed altogether, because of the mildness of the disease or its short duration or both, and many workers in America believe that such patients often pass into the condition known there as "chronic brucellosis," their symptoms being attributed to neurosis, rheumatism, septic foci, and the like. Of the 68 cases in my series lasting a fortnight or less some were of this type. These patients often suffer from headache, feelings of chilliness, fatigue, impairment of appetite, perhaps mild nasal or bronchial catarrh, and little else.

Undulant

This is the commonest type in this country, but not, apparently, in the United States, since Huddleson,[52] writing of the temperature curve regarded by Hughes [53] as typical of brucellosis in the Mediterranean region, states that he and his associates as yet "have not encountered a single chart which conformed closely to the type so frequently described." Unless the word "closely" excludes any chart in which variations of type occur at some period of the illness, my experience here has been very different to his. Of the 280 temperature charts available in my cases, 149 (53·2%) showed typical undulations at some time, and in most of them such undulations were an outstanding feature. A typical chart of this kind is shown in fig. 11.

Corresponding to these undulations there is daily exacerbation of symptoms such as headache, fatigue, malaise, anorexia (often only during the period of the day when the fever is at its height), sweating, aching of the limbs and back, and perhaps arthralgia and sore throat. These daily exacerbations become more and more pronounced as the undulation reaches its peak, fading away gradually as the line of the daily crests declines toward normal. In some cases, or during some phases of a particular case, these waves are continuous for an extended period without a return of the temperature to normal; at other times an apyrexial period of a few days separates the waves. Often towards the end of the illness these intermissions become longer, but one often sees either a sudden and unexpected cessation of the fever when apparently in full swing, or one or two isolated waves following an apyrexial interval of such length as to give good hope that the illness is at an end. Sometimes, as other workers have pointed out, there seems to be an overlapping of waves which gives an irregular appearance to one or more sections of an otherwise typical undulant chart.

Moderate Continuous or Daily Remittent

This is a much smaller group of cases, in some of which the fever never rises above 99°F, either remaining just above normal for long periods or returning daily to normal or below, whilst in other cases the temperature fluctuates more but returns daily to the normal line or near it (fig. 12). Apart from the symptoms already described in connection with the ambulant type, such patients suffer from sweating, constipation, pains in the limbs, joints, or back, or perhaps an occasional mild rigor. In my series of 280 patients for whom a temperature chart was available 31 (11·1%) showed this type of fever.

Moderate Relapsing

Many patients, however, show a more irregular type of fever, with afebrile intervals of several days or even several weeks followed by a moderate exacerbation for a limited period, and these alternations may continue as long as several months. Such cases constitute a rather indefinite proportion of the 100 patients (35·7% of the 280 temperature charts) grouped under the heading of "irregular or indeterminate" (fig. 13). During their pyrexial periods these patients suffer from much the same symptoms as do those in the last category, but even when free from fever they are seldom entirely free from symptoms—a useful point in prognosis, as I shall show. Often, moreover, enlargement of the spleen, and also perhaps of the liver, is found, and arthritis or arthralgia is fairly common.

Nervous and Toxic

The nervous manifestations which may occur in this disease I shall mention presently. There is a type of case, usually of sudden onset, in which such manifestations are particularly conspicuous, and seem to be attributable to toxic causes rather than to definite invasion of the nervous system by the causative organism. As a rule such patients are not very seriously ill and often their fever is moderate throughout, though they may have extreme depression and even suicidal tendencies. On the other hand the presence of circulating toxins in large amounts can be serious for elderly or debilitated patients.

Malignant and Hæmorrhagic

The malignant type is rarer in this country than in the Mediterranean as described by Hughes.[53] It is usually an extreme instance of the toxic type just described, and is marked by severe headache, anorexia, thirst, nausea, and even vomiting. Mental disturbances are common and at the end there is often delirium followed by coma.

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* The Milroy lectures for 1950, delivered before the Royal College of Physicians on Feb. 14 and 16.

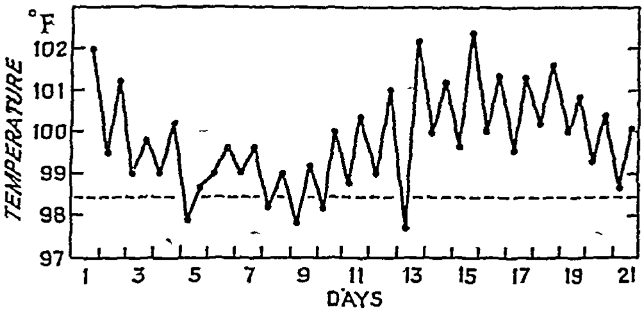

Fig. 11—Undulant type of fever.

The face is usually flushed, the tongue thickly coated, especially in the middle, the breath offensive, the spleen and perhaps the liver enlarged. Bronchial and even pneumonic involvement are common, and hæmorrhage from the bowel and perhaps elsewhere sometimes occurs and usually heralds a fatal outcome (as in 4 of my 19 fatal cases).

SIGNS AND SYMPTOMS

There is, perhaps, no more difficult disease to diagnose clinically than undulant fever: its manifestations are protean (230 different signs and symptoms were reported in my cases) and its mildness and short duration often lead the physician to content himself with a diagnosis of "feverish cold," "influenza," or merely "pyrexia of uncertain origin (P.U.O.)." At the same time knowledge of the commonest signs and symptoms will often arouse a suspicion, the truth of which can usually be tested by laboratory methods, and it is very important to bear in mind the possibility of this diagnosis when certain of the less common signs and symptoms occur, so as to save the patient from unnecessary therapy including major surgical interference. The twelve commonest signs and symptoms in my series, with the numbers of cases in which they were recorded, are shown in table IX.

TABLE IX—TWELVE COMMONEST SYMPTOMS IN ORDER OF FREQUENCY

Sweating	757	Constipation	409
Weakness	694	Rigors	328
Headache	626	Spleen enlarged	213
Malaise	600	Cough	184
Anorexia	534	Sore throat	156
*Pain	524	Arthritis or arthralgia	109

* Other than headache, arthralgia, or abdominal pain.

Sweating is sometimes moderate or slight, but more usually drenching. It occurs with the fall of temperature in the afternoon or evening, and sometimes (though not nearly so often in *Br. abortus* infection as in the *Br. melitensis* infection of "Malta fever") it has a characteristic sour odour.

Weakness and fatigue may be troublesome even when the fever is slight and other symptoms inconspicuous; but on the other hand the patient often recovers strength with a rapidity quite at variance with the height of the fever from which he has been suffering.

Headache is usually either frontal or occipital, but it is also commonly described by the patient as "burning," "burning behind the eyes," or "eyes full of hot sand." Headache of any type is often very intense and may be long continued. It had led to a diagnosis of meningococcal meningitis in 3 of my cases and of tuberculous meningitis in 1.

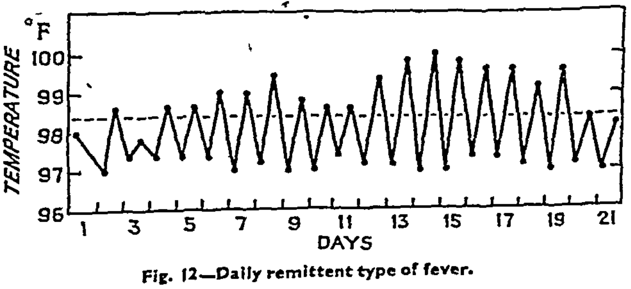

Fig. 12—Daily remittent type of fever.

Pain, apart from headache, abdominal pain, or arthralgia, is usually located in the muscles of the limbs or of the back (chiefly the lumbar region). Abdominal pain however occurred in 79 of my cases and is important because it may lead to serious mistakes in diagnosis. Thus pain in the right iliac fossa was attributed to appendicitis in 2 of my cases, and pain in other parts of the abdomen to cholecystitis (4 cases), † nephritis or perinephric abscess (2), gastritis (4), and tuberculous peritonitis, pyelitis, and hepatitis (1 each).

Digestive disturbances are common. The commonest (as the table IX shows) is *anorexia,* but nausea was noted in 34 cases and vomiting in 56. Though *constipation* was recorded in 409 cases, there was diarrhœa in 56 of my cases, and sometimes these conditions alternate.

When there are *rigors* (fig. 14) they are usually infrequent or at any rate confined to a short phase of the illness. A cold feeling which may or may not go on to a shivering attack is very common and was well described by one of my patients as "an intense cold which is not just chilliness but amounts to an actual pain and sometimes will not give way even in a hot bath." Pains in the joints are frequent, but true arthritis is far less common in *Br. abortus* than in *Br. melitensis* infections.

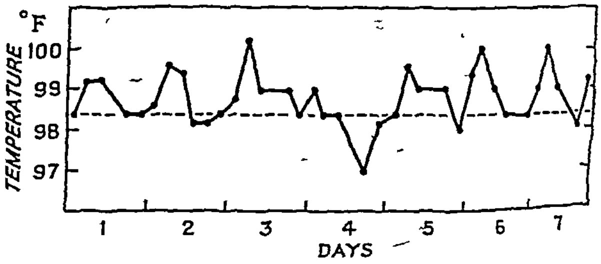

Fig. 13—Irregular type of fever.

Organisms of the brucella group often cause enlargement (and sometimes tenderness) of the *spleen,* which in this country seldom extends more than one to three finger-breadths below the costal margin. The evidence suggests strongly that when the disease becomes chronic it is here that the causative organism often lurks. Enlargement of the *liver,* though not so common (48 of my cases), is a valuable sign; but it is remarkable that in only 3 cases was the liver tender as well as swollen.

The *respiratory system* is often invaded; though there may be no more than a slight nasal or bronchial catarrh or a sore throat, yet frank bronchitis, pleurisy, or pneumonia are occasionally encountered.

Any long-continued fever is apt to affect the patient's *nervous system,* and this must be especially true of one which fluctuates up and down day after day and week after week for months, or is continually encouraging false hopes of cure by intermissions of several days followed by the same familiar and hated burning afternoons and drenching nights. It is not, therefore, surprising that, besides mere depression and apathy, one sometimes sees such features as anxiety, amnesia, aphasia, aphonia, childishness, deafness, delusions, hallucinations, dizziness, drowsiness, delirium, various phobias, irritability, somnolence, and suicidal tendencies. Some of these symptoms are probably due to pathological changes in the central nervous system (fig. 15).

The *blood system* is seldom severely affected, but hæmorrhages do sometimes occur from the nose, throat, ears, lungs, or bowel—particularly the nose. In 1

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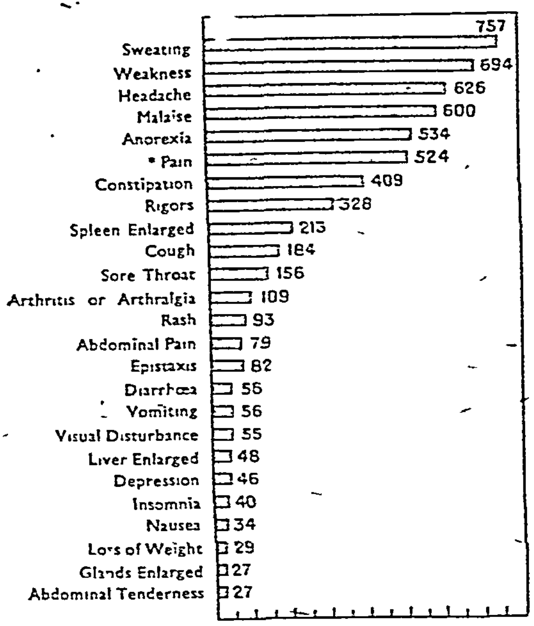
† The gall-bladder is a favourite lurking-place of brucella, which therefore is presumably a cause of cholecystitis. Tenderness of this organ was noted in 24 of my cases.



* Other than headache, arthralgia, or abdominal pain

Fig. 14—Frequency of the commonest symptoms in 983 cases of undulant fever.

of my cases a retinal thrombosis caused permanent blindness in one eye. Brucella occasionally invades the *heart* causing endocarditis, described in England by Rennie and Young [77] and in other countries by Hardy et al.,[44] Olin,[71] Spink et al.,[89] and Uhlhorn.[91] My series contains 1 case of myocarditis and 1 of pericarditis. Changes in the heart's rhythm are seldom pronounced or characteristic: bradycardia is commoner than tachycardia.

Rashes of various kinds occurred 93 times in my series, but none is pathognomonic. The commonest forms of rash were roseolar, as in typhoid fever (16%),‡ papular (13%), urticarial (9%), and erythematous (8%).

As already stated, *arthritis or arthralgia* is a fairly common feature of the disease in this country, affecting 109 of my cases. But whereas in the Mediterranean form of the disease effusion often develops (Hughes [53] noticed it in some 40% of his cases), in my series it was usually limited to transient pain, often flitting from joint to joint. Occasionally, however, a true effusion has occurred, with or without pain, and 1 patient had an acute, painful spondylitis similar to those described by some American workers.[9] [44]

Though *abortion* is the outstanding clinical feature of brucella infection in cattle, goats, and sheep, it is uncommon in pregnant women (Buser-Plüss,[16] Janbon and Caderas de Kerleau,[55] Zeller[100]). Nevertheless, among the 189 females in my series between fifteen and forty-five years of age there were 5 abortions. Of 2 patients who became infected during their pregnancy neither aborted, though in 1 of them the fever persisted for about eight months after her delivery at full term.

DURATION AND TERMINATION

My experience, in agreement with that of workers in other countries, has been that, in the absence of any specific treatment, the disease may terminate in a few days or may last for many years, and that its mode of termination may be sudden or gradual. Some patients show extraordinary resilience in the face of long-continued illness—such fortitude being perhaps commoner in abortus than in melitensis infections where rheumatic manifestations are more usual in the later phases.

The first patient seen by me in this country had apparently contracted the disease at Sydenham in 1886; for her symptoms had been exactly the same from that time until she came to me in 1929—except for a three-year period of freedom from 1918 to 1921, which of course raises the possibility of a reinfection. In 1932 she became afebrile and she was still so when I saw her last in 1936, though unfortunately in 1933 she had developed diabetes.

During all this long period she had felt fairly well in the morning, but about the middle of the afternoon the temperature would rise, with burning headache and the feeling that her eyes were full of hot sand, a sensation of violent heat or intense cold amounting at times to actual pain, and finally drenching perspiration lasting for a considerable time and soaking through her clothes, necessitating sometimes several changes of underclothes or night-clothes within an hour or two. During these attacks ocular accommodation was disturbed, making it impossible for her to read and eventually forcing her to give up needlework. In addition she suffered from pains in the back, lassitude, depression, insomnia (sometimes severe), constipation, and frequent nasal and bronchial catarrh. She told me that the disease had spoilt her life, for she could never accept a late afternoon or evening invitation owing to these drenching sweats, which were of the sour-smelling variety. Yet in spite of this long martyrdom she appeared, at the age of 60 when I first saw her, little different from a healthy woman of her age, except for some pallor and an unusually quiet demeanour.

This lady was, for many years, regarded by her family and her doctor as suffering from "nerves," and her temperature was not even taken until she contracted malaria in Ceylon in 1928—i.e., after 42 years of undulant fever. Another lady in my series, who had suffered from the disease for between eleven and thirteen years, was condemned by the same diagnosis of "nerves" to this long period of mental as well as physical suffering.

Even in cases of more normal duration, the frequency of intermissions and the usual failure of treatment to bring more than a slight alleviation make this a particularly trying disease. A good description of a case of moderate severity given to me by the physician was "a long, wearisome and most crippling form of illness, for the patient was not ill enough to compel him to stay in bed and yet was not well enough to go about his work."

DIAGNOSTIC CRITERIA

Workers in this field differ widely in their opinion on the criteria for diagnosis. Too lenient a standard will not only distort our knowledge of the disease but may

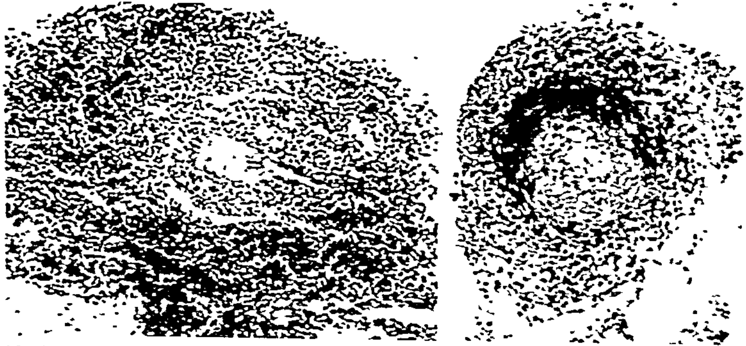


Fig. 15—Sections of human brain (×130) showing lesions due to brucella. Left: dense collar of lymphocytes around a meningeal vessel. Right: infiltration of lymphocytes around a brain-stem artery, showing much destruction of the media, with connective-tissue replacement. (After Hansmann and Schenken, *Amer. J. Path.* 1932, 8, 435.)

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‡ It is interesting to note that Hughes [53] remarks that this rash "is seldom well developed in enteric fever cases in Malta, though present in some 70% of English cases."

also result in failure to treat the patient for some other condition from which he is really suffering. On the other hand too strict requirements will entail the missing of cases of undulant fever and deprive the patient of the benefit of treatment which is at long last showing some promise of effectiveness: they may condemn him to ineffective, distressing, and perhaps dangerous treatment for some other complaint from which he is not suffering; and the result may well be a serious attack on his mental integrity.

The criteria which I adopted for my series were:

1. Positive culture from the blood or other tissues.
2. A clinical picture consistent with undulant fever.
3. Agglutination by a standard brucella antigen to a titre of not less than 1 in 100.§

Positive culture, combined with a satisfactory clinical picture, is perhaps the only wholly satisfactory criterion; but in its absence a good clinical picture plus positive agglutination has seemed to me sufficient for practical purposes. The value of these and other criteria must now be briefly discussed.

Culture

By using a suitable technique (involving such precautions as suitable media, the use of an atmosphere containing an increased proportion of carbon dioxide, frequent subculturing and the continuation of culturing for at least twenty-eight days) it is often possible to isolate brucella from the blood, and less often from the spleen, urine, fæces, tonsillar swabs, bile, lymph-glands, sternal marrow, and abscesses (including osteomyelitis), and from the vagina and placental surface in cases of abortion. Unfortunately in this country culture is attempted far too seldom (only 239 times in my series) and too half-heartedly; and the statement of McCullough [63] in the United States is worth noting—that blood-culture should be attempted daily for a minimum of seven to ten days in any case in which undulant fever is strongly suspected, and that in his experience "we have yet to see a patient in the first six months of illness, in whom we seriously suspected brucellosis, from whom the organism was not recovered."

Though blood-culture is more likely to be successful when the temperature is high, it may succeed in the late stages of the illness when the temperature is normal, or even some time after apparent recovery (Olin [71]). It is sometimes positive in the continued absence of demonstrable blood agglutinins, and the organism may even be isolated when no actual fever has been detected, as occurred in one of my cases.‖

Agglutination

Strictly speaking, the agglutination test is a satisfactory criterion only if the antigen used is itself satisfactory; and unfortunately neither our own "standard" antigen nor the great variety of those employed in other countries can be regarded with complete equanimity. We have, however, two great advantages in this respect over our American colleagues—namely, that, speaking generally, we employ only a single antigen instead of a great variety, and that the chief disease in which cross-agglutination occurs, tularæmia, is unknown in this country. The value of this test is, however, greatly enhanced if it be repeated periodically; for a rising titre, when found, confirms the presence of active brucella infection (just as it does in the case of the enteric group).

Fortunately in most cases a fairly high reading is given, as will be seen from fig. 16. A negative result on the other hand, is of little value; for even when agglutinins eventually develop they take at least five days, and often much longer, to do so (in my series, it was thirty-five days in one case and a year in another, before they appeared); and, as I have shown, they may never appear at all in a long illness, even when the organism is grown from the blood.

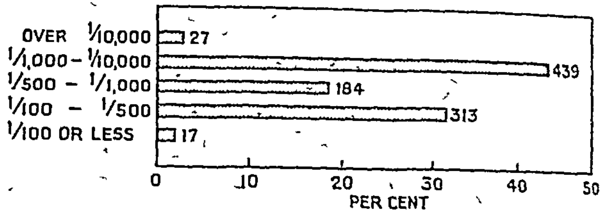

Fig. 16—Agglutination titres in 980 cases of undulant fever.

I have already mentioned the frequency of "prozones" in agglutination tests with brucella, and the importance therefore of employing a wide range of serum dilutions in the performance of this test, at any rate when the use of a more limited range has given a negative result.

Complement-fixation Reaction

This reaction is more widely employed in the United States than here. Its chief use is as an additional test when agglutination is negative, the two reactions being apparently quite unrelated. It does not, however, give a positive result as early in the disease as the agglutination test.

Intradermal Test

This test is used to detect specific sensitivity to brucella antigens, the antigen employed in this country ¶ being a preparation named "brucellin," an extract prepared from organisms of the brucella group, according to Olin's technique, by the Public Health Laboratory Service. The test is carried out by the injection of 0·1 ml. of brucellin into the skin of the forearm. A positive reaction is characterised by the appearance, in four to forty-eight hours, of a slightly raised, sometimes tender, œdematous plaque, 2–6 cm. in diameter, distinguished by its redness from the surrounding skin. A simple erythema, unattended by œdema, induration, or tenderness, which disappears in twenty-four hours, may be regarded as negative.

A negative reaction is strong evidence of the absence of recent brucella infection, but a positive reaction merely indicates that the patient has been sensitised by either past or present experience of brucella. The chief value of the test is therefore for retrospective diagnosis or to exclude undulant fever in cases in which blood-culture and the agglutination test have given negative results, though the patient is suffering from a febrile illness resembling undulant fever; but according to Foshay [33] it is occasionally negative where there is a positive blood-culture. It was employed in only 16 of my cases, in all of which it was positive, though very feebly in 3. In another 3 cases in which it was strongly positive though the agglutination titre was low (1 in 50, 1 in 100, and 1 in 125) it helped to confirm the diagnosis. In my opinion it could with advantage be employed more often in doubtful cases.

Opsonocytophagic Test

This test has been freely employed by Huddleson and other American workers, who claim that in combination with the agglutination reaction and the intradermal test it shows whether a patient is actively infected with brucella, has acquired immunity from past infection, or has had no experience of this organism. For instance

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§ I have made 5 exceptions to this rule. In 3 cases blood-culture was positive, though agglutination was consistently negative, and in the other 2 cases the agglutination titre was 1 in 50 or 1 in 80 but the clinical picture and/or the intradermal test seemed to justify the diagnosis.

‖ Such findings seem to me the best argument in favour of the American use of the name "brucellosis" in place of the historical equivalent "undulant fever" bestowed on it by Hughes.

¶ In the United States Huddleson's "brucellergen," a preparation of the nucleoprotein fraction of brucella, is very generally employed for this test.

Huddleson[52] suggests that with a positive intradermal test and an opsonocytophagic power of 0–40% of cells (using his technique) the patient should be regarded as infected whether the agglutination test is positive or not. On the other hand, when the opsonocytophagic power is 60–100% and the intradermal test is positive, the patient should be regarded as "immune," whatever the answer given by the agglutination test. In other words, this test enables an answer to be given when the agglutination test is of no help, provided the skin test is done at the same time. Most English workers do not place the same faith in this test, which is little used in this country.

Blood-count

Information about the condition of the erythrocytes in this disease is surprisingly scanty. Hughes[53] says that "the red corpuscles diminish rapidly at first, from 5,000,000 to 3,000,000 per cubic millimetre (Bruce), more slowly but steadily later on throughout the pyrexial period, leading to the pronounced anæmia which so prolongs convalescence." Huddleson[52] does not mention either the red-cell count or the hæmoglobin content of these cells, but merely quotes Munger on the question of anisocytosis. Carpenter and Boak[17] describe a secondary anæmia with a hæmoglobin of 60–50%. Sordelli and Molinelli[67,85] found a hypochromic anæmia, becoming more marked during the course of the disease, in their Argentine cases. In my own series the necessary information was available in 221 cases (table x).

TABLE X—EVIDENCE REGARDING ANÆMIA IN 221 CASES OF UNDULANT FEVER

Cases with anæmia (less than 4 2 million red cells per c.mm.)			Cases without anæmia (4 2 million or more red cells per c.mm.)		
Normochromic (C.I. 0 9 – 1·1)	Hypochromic (C.I. less than 0 9)	Hyperchromic (C.I. more than 1·1)	Normochromic (C.I. 0 9 – 1·1)	Hypochromic (C.I. less than 0 9)	Hyperchromic (C.I. more than 1·1)
15	18	5	111	67	5
	38			183	

C.I. = colour index.

It will be seen that anæmia was present in 38 cases (17·2% of the 221 cases for which the necessary information was available) and that in 18 cases (47·4% of the cases of anæmia or 8·1% of the total) the anæmia was hypochromic.

The most frequently recorded feature of the white-cell count is a lymphocytosis, either absolute or relative.[17,19,60,71,86] Castañeda and Guerrero[19] found that in more than half their 888 cases there was an absolute lymphocytosis, whilst in more than a third the lymphocytosis was only relative. As regards the polymorphonuclear leucocytes, the absolute number was reduced only when there was a general leucopenia—a finding which they considered did not agree with the hypothesis of Munger and others that some brucella toxin had a selective destructive action on these cells. Table XI shows the evidence as regards lymphocytosis in the 394 cases in my own series in which a differential blood-count was done. It will be seen that of these 394 cases a lymphocytosis was present in 78·2%, but it was absolute in only 33 5% of the total cases (42 9% of those with lymphocytosis). In view of the suggestion by Burnet,[14] Osterlind,[73] Oakley et al.,[70] and others, that lymphocytes may synthesise antibodies, it seemed of interest to ascertain whether lymphocytosis, which has been shown to be so common a feature of undulant fever, was associated with a high agglutinin titre. Of the 132 cases with an absolute lymphocytosis 81 (61·4%) had an agglutinin titre of 1 in 1000 or more, whereas of the other 262 cases in which a differential cell-count was done, such an agglutinin titre was again present in 81 cases, representing only 30·9% of these 262 cases. So big a difference is at least suggestive.

TABLE XI—EVIDENCE OF LYMPHOCYTOSIS IN 394 CASES OF UNDULANT FEVER

Total no of cases with lymphocytosis (more than 30 % lymphocytes per c mm.) = 308		
No. of cases with *absolute* lymphocytosis (more than 3000 lymphocytes per c.mm.) = 132 (42 9 %)		No. of cases with only *relative* lymphocytosis
More than 3000 but less than 5000 lymphocytes per c mm.	More than 5000 lymphocytes per c.mm.	
102 (33·1 %)	30 (9 7 %)	176 (57·1 %)

As regards the alleged effect of brucella toxins in producing a polymorphonuclear leucopenia, the findings in this series are set out in table XII. Of the 394 cases for which the necessary information was available there was a polymorphonuclear leucopenia in 208 cases (52·8%) and in 150 of these (i.e., 72 1% of the cases with polymorphonuclear leucopenia or 38·1% of the total) this leucopenia was absolute.

Sordelli and Molinelli,[86] and later Molinelli[67] noted the disappearance of eosinophil leucocytes during the acute stages of the disease. In my own series the eosinophil leucocytes were absent in 224 of these 394 cases (56·9%), but in 14 there was an eosinophilia (more than 3% of eosinophils), in 6 of these the eosinophils amounting to more than 5%, and in 9 of the 14 the eosinophilia was absolute (more than 300 per c.mm.).

"CHRONIC BRUCELLOSIS"

A special diagnostic problem arises in connection with the condition described by American writers[39,40,41,56,60] as "chronic brucellosis." Many of these workers are convinced that in their own country a great deal of chronic ill health attributed to rheumatism, septic foci, neurosis, and other causes, is really due to unrecognised brucella infection. Many of these patients are free from fever and specific agglutinins are absent from their blood-serum. Our American friends admit freely that infection with brucella is often difficult to prove in such cases, but they point to the many recorded cases in which after years of illness and innumerable investigations brucella has eventually been grown from the blood. In most cases, however, no such conclusive evidence can be adduced, and the diagnosis rests on the combined results of the agglutination test, the opsonocytophagic test, the intradermal test, and the complement-fixation test. On such grounds it has been concluded that chronic brucellosis is extremely common in the United States, and I have already quoted an American estimate that 40,000–100,000 infections occur yearly.

Whilst regarding such estimates with extreme caution —or at any rate their application to this country—I think

TABLE XII—EVIDENCE OF POLYMORPHONUCLEAR LEUCOPENIA IN 394 CASES OF UNDULANT FEVER

Total no. of cases with polymorphonuclear leucopenia (less than 50 % of polymorphonuclear leucocytes per c.mm.) = 208		
No. of cases with *absolute* polymorphonuclear leucopenia (less than 3000 polymorphonuclear leucocytes per c.mm.) = 150		No. of cases with only *relative* polymorphonuclear leucopenia
Less than 3000 but more than 2000 p.l s per c.mm.	Less than 2000 p.l.s per c.mm.	
68	82	58

it is highly probable that many cases of chronic brucella infection are in our midst, for the reasons I have already adduced in support of an even higher incidence here than can be deduced from routine Widal testing—namely :

1. The known occurrence of many mild cases likely to elude diagnosis.
2. The isolation of brucella from cases with a persistently negative agglutination test, to which I would add
3. There is no doubt that brucella is hard to eradicate from the tissues in many cases, as is shown by the fact that
   - (a) relapses are very frequent, often after intervals of a year or more in which no apparent reinfection has occurred (Foshay[34] describes a case in which the injection of specific antigen for a skin test reactivated disease which had been quiescent for six years, with resultant disability for almost one year) ;
   - (b) the organism has often been isolated from the spleen, gall-bladder, lymph-glands, or bone-marrow ; and
   - (c) there is considerable evidence pointing to an intracellular habitat for this organism, giving it the protection enjoyed so conspicuously by many viruses.

Professor Debono, of Malta, lately told me of an interesting case which well illustrates the lurking habit of brucella.

A retired British colonel, who had had undulant fever in Malta as a subaltern thirty-five years previously, one day fell from his horse, fracturing his thigh. Though the fracture was accurately set, and there were no signs of local inflammation, his convalescence was complicated by a persistent fever. The patient insisted that his symptoms were exactly similar to those suffered by him in his attack of undulant fever thirty-five years before ; and, though his agglutination reaction was negative, *Br. melitensis* was eventually grown from his blood. Thus the organism had apparently hidden for all these years in the marrow of his femur, giving no sign of its presence and biding its time !

DIFFERENTIAL DIAGNOSIS

The extraordinary variety of the manifestations of this disease cause it to simulate a great many others ; and it is therefore not surprising to encounter a wealth of provisional diagnoses. In my series 97 different provisional diagnoses were made, in many cases several being employed successively. The commonest examples are shown in table XIII.

TABLE XIII—PROVISIONAL DIAGNOSES

Provisional diagnosis	*No. of times employed*
Influenza	63
(P.U.O.)	(63)
Paratyphoid	28
Tuberculosis	19
Malaria	13
Enteric fever	10
Pneumonia	8
Typhoid	8
Rheumatic fever	7
Rheumatism	6
Endocarditis (subacute bacterial)	5
Cholecystitis	4
Feverish cold	4
Gastritis	4

Some of the diagnoses less frequently employed indicated actual symptoms and complications of undulant fever rather than other ætiology (e.g., cholecystitis, bronchitis, laryngitis) ; but such attributions as Addison's disease, agranulocytosis, cerebrospinal meningitis, migraine, and appendicitis showed the wide range of symptoms and signs.

Let us briefly consider some of the diseases for which undulant fever is most often mistaken.

Influenza

Clinically the onset may be very much the same in both diseases, but in most cases the swinging temperature and heavy sweats, usually occurring at the same time every day, make a suspicion of undulant fever justifiable before long. Suggestive also may be the comparative absence of malaise during the afebrile intervals in undulant fever, in contrast to the feeling of illness which in influenza is so often far greater than the fever would make one expect.

Paratyphoid Fever

The resemblance here is, one would think, closer ; but digestive disturbances are much commoner in paratyphoid than in undulant fever. The temperature chart may not be so helpful as in influenza.

Typhoid Fever

Differentiation from typhoid fever is perhaps the most difficult of all, though not as difficult in England as in countries where the causative agent of undulant fever is *Br. melitensis* and cases of the "typhoid" type are therefore commoner. Hughes[53] gives as the chief distinguishing signs the intermittency and irregularity of the pyrexial curve in undulant fever, in contrast to the only occasional irregularities of the enteric temperature chart ; the much greater duration of the pyrexia in undulant fever ; and, during the first fortnight when differentiation is hardest, a temporary fall of temperature to nearly normal—an event most rare in typhoid in the absence of some special cause such as bleeding from the bowel. Help is also given by the profuse sweating and constipation, both so common in undulant fever ; the absence of "that tumid swollen condition of the abdomen, so common in enteric fever" ; the moist, swollen, and more uniformly furred tongue more commonly found in undulant fever ; and the greater swelling and tenderness of the spleen in the latter, the liver being also sometimes enlarged and tender. Joint affections when present are also helpful, for such complications are very rare, even in a slight degree, in enteric.

Tuberculosis

Long-continued and irregular fever with sweating are common to both diseases, and a troublesome non-productive cough is not infrequent in the early stages of undulant fever as in pulmonary tuberculosis. Characteristic undulations of the temperature curve occur sooner or later in most cases of undulant fever which last more than a fortnight, and loss of weight is much less common, less pronounced, and later in occurrence than in tuberculosis.

Malaria

Very few cases of indigenous malaria are seen in this country, but the disease may well be suspected in patients coming from abroad and especially members of the Forces who served during the war in the East and the Mediterranean area. In such cases undulant fever of the melitensis variety must be borne in mind. So far as clinical differentiation is concerned, Hughes is once again a valuable guide. He points out that undulant fever differs essentially from malaria in being non-paroxysmal, in having no periodical or regular apyrexial intervals, and in being unaffected by quinine to any great extent—and to this we may now add mepacrine and all the other new antimalarial drugs. But he admits that there may be some difficulty "in those cases in which there is a daily intermission, more especially when they occur in countries where ague also exists"—or of course in patients returning from such countries. Again "in undulant fever of an intermittent type the temperature rises so steadily and slowly that the patient often makes no complaint, or complains of but slight headache and general malaise. There is no paroxysm, and rarely any attempt at a rigor, though when the temperature falls profuse and continued sweating may take place." As we have seen, however, rigors are not very uncommon in cases in this country (328 in my series). Where malaria and undulant fever coexist, the malarial parasite will be found in the blood ; and if, when it has been driven therefrom by appropriate treatment, the fever still persists, undulant fever may reasonably be suspected.

Rheumatic Fever

This disease resembles undulant fever especially in those cases in which the onset is preceded by irregular pains in the joints, slight malaise, and sore throat. The ordinary febrile symptoms, such as anorexia, constipation, thirst, and chilliness, are common to the onset of both diseases. Moreover profuse sour-smelling sweats are also a feature of both and coincide in each case with remissions of the fever. In rheumatic fever, however, the anæmia is usually more pronounced and develops more rapidly, and the joint affections are more definite and painful (though in *Br. melitensis* infections this distinction is not always valid). The cardiac involvement almost universal in acute rheumatism is uncommon in undulant fever.

PROGNOSIS

Mortality

The case-mortality of undulant fever is low in all countries where it occurs. Hughes[53] gives it at about 2% for the Forces in Malta, and Huddleson[52] as 3% for his cases. In my series it was 2%, so that it cannot be regarded as a very lethal disease. On the other hand it is certainly the cause of much misery and loss of work, even if a conservative estimate of its incidence be accepted. Of my 19 fatal cases 5 had some other diseased condition unconnected with brucella infection, and 2 others were feeble and old (seventy and eighty-one).

Duration

As already pointed out, the incubation period is often difficult to assess owing to the insidious onset and the frequent history of weeks of ill health preceding the detection of definite fever or the onset of acute symptoms. Consequently an estimate of the duration of the illness in any given case must be provisional, especially as the final disappearance of fever is often followed by a long period of convalescence. For these reasons it seems best to define "duration" as total duration of the fever (so far as can be ascertained), reckoning from the believed date of onset of fever to its final termination, and therefore including any afebrile intervals which were not believed to be periods of complete freedom from infection (or invasion) followed by reinfection. On this basis the duration of my cases varied from a few days to forty-six years, and the distribution in convenient groups is shown in fig. 17.

It will be seen that in 204 cases (27·5%) the fever lasted less than four weeks, but that the duration in about half the cases (366) was between four and twelve weeks, whilst in 48 (6·5%) it was over six months and in 7 exceptional cases more than three years (viz., four years; more than four years; eight years; eleven to thirteen years; sixteen years; thirty-five years; and forty-six years).

Clinical Indications

In no disease is the termination of fever harder to foretell, but I have found the following indications useful. During a febrile period, the immediate precedence of a stretch of lower fever than has previously been experienced, the return of appetite, the disappearance of headache and sweating if formerly persistent, and the clearing of the tongue are all good signs. In an afebrile period the last two signs are also of good prognosis, and as the afebrile interval becomes much longer than previous such intervals the chances of the patient having got rid of this infection steadily improve. In some cases the patients complain of a peculiar taste in the mouth (or occasionally a smell in the nose) which is apparently so characteristic that 2 of my patients, who suffered from relapses or reinfection after intervals of six months and a year, knew instantly by this sign that undulant fever and no other illness was attacking them. In such cases, of course, the disappearance of this symptom is of good import.

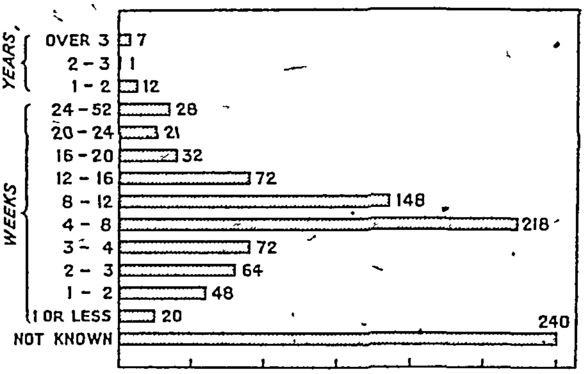

Fig. 17—Duration of fever in 743 cases of undulant fever.

Laboratory Indications

The laboratory is not particularly helpful in prognosis, but an increasing agglutination titre indicates that the body is building up resistance to the infection, and disappearance of anæmia with increase of leucocytes (particularly neutrophils), are also encouraging signs. On the other hand, in the absence of infection, agglutinins disappear from the blood far more quickly than they do in enteric fever, and an agglutination titre of 1 in 200 or more, found several months after the apparent recovery of the patient, may be a sign that relapse is on the way. In two instances where I warned practitioners of this, I received news of the relapse by return of post.

In a case reported by Dooley[25] a titre of 1 in 12,000 had dropped to 1 in 160 in five months and in another of his cases a drop occurred from 1 in 2560 to 1 in 80 in the same period. According to Olin[71] and Foshay[33] agglutinins may be present several years after recovery, but in such cases the infection may well be still present and the patient liable to relapse, as in Debono's case already mentioned.

Relapses and Reinfections

Relapses are certainly very common; but in any particular case it may be extremely difficult to say whether one is dealing with a true relapse or a reinfection. From the spleen, gall-bladder, or lymph-glands, the brucella may make a sortie after a long period of freedom from symptoms. It is this phenomenon which makes caution in prognosis advisable if we wish to avoid adding to the numerous disappointments caused by the fluctuations of the disease.

PROPHYLAXIS

Eradication of Contagious Abortion in Cattle

In a small and congested island such as ours, eradication of this disease presents great difficulty. It was hoped at one time that by means of the agglutination test and strict segregation of reacting animals a steady process of eradication within a reasonable time might be possible, as it had proved in parts of the United States and Canada. However, careful trials organised by an expert committee of the Agricultural Research Council, on which I served, showed that, under the conditions in this country, a herd from which infection is carefully weeded out, and which is protected from outside infection by every known means, will often become reinfected, usually within two years. Nothing is known for certain of the way in which such reinfection occurs, but conveyance of infection by birds and small mammals is an obvious possibility.

When this road was seen to be closed, recourse was had to vaccination of young animals with a live non-virulent vaccine. The American strain designated as "strain 19" (often abbreviated to S. 19 (fig. 18)) is being more and more widely employed by veterinarians for this purpose, and its use is reducing very considerably the degree of infection in herds, as well as saving many valuable animals to the dairy and meat industry by preventing abortion and sterility. There is no evidence that this living organism ever gives rise to virulent mutants, and it hardly ever gains access to the milk; so any such objection on public-health grounds has no validity. Moreover, since, as Stableforth has shown,[90] the agglutinins to which S.19 gives rise *in the calf* usually disappear at the time of the animal's first calving. S.19 vaccine can be used in conjunction with a policy of eradication.

Eradication by means of slaughter following an agglutination test is hardly a practical policy, owing to the high rate of infection of the cattle in this country. Such a policy, if thoroughly carried out, might reduce the present milk-supply of the country by a third.

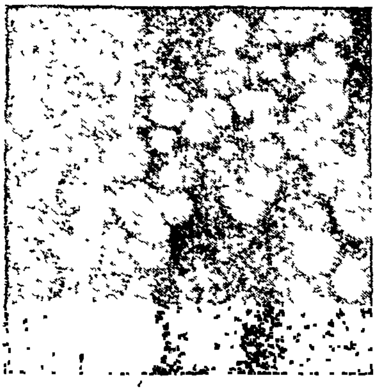

Fig. 18.—Colonies of *Br. abortus* strain 19; "going rough" (rough colonies show white).

Banning of Infected Milk-supplies

Though stopping the sale of milk containing brucella is an obvious way of protecting the public, and though section 25 of the Food and Drugs Act, 1938, makes it an offence for a person to sell, for human consumption, &c., the milk of any cow which to his knowledge is suffering from contagious abortion, yet the Ministries of Health and Agriculture take the view (which can only be confirmed or rejected by a decision of the courts) that the mere presence of agglutinins for brucella in the milk could not be regarded as proof of infection of the milk, for which purpose the presence of the actual organisms would need to be demonstrated before an offence could be proved. Moreover, even if the milk could be shown to be infected, it would still be necessary in any legal proceedings to establish that the owner knew that the cow in question was suffering from contagious abortion; and, though section 68 of the Act gives power to councils of counties and county boroughs to sample milk, there is no power to sample the cow's blood in order to carry out the agglutination test or to culture the organism. The legal position has, however, been improved by the issue of the Milk and Dairies Regulations, 1949, section 20 of which gives power to the medical officer of health of a sanitary district to stop a milk-supply, or to require its efficient heat treatment before sale, if he is satisfied that any person is suffering from a disease caused by consumption of such milk, or if he has reasonable grounds for suspecting that a person is so suffering or that the milk is infected with an organism capable of causing disease in man. As the milk-supplier is entitled to compensation under certain conditions laid down in the regulations, it is important that the medical officer of health should consider carefully the evidence of infection before taking action under these regulations, and consultation with a divisional (veterinary) inspector of the Ministry of Agriculture and Fisheries will often help him to make a wise decision.

Heat Treatment of Milk and Cream

Apart from the eradication of the disease in cattle and the taking of such precautions as are possible by laboratory workers, farm workers, veterinarians, &c., against infection by direct contact, the only prophylactic method of any value is the efficient heat treatment of all milk.

It is really astonishing how many people, many of whom should know better, continue to regard milk from [illegible] rom risk of conveying [illegible] such herds has caused many cases of undulant fever in this country and will continue to do so. Fortunately brucella is more easily killed by heat than the tubercle bacillus, and can be destroyed by simply raising the milk to boiling-point and then cooling it immediately. Commercial pasteurisation must, however, be our sheet-anchor, and the sooner it is extended so as to become universal, provided a high standard of performance is ensured, the sooner will the vast majority of the population of this country be free, to all intents and purposes from the danger of contracting this miserable, long-drawn-out, and occasionally fatal disease.

TREATMENT

Speaking generally, almost every conceivable remedy has been tried in this disease, including each new drug as it became fashionable. (I have records of 79 employed in my cases, excluding those used purely symptomatically.) Until quite lately by far the most effective treatment was protein shock, employing T.A.B. vaccine, but recently the new antibiotics have brought a ray of hope—first streptomycin, in conjunction with one of the sulphonamide drugs and more recently 'Aureomycin' and 'Chloromycetin' (chloramphenicol). Though the very limited experience so far obtained here with these antibiotics is distinctly encouraging, the frequency of relapses has shown that we still have much to learn about their employment and their limitations.

CONCLUSION

We should, I suggest, ask ourselves the following questions:

1. Are we so very sure that undulant fever is a rare disease in this country?
2. Do we always bear the possibility of this diagnosis in mind in cases of continued fever—or continued ill health without apparent fever—in which we are not completely satisfied that the case has been correctly labelled?
3. Do we, when we consider the possibility of undulant fever, always carry out the right diagnostic tests, or arrange for them to be done—and done *repeatedly*?
4. Do we order or allow milk which has not been efficiently heat-treated to be given to children, old people, mentally deficient, or mentally deranged patients, and other persons for whom we are responsible, thus exposing them to the danger of illness, perhaps long continued and distressing, or even death, from this disease?

Finally a word as to the future. Even if we succeed in getting the whole milk-supply pasteurised—because we cannot afford to wait for the complete eradication of the bovine disease—shall we have stamped out human undulant fever in Great Britain? Not so long as any of our cattle still suffer from contagious abortion, because there is always the danger of infection of humans by direct contact with infected animals. Admittedly the evidence of my large series of cases shows that infection by this means is comparatively uncommon. But apart from the missed cases, which may be numerous (most veterinarians doing cattle work seem to regard occasional malaise and rashes, which may be allergic, as part of their day's work) we must remember that there is no *Br. melitensis* infection (with the anomalous exceptions I have mentioned) or *Br. suis* infection in this country—at present. If such an invasion should occur, it will be not only cattle but sheep, goats, swine, and perhaps other domestic animals which will be affected, and consequently the chances of infection being conveyed to man will be greatly multiplied—the disease produced being usually more severe than that due to *Br. abortus*, with which alone we have to deal at present.

Is such a possibility fanciful? I do not think so. For example, nothing is known of the beginnings of undulant fever in the United States and the different varieties of brucella resemble each other so closely that it would be a bold man who would say that *Br. abortus* or *Br. suis* had not evolved from *Br. melitensis* or vice-versa.

Not being a veterinarian, I would not venture to suggest that the devoted efforts of our sister profession will not be successful in eradicating contagious abortion of cattle within a reasonable time: but I do note that in the United States the nation-wide campaign with this object does not seem to be meeting with as rapid and complete a success as had been hoped.

It seems to me, therefore, that it is the bounden duty of public authorities, the medical profession, and all enlightened people to do everything in their power firstly to protect milk-consumers by pasteurisation of the nation's milk-supply—including tuberculin-tested milk —and secondly to take all possible steps to diagnose this disease at an early stage, so that efficient treatment may be applied. Many years ago, when undulant fever was still believed to be confined to the Mediterranean area, Charles Nicolle used to tell his students that it was a disease of the future, and so it proved to be. But with your coöperation it may one day become a disease of the past.

I wish to express my deep indebtedness to all those medical practitioners, medical officers of health, and pathologists who have so kindly supplied me with material for these studies during the past twenty-one years; to all my friends in the veterinary profession who have supplied information and advice with regard to brucella infections of animals and especially to Dr. T. Dalling, chief veterinary officer, Ministry of Agriculture and Fisheries, Dr. A. Stableforth, deputy director, and other members of the staff of the Veterinary Laboratory, New Haw, Weybridge, who, amongst other kindnesses, have supplied me with three photographs reproduced in figs. 8, 9, and 18; to Sir Alexander Fleming for kindly sending me a photograph of Sir Almroth Wright; to the Commandant of the Royal Military Hospital, Millbank, for kindly supplying me with photographs of Sir David Bruce, Major Hughes, and Sir William Horrocks; to Professor Debono of Malta for kindly sending me the photograph of Sir Themistocles Zammit reproduced in fig. 5; and finally to innumerable friends in Malta, the United States of America, the Argentine, South Africa, Rhodesia, France, Denmark, Sweden, and other countries who have supplied me with most valuable information and comments.

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"... In face of the mounting costs of therapy and our far from limitless resources we shall need to know not only how to reduce the incidence of disease, but also how to reduce it at a cost we can afford. It will always be impossible to make *every* improvement which has been demonstrated to be capable of bettering community health in some degree. ... We need to know, therefore, how to apportion our efforts for improving diet and housing, for relieving special stresses and strains or for trying to improve personal conduct. Indeed, the problem of defining the best possible use of available resources to yield the maximum benefit to the greatest number of people is now a central problem of community medicine.—Prof. FRED GRUNDY in a foreword to *Illness in Infancy*, by Dr. R. M. Dykes (Luton, 1950).

BACTERIAL SYNTHESIS OF VITAMIN B_{12} IN THE ALIMENTARY TRACT

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THE existence of racial and familial hereditary factors determining the incidence of pernicious anæmia seems well established, but it is becoming generally recognised that a breakdown in the normal metabolism of an essential anti-pernicious-anæmia factor—vitamin B_{12}—is the primary cause of this condition. It is therefore important to consider the sources from which normal man and animals derive this vitamin.

Neither normal gastric juice nor beef muscle alone have any action in the treatment of pernicious anæmia, but the two materials fed together are effective, and so is raw liver. Thus it seemed likely, as Castle pointed out in 1930, that an extrinsic factor in food is acted on by an intrinsic factor in normal gastric juice to produce an anti-anæmia factor which is absorbed and stored in the liver; and that in pernicious anæmia there is a deficiency of the intrinsic factor.

It is well known that liver extracts are very much more active parenterally than by mouth (Gansslen 1930), and it has recently been shown that this is also true of vitamin B_{12}. The effective dose of vitamin B_{12} by mouth is 400 µg. per day (Spies et al. 1949), but when the vitamin is supplemented with normal gastric juice 5 µg. daily will suffice (Berk et al. 1948). The gastric juice must be fed not longer than 2 hours after the vitamin has been administered (Hall et al. 1949).

Vitamin B_{12} is identical with, or closely allied to, animal protein factor (Ott et al. 1948), cow-dung factor (Lillie et al. 1948), and extrinsic factor (Bethel et al. 1949). Generally speaking, vegetable foods such as grass, hay, &c., are low in this material, whether it is assayed as animal protein factor, extrinsic factor, or vitamin B_{12}.

The fæces of patients with pernicious anæmia show microbiological vitamin-B_{12} activity (Bethel et al. 1948), and extracts of them are clinically active when administered parenterally and behave similarly to vitamin B_{12} on paper chromatography (Callender et al. 1949).

Since pure vitamin B_{12} is highly effective if injected intramuscularly, when there is no possibility of its coming into contact with gastric juice, it does not seem necessary for this extrinsic factor to be changed by intrinsic factor before it can exert its effect. In-vitro formation of anti-anæmia principle from a mixture of gastric juice and beef has not been demonstrated (Formijne 1940).

EFFECT OF GASTRIC JUICE ON EXTRINSIC FACTOR IN VITRO

The following experiments were undertaken to ascertain whether the microbiological activity of the extrinsic factor in meat is increased by digestion with normal human gastric juice.

Minced lean beef was incubated at 37°C for 2½ hours with (1) water, (2) normal gastric juice, and (3) boiled normal gastric juice. After incubation all three preparations were boiled and filtered. The filtrates were assayed microbiologically, and at equivalent dilutions no difference was found between their growth-producing effects for either *Lactobacillus lactis* Dorner or *L. leishmannii*. Similar results were obtained when either minced veal or minced horsemeat were used as substrate.

VITAMIN B_{12} IN THE GUT OF MAN AND ANIMALS

Vitamin B_{12} (extrinsic factor) may be derived from the diet or be produced by bacterial synthesis in the gut. The vitamin B_{12} in the contents of the alimentary canal of a man, a horse, and a sheep was assayed. Samples were obtained at autopsy from various levels of the digestive tract, and suitable boiled extracts from these were assayed microbiologically using *L. leishmannii* as the test organism. The possible interference of desoxyribonucleosides was eliminated by making a further assay after heating the extracts to 100°C for 15 minutes in the presence of 0·2*N* NaOH, a procedure which completely destroys free vitamin B_{12} but is believed not to affect desoxyribonucleosides. The results of the various assays are given in table I.

The interpretation of these figures is complicated because they are the resultants of a number of factors. Intake of food and water, screening by pylorus and ileocæcal valve, dilution with gastric and intestinal juices, and dehydration by absorption through the intestinal wall all play a part, and at the same time vitamin B_{12} is probably being absorbed. Nevertheless, the results obtained present a clear picture of the distribution of vitamin B_{12} in the alimentary canal. Estimation of the lowest values is probably somewhat inaccurate owing to interference by non-specific factors, whereas for the high values the concentration of gut contents in the assay tube is very small, being of the order of 1 in 20,000, so that non-specific factors are diluted out.

The horse was fed on hay, proprietary rearing-nuts, bran, and straw, and the sheep on hay and nuts. The results of assays of these materials were as follows:

Feeding-stuff	*Total vitamin B_{12} (µg. per g. dry weight)*	*Alkali stable*
Hay	0·01	36%
Rearing-nuts	0·002	30%
Bran	0·002	50%
Straw	0·001	—

These values refer to dry and not to wet weight, as in the samples from the alimentary tract.

No explanation is offered for the high result obtained for the sheep's ileum. The similar proportion of alkali-stable activity in the stomach contents of the horse and in its diet is interesting. The ratio of alkali-stable to total activity is greater in the contents of the upper section of the alimentary canal than in the lower sections in all three subjects.

ISOLATION OF "VITAMIN B_{12}" FROM INTESTINAL CONTENTS

Samples of intestinal contents from horses were extracted, and after suitable purification, culminating in chromatographic separation, red fractions were obtained which, when dissolved in water and diluted to a colour comparable to that of a standard solution of crystalline

TABLE I—CONCENTRATION OF GROWTH FACTOR FOR *L. leishmannii* IN VARIOUS PORTIONS OF THE ALIMENTARY CANAL OF MAN, HORSE, AND SHEEP (µG. PER G. WET WEIGHT)

Part or organ	Man		Horse		Sheep	
	Total	Alkali-stable (%)	Total	Alkali-stable (%)	Total	Alkali-stable (%)
Rumen	..	..	..	..	0·35	1
Abomasum	..	..	..	..	0·28	4
Stomach	0·01	10	0·006	36	..	..
Duodenum	0·01	20	0·03	1·5	..	..
Jejunum	0·003	<1	0·011	1·2	0·18	10
Ileum	0·008	<1	0·003	<1	0·5	4
Cæcum	0·055	<1	0·23	<1	0·15	1·2
Large colon (1st part)	..	..	0·2	<1	0·18	<1
Large colon (2nd part)	..	..	0·24	<1	0·41	<1
Small colon	..	..	0·36	<1	..	..
Pelvic colon	0·14	<1	..	..	..	..
Rectum	..	..	0·6	<1	0·52	<1
Liver	0·3	1	0·46	10	0·58	30
Muscle	0·005	<1	0·015	<1	0·014	<1

vitamin B_{12}, had a similar growth-promoting activity for *L. lactis* Dorner and *L. leishmannii.*

Clinical Trials.

To confirm that the substance isolated from intestinal contents was indeed an anti-pernicious-anæmia factor, some of the purified fractions were applied to the treatment of typical cases of pernicious anæmia in relapse. The results of one such trial on 3 cases (table II) indicate that the material is clinically active when injected intramuscularly, and its activity approximates to that expected from its microbiological potency.

It appears, therefore, that the microbiologically active material in the horse's intestinal contents is similar in effect to crystalline vitamin B_{12}. Whether the two substances are completely identical is a subject for further investigation.

Trials are in progress to establish the minimum effective dose of the substance by mouth.

DISCUSSION

If the amount of vitamin B_{12} is a measure of anti-anæmic activity, our observations support the contention that normal gastric juice does not create anti-anæmia factor from extrinsic factor in food. An alternative possibility, that intrinsic factor is solely concerned with the adsorption of vitamin B_{12} is thus indirectly supported.

The vitamin-B_{12} content of the diet of the human subject was not known. In the horse the daily intake is only a minute fraction of the daily excretion, even assuming that all the alkali-labile growth-promoting activity in the diet is due to vitamin B_{12}. Synthesis must therefore take place in the horse's intestinal tract, and work now in progress indicates that certain strains of lactobacilli isolated from the intestinal contents are capable of producing considerable amounts of vitamin B_{12}.

The red fraction from the horse's intestinal contents is active both microbiologically and clinically; it is therefore similar to vitamin B_{12}. In view of the recent work on cow-dung factor (Winsten and Eigen 1949), however, this red material may not be completely identical with crystalline vitamin B_{12}.

In the animals examined, the amount of vitamin B_{12} synthesised in the intestine seemed to be considerable. In ruminants, synthesis occurs in both the upper and lower portions of the digestive tract, whereas in equines and man it apparently does not begin until the cæcum is reached. Broadly speaking, synthesis is greatest in ruminants, somewhat less in equines, and definitely less in man. Nevertheless, in man, when the absorptive mechanism is effective, it seems that intestinal synthesis contributes the major portion of the total amount of extrinsic factor. In vegetarians this must be the case.

If it is accepted that vitamin B_{12} is present in the lower reaches of the digestive tract, its absorption from this site remains to be explained. There are strong grounds for assuming that extrinsic factor, whether as crystalline vitamin B_{12} or in any other form, requires the presence of intrinsic factor before it can be assimilated. It is only recently that investigations have been made into the presence in the intestinal wall of intrinsic factor as distinct from extrinsic and intrinsic factor together. The presence of intrinsic factor in duodenal mucosa has been established (Bethel et al. 1949) and there is indirect evidence of its existence as far down as the wall of the ileum (Uotila 1936, 1938), but apparently its presence in the cæcum and colon has not been inquired into. It is generally assumed that a deficiency in intrinsic factor is the main characteristic of classical pernicious anæmia and that this deficiency is associated with a defect in the upper portion of the tract. How far down the defect exists is not certain, but if, as has been suggested, the argentaffine cells are concerned with the defect (Jacobson 1939), then the whole of the intestine, including the colon, is implicated. Man and non-ruminant animals are at a disadvantage in that autogenous vitamin B_{12} is not exposed to the absorptive area of their whole gastro-intestinal tract. This disadvantage is overcome in man by the inclusion of meat products in the diet and in animals by coprophagy, a common phenomenon well illustrated in the rabbit.

TABLE II—CLINICAL RESPONSE OF 3 CASES OF PERNICIOUS ANÆMIA IN RELAPSE TO INTRAMUSCULAR INJECTIONS OF VITAMIN-B_{12} CONCENTRATE PREPARED FROM HORSE'S INTESTINAL CONTENTS

Days when test was made		Case 1			Case 2			Case 3		
		Dose: 15 µg.			Dose: 15 µg.			Dose: 45 µg.		
		Red cells (mill. per c.mm.)	Retic. (%)	Hb (%)	Red cells (mill. per c.mm.)	Retic. (%)	Hb (%)	Red cells (mill. per c.mm.)	Retic. (%)	Hb (%)
Control period (days)	1	..	..	..	..	..	..	..	..	..
	2	..	..	..	..	..	..	1·8	<1	50
	3	..	..	..	..	..	..	..	<1	..
	4	1·48	<1	44	1·47	1·7	30	..	<1	..
	5	..	..	..	1·21	1·8	32	..	<1	..
Period after injection (days)	1	1·69	<1	40	..	2	..	1·7	<1	48
	2	..	..	..	..	3	..	..	<1	..
	3	..	<1	..	..	3	29	..	<1	..
	4	..	2	..	..	10	..	2·0	3	50
	5	..	12	..	..	12	..	..	7	..
	6	..	24	..	..	25	..	2·0	20	..
	7	..	15	..	1·62	22	..	..	11	..
	8	2·02	11	50	..	23	..	2·4	15	64
	9	..	..	..	..	14	..	..	..	..
	10	..	2½	..	..	6	..	..	..	..
	11	..	1½	..	..	6	..	..	..	..
	12	..	<1	..	..	..	..	..	..	..
	13	..	<1	..	1·8	1	51	2·7	<1	66
	14	..	<1	..	..	..	..	..	..	..
	15	2·08	<1	57	2·15	1	51	3·2	<1	78
	16	..	..	..	..	..	..	..	..	..
	17	..	..	..	..	..	..	2·74	<1	75
	18	..	..	..	..	..	..	..	..	..

In the past, consideration of the ætiology of macrocytic anæmia has been mainly directed to (*a*) the failure in intrinsic factor, (*b*) the dietary deficiency in extrinsic factor, and (*c*) possibly an abnormal expenditure of hæmopoietic factor. It is now suggested that a further factor should be taken into consideration—namely, the variations in intestinal vitamin-B_{12} content due to changes in intestinal conditions. The type and number of organisms present in the intestine will depend on the nature of the food residues. The bacterial flora produced by the cooked low-residue diet of western man would be expected to differ from that resulting from the high-residue diet of herbivora and vegetarians.

Microbiological assays of vitamin B_{12}, folic acid, and other essential factors in fæces might throw some light on the relationship between variations in diet and spontaneous remission and relapse in pernicious anæmia, and might explain the supposed value of strawberries in sprue, and bananas in cœliac disease.

SUMMARY

The vitamin B_{12} growth-promoting activity for *L. lactis* Dorner and *L. leishmannii* in meat is not increased by incubation with normal gastric juice.

The presence of vitamin B_{12} in the contents of the alimentary canal at various levels in man and animals is established and its amount is shown to be greatest below the ileocæcal valve.

Purified extracts made from intestinal contents are shown to be active in the treatment of pernicious anæmia when given parenterally.

It is suggested that in man the normal requirements of vitamin B_{12} are met by bacterial synthesis in the colon.

BACTERIAL SYNTHESIS OF VITAMIN B_{12} IN THE ALIMENTARY TRACT

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THE existence of racial and familial hereditary factors determining the incidence of pernicious anæmia seems well established, but it is becoming generally recognised that a breakdown in the normal metabolism of an essential anti-pernicious-anæmia factor—vitamin B_{12}—is the primary cause of this condition. It is therefore important to consider the sources from which normal man and animals derive this vitamin.

Neither normal gastric juice nor beef muscle alone have any action in the treatment of pernicious anæmia, but the two materials fed together are effective, and so is raw liver. Thus it seemed likely, as Castle pointed out in 1930, that an extrinsic factor in food is acted on by an intrinsic factor in normal gastric juice to produce an anti-anæmia factor which is absorbed and stored in the liver; and that in pernicious anæmia there is a deficiency of the intrinsic factor.

It is well known that liver extracts are very much more active parenterally than by mouth (Gansslen 1930), and it has recently been shown that this is also true of vitamin B_{12}. The effective dose of vitamin B_{12} by mouth is 400 µg. per day (Spies et al. 1949), but when the vitamin is supplemented with normal gastric juice 5 µg. daily will suffice (Berk et al. 1948). The gastric juice must be fed not longer than 2 hours after the vitamin has been administered (Hall et al. 1949).

Vitamin B_{12} is identical with, or closely allied to, animal protein factor (Ott et al. 1948), cow-dung factor (Lillie et al. 1948), and extrinsic factor (Bethel et al. 1949). Generally speaking, vegetable foods such as grass, hay, &c., are low in this material, whether it is assayed as animal protein factor, extrinsic factor, or vitamin B_{12}.

The fæces of patients with pernicious anæmia show microbiological vitamin-B_{12} activity (Bethel et al. 1948), and extracts of them are clinically active when administered parenterally and behave similarly to vitamin B_{12} on paper chromatography (Callender et al. 1949).

Since pure vitamin B_{12} is highly effective if injected intramuscularly, when there is no possibility of its coming into contact with gastric juice, it does not seem necessary for this extrinsic factor to be changed by intrinsic factor before it can exert its effect. In-vitro formation of anti-anæmia principle from a mixture of gastric juice and beef has not been demonstrated (Formijne 1940).

EFFECT OF GASTRIC JUICE ON EXTRINSIC FACTOR IN VITRO

The following experiments were undertaken to ascertain whether the microbiological activity of the extrinsic factor in meat is increased by digestion with normal human gastric juice.

Minced lean beef was incubated at 37°C for $2^1/_2$ hours with (1) water, (2) normal gastric juice, and (3) boiled normal gastric juice. After incubation all three preparations were boiled and filtered. The filtrates were assayed microbiologically, and at equivalent dilutions no difference was found between their growth-producing effects for either *Lactobacillus lactis* Dorner or *L. leishmannii*. Similar results were obtained when either minced veal or minced horsemeat were used as substrate.

VITAMIN B_{12} IN THE GUT OF MAN AND ANIMALS

Vitamin B_{12} (extrinsic factor) may be derived from the diet or be produced by bacterial synthesis in the gut. The vitamin B_{12} in the contents of the alimentary canal of a man, a horse, and a sheep was assayed. Samples were obtained at autopsy from various levels of the digestive tract, and suitable boiled extracts from these were assayed microbiologically using *L. leishmannii* as the test organism. The possible interference of desoxyribonucleosides was eliminated by making a further assay after heating the extracts to 100°C for 15 minutes in the presence of 0·2*N* NaOH, a procedure which completely destroys free vitamin B_{12} but is believed not to affect desoxyribonucleosides. The results of the various assays are given in table I.

The interpretation of these figures is complicated because they are the resultants of a number of factors. Intake of food and water, screening by pylorus and ileocæcal valve, dilution with gastric and intestinal juices, and dehydration by absorption through the intestinal wall all play a part, and at the same time vitamin B_{12} is probably being absorbed. Nevertheless, the results obtained present a clear picture of the distribution of vitamin B_{12} in the alimentary canal. Estimation of the lowest values is probably somewhat inaccurate owing to interference by non-specific factors, whereas for the high values the concentration of gut contents in the assay tube is very small, being of the order of 1 in 20,000, so that non-specific factors are diluted out.

The horse was fed on hay, proprietary rearing-nuts, bran, and straw, and the sheep on hay and nuts. The results of assays of these materials were as follows:

Feeding-stuff					*Total vitamin B_{12} (µg. per g. dry weight)*	*Alkali-stable*
Hay	..	..	..	..	0·01	36%
Rearing-nuts	..	..	..		0·002	30%
Bran	..	..	..	..	0·002	50%
Straw	..	..	..	..	0·001	—

These values refer to dry and not to wet weight, as in the samples from the alimentary tract.

No explanation is offered for the high result obtained for the sheep's ileum. The similar proportion of alkali-stable activity in the stomach contents of the horse and in its diet is interesting. The ratio of alkali-stable to total activity is greater in the contents of the upper section of the alimentary canal than in the lower sections in all three subjects.

ISOLATION OF "VITAMIN B_{12}" FROM INTESTINAL CONTENTS

Samples of intestinal contents from horses were extracted, and after suitable purification, culminating in chromatographic separation, red fractions were obtained which, when dissolved in water and diluted to a colour comparable to that of a standard solution of crystalline

TABLE I—CONCENTRATION OF GROWTH FACTOR FOR *L. leishmannii* IN VARIOUS PORTIONS OF THE ALIMENTARY CANAL OF MAN, HORSE, AND SHEEP (µG. PER G. WET WEIGHT)

Part or organ	Man		Horse		Sheep	
	Total	Alkali-stable (%)	Total	Alkali-stable (%)	Total	Alkali-stable (%)
Rumen	..	..	..	..	0·35	1
Abomasum	..	..	..	..	0·28	4
Stomach	0·01	10	0·006	36	..	..
Duodenum	0·01	20	0·03	1·5	..	..
Jejunum	0·003	<1	0·011	1·2	0·18	10
Ileum	0·008	<1	0·003	<1	0·5	4
Cæcum	0·055	<1	0·23	<1	0·15	12
Large colon (1st part)	..	..	0·2	<1	0·18	<1
Large colon (2nd part)	..	..	0·24	<1	0·41	<1
Small colon	..	..	0·36	<1	..	..
Pelvic colon	0·14	<1	..	..	..	..
Rectum	..	..	0·6	<1	0·52	<1
Liver	0·3	1	0·46	10	0·58	30
Muscle	0·005	<1	0·015	<1	0·014	<1

—and of the hydrogenated alkaloids of ergot were investigated. The drugs were either injected directly into the mucosa of the bowel or given as an intravenous infusion.

For the intravenous procedure a needle was inserted into a suitable vein in the right forearm and connected to a constant speed infusion apparatus. A steady infusion of saline was started, and the blood-pressure was measured by the auscultatory method from the left arm. When basal readings had been obtained, the saline infusion was superseded by one containing the drug under investigation.

When the direct effect of the substance was to be studied, it was dissolved in 0·5 ml. of physiological saline and injected into the bowel close to the thermocouple. If the drug seemed to produce a rise in the temperature of the bowel, the subsequent experiments consisted in injecting 0·5 ml. of physiological saline at 25°C as a control and then, after an interval, injecting the drug dissolved in 0·5 ml. of saline at 25°C. If a constrictor response appeared likely, saline at 35°C was used. Thus anomalous responses due to the temperature of the saline could be eliminated.

RESULTS WITH ADRENALINE AND NORADRENALINE

For these experiments *l*-adrenaline tartrate and *l*-noradrenaline hydrochloride were used.

Intravenous Infusions.—Seven experiments in which adrenaline was infused and six in which noradrenaline was infused were made. Doses of 5–10 µg. per minute were infused for 2–5 minutes. The response of the colon seemed to be similar in all experiments. Shortly after the start of the infusion there was a rapid fall in bowel temperature of 0·9–1·5°C. This lowered temperature was maintained for periods up to 2 minutes after the infusion had been discontinued. The temperature then returned to the level observed before the infusion. The responses of the blood-pressure and heart-rate were found to be similar to results previously reported for adrenaline (Gordon and Levitt 1935) and noradrenaline (Goldenberg et al. 1948, Swan 1949a). Fig. 1 shows the effect of intravenous adrenaline and fig. 2 that of intravenous noradrenaline. In some experiments the temperature-level tended, after the infusion, to rise transiently above the base-line. This effect had the same time relationship as the dilatation which occurs in the hand after adrenaline infusions (Swan 1949b).

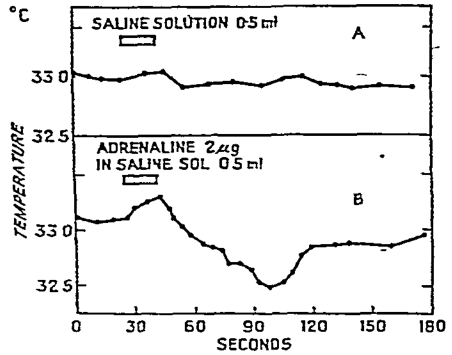

Fig. 3—Effect of local infiltration of bowel on bowel temperature: A, control (physiological saline solution at 35°C); B, adrenaline 2 µg. in 0·5 ml. of physiological saline solution at 35°C.

Local injections of adrenaline or of noradrenaline produced a sustained fall in colostomy temperature in four patients. A control injection of 0·5 ml. of warm saline (35°C) was made into the bowel wall, and 5 minutes later adrenaline 2 µg. dissolved in 0·5 ml. of warm saline was injected (fig. 3).

RESULTS WITH DIHYDROERGOCORNINE AND HYDERGINE

The action of dihydroergocornine and 'Hydergine'* on blood-flow in skin and muscle has been investigated by Barcroft et al. (1950).

Intravenous infusion with either hydergine or dihydroergocornine produced a fall in bowel temperature lasting about 30 minutes. A typical experiment is shown in fig. 4, in which the relation of the fall in colostomy temperature to the rise in finger temperature is clearly seen. Five experiments were performed on five patients with normal blood-pressure, and the effect on two patients with raised blood-pressure was also observed. Hydergine was given to five patients in doses of 0·1–0·5 mg. intravenously, and dihydroergocornine 0·5 mg. was given to each of two patients. The fall in bowel temperature occurred in all cases and usually began about 5–10 minutes after the infusion of the ergot alkaloid was complete. A fall in tissue temperature of up to 2·3°C was observed. The fall was greater with the larger doses of the alkaloids. The duration of infusion of the drug, which varied from 1$^1/_2$ to 10 minutes, made no apparent difference to the response obtained. In the two hypertensive patients the blood-pressure fell but the bowel temperature continued to fall for some time after the lowest blood-pressure was recorded.

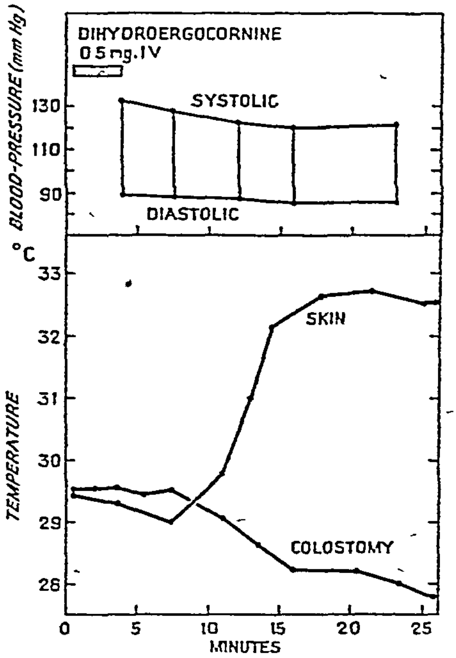

Fig. 4—Effect of intravenous dihydroergocornine 0·5 mg on temperature of colostomy tissue, skin temperature of right index finger, and blood-pressure.

Local infiltration of dihydroergocornine into the bowel produced a different response from that of intravenous infusion. The tissue temperature rose 1·1–1·5°C in each of these patients and returned to the initial level in 15–20 minutes (fig. 5).

DISCUSSION

Adrenaline and Noradrenaline

These two sympathomimetic amines, whether given intravenously or locally, invariably produced a fall in colostomy temperature in our subjects. We therefore conclude that the fall in tissue temperature was due to diminution in the flow of blood through the exposed bowel. This effect is considered to be a local constrictor response of the colonic blood-vessels, since it occurred when the adrenaline or noradrenaline was infiltrated

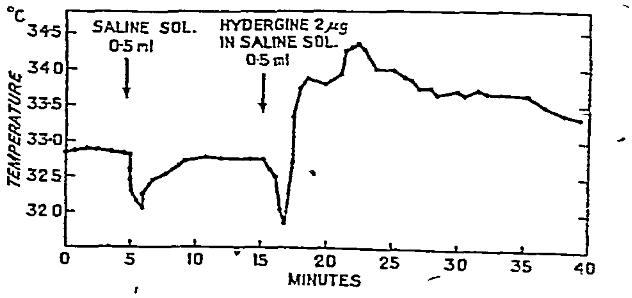

Fig. 5—Effect of local infiltration of bowel on bowel temperature: A, control (physiological saline solution at 25°C); B, hydergine 2 µg. in physiological saline solution 0·5 ml. at 25°C.

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* Hydergine (Sandoz) is a mixture, in equal amounts, of dihydroergocornine, dihydroergokryptine, and dihydroergocristine.

Some advantage is undoubtedly to be gained by supplementing this with foodstuffs rich in vitamin B_{12}.

We wish to thank Dr. A. J. McCall, Dr. J. G. A. McSorley, Mr. R. S. Roberts, and Prof. H. L. Sheehan for their help in the investigation.

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ACTION OF ADRENALINE, NORADRENALINE, AND DIHYDROERGOCORNINE ON THE COLONIC CIRCULATION

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STUDIES of vascular reactions in the splanchnic area are necessarily confined largely to experiments on animals, and conclusions drawn from such experiments are not always applicable to man, for anæsthesia, surgical manipulation, and hæmorrhage may affect the experimental findings, and what is true of one species is not always true of another. Nevertheless, in the last few years experimental procedures have given us some valuable information concerning hepatic (Bradley et al. 1945) and renal (Goldring et al. 1940) blood-flow in man. We describe here a simple method whereby further information concerning the circulation in the splanchnic area may be obtained by measuring the temperature changes in bowel exteriorised at operation. The effects of some pharmacological substances on the colonic circulation have been studied in this way.

METHOD

If the temperatures of the blood and environment are constant but unequal, the temperature of any tissue will depend on the blood-flow through the tissue. This general principle can be applied as an index of changes in blood-flow. In man it has been used in the assessment of circulatory phenomena in skin by Parmenter and Benedict (1929) and in muscle by Barcroft and Millen (1939). A somewhat similar method has recently been applied by one of us (Grayson 1949) in recording continuously the changes in temperature in the mucosa and muscle layer of the exposed bowel in patients with an ileostomy or colostomy. The experimental procedure was as follows:

The patient lies still for about 30 minutes with the colostomy exposed, in a room which is kept at a constant temperature of about 21°C throughout the experiment. A fine needle thermocouple is then inserted into the mucosa or into the muscular layer of the exposed bowel, and the leads are connected through a suitable circuit to a sensitive galvanometer which measures changes in tissue temperature of the order of 0·02°C. A manually operated mechanical device is used to obtain a continuous record on a kymograph (Schmidt and Pierson 1934). The detailed technique, including construction of the thermocouples and estimations of the normal rate of cooling in the bowel, has been described elsewhere (Grayson 1949).

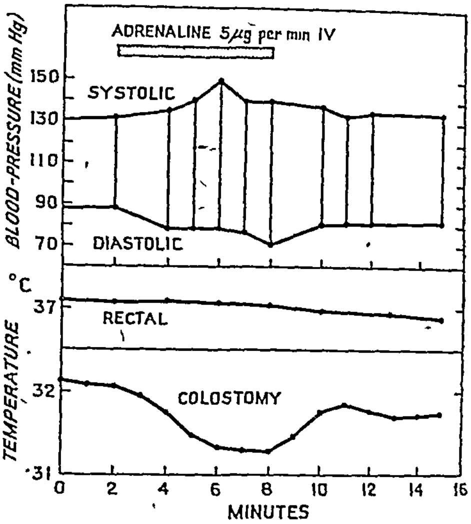

Fig. 1—Effect of intravenous infusion of adrenaline 5 µg. per minute on rectal temperature, blood-pressure, and colostomy temperature.

This method, though simple in principle and practice and completely innocuous to the patient, has limitations. First, the choice of subjects is small, and most of those available are in late middle life, often in poor physical condition. Secondly, the response obtained is qualitative only. Unpublished experiments made by one of us (J. G.) show that the relation between tissue temperature and blood-flow is not linear, and without previous knowledge of the initial blood-flow and the behaviour of the tissue under investigation it is impossible to assess changes of temperature in terms of absolute blood-flow. Thirdly, the information obtainable concerns only the mucosa or muscle wall of the part exposed, and it is not possible to study changes of blood-flow in the mesentery, omentum, or other viscera in this way.

However, the responses in many different parts of the bowel may be obtained by selecting suitable subjects—patients with ileostomy, cæcostomy, or the various types of colostomy.

In the observations reported here the effects of two sympathomimetic amines—adrenaline and noradrenaline

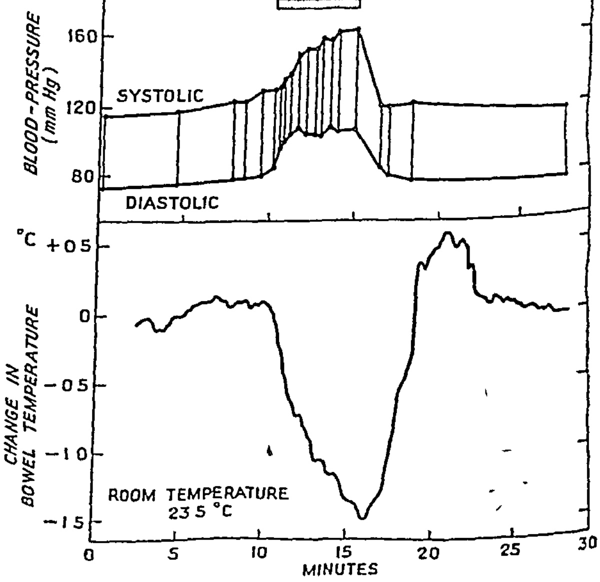

Fig. 2—Effect of intravenous infusion of noradrenaline 10 µg. per minute on colostomy temperature and blood-pressure.

—and of the hydrogenated alkaloids of ergot were investigated. The drugs were either injected directly into the mucosa of the bowel or given as an intravenous infusion.

For the intravenous procedure a needle was inserted into a suitable vein in the right forearm and connected to a constant speed infusion apparatus. A steady infusion of saline was started, and the blood-pressure was measured by the auscultatory method from the left arm. When basal readings had been obtained, the saline infusion was superseded by one containing the drug under investigation.

When the direct effect of the substance was to be studied, it was dissolved in 0 5 ml. of physiological saline and injected into the bowel close to the thermocouple. If the drug seemed to produce a rise in the temperature of the bowel, the subsequent experiments consisted in injecting 0·5 ml. of physiological saline at 25°C as a control and then, after an interval, injecting the drug dissolved in 0 5 ml. of saline at 25°C. If a constrictor response appeared likely, saline at 35°C was used. Thus anomalous responses due to the temperature of the saline could be eliminated.

RESULTS WITH ADRENALINE AND NORADRENALINE

For these experiments l-adrenaline tartrate and *l*-noradrenaline hydrochloride were used.

Intravenous Infusions.—Seven experiments in which adrenaline was infused and six in which noradrenaline was infused were made. Doses of 5–10 µg. per minute were infused for 2–5 minutes. The response of the colon seemed to be similar in all experiments. Shortly after the start of the infusion there was a rapid fall in bowel temperature of 0 9–1·5°C. This lowered temperature was maintained for periods up to 2 minutes after the infusion had been discontinued. The temperature then returned to the level observed before the infusion. The responses of the blood-pressure and heart-rate were found to be similar to results previously reported for adrenaline (Gordon and Levitt 1935) and noradrenaline (Goldenberg et al. 1948, Swan 1949a). Fig. 1 shows the effect of intravenous adrenaline and fig. 2 that of intravenous noradrenaline. In some experiments the temperature level tended, after the infusion, to rise transiently above the base-line. This effect had the same time relationship as the dilatation which occurs in the hand after adrenaline infusions (Swan 1949b).

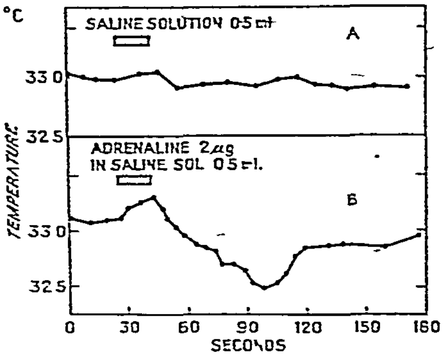

Fig. 3—Effect of local infiltration of bowel on bowel temperature: A, control (physiological saline solution at 35°C); B, adrenaline 2 µg. in 0 5 ml. of physiological saline solution at 35°C.

Local injections of adrenaline or of noradrenaline produced a sustained fall in colostomy temperature in four patients. A control injection of 0·5 ml. of warm saline (35°C) was made into the bowel wall, and 5 minutes later adrenaline 2 µg. dissolved in 0 5 ml. of warm saline was injected (fig. 3).

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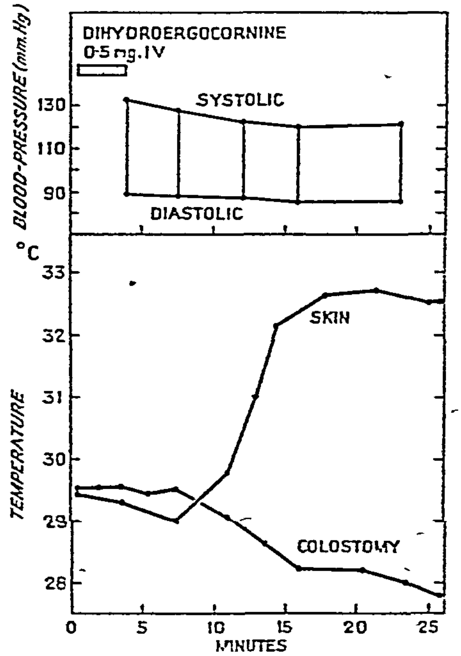

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Local infiltration of dihydroergocornine into the bowel produced a different response from that of intravenous infusion. The tissue temperature rose 1·1–1 5°C in each of these patients and returned to the initial level in 15–20 minutes (fig. 5).

DISCUSSION

Adrenaline and Noradrenaline

These two sympathomimetic amines, whether given intravenously or locally, invariably produced a fall in colostomy temperature in our subjects. We therefore conclude that the fall in tissue temperature was due to diminution in the flow of blood through the exposed bowel. This effect is considered to be a local constrictor response of the colonic blood-vessels, since it occurred when the adrenaline or noradrenaline was infiltrated

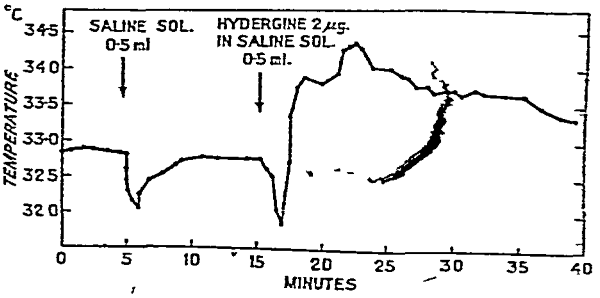

Fig. 5—Effect of local infiltration of bowel on bowel temperature: A, control (physiological saline solution at 25°C); B, hydergine 2 µg. in physiological saline solution 0 5 ml. at 25°C.

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* Hydergine (Sandoz) is a mixture, in equal amounts, of dihydroergocornine, dihydroergokryptine, and dihydroergocristine.

directly into the bowel wall. When the drug was given intravenously the fall in colostomy temperature coincided with the rise in blood-pressure; so an active vasoconstriction must have taken place.

Hydrogenated Alkaloids of Ergot

We have observed a fall in temperature in all the subjects given an intravenous infusion of dihydroergocornine or hydergine. Since this occurred in some subjects without any fall in blood-pressure, we conclude that it is the result of an active vasoconstriction. Wilkins et al. (1949) have observed a fall in renal and hepatic blood-flows on intravenous injection of dihydroergocornine. Our observation suggests a comparable reaction in another part of the splanchnic area. This vasoconstriction in the colonic circulation may be due either to a direct constrictor action on the vessels or to a nervous constrictor mechanism. Since the local injection of dihydroergocornine causes a rise in bowel temperature, we conclude that the direct effect of the alkaloids on the vessels is dilator. The constrictor response seen on intravenous injection without any fall in blood-pressure is therefore due to a nervous reflex which overrides the local direct effect. It is unlikely that the alkaloids cause an outpouring of humoral constrictor substances, since one of us (H. J. C. S.) has observed consistent dilatation in the skin on infusion of the dihydro alkaloids.

Thus the over-all response of the colonic circulation to the dihydro alkaloids of ergot is vasoconstrictor and probably reflex. This may well be another example of the reciprocal relation between bowel and skin circulations which has been shown to exist (Grayson 1949).

Bluntschli and Goetz (1947) concluded that a reflex splanchnic vasodilatation was responsible for the fall in blood-pressure on intravenous infusion with dihydroergocornine. They observed that in hypertensive patients a considerable and sustained fall in blood-pressure occurred on administration of 0·3 mg. of dihydroergocornine. After splanchnic sympathectomy, however, this response was absent or much reduced. We may point out, however, that in these circumstances a moderate fall in blood-pressure had already taken place as a result of the operation. Hayes et al. (1949) and Barcroft et al. (1950), using a similar dosage, find little fall in blood-pressure in persons with normal blood-pressure.

SUMMARY

A simple method is described whereby the changes in temperature of the human colon exposed at colostomy can be used as a qualitative index of blood-flow change in the colon.

By this method it is shown that adrenaline and noradrenaline cause a vasoconstriction. The dihydrogenated alkaloids of ergot cause a reflex vasoconstriction, but their direct action on the vessels is dilatation.

We would like to express our gratitude to Prof. H. Barcroft, at whose suggestion this investigation was undertaken. Some of the expenses were defrayed by the Colston Research Fund and by the Medical Research Council.

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TECHNIQUE OF
DIAGNOSTIC CHEST FLUOROSCOPY

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NEXT to taking a careful history, fluoroscopy probably gives more valuable information than any other single procedure in the diagnosis of chest disease. Also it is cheap, rapid, and safe.

Hall (1942) screened 1370 factory workers and found the same incidence of pulmonary tuberculosis as was later found by mass radiography for such a population. Tattersall (1948), reviewing 2908 cases fluoroscoped at a chest clinic, found no reason to believe that any cases of tuberculosis had been missed by this method.

APPARATUS

Various suitable apparatus is available. There must be ample room between the fluorescent screen and the tube to tilt and move the patient freely. For this reason some of the large X-ray sets are not very satisfactory when they have to be used with the table placed vertically just behind the patient. A Levy-West screen gives the best fluorescent image.

The examination should be conducted with 5 mA. and 80 kV. This degree of penetration should enable the whole examination to be made within 60 seconds; with less, the examination may take longer and expose the patient to heavier irradiation in the long run. Less penetration can, however, be used for children and very thin adults. A foot-switch which simultaneously turns off the red light and turns on the X-ray beam facilitates minimal irradiation; it is more convenient than to rely on an assistant to turn off the light.

PRECAUTIONS

The risks from *cumulative exposure* to X rays have been fully described, and anyone doing any sort of X-ray work must take the recognised and effective precautions. When the more precise and detailed help of a skilled physicist is not immediately available, arrangements can be made with the National Physics Laboratory to test quantitatively an operator's degree of exposure to irradiation.

We have not been able to discover any report of X-ray trauma to a patient from chest fluoroscopy.

The most common source of error in fluoroscopy arises from inadequate *dark adaptation*. If one depends on sitting in a darkened room before starting work, patience will eventually flag, and sooner or later errors will be made as a result of starting to screen prematurely. A better plan is to wear well-fitting dark spectacles, with side protection, for at least half an hour before screening. (A cheap pair of sun-glasses is useless.) Further, as the eyes become accommodated during this time, adaptation can be further improved by having a pair of clip-on dark glasses, so that, for the last ten minutes or so before starting the operator is looking through two layers of dark glass. This routine enables other work to be done while the visual purple is being mobilised.

All apparatus should be *shock-proof*.

THE EXAMINATION

The procedure consists in watching the lung fields in the postero-anterior view, the antero-posterior view, and with all degrees of tilting, leaning, and twisting from these positions, while the patient breathes deeply, or "pants as if running a race." The cardiac shadow is observed in the three classical positions. It is well to be prepared to examine the œsophagus by a barium swallow.

Obviously, all the ordinary radiographic abnormalities are looked for, and they should be readily seen. This paper deals only with abnormalities which may be missed in a "straight" film but detected fluoroscopically, and with pitfalls in fluoroscopic diagnosis. The essential feature of the technique is that the lung fields are examined dynamically during accentuated ventilation. By moving the patient about all the time, the depth of various shadows can be estimated by parallax, while forward and backward tilting at the same time permits careful scrutiny of tissue otherwise concealed by the ribs. Thus fluoroscopy differs from inspection of X-ray films just as cinephotography differs from still photography.

Parallax readily discloses extrathoracic shadows. Increased striate shadows in a lower zone can often thus be assigned to the breast (especially of a nursing mother) as well as by lifting the breast. Similarly, parallax should always avert the "pig-tail" pitfall and localise calcification in costal cartilages, as well as the position of shrapnel or other foreign bodies.

As the patient is tilted obliquely, a fluid level is sometimes definitely seen in an otherwise doubtful cavity not suspected from the straight film, which prompts tomographic confirmation.

It is sometimes suggested that the soft hazy shadow associated with early tuberculosis may be missed if no film is taken. If the patient is screened only in a stationary position this may be so, but if each part of the lung fields is examined from as many aspects as possible, attention will often be called to such shadows by their change in shape and density as the patient is twisted and turned. The shadows least easily detected are the small fine mottled opacities of disseminated lesions (miliary tuberculosis, pneumoconiosis) which are equally difficult to discern in all planes, whether they are localised or occur throughout the lungs. The same difficulty, however, may arise in assessing fine mottling in a straight film. The association of rather horizontal ribs with a relative increase of lung translucency—most readily observed during vigorous expiration—suggests emphysema. The hemidiaphragm of the emphysematous side is often depressed and has a reduced range of movement.

When a bronchus is obstructed, the lighting up of the affected lung field may be altered. If the obstruction is partial, air may be able to enter the distal bronchial tree but not escape—the phenomenon described as "trapping." In this case, during expiration, the segment of lung involved remains lit up as the translucency of the normal lung field diminishes—an appearance which at once calls for further elucidation. In the early stage of collapse, aeration of the collapsing segment is impeded, and it will light up less rapidly than the normal field during inspiration, and look hazy during this phase.

Segmental collapse can often be located by parallax and tilting. This is especially true of right-middle-lobe collapse, which shows as a sharply defined wedge-shaped opacity as the patient is tilted backwards. Such a diagnosis has sometimes been made with certainty, only to find that on photography the lesion could not be demonstrated because the exact degree of lordotic tilt necessary had not been attained in the film. Tilting is particularly necessary to pick up collapse of the anterior segment; the lateral segment often exhibits the well-known fan-shaped haze which can be seen in the vertical position. Much the same comments apply to the lingula on the left side, though this wedge is not so sharply defined.

Interlobar septa, especially if distorted, are more oft seen fluoroscopically than in a postero-anterior fil and by their distortion they may indicate contracti of a lobe. When discovered as the sharp edge of a obvious opacity which appears to have a hazy edge in t "straight" view, the finding is particularly useful.

Special care must be taken with the scrutiny of t lung apices, which normally light up less than t bases on ventilation. It is important to examine the postero-anteriorly, and antero-posteriorly, with t patient tilted back and forwards as far as practicable.

It is said that mediastinal shift on inspiration can noted when there is pulmonary collapse. Mediastin shift on ventilation is related more particularly to t rigidity of the mediastinum and is not of great diagnost value (except of course in the management of pneumothorax).

It is not generally realised how well the posteri mediastinum, and especially the trachea, can be di played in the right anterior oblique position. Starti with the epiglottis, which is a good landmark, t trachea can be followed, in all but the most obese subject right down to the bifurcation, together with the fir inch of both main bronchi. In children this examinatio is most valuable and often an enlarged bifurcatio gland may be easily seen.

The costophrenic angles are best seen in the anter posterior view with the patient tilted forwards an rotated a little until, in the normal subject, the diaphrag is seen originating from the lower ribs at a sharp angl This position also gives the best view of the posteri lung bases, lying behind and below the dome of th diaphragm.

Total or partial paralysis of a hemidiaphragm is a important condition not readily revealed by a chest fil Diaphragmatic movement can be accentuated by askin the patient to sniff. Paralysis of the phrenic nerve caused not only by neoplasms but also by inflammator conditions, and it may be relatively transient. In case where no cause has been found it has possibly been due t occlusion of the phrenic nerve by calcification of caseou tuberculous hilar glands.

Functional disorders of the movements of the diaphragms are common in asthma and are readily demonstrated on the screen, as indeed is the improvemen which follows a course of breathing exercises in th physiotherapy department.

Obesity of the patient makes screening more difficult and is one reason for many "unnecessary" films In doubtful cases, confidence in the normality of th upper fields can be reached by increasing the milliamperage to 7 or 8 for a few seconds; but subcutaneou fat can easily be mistaken for a small pleural effusio obliterating the costophrenic angles.

We do not propose to discuss the fluoroscopic examination of the heart shadow; but in all cases it should b inspected in the "straight" view, and also with th patient stationary for a second or two in each obliqu position. An enlarged left auricle or an extended aorta —to mention only two conditions which are easil noted—is often a valuable clue to diagnosis.

ECONOMICS

More and more people are now aware that chest diseas can often be diagnosed radiologically. This partl accounts for the tremendous increase in the number o patients referred to chest clinics. Chest physician spend more and more time sorting healthy wheat from unhealthy chaff, and much public money is squandered on X-ray films because the physician knows that many "silent" lesions will not be found without radiography The present cost of a screening apparatus is no more than the cost of about 400 films for such examinations at a guinea each. Widespread installation of such equipment would save many films and help to relieve congestion in the greatly overworked X-ray departments of our hospitals. This would save not only money but also the chest physicians' time.

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OPPOSITE ACTIONS OF THYROID AND ADRENAL HORMONES IN ALLERGIC HYPERSENSITIVITY

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Among the explanations of the characteristic tissue reactions in rheumatoid arthritis, that of a chronic allergic hypersensitivity has received a good deal of attention (see, for example, Urbach and Gottlieb 1946). The striking modification of these reactions by the administration of adrenocorticotropic hormone (A.C.T.H.) or 'Cortisone' (Hench et al. 1949) is consistent with this explanation, because the reactions of animals artificially hypersensitised to injection of the exciting allergen have also been modified substantially by increase or decrease of the adrenal hormones. Thus, adrenalectomy in guineapigs (Kepinov 1922a) and rats (Flashman 1926) increases sensitivity to anaphylactic shock, whereas adrenocortical extracts temporarily diminish it in guineapigs (Wolfram and Zwemer 1935) and dogs (Dragstedt et al. 1937). Moreover, A.C.T.H. diminishes sensitivity in a variety of established allergic diseases (Bordley et al. 1949).

This enhancement of hypersensitivity by deprivation, and its decrease by the giving, of adrenocortical hormones is matched, in the opposite sense, by the effect of thyroid secretions. Both tuberculin and anaphylactic hypersensitivity are recorded as decreased in thyroidectomised animals by Kepinov (1922b) and Kepinov and Metalnikov (1922); and according to Eickhoff (1939), neither allergic nor anaphylactic hypersensitivity can be induced in thyroidectomised guineapigs, but both develop in these animals when thyroid is given.

EARLIER WORK

The idea of a balanced opposition between thyroid and adrenocortical hormones in the normal animal is of course not new. As early as 1917, Herring demonstrated, in experimental hyperthyroidism, compensatory hypertrophy—and presumably hyperactivity—of the adrenal cortex, and many subsequent observers have confirmed this effect (e.g., Squier and Grabfield 1922, Gohar 1933, Gerlei 1938). In rats, atrophy of the adrenal cortex follows suppression of thyroid activity by thiouracil (Marine and Baumann 1945, see also Zarrow and Money 1949).

Among the further evidence of a thyroid-adrenal balance is the positive nitrogen balance maintained in adrenalectomised dogs by the simultaneous administration of cortin and thyroxine (Koelsche and Kendall 1935); the prolongation of life in adrenalectomised cats by thyroidectomy (Zwemer 1927); the inhibition of increased metabolism in acute experimental thyrotoxicosis by 'Cortidyn' (Oehme 1936); the increased resistance of rats to potassium chloride poisoning induced by cortical extract, and its annulment by thyroid extract (Lowenstein and Zwemer 1943); and the stimulation of thyroid activity and hyperplasia by moderate injury to the adrenal cortex (Scott 1922).

These effects are mainly acute. With prolonged modification of the thyroid secretion, the opposition of the adrenals has other consequences. For example, when Lowenstein and Zwemer gave their rats thyroid for ten days and then rested them for ten days, there was increased resistance to potassium chloride associated with the compensatory hypertrophy of the adrenal cortex. Again, whereas excess of thyroxine for a short period is followed by a drop in the cholesterol content of the adrenals, long-lasting excess induces hypertrophy of the gland and an absolute increase in the cholesterol content (Abelin 1944). Clearly, any antagonism between the two glands must be interpreted in terms of an immediate opposition of available hormones, and of the stimulus one hormone may give to compensatory production or overproduction of the other.

FEATURES OF INVESTIGATION

The relation of the allergic state to the thyroid-adrenal system is still obscure, partly because of the piecemeal evidence, and partly because the adrenal hormones hitherto used in this kind of work have been ill defined. With cortisone available in a purified state, we re-examined this relation in the hope of widening the investigation of problems which up till now have been tackled in terms of the adrenocortical hormones alone. From the preliminary work we record in this paper, three noteworthy features emerge: (1) the opposite nature of thyroxine and cortisone effects in allergy; (2) the swing of allergic reactivity in the opposite direction two weeks after administration of either of the two hormones has ceased; and (3) the use of the tuberculin-sensitive guineapig as a test object for the assay of substances with a cortisone-like effect.

EFFECT OF THYROXINE AND PROPYLTHIOURACIL ON SENSITISATION TO TUBERCULIN

In our first tests with thyroxine (experiment 1), we relied upon twice-weekly intradermal injections of 2000 international units (I.U.) of tuberculin to induce hypersensitivity.

Each injection was made into a different site in the skin of healthy albino guineapigs weighing about 400 g.; and twenty-four hours later the diameter of the reaction to that injection was measured. Three groups of twenty animals were used (fig. 1); those in group I were given 0·2 mg. sodium thyroxine subcutaneously three times a week, and those in group II, 25 mg. propylthiouracil by mouth three times a week; group III was the control. On the 10th day of treatment the tuberculin injections were started.

Sensitivity increased slowly in groups II and III, rapidly in the thyrotoxic animals (group I). On the 28th day, after 18 days' sensitisation, half the animals in groups II and III were given thyroxine; and, while in the remainder hypersensitivity did not increase materially, in these it increased very rapidly. The same increase occurred in ten animals of group I that continued to receive thyroxine; but in ten taken off thyroxine after 28 days, hypersensitivity declined to that of the untreated

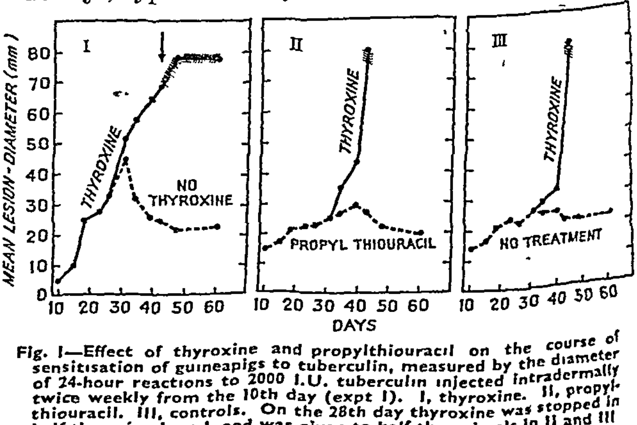

Fig. 1—Effect of thyroxine and propylthiouracil on the course of sensitisation of guineapigs to tuberculin, measured by the diameter of 24-hour reactions to 2000 I.U. tuberculin injected intradermally twice weekly from the 10th day (expt 1). I, thyroxine. II, propylthiouracil. III, controls. On the 28th day thyroxine was stopped in half the animals in I, and was given to half the animals in II and III. Cross-hatching indicates a diffuse erythema of the animal's skin. ↓, death of two animals.

animals in group III. The thyrotoxicosis was not severe; its degree is evident from the variation in body-weight of the animals (fig. 2). It was in fact regulated so as to keep the weights of the animals approximately stationary —that is, if our hypothesis is correct, in a state of approximate balance of thyroid and adrenal hormones. Two animals in group I died after 42 days' thyroxine, with hæmorrhages in the adrenal cortex.

In all the thyroxine-treated animals, the tuberculin reaction at about the 30th day was intense, with a flare-up at the sites of previous tuberculin injections and a diffuse erythema of the skin (see fig. 1).

The hypersensitive reactions of the animals treated with propylthiouracil did not differ materially from those of untreated animals; and in both groups the later treatment with thyroxine had the same effect. According to our other results (see below) we might expect a diminution of hypersensitivity by adrenal hormones becoming dominant as a result of depressed thyroid activity. Possibly the appropriate adjustment of the adrenal-thyroid balance during propylthiouracil treatment is more rapid than that during thyroxine intoxication, though on this we have no direct evidence. But the enhancement of hypersensitivity by thyroxine was indubitable; and it disappeared about 10 days after the thyroxine injections ceased. Thyroxine does not appear to have affected the *rate* of sensitisation, because after 10 days of the drug the animals in groups II and III reacted as violently to tuberculin as those in group I that had had thyroxine during the whole period of sensitisation.

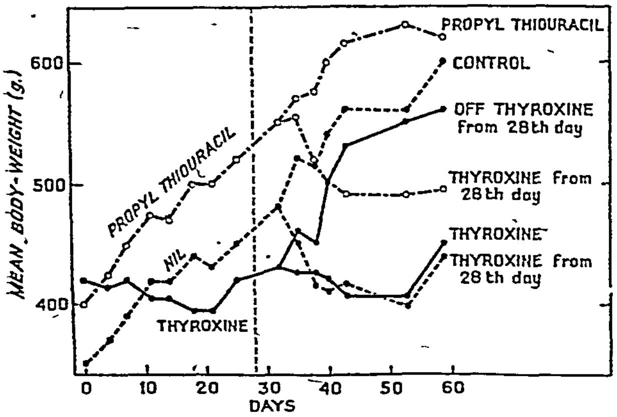

Fig. 2—Mean weights of the guineapigs in expt I. Groups and treatments as in fig. I. Treatment of half the animals in each group changed at the 28th day.

EFFECT OF THYROXINE, A.C.T.H., AND CORTISONE ON HYPERSENSITIVITY OF B.C.G.-INFECTED ANIMALS

B.C.G.-infected Guineapigs as Test Animals.—The rest of our tests were made with B.C.G.-infected guineapigs. Albino guineapigs, weighing 350–400 g., were given 2–5 mg. wet weight of B.C.G. into the right adductor muscles of the thigh and were submitted to tuberculin skin-tests some 30–48 days after this injection. They were housed under standard conditions and given Bruce and Parkes's (1947) pellet diet and unlimited cabbage. We chose the tuberculin-sensitive guineapigs for three reasons:

1. Tuberculin sensitivity exemplifies the so-called "bacterial allergy," as distinct from the "anaphylactic" or "Arthus" hypersensitivity; and we feel that if allergy in fact predominates in clinical syndromes which, like rheumatoid arthritis, yield to treatment with cortisone, it is likely to be "bacterial" in type.

2. The allergy is induced by infection with living B.C.G., and, like natural allergy, is a progressive state, at least during the period in which we made the tests.

3. We had, with these animals, developed a method for measuring changes in allergy with some precision. Measurement of hypersensitivity is notoriously difficult; only very roughly quantitative statements are usually possible. Tuberculosis allergy may be crudely measured by the Mantoux intradermal test, but the end-point thus achieved is relatively coarse. A better measure proved to be possible by the discovery (which we later found had been made by Wadley [1949]) that the diameter of the 24-hour skin lesion produced by a constant volume of tuberculin solution was directly proportional to the logarithm of the concentration of tuberculin. (A similar relation holds for diphtheria toxin [Miles 1949].)

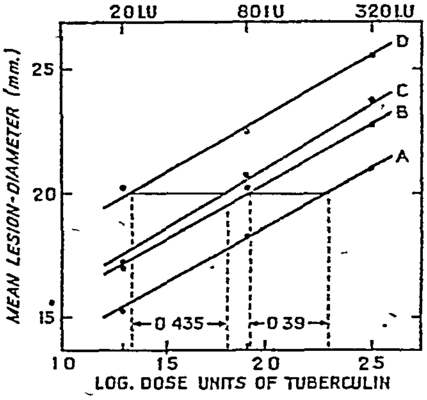

Fig. 3—Dose-responses to 20, 80, and 320 I.U. tuberculin in sensitive guineapigs. A, control; B, treated with thyroxine; C, control 14 days later; D, B 14 days later, having had no thyroxine since test B. (Table II, expt 2.)

Method of Estimating Hypersensitivity.—In fig. 3 the mean lesion-diameters at 24 hours in four groups of infected guineapigs are plotted against the log dose of tuberculin, which was injected in 0·2 ml. volumes in doses of 20, 80, and 320 I.U. into the dorsolateral skin of the depilated animals. For each group the mean responses to the doses fall approximately on a straight line. All our tests were designed to yield data susceptible to the standard methods of regression analysis (Fisher 1947); and by these it was possible to prove that in each comparative test the dose-response lines were substantially straight and parallel to one another, but differed significantly in position. One such analysis is recorded in table I; the probability (P) that differences between responses to the three doses of tuberculin (*b*) and between responses by each group of animals as a whole (*a*), and that the two-dose response lines are not linear (*c*), is in all cases less than 1 in 100.

In fig. 3, parallel regression-lines are fitted to A and B, and to C and D, which represent pairs of tests on thyroxine-treated animals (table II, expt 2). Thus the horizontal distance between A and B is 0·39, which is the log ratio of the doses of tuberculin required to elicit a lesion of given diameter in the guineapigs of the two groups. That is, group B animals require antilog 0·39=2·5 times as little tuberculin as group A animals to give a reaction of, say, 20 mm. diameter, and are therefore 2·5 times more hypersensitive. Similarly group C is antilog 0 435=2·7 times less sensitive than group D.

This method permits a precise numerical estimate of hypersensitivity and will, we hope, prove useful in the investigation both of allergy and of substances that modify allergy. The linear relation of log-dose with

TABLE I—ANALYSIS OF VARIANCE: DATA FROM THE EXPERIMENT RECORDED IN FIG. 3, A AND B

Variance	DF	Mean square	F	P
(*a*) Between groups ..	1	87·1169	8·10	0 001–001
(*b*) Between doses ..	2	488·1255	45 38	<0·001
(*c*) Linearity ..	1	976 2217	90·77	<0 001
Departures ..	1	0 0293	0 003	>0 05
Group/dose interaction	2	2·7211	0·25	>0 05
Guineapig/dose interaction	82	2·5205	0 25	>0·05
Guineapig/group interaction	41	10·7551	..	..
Total	128	..	..	..

would save many films and help to relieve congestion in the greatly overworked X-ray departments of our hospitals. This would save not only money but also the chest physicians' time.

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Sensitivity increased slowly in groups II and III, rapidly in the thyrotoxic animals (group I). On the 28th day, after 18 days' sensitisation, half the animals in groups II and III were given thyroxine; and, while in the remainder hypersensitivity did not increase materially, in these it increased very rapidly. The same increase occurred in ten animals of group I that continued to receive thyroxine; but in ten taken off thyroxine after 28 days, hypersensitivity declined to that of the untreated

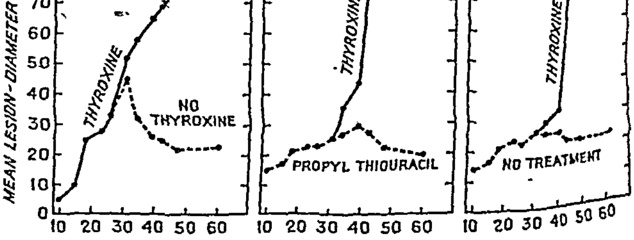

Fig. 1—Effect of thyroxine and propylthiouracil on the course of sensitisation of guineapigs to tuberculin, measured by the diameter of 24-hour reactions to 2000 I.U. tuberculin injected intradermally twice weekly from the 10th day (expt I). I, thyroxine. II, propylthiouracil. III, controls. On the 28th day thyroxine was stopped in half the animals in I, and was given to half the animals in II and III. Cross-hatching indicates a diffuse erythema of the animal's skin. ↓, death of two animals.

animals in group III. The thyrotoxicosis was not severe; its degree is evident from the variation in body-weight of the animals (fig. 2). It was in fact regulated so as to keep the weights of the animals approximately stationary—that is, if our hypothesis is correct, in a state of approximate balance of thyroid and adrenal hormones. Two animals in group I died after 42 days' thyroxine, with hæmorrhages in the adrenal cortex.

In all the thyroxine-treated animals, the tuberculin reaction at about the 30th day was intense, with a flare-up at the sites of previous tuberculin injections and a diffuse erythema of the skin (see fig. 1).

The hypersensitive reactions of the animals treated with propylthiouracil did not differ materially from those of untreated animals; and in both groups the later treatment with thyroxine had the same effect. According to our other results (see below) we might expect a diminution of hypersensitivity by adrenal hormones becoming dominant as a result of depressed thyroid activity. Possibly the appropriate adjustment of the adrenal-thyroid balance during propylthiouracil treatment is more rapid than that during thyroxine intoxication, though on this we have no direct evidence. But the enhancement of hypersensitivity by thyroxine was indubitable; and it disappeared about 10 days after the thyroxine injections ceased. Thyroxine does not appear to have affected the *rate* of sensitisation, because after 10 days of the drug the animals in groups II and III reacted as violently to tuberculin as those in group I that had had thyroxine during the whole period of sensitisation.

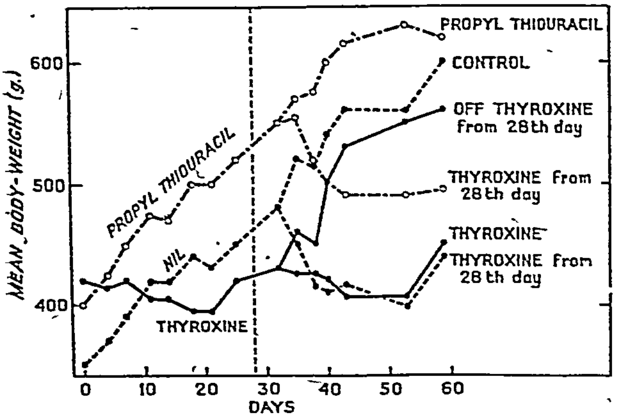

Fig. 2—Mean weights of the guineapigs in expt I. Groups and treatments as in fig. I. Treatment of half the animals in each group changed at the 28th day.

EFFECT OF THYROXINE, A.C.T.H., AND CORTISONE ON HYPERSENSITIVITY OF B.C.G.-INFECTED ANIMALS

B.C.G.-infected Guineapigs as Test Animals.—The rest of our tests were made with B.C.G.-infected guineapigs. Albino guineapigs, weighing 350–400 g., were given 2–5 mg. wet weight of B.C.G. into the right adductor muscles of the thigh and were submitted to tuberculin skin-tests some 30–48 days after this injection. They were housed under standard conditions and given Bruce and Parkes's (1947) pellet diet and unlimited cabbage. We chose the tuberculin-sensitive guineapigs for three reasons:

1. Tuberculin sensitivity exemplifies the so-called "bacterial allergy," as distinct from the "anaphylactic" or "Arthus" hypersensitivity; and we feel that if allergy in fact predominates in clinical syndromes which, like rheumatoid arthritis, yield to treatment with cortisone, it is likely to be "bacterial" in type.

2. The allergy is induced by infection with living B.C.G., and, like natural allergy, is a progressive state, at least during the period in which we made the tests.

3. We had, with these animals, developed a method for measuring changes in allergy with some precision. Measurement of hypersensitivity is notoriously difficult; only very roughly quantitative statements are usually possible. Tuberculosis allergy may be crudely measured by the Mantoux intradermal test, but the end-point thus achieved is relatively coarse. A better measure proved to be possible by the discovery (which we later found had been made by Wadley [1949]) that the diameter of the 24-hour skin lesion produced by a constant volume of tuberculin solution was directly proportional to the logarithm of the concentration of tuberculin. (A similar relation holds for diphtheria toxin [Miles 1949].)

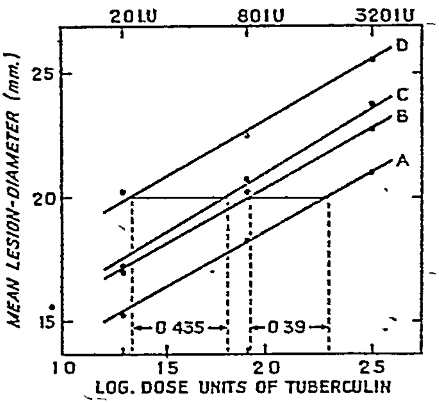

Fig. 3—Dose-responses to 20, 80, and 320 I.U. tuberculin in sensitive guineapigs. A, control; B, treated with thyroxine; C, control 14 days later; D, B 14 days later, having had no thyroxine since test B. (Table II, expt 2.)

Method of Estimating Hypersensitivity.—In fig. 3 the mean lesion-diameters at 24 hours in four groups of infected guineapigs are plotted against the log dose of tuberculin, which was injected in 0·2 ml. volumes in doses of 20, 80, and 320 I.U. into the dorsolateral skin of the depilated animals. For each group the mean responses to the doses fall approximately on a straight line. All our tests were designed to yield data susceptible to the standard methods of regression analysis (Fisher 1947); and by these it was possible to prove that in each comparative test the dose-response lines were substantially straight and parallel to one another, but differed significantly in position. One such analysis is recorded in table I: the probability (P) that differences between responses to the three doses of tuberculin (*b*) and between responses by each group of animals as a whole (*a*), and that the two-dose response lines are not linear (*c*), is in all cases less than 1 in 100.

In fig. 3, parallel regression-lines are fitted to A and B, and to C and D, which represent pairs of tests on thyroxine-treated animals (table II, expt 2). Thus the horizontal distance between A and B is 0·39, which is the log ratio of the doses of tuberculin required to elicit a lesion of given diameter in the guineapigs of the two groups. That is, group B animals require antilog 0·39=2·5 times as little tuberculin as group A animals to give a reaction of, say, 20 mm. diameter, and are therefore 2·5 times more hypersensitive. Similarly group C is antilog 0·435=2·7 times less sensitive than group D.

This method permits a precise numerical estimate of hypersensitivity and will, we hope, prove useful in the investigation both of allergy and of substances that modify allergy. The linear relation of log-dose with

TABLE I—ANALYSIS OF VARIANCE: DATA FROM THE EXPERIMENT RECORDED IN FIG. 3, A AND B

Variance	DF	Mean square	F	P
(*a*) Between groups ..	1	87·1169	8·10	0 001–001
(*b*) Between doses ..	2	488·1255	45 38	<0·001
(*c*) Linearity ..	1	976·2217	90·77	<0 001
Departures ..	1	0 0293	0 003	>0 05
Group/dose interaction	2	2·7211	0 25	>0 05
Guineapig/dose interaction	82	2·5205	0 25	>0·05
Guineapig/group interaction	41	10·7551	..	..
Total	128	..	..	..

TABLE II—SYNOPSIS OF HYPERSENSITIVITY ESTIMATIONS IN B.C.G.-INFECTED GUINEAPIGS

Expt no.	No. of guinea-pigs	Treatment	Hypersensitivity tests			
			Day	Ratio	Day	Ratio
2	16	35th–47th day, thyroxine	47th	2 5	61st	1·0
	24	Nil		1 0		2·7
3	10	30th day, A.C.T.H.	30th 2½ hr. later	1·0	44th	3·4
	10	Nil		3 6		1·0
4	6	46th–48th day, cortisone	48th 4 hr. later	1 0	62nd	9·0
	6	Nil		4 0		1 0

Days refer to duration of B.C.G. infection. Doses: thyroxine 0 2 mg. thrice weekly; A.C.T.H. 0 6 mg., cortisone 1 mg. daily, all subcutaneously.

lesion-diameter holds good for a number of substances besides diphtheria toxin and tuberculin; we have in this laboratory demonstrated its validity for scarlet-fever toxin, *Clostridium welchii* α-toxin, histamine, and some histamine-liberating substances.

Results.—Table II summarises three experiments. The small number of animals in experiments 3 and 4 was dictated by the need for economy in A.C.T.H. and cortisone. However, the response of the guineapigs in each group was surprisingly consistent; and even with the few animals used, analysis showed clearly that the ratio of hypersensitivities was statistically significant ($P = 0{\cdot}05$).

The A.C.T.H. was a peptide prepared by Dr. C. J. O. R. Morris, in whose test-rats 1 μg. produced an approximately 30% decrease in adrenal ascorbic acid. The cortisone was part of a batch sent to Sir Henry Dale at the National Institute for Medical Research by E. C. Kendall in 1942.

In experiment 2, 12 days' treatment with thyroxine increased hypersensitivity 2 5-fold, compared with controls. After a further 14 days, during which no more thyroxine was given, hypersensitivity declined until it was only 1:2 7 that of the controls.

In experiment 3 a single subcutaneous dose of A.C.T.H. decreased hypersensitivity 3·6-fold. Two and a half hours was chosen as the interval between A.C.T.H. and the tuberculin injection, because after this interval the effect of A.C.T.H. on adrenal ascorbic acid and cholesterol, and, according to Sayers et al. (1944), on the output of cortical hormone, begins to mature.

In experiment 4 three daily subcutaneous doses of 1 mg. cortisone decreased hypersensitivity fourfold, when tuberculin was given 4 hours after the last injection.

In experiments 3 and 4 the effect was later reversed. Fourteen days after a single dose of A.C.T.H. the animals were 3·4 times as sensitive as the controls; and fourteen days after three doses of cortisone hypersensitivity was nearly 9 times that in the controls.

DISCUSSION

The most striking results are: (1) the opposite effect of thyroxine on the one hand, and of cortisone and A.C.T.H. on the other; and (2) diminution of the effect some days after the administration of the hormone has ceased, and furthermore a swing in the opposite direction. With cortisone at least, this parallels the exacerbation of symptoms in patients with rheumatoid arthritis when the drug is withdrawn (Hench et al. 1949).

The overswing can be explained in terms of the opposition of thyroid and adrenal cortex. Such an explanation must be largely speculative; but, quite apart from their opposite effects on hypersensitivity when tested in *different* groups of animals, we have some evidence that the thyroid and adrenocortical hormones opposed each other in the same animal. Thus animals given thyroxine throughout experiment 1 had enlarged adrenals, with pronounced cortical hypertrophy. Fig. 4 shows the maximum transverse sections of the adrenals from these animals, compared with those from the control group. The extreme sizes in the picture are the biggest and smallest found in each group, and the inner four sections represent intermediate sizes, which in each group were evenly distributed between the extremes. There was evidently compensatory hypertrophy of the adrenal cortex, and histologically the thyroids were in the resting stage. In experiment 2, therefore, it is not unreasonable to postulate an excessive adrenocortical activity for some days after the end of thyroxine injections.

With regard to the overswing in the other direction, after stimulation of the cortex by A.C.T.H. or after an excessive dose of cortisone, an overcompensatory response of the thyroid, becoming manifest in its effect on allergy two weeks later, is clearly possible.

Direct evidence of the opposition of the two glands, the nature of the adrenocortical hormones immediately or mediately responsible for modification of the allergic

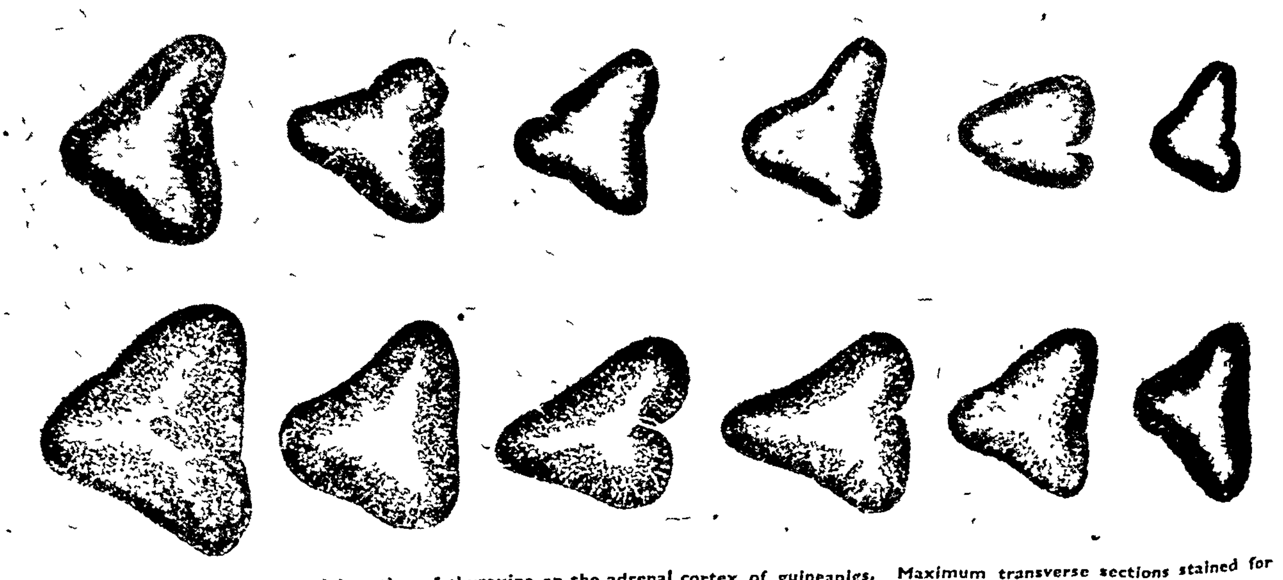

Fig. 4—Effect of prolonged administration of thyroxine on the adrenal cortex of guineapigs. Maximum transverse sections stained for cholesterol. Above: controls. Below: thyroxine.

effects, and the time relations of the "overswing" in sensitivity remain to be demonstrated. Nevertheless, we feel there is a strong a priori case for extending the investigation of adrenocortical effects on pathological processes to include the thyroid gland. It is unlikely that these effects can be described completely in terms of an adrenal-thyroid system, but the thyroid may prove to have a greater direct influence than has hitherto been suspected.

Finally, it is evident from our results with animals infected with B.C.G. (a microbe of low virulence for the guineapig) that a pathological state developing as a result of the infection can be definitely, readily, and reversibly modified by simple changes in the balance of hormones. In rheumatoid arthritis Hench and his colleagues find it "increasingly difficult to harmonize the microbic theory of the origin of rheumatoid arthritis with the phenomenon of relief by jaundice or pregnancy." Though we would support any attempt to eliminate all unnecessary hypotheses about rheumatoid arthritis, we feel, as a result of our investigations, that there is nothing contradictory in the hypothesis of certain consequences of infection (some of them perhaps allergic in nature) being modified in pregnancy or jaundice by accompanying biochemical changes—some of them perhaps hormonal in origin.

SUMMARY

Past experimental work on the relation of the thyroid and adrenal cortex suggests that their hormones are opposed to each other. Allergic and anaphylactic hypersensitivity are among the physiological and pathological processes influenced in this way. Thyroxine appears to increase, and the adrenocortical hormones to decrease, hypersensitivity.

Using hypersensitivity to tuberculin in guineapigs as an example of "bacterial" allergy, we devised a quantitative measure of allergy and have shown that:

1. Moderate thyrotoxicosis of two weeks' duration increases hypersensitivity, whereas either three daily injections of cortisone or one injection of A.C.T.H. diminishes it; moderate doses of propylthiouracil did not affect it.

2. Fourteen days after stopping the thyroxine injections there was a swing of the thyroxine effect in the opposite direction, and the animals were *less* hypersensitive than the controls.

3. Fourteen days after the treatment with either cortisone or A.C.T.H., there was also a swing in the opposite direction, the animals now being *more* hypersensitive than the controls.

In the thyroxine-treated animals there was adrenocortical hypertrophy, which may account for the "overswing" in allergy after fourteen days without thyroxine. The "overswing" in the A.C.T.H. and cortisone-treated animals may be due to an analogous overcompensation in thyroid activity.

We are indebted to Mr. C. J. O. R. Morris, PH.D., for the A.C.T.H., to Mrs. R. Pitt-Rivers for the thyroxine used, to Dr. Knud Tolderlund, of the State Serum Institute, Copenhagen, for the B.C.G., and to Dr. W. L. M. Perry for the statistical analyses.

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PROCAINE PENICILLIN WITH ALUMINIUM MONOSTEARATE

EFFECTS OF A SINGLE LARGE DOSE IN BED AND AMBULANT PATIENTS

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OF the slow-release penicillin preparations recently introduced procaine penicillin in oil with 2% aluminium monostearate has proved the most effective in delaying absorption of the injected penicillin. Since its introduction by Buckwalter and Dickison (1948) several workers have compared its properties with those of soluble penicillin in oil or wax and procaine penicillin in oil or water (Robinson et al. 1948, Thomas et al. 1948, Floyd 1949, Young et al. 1949). Most of the work reported so far has been aimed at obtaining therapeutic blood-penicillin levels lasting for 24–48 hours; and it is clear that a single intramuscular injection of 300,000 units of the aluminium-stearate preparation will achieve this object.

Kitchen et al. (1949) showed that larger doses (1,200,000 and 2,400,000 units) maintained a blood-penicillin level of 0·03 unit per ml., on the average, for about 7 days. Young et al. (1949) found that in eight of their patients a dose of 2,000,000 units gave continuous therapeutic blood-penicillin levels for 6–8 days. Neither of these groups of workers states whether their patients were confined to bed. A single-injection method which consistently gives a therapeutic effect of this duration would be particularly useful in treating outpatients with minor infective conditions since it would considerably reduce the number of injections given in the outpatient department, with obvious advantages for patients, nurses, and doctors.

We have investigated the duration of therapeutic blood-penicillin levels in two main groups of patients after a single intramuscular injection of 2,000,000 units of procaine penicillin with aluminium stearate in arachis oil. It was realised that results in bed patients and ambulant patients might be different. Boger et al. (1948) and Emery et al. (1949) noted that after the injection of procaine penicillin (without aluminium stearate) the blood-penicillin levels tended to fall more rapidly in ambulant patients than in bed patients. For this reason we have compared results in these two groups. Among those included in the trial were 48 outpatients with boils, carbuncles, and minor sepsis of the hand, and in these the clinical results were noted. A statistical comparison of these cases with others treated in other ways was not, however, attempted. Among the surgical bed patients were five with severe bronchitis and emphysema. It was hoped that penicillin given in this way, at the time of operation, might prevent the postoperative chest complications likely to occur in such cases. Patients thought to have defective renal function were excluded from the investigation.

METHODS

The procaine penicillin with aluminium stearate was supplied by Allen & Hanburys Ltd. The injections were given into the upper outer quadrant of the buttock, the whole dose of 2,000,000 units (6·6 ml.) being given into the one buttock. The bed patients had no pain after the injection, but ambulant patients varied in their reactions. Most complained of a minor degree of stiffness developing about 6 hours later and lasting 12–24 hours, but a few had more severe aching pain and stiffness lasting up to 3 days. Probably these reactions may be minimised by making sure that the injection is given deep into the muscle.

The material was withdrawn from the ampoule with a French's serum needle. The injections were given through a no. 1 intramuscular needle. Though the withdrawal was reasonably easy, considerable force had to be used for the injection. This disadvantage was overcome by the use of a metal holder into which the syringe was clipped (fig. 1), the dose being injected by the turning of a screw thread. The introduction of this simple device (constructed by the hospital instrument technician) made the giving of the injections quite easy and in consequence more popular with the nurses. Less viscid preparations, which, it is understood, are now obtainable, may be still simpler to administer and will render this apparatus unnecessary.

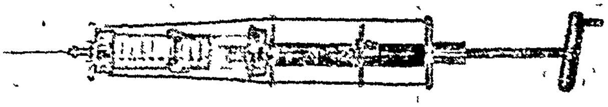

Fig. 1—Screw adapter for syringe.

Serum-penicillin levels were estimated by a modification (Gillespie and Alder 1948) of the method of Fleming and Smith (1947), standard penicillin solutions in normal serum being put up in duplicate with each batch of tests. A staphylococcus was used as the test organism. On some occasions parallel tests were put up with a hæmolytic streptococcus, with similar results. A serum-penicillin concentration of 0 06 unit per ml. was regarded as the minimal therapeutic level.

RESULTS

Bed Patients

These consisted of twenty-four surgical and eleven medical cases. It was intended to follow each patient's serum-penicillin level until it fell below the therapeutic minimum, but discharge from hospital made this impossible in ten surgical and four medical patients. However, all the cases were followed for at least 7 days, and most for a longer period.

In the surgical cases the serum-penicillin level was estimated daily, with some omissions, usually at week-ends. All these patients had operations (from simple appendicectomy to extensive thoracotomy with œsophageal resection) a day or two before or after the injection. Their ages ranged from 19 to 72 years (average 48). The results are summarised in the accompanying table, and the average effects shown in fig. 2. The daily serum-penicillin levels varied considerably from case to case. Those on the 1st day after injection ranged from 0·25 to 2·0 units per ml. Thereafter they gradually fell, sometimes with fluctuations, but, in all but two cases, stayed above the therapeutic minimum for 7–12 days. Of the two exceptions, one maintained a therapeutic level for 5 days, and in the other the duration was not exactly determined.

SERUM-PENICILLIN LEVELS IN DIFFERENT CLASSES OF PATIENTS AND IN AMBULANT VOLUNTEERS

Category	No. tested	Days after injection	Serum-penicillin level (units/ml.)	
			≧0·06	<0 06
Bed patients, surgical	19	9	13	6
Bed patients, medical	9	”	2	7
Bed patients, surgical	24	7	22	2
Bed patients, medical	11	”	9	2
Ambulant patients ..	28	”	7	21
Ambulant volunteers	13	”	2	9
Ambulant patients (a further series) ..	20	5	15	5
Ambulant volunteers	13	”	9	4
Ambulant volunteers	13	3	13	0

The eleven medical bed patients were aged from 11 to 73 years (average 45). None was acutely ill. Serum-penicillin levels were estimated on the 1st, 5th, or 6th and subsequent days after injection (see table and fig. 2). The levels on the 1st day ranged from 0·12 to 2 0 units per ml., and then stayed above the therapeutic minimum for 7–12 days in all but two cases. In one of these the effect lasted for 6 days; in the other the duration was not exactly determined. In general the duration of the therapeutic levels was less than in the surgical patients, as shown by the results on the 9th day (see table).

It is therefore evident that our results in medical and surgical bed patients agree with those of Young et al. (1949).

Ambulant Patients and Volunteers

In twenty-eight ambulant outpatients (with boils, carbuncles, and minor sepsis of the hand) the serum-penicillin level was estimated on the 7th day after injection. These patients were aged 22–70 (average 37). When it was found that twenty-one of the patients did not maintain their blood-penicillin levels for this period, a further series of twenty similar cases, aged 15–49 (average 31), was tested 5 days after the injection (see table).

In addition, an attempt was made to establish more exactly the duration of the therapeutic levels in ambulant cases by estimating the serum-penicillin levels daily in thirteen ambulant healthy volunteers, who were medical students aged 20–30. On the 1st day after injection their blood-penicillin levels ranged from 0·06 to 1·0 unit per ml., but they fell more rapidly than in the bed patients (see table and fig. 2); twelve of the thirteen volunteers maintained their therapeutic levels for 4 days, nine for 5 days, two for 7 days, and none for a longer period.

Influence of Age and Surgical Operations

Excretion of penicillin may be slower in elderly people than in the young. Since the bed patients were on the whole older than the ambulant patients and volunteers, it was important to see if age played a significant part

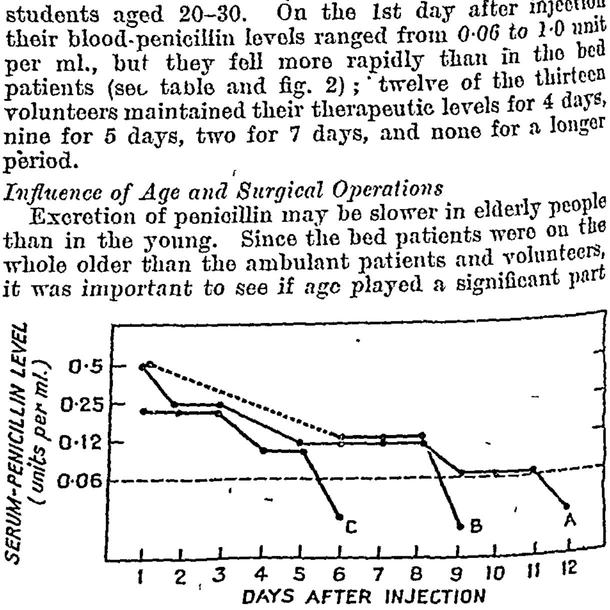

Fig. 2—Median serum-penicillin levels in: A, surgical bed patients; B, medical bed patients; C, ambulant volunteers. Broken line: minimal therapeutic level.

in producing the striking difference between the two groups. Of the thirty-five bed patients sixteen were under the age of 50 (average 34), and in them the average duration of the therapeutic serum-penicillin level was more than 8 days. The average duration in the five bed patients under the age of 30 was more than 9 days. These figures do not exclude some effect due to age, but do show that age by itself was not responsible for the striking differences found between bed and ambulant patients. Similarly it is apparent from our results that operations have not caused the striking differences between the bed and ambulant cases. Nevertheless, possibly because of their relative immobility, the surgical bed patients on the whole maintained their serum-penicillin levels longer than the medical bed patients.

Clinical Results

The clinical effectiveness of this method of giving penicillin can be finally assessed only by an adequate statistical comparison with similar cases treated by other methods. No such comparison has been attempted in this investigation. All that can be said is that the clinical results obtained in forty-eight outpatients with minor septic conditions have been similar to what one would have expected from courses of soluble penicillin injections. The results were also promising in five elderly bed patients with severe bronchitis and emphysema, who remained free from chest complications after major surgical operations.

Complications

No case of sensitivity to penicillin or the other constituents of the preparation was observed in this series, but one patient developed a localised fibrous mass in the buttock. This was thought to be due to the fact that the injection had not been made deep into the substance of the muscle and some had leaked into the subcutaneous tissue. Another patient developed an abscess (coliform bacillus) which discharged itself on the 8th day.

DISCUSSION

The striking difference in the duration of therapeutic blood-penicillin levels between bed patients and ambulant patients is probably a result of the much greater activity and blood-supply of the gluteal muscles in the ambulant patients. This difference must be borne in mind if the single-large-injection method is used.

The arguments in favour of maintaining a steady blood-penicillin level, rather than the discontinuous administration of large doses, have been reviewed by Wayne et al. (1949), who conclude that the evidence, so far as it goes, is in favour of the former. However, the relation between blood-penicillin levels and therapeutic effectiveness is still partly speculative. Further work may show that different types of infection respond best to different methods of administration.

The single-large-injection method should be a convenient way of giving prophylactic penicillin cover for surgical operations in patients who are likely to develop infective complications—e.g., dental extractions in cases of endocarditis and major operations (especially emergency operations) on patients with upper or lower respiratory infections.

SUMMARY

Single injections of 2,000,000 units (6·6 ml.) of procaine penicillin with aluminium stearate were given to thirty-five bed patients (twenty-four surgical and eleven medical) and to forty-eight ambulant patients and thirteen healthy ambulant volunteers. The durations of bacteriostatic blood-penicillin levels were compared in the bed and ambulant groups.

Almost all the bed patients maintained their blood-penicillin levels for at least 6 or 7 days, and most for a longer period. In the ambulant persons the effect was distinctly shorter: it lasted for 5 days in about two-thirds of those tested, but in most cases it had disappeared by the 7th day.

The difference is thought to be largely due to the better blood-supply to the gluteal muscles produced by activity.

The clinical results were satisfactory in forty-eight outpatients with minor septic conditions, but the value of the method cannot be fully assessed without controlled clinical trials.

Single large injections will be useful prophylactically in providing penicillin cover for operations.

Our thanks are due to Prof. R. Milnes Walker for his advice and encouragement, Mr. A. E. Christmas for making the syringe holders, and Miss Nora Glen and Mr. V. G. Alder for invaluable technical assistance.

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Medical Societies

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY

Breech Delivery

AT a meeting of this society on Feb. 24, under the presidency of Mr. H. HARVEY EVERS, fœtal mortality associated with breech delivery was discussed by Mr. L. W. COX.

Analysing the results of breech deliveries at the Liverpool Maternity Hospital between 1933 and 1949, Mr. Cox pointed out that refinements in technique had brought about a consistent improvement; during the last five years, of 374 infants only 12 were lost—a mortality of 3·2%. The mortality was high in the child weighing under 5 lb. or over 9 lb. Mr. Cox observed that in hospital practice the mortality in multigravidæ tended to be high, because in many centres only unfavourable cases of breech presentation in the multigravida were referred for hospital confinement.

Intracranial injury was still the most important cause of fœtal death. The Liverpool Maternity Hospital figures showed that in breech cases delivery at home increased the risk. All breech deliveries should be conducted in hospital.

Whether external version should be carried out was a question to be left to the individual operator.

Mr. C. M. MARSHALL pointed out that the essentials of the Burns-Marshall method of delivering the aftercoming head were that the child should be allowed to hang, and that traction should then be applied to its legs and trunk lifted upwards towards the mother. How long the child should be allowed to remain had never been decided by either of the inventors of the method; but Mr. Marshall allowed the child to remain pendant only for a very short time—usually long enough to allow him to rinse his hands in solution.

The PRESIDENT strongly advocated presacral block. In a discussion of Løvset's manœuvre some members suggested that it was one of the greatest advances in the technique of breech delivery, while other maintained that it was nothing more than a debased version of the method described many years ago by Potter.

Reviews of Books

The Common Infectious Diseases

H. STANLEY BANKS M.A., M.D. Glasg., F.R.C.P., D.P.H., physician-superintendent, Park Hospital, London. London: Edward Arnold. 1949. Pp. 354. 21*s.*

THIS concisely written and well-illustrated handbook is based on Dr. Banks's practice and teaching. It is intended for students and postgraduates—particularly, perhaps, general practitioners attending clinical courses on fevers. Some of the views and methods are debatable: not all will favour routine chemoprophylaxis with small doses of sulphonamides in measles wards, for example. As might be expected, the chapter on meningococcal fever is comprehensive, but there are also sound accounts of the other common fevers—though paratyphoid receives rather scant measure. The last chapter, on infective gastro-enteritis of infants, is among the best. Dr. Banks stresses the formidable nature of this disorder in children's hospitals and nurseries and the importance of early segregation in individual cells with complete barrier-nursing. Modern treatment of this major disease, and—equally important—its nursing and general management, are clearly described. To the opening chapter on diphtheria Dr. L. J. M. Laurent has contributed an appendix on the electrocardiogram.

Some of the claims to "priority" made in the preface are a little surprising. "Priorities," like snap, is a game for any number of players, and except that prefaces to first editions are commonly repeated in later ones—which in this case are certain to be called for—the subject is perhaps not worth discussing, especially in a rapidly developing branch of medicine where values change so rapidly. But surely the real pioneers of the "intensive" intravenous antitoxin treatment of diphtheria were W. H. Park of New York, who urged the intravenous route in 1913, and V. Bie of Copenhagen, who at the Blegdams Hospital injected "massive" doses, in part intravenously, from 1920 onwards. However, the disputable preface does not detract from the very real value of the book.

Recent Advances in Social Medicine

By ALAN CARRUTH STEVENSON, B.SC., M.D., M.R.C.P., D.P.H., professor of social and preventive medicine, Queen's University, Belfast. London: J. & A. Churchill. 1950. Pp. 241. 18*s.*

Professor Stevenson has not attempted, in less than 250 pages, to cover the whole of social medicine, but has chosen a group of subjects significant for undergraduate and postgraduate students of preventive medicine. He summarises and collates recent work on measurement of growth in children, infant mortality, the health of children in day nurseries, the unmarried mother and her child, problem families, and school medical inspection; and adds notes on psychosomatic illness, the adolescent in industry, and PULHEEMS. Dr. E. A. Cheeseman contributes a useful chapter on statistical methods. Professor Stevenson has a good eye for values, and in dealing with controversial topics—day nurseries, for instance—gives fairly the arguments of both sides before offering his own mature guidance. The book brings together much diffuse work, and presents a balanced view of the chosen subjects. The pity is that he has been obliged to confine himself to so few.

Fetal and Neonatal Death

(Revised edition.) EDITH L. POTTER, M.D., associate professor in department of obstetrics and gynecology, University of Chicago; FRED L. ADAIR, M.D., Mary Campau Ryerson professor emeritus in the university. Chicago: University of Chicago Press. London: Cambridge University Press. 1949. Pp. 173. 30*s.*

IN the nine years since this book was first written, interest in its subject has increased. It is divided into five sections—on the normal fœtus, post-mortem examination, causes of death, special pathology, and statistics. The section on post-mortem examinations is instructive. Too often the inquiry into the cause of death is perfunctory, with little attempt to find information of use to the obstetrician. A knowledge of obstetrics is indispensable to the pathologist examining these cases; yet even in quite large maternity hospitals the pathologist may be content to label infant deaths simply as "macerated fœtus," "tentorial tear," or "atelectasis"; while the "occasional pathologist" is liable to damage the cranial contents on opening the skull and to misinterpret his findings. The authors hold that this is a task for the specially trained pathologist whose interest extends both to clinical obstetrics and pædiatrics. More could have been said about neonatal infections as causes of death, particularly gastro-enteritis; and the statement that "the combined incidence of intracranial and abdominal hæmorrhage was only 1 in 5000 births," which they quote, is very hard to accept. The data on which this figure is based might well be critically surveyed.

Tuberculosis

A Global Study in Social Pathology. JOHN B. MCDOUGALL, C.B.E., M.D., F.R.C.P.E., F.R.F.P.S., F.R.S.E. Edinburgh: E. & S. Livingstone. 1949. Pp. 455. 32*s.* 6*d.*

EPIDEMIOLOGICAL study of tuberculosis is badly needed. The relative importance of the many factors which have combined to determine the downward trend of tuberculosis mortality in the past century is still matter for conjecture; the causes of retardation in decline in certain age-groups, in males or females, in certain communities or countries, are at present even more obscure. Dr. McDougall's book attempts to cover these problems; and if anyone is qualified to write such a book it is he, since, with his background of work in this country and his recent work in UNRRA and at the head of the section of tuberculosis at the World Health Organisation, he has collected a store of invaluable information on the subject.

He begins by presenting mortality-rates and other data from different countries, though the available information from many of them is very meagre. Next he discusses the factors influencing morbidity and mortality rates, under the headings of the vulnerable age-groups, variations between east and west, unrestricted migration, downward trends, native and acquired resistance, the infecting dose, and tuberculosis mortality in successive generations. In part III he discusses the task of investigating the tuberculosis problem in a community, and submits a schedule for its analysis. He comments on race, infection and morbidity, mass radiology (a long section presenting results from many countries), epidemiological surveys, environmental factors, and the organisation of tuberculosis services. The editing is unfortunately faulty (some of the forms are printed upside down, a "generation" curve for Sweden is given as for England and Wales, and vice versa, and in charts demonstrating the trend of mortality-rates over a period of years the scale is altered halfway across, without warning). It is inevitable that in so extensive a survey any reader will find points he disagrees with, and omissions; but Dr. McDougall has made a brave effort to cover the whole field.

Three Essays on the Theory of Sexuality (London: Imago Publishing Co. 1949. Pp. 133. 10*s.* 6*d.*).—Mr. James Strachey has worked with his customary fidelity and skill in preparing this first English edition of this work of Freud's, which has long occupied a most important place in the Freudian canon. He used the 1925 revision of the original, and had the help of Miss Anna Freud in ensuring that he should convey her father's meaning exactly.

Spectacle Fitting and Optical Dispensing (London: Hammond, Hammond & Co. 1950. Pp. 294. 30*s.*).—This essentially practical manual written by Mr. L. S. Sasieni for the student optician, describes the methods employed to ensure that a patient's spectacles do in fact sit on the face in such a way that the lenses do the work which the prescriber intended. The well-illustrated text is therefore chiefly concerned with facial measurements and types of frames, and it deals very fully with the subject. In another edition more prominence might be given to what may happen if the lenses are incorrectly sited. We should perhaps point out that, after severing the trigeminal nerve, spectacles are required not because the eye is more sensitive but because it is in fact quite insensitive and accordingly needs protection.

The book puts a mass of detail before the optician in readable form.

THE LANCET

LONDON: SATURDAY, MARCH 18, 1950

Hospital Finance

THE supplementary estimate presented to Parliament for the National Health Service is nearly £99 million, bringing the total cost to the Exchequer in 1950–51 to £358 million. In this unexpected £99 million the largest item is the additional cost of the hospital services—£41 million in advances to the regional hospital boards, and £7 million to the boards of governors of teaching hospitals. No doubt this represents mainly the restoration of the cuts imposed a year ago: and in that sense it may be said that the hospitals are, after all, only working to their own original estimates. But further increases lie ahead, and, at a time when reduction in Government spending is being so strongly urged, it will be asked why the Chancellor is allowing Mr. BEVAN to throw this colossal burden on to the taxpayer. What is the Treasury about?

The Minister of Health, we must hope, will not be induced to yield to any pressure for more rigid Treasury control of the kind already incipient. There is enough of this already. The trouble is rather that the system is wrong, and that, despite the rigidity which destroys the power to spend on the roundabouts what is saved on the swings, the money continues to pour out and hospital costs to soar. This is not perhaps surprising, for the Act did many strange things, whose full consequences have not been properly appreciated. The *Times* put its finger on the point last August when it said that:

> "The hospital service represents a notable innovation in social affairs. In it financial and managerial responsibility are divorced. The provision of funds is centralized, so that all hospitals can enjoy financial security, while management is entrusted to local committees, coördinated by regional boards, in order to preserve that flexibility and local touch essential for the welfare of patients and the professional freedom of doctors. For this novel experiment to work, the hospital management committee, subject to any necessary control by its regional board, must be in a position to count on a total annual sum, deemed adequate for its needs, which it is free to spend or save as it thinks fit. This is not what is happening. . . . The present makeshift methods were perhaps inevitable in the initial stages of a great social experiment. Their continuance may well wreck an experiment in the delegated management of a State service which was launched with the highest hopes."

Referring to the lack of a costing system, this editorial argued that such a system is an essential prerequisite to the delegation of spending power to match the delegation of administrative responsibility. In the 20th report of the Select Committee on the Estimates we have recently been told that something is in fact being done about a costing system. So far so good. But such a system by itself will not take us far; with it must be coupled the bold experiment in the delegation of financial responsibility for which the *Times* called.

The question to which Parliament should address itself is surely, what substantial reason is there why the principle of round-sum allocations should not be adopted? This principle was apparently endorsed when the Bill was in Standing Committee, for on June 27, 1946, the Parliamentary Secretary to the Ministry of Health, discussing the relevant clause, spoke of the regional hospital boards and the hospital management committees having "a considerable amount of latitude within the sum that has been approved." He went on to say that "quite obviously, if as a result of the activities of the year something unforeseen occurs and a deficit results, that deficit will have to be made good in the Budget arrangements for the following year; and also, if there is any surplus, that surplus must be carried through to the next budget period." He spoke of "a sense of real responsibility for the services they are providing, and for the finances of their administration." Why has the Minister gone back, or why does he appear to have gone back, on these assurances? Could it not be explained in simple language? It does not seem sufficient explanation that the vote for hospitals must be based on estimates and included with other items in the annual national budget; for the quite different principle of fixing a round sum or pool has been adopted in the case of the remuneration of the general practitioners.

It sometimes seems that the financial authorities concerned are strangely blind to the nature of hospital finance. What they seem to miss is the fact that in any hospital, at any time and any place, a really strong case can be put up for additional expenditure; and that, in the present state of society, against this advocacy no barrier erected by a lay authority, not even Parliament itself, can long prove effective if the question is merely one of voting the money. There is, of course, nothing new about this; but before nationalisation each hospital was a unit—or in the case of the local-authority hospitals part of a relatively small unit for limited finances—where one medical need clashed with another, and a great many, as it were, cancelled each other out. The financial authorities do not seem to have seen that it is to their own great advantage to grant the degree of delegation here advocated; as soon as they do, projects for expenditure will, for the first time since the appointed day, be fully exposed to rigorous and informed medical criticism. One claim will have to be compared with another, and some of them will look less convincing than they do today.

A system based on round-sum allocations would not only save the Treasury a large part of a steadily mounting bill but would, at the same time, rescue the hospitals from the strait-jacket into which they are now being gradually forced. To put it shortly, the hospitals *would fundamentally* rather have less money, and be free to spend it as they liked, than have to conform to a rigid "approved budget" and make every additional item they need the subject of an addition to estimates liable to be pruned from above. Doubtless, it would have been too difficult to introduce such a system right away on the appointed day; but with the knowledge of what the hospitals look like costing under the new régime it should be practical politics to say to each regional hospital board something like this:

> "Your budget for the next year [or three years, or five years, as the case may be] will be £*x*—excepting only that we will reimburse you for excesses brought about by circumstances outside your control, such as nationally agreed scales of salaries, or changes in the price level. Divide it up among your hospitals as rationally as you can, but not ignoring historic circumstances, and retain a modest pool at your own disposal for helping out where a hospital makes a good case for something extra. Meanwhile we shall do our best to get on with a costing system so that as the months go by you may have data to help you in deciding, by reference to comparative statistics, which hospital budgets will have to be reduced next time, and which can be allowed a little more."

A little too drastic, does it sound? Perhaps so; perhaps for quite a long while all sorts of exceptions would have to be permitted. But the principle is surely as right as the principles governing the present system are utterly wrong. The incentives would be right way up instead of upside down.

Vitamin B_{12} and Pernicious Anæmia

THERE *is now sufficient evidence for us to say that* preparations of vitamin B_{12} from liver or from *Streptomyces griseus* will produce a remission in pernicious anæmia, and that regular dosage will maintain a normal blood picture. UNGLEY,[1] who has reported results in 73 patients given vitamin B_{12} prepared from liver, found that small doses, such as 10 µg., produced a reticulocytosis but no satisfactory subsequent rise in red cells or hæmoglobin; in 32 patients the dose needed to raise the red-cell count above 4,500,000 per c.mm. varied from as little as 15 µg. to as much as 140 µg. Once the blood-count was normal, the average maintenance dose was 10 µg. fortnightly; only a few patients needed more. His 8 patients with neurological complications received much larger doses, 40 µg. being given weekly for up to ten months and then 20 µg.; the reason for this high dosage is not clear, but it is presumably based on previous experience with full doses of liver. The 8 patients recovered as well as they would have been likely to do on liver extracts, and so far there have been none of the relapses that followed folic acid treatment. Vitamin B_{12}, again unlike folic acid, causes the macrocytosis to disappear. Similar results on fewer patients were described by Dr. J. V. DACIE and Dr. J. N. M. CHALMERS[2] at the Royal Society of Medicine on Feb. 14. though they prefer larger doses. Unless some unexpected snag appears after longer experience, the practical value of vitamin B_{12} for the treatment of pernicious anæmia seems settled, and its everyday use is likely to be much increased by the production of a potent preparation from *Streptomyces griseus* at a price competitive with that of liver extracts. The estimation of B_{12} activity in these streptomyces preparations is far from simple, but there is much less uncertainty with them than in the assay of liver extracts, and manufacturers have complete control over their starting material.

The question now is, how does vitamin B_{12} work; what part, if any, does it play in the ætiology of pernicious anæmia? Since vitamin B_{12} was first obtained from liver, it is not surprising that it was soon claimed to be the "anti-pernicious-anæmia liver principle" in crystalline form; and it was then an obvious step to say that pernicious anæmia was due to a "deficiency," real or conditioned, of vitamin B_{12}. This view soon ran into difficulties. Several red cobalt-containing substances of the B_{12} type have been found in nature. LESTER SMITH[3] has separated three from liver; another streptomyces—*aureofaciens*—produces a B_{12} that has different absorption spectra from that produced by *griseus* but is hæmopoietically active in about the same dose.[4] HAUSMANN[5] has pointed out that B_{12} activity is widely scattered in nature, and that some of the materials—e.g., the cow-dung factor—are not hæmopoietically active until acted on by the enzymes found in hog-stomach mucosa or pancreas. Probably other "vitamins B_{12}" will be found; which of them is to be the liver principle? Then B_{12} activity has been found in animal foods—for instance, in meat[6]—but the quantities are small, and the amounts of vitamin B_{12} that must be given by mouth to produce any effect are far in excess of those likely to be provided by food.[7] When the excretion of vitamin B_{12} was studied, considerable amounts were found in the fæces, and by extracting the fæces and preparing the extract for parenteral injection it was shown that patients with pernicious anæmia were excreting hæmopoietically active vitamin B_{12} at a high rate.[8] Was it possible then that in *pernicious anæmia the vitamin* B_{12} in the food was not being absorbed in the small intestine? In this issue Dr. DYKE and colleagues show that the vitamin B_{12} is formed in the colon. They assayed the B_{12} in the contents of the alimentary tract of animals and man at various levels. In man an amount of the same order as is found in the liver was found only in the colon. In the horse, whose diet contains no B_{12} to speak of, the vitamin was again found only in the colon. The sheep, however, forms vitamin B_{12} in the rumen as well as in the colon. These findings suggested that vitamin B_{12} was being formed by bacterial synthesis in the bowel. In a review of this type of synthesis[9] we noted how many vitamins of the B group are known to be formed by bacteria in the bowel, and that in ruminants the same action occurs in the rumen—*the first stomach*, which we described as a veritable bacterial workshop. It is probable then *that the vitamin* B_{12} in human fæces is synthesised

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1. Ungley, C. C. *Brit. med. J.* 1949, ii, 1370.
2. *Lancet*, Feb. 25, p. 353.
3. Smith, E. L. *Brit. med. J.* 1949, ii, 1367.
4. Lichtman, H., Watson, J., Ginsborg, V., Pierce, J. V., Stokstad, E. L. R., Jukes, T. H. *Proc. Soc. exp. Biol., N.Y.* 1949, 72, 643.
5. Hausmann, K. *Lancet*, 1949, ii, 962.
6. Register, U. D., Lewis, U. J., Thompson, H. T., Elvehjem, C. A. *Proc. Soc. exp. Biol., N.Y.* 1949, 70, 167.
7. Spies, T. D., Stone, R. E., Lopez, G. G., Milanes, F., Toca, R. L., Aramburu, T. *Lancet*, 1949, ii, 454.
8. Editorial, *Ibid*, p. 565.
9. Editorial, *Ibid*, 1944, ii 854.

in this way, and Dyke and colleagues have shown that some lactobacilli present in the intestinal contents can produce vitamin B_{12}. There is so far no evidence that vitamin B_{12} can be absorbed from the colon, and therefore the observations on fæcal B_{12} do not support the absorption defect theory.

Another approach was made by Castle and his co-workers, who set out to see whether vitamin B_{12} acted like an extrinsic factor in the reaction :

Intrinsic factor (hæmopoietin) + extrinsic factor → liver principle.

Some sources of extrinsic factor, like yeast, were known to produce irregular responses in pernicious anæmia when given alone, but if vitamin B_{12} was an extrinsic factor it was certainly more active than any previously isolated factor. Now the usual sources of intrinsic factor are human gastric juice or the press juice from hog-stomach mucosa. Castle therefore took a small amount of vitamin B_{12}, insufficient to produce any response by mouth, and mixed it with fresh unfiltered human gastric juice: the mixture was hæmopoietically active.[10] This observation has been confirmed, most recently by Ungley,[2] who considers that a mixture of 5 µg. of vitamin B_{12} with 50 ml. of human gastric juice has about the same hæmopoietic effect as 10 µg. of vitamin B_{12} given parenterally. But Dyke and colleagues incubated beef—a well-known source of extrinsic factor—with gastric juice and were surprised to find that the mixture had no B_{12} activity. The reason for this may lie in the observations of Ternberg and Eakin[11] that there is a factor in human gastric juice which combines quantitatively with vitamin B_{12} and then the vitamin is not available to micro-organisms. This gastric-juice factor, named "apoerythein," is heat-labile and non-dialysable: an identical factor can be obtained from hog-gastric mucosa, and in fact apoerythein has properties similar to those of Castle's intrinsic factor and Wilkinson's hæmopoietin.

At this point anyone familiar with the early work on the rôle of the stomach in the ætiology of pernicious anæmia might exclaim: "This is where I came in!" Twenty years ago Castle[12] and Wilkinson[13] showed clearly that gastric juice and beef muscle, hæmopoietically inert by themselves, produced a hæmopoietically active material when incubated together. This observation has been modified but never controverted. Castle and co-workers[14] later found that incubation was not necessary (the gastric juice and the beef could be given as long as 6 hours apart), and that a neutral reaction rather than an acid one favoured maximum hæmopoietic activity. Wilkinson and colleagues[15] concentrated their attention on the enzyme hæmopoietin that was readily available in the press juice from hog-stomach mucosa, and worked out the details of the reaction. The only work quoted in a contrary sense is that of Forminje[16]; but Forminje did repeat Castle's experiment and obtained the same result. He was chiefly interested in the extrinsic factor and showed that an 80% alcoholic extract of beef, from which fats and lipids had been removed, still contained extrinsic factor and produced a hæmopoietically active material when incubated with gastric juice. The only point of difference was that his product was inactivated by 70% alcohol, whereas Wilkinson's was not.

Any practical hypothesis about the ætiology of pernicious anæmia must take into account the invariable achlorhydria and failure of secretion of the gastric enzymes, including intrinsic factor. Vitamin B_{12} certainly has properties resembling known extrinsic factors; is it the only effective one? We do not yet know: Ungley's reminder[2] that yeast, a very potent source of extrinsic factor, has no B_{12} activity, suggests that vitamin B_{12} is not the only source. Ten years ago we might have thought that only a little tidying up remained to complete our knowledge of the ætiology of pernicious anæmia. Folic acid and vitamin B_{12} have changed all that, but the early emphasis on the fundamental importance of the gastric lesion still stands: it is our ideas on the later stages that are likely to be expanded and clarified by the researches now in progress.

Surgery of Carcinoma of the Cardia

The classical description of the lymphatic drainage of the stomach, by Jamieson and Dobson[1] in 1907, presented technical problems in the treatment of gastric cancer which were then insoluble, and the surgeons of the time had no choice but to ignore its lessons. In those days the only surgical approach to the stomach was through the abdomen, and if a carcinoma could be resected with a reasonable margin of apparently healthy stomach it was the most that could be achieved. But a glance at the diagrams of Jamieson and Dobson must have shown that such a partial resection cuts across the lymphatics in a way which would not be tolerated in the treatment of more accessible cancers. The lymphatics of the lesser curvature and upper part of the body of the stomach pass up to the cardia and over the fundus into the left gastric and suprapancreatic glands. That these vessels were severed and the gland stations left behind was regrettable but unavoidable. So, though an occasional patient survived resection for a long time, any statistical survey of the results was bound to be depressing. A few highly skilled surgeons tried to improve the results by performing total gastrectomy with œsophagojejunostomy, but even in their hands the operative mortality was formidable. Carcinomas starting high up in the stomach and involving the cardia were rejected as inoperable, apart from palliative gastrostomy or jejunostomy. These measures did little to relieve discomfort or to prolong life, though there were inevitably a few patients so treated whose symptoms arose not from a carcinoma but from a stenosing peptic ulcer of the stomach or œsophagus, and these patients were saved.

The modern achievements in the surgery of upper growths of the stomach are largely the outcome of advances in anæsthesia, chemistry, and physics. Safe blood-transfusion and chemotherapy removed two of

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10. Berk, L., Castle, W. B., Welch, A. D., Heinle, R. W., Anker, R., Epstein, M. *New Engl. J. Med.* 1948, 239, 911.
11. Ternberg, J. L., Eakin, R. E. *J. Amer. chem. Soc.* 1949, 71, 3858.
12. Castle, W. B. *Amer. J. med. Sci.* 1929, 178, 748.
13. Wilkinson, J. F. *Brit. med. J.* 1930, 1, 236.
14. Castle, W. B., Heath, C. W., Strauss, M., Heinle, R. W. *Amer. J. med. Sci.* 1937, 194, 618.
15. Wilkinson, J. F. *Lancet*, 1949, i, 249, 291.
16. Forminje, P. *Arch. intern. Med.* 1940, 66, 1191.

1. Jamieson, J. K., Dobson, J. F. *Lancet*, 1907, i, 1061.

Dr. Robert Melig Library
[illegible]

the main obstacles to the extension of surgical techniques; and the ability of the anæsthetist to keep a patient in good condition for 3–4 hours with his abdomen and both pleural cavities open made it possible to attack these growths from the chest. Carcinoma of the cardia, which for no known reason is twice as common in men as in women, may be a primary gastric growth involving the diaphragmatic œsophagus and even extending high up into the mediastinum, or it may be a squamous carcinoma of the œsophagus extending down to the cardia and over the gastric border. The approach from the chest, with incision of the diaphragm and delivery of the growth up through the chest, soon gave place to a combined thoraco-abdominal approach, and most surgeons would now agree that this direct exposure is the only satisfactory one. The extension of the incision across the costal margin, with splitting of the diaphragm in the same direction backwards into the œsophageal hiatus, gives an exposure through which the growths can be extirpated whether they extend high into the œsophagus or low into the stomach. To dissect the pylorus and the hilum of the liver is as easy as to remove mediastinal lymph-glands. This may well be the incision of choice for all gastric carcinomas, except perhaps those at the extreme pyloric end invading the pancreas. The local resection of growths at the cardia has presented no great difficulty and has been valuable in relieving dysphagia; but it soon became obvious that the recurrence-rate after such limited operations was very high, and that a far more extensive radical operation was called for.

Physiology as well as anatomy must be considered in planning an operation for carcinoma of the cardia. The physiology of the cardia is not yet fully understood, but we know that it cannot be disturbed with impunity. Normally the œsophagus, which has a relatively poor resistance to the digestive juices, is protected from them by the mechanism of the cardia. The oblique entry of the œsophagus into the stomach, the oblique fibres of the stomach arching over the cardia, and the thick tunnel of the diaphragmatic crura through which the lower œsophagus passes, all combine to prevent the reflux of acid and food from the stomach into the œsophagus. During belching and vomiting, of course, this arrangement is relaxed, and persistent vomiting may lead to erosion of the œsophagus. If, however, the anatomy of the cardia is disarranged, either by its herniation into the mediastinum or by surgery, there is a serious risk of erosion of the œsophagus. It is still impossible to predict which patient with a sliding hernia of the cardia will develop such erosion; this certainly does not wholly depend on the amount of acid in the stomach. The danger of œsophageal erosion must be borne in mind when restoring the continuity between the œsophagus and the stomach after resection of the cardia. The operation of resection with mediastinal œsophago-gastrostomy reproduces the condition of sliding hernia of the cardia, and would therefore be expected to cause œsophagitis, œsophageal ulceration, and even stenosis in some cases. Postoperative œsophagitis with heartburn and waterbrash does in fact occur; later there may be chronic œsophageal ulceration and fibrosis with dysphagia, and the ulcers have even perforated the aorta, the pleura, and the pericardium. But so far no-one has published a detailed follow-up report on a big series of œsophagogastrostomies to tell us how often these more serious complications arise. Many surgeons think the milder digestive disturbances a small price to pay for the removal of a malignant obstructing growth, and the Americans who have practised the operation extensively seem well content with their results. The alternative is to anastomose the œsophagus with the jejunum. If a carcinoma of the cardia is resected with enough œsophagus to give a good margin of healthy tissue beyond the growth it is impossible to bring up a loop of intestine and anastomose it to the œsophagus, as is done in partial gastrectomy. If this form of anastomosis is done, the œsophagus will inevitably be resected too low down. Œsophagojejunostomy therefore necessitates a plastic operation on the mesentery, as in the method of ROUX.[2] The œsophagus is then anastomosed to the end of the jejunum, and continuity is restored by a "T" anastomosis lower down. After this there is no reflux of biliary and pancreatic fluid into the œsophagus to produce œsophagitis, and the method allows of the whole stomach being removed.

Histological examination of the stomach wall some way from the apparent margin of a gastric carcinoma often shows microscopic involvement, and some surgeons believe that a total gastrectomy is the best treatment for all growths involving the stomach. Growths of the cardia, whether they are squamous growths of the œsophagus or glandular growths of the stomach, may spread to involve the left lobe of the liver, the spleen, the pancreas, the left suprarenal capsule, or the diaphragm. The thoraco-abdominal approach makes it possible to resect such growths with their extensions, and it is probably wise to remove the adjacent part of the diaphragm in all neoplasms which transgress the cardia. There is direct or indirect lymphatic drainage from the stomach into the hilum of the spleen, over the fundus of the stomach into the retroperitoneal tissues, and so to the supra-pancreatic glands. Even where the pancreas is not directly involved, the lymph-glands along its upper border and posterior surface may well be affected. A radical dissection, therefore, necessitates removal of the spleen and most of the body of the pancreas, with retroperitoneal tissues extending up from the pancreas to the hiatus.

Recent work in this country has convincingly shown that the lymphatic vessels and glands which JAMIESON and DOBSON described are, in fact, those involved in gastric carcinoma. The surgical treatment of this disease, therefore, is now at the stage where carcinoma of the rectum was about twenty years ago. Some surgeons still prefer a relatively local resection with a low mortality to the more extensive but theoretically sound operation which may carry a higher mortality. With carcinoma of the rectum, the operation which was theoretically sound ultimately found favour, and it seems likely that the same will happen in the case of the stomach. Meanwhile, whatever line of attack the surgeon chooses, he should keep accurate records of what he has done, with a careful follow-up, so that in ten years' time our conclusions will be decisive.

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[2] *Sem. méd.* 1907, 1, 37.

Annotations

CORTISONE AND A.C.T.H.

THE dramatic results achieved with 'Cortisone' and adrenocorticotropic hormone have fixed our attention on the adrenal gland; and we have thus tended to lose sight of the interdependence of this and other endocrine organs. Elsewhere in this issue Dr. Long and Dr. Miles, of the National Institute for Medical Research, develop the evidence for a balanced opposition between thyroid and adrenal hormones. Their article is also notable for containing the first report on work carried out in Britain with cortisone.

In the U.S.A. the Mayo Clinic workers[1] have brought together and extended the clinical and biochemical data on both cortisone and A.C.T.H. They have confirmed the capacity of cortisone, administered in sufficiently large doses over a long period, to induce most of the clinical and metabolic features of Cushing's syndrome. The features induced in this way include rounding of the facial contour, hirsutism, acne, keratosis pilaris, muscular weakness, œdema, amenorrhœa, cutaneous striæ, mental depression, impaired carbohydrate tolerance, negative nitrogen balance, increased excretion of corticosteroids in the urine, and hypochloræmic hypopotassæmic alkalosis. Both cortisone and A.C.T.H. have been found to promote urinary excretion of creatine and uric acid, and to give rise sometimes to a negative potassium balance. Their effects on sodium and chloride balances are variable, the usual pattern being retention, followed by increased excretion, of salt; sometimes urinary excretion of calcium and phosphorus is slightly increased. The report provides further evidence that protracted administration of cortisone depresses adrenal cortical function; and the Mayo Clinic group suggest that the 17-ketosteroids excreted during its administration are derived largely, if not entirely, from the cortisone. It seems that A.C.T.H. stimulates the adrenal cortex to secrete, not cortisone (17-hydroxy-11-dehydrocorticosterone), but the closely allied Compound F (17-hydroxycorticosterone).

Injection of pituitary thyrotropic or gonadotropic hormone is well known to induce in animals of heterologous species a refractory state associated with demonstrable anti-hormones in the serum. That this reaction extends to A.C.T.H. has been demonstrated, in the rat, by Chase[2]; and her report has been followed by one from Gordon[3] showing that rats gradually became refractory to hog A.C.T.H. in doses comparable, on a body-weight basis, to those used in man to alleviate rheumatoid arthritis. It has already been established that continued injection of pituitary extracts from heterologous species may render animals refractory to their own pituitary hormones, with subsequent atrophy of the "target" glands[4]; and Gordon concludes that "one might speculate as to the possible effect of antihormone on the pituitary-adrenal system of a refractory animal or patient who continues to receive heterologous A.C.T.H." As time goes on, we are likely to see still more clearly how right the initiators of the method have been in insisting that A.C.T.H. and cortisone, must for the present be regarded as research tools rather than sure means of treatment. The national councils advising the United States Public Health Service on medical-research problems have in fact urged that both drugs should be used only for reseach; and that most of the basic reseach on treatment, side-effects, and mode of action should be made with animals.[5]

BLOOD IN THE STOOLS

THE passing of blood in the fæces is a common feature of disease. It must always be regarded seriously because all its common causes, except internal piles, are serious. The blood may be obvious or it may be occult and detected only by special methods. Melæna means the passage of a shiny black (μέλαινα = black) tarry stool, consisting largely of partly digested blood, but the term is often applied loosely to any passing of blood from the anus. Bleeding in the upper part of the bowel, including the small intestine, usually produces melæna, and as little as 50–60 ml. of blood will render the stool black.[1] Red blood in the fæces usually indicates bleeding from the colon, rectum, or anal canal.

The diagnosis of the cause of blood in the stool is the diagnosis of alimentary disease. It rests on careful routine history-taking, complete physical examination, and the results of investigations. In every case there are two questions to be answered: (1) "What is the site of the bleeding?", and (2) "What is the pathological lesion?" In the history other symptoms must be noted. Hæmatemesis commonly precedes melæna when the œsophagus, stomach, or duodenum is bleeding. There may be a typical ulcer dyspepsia, but this is not invariable in cases of bleeding peptic ulcer. If there is colic and diarrhœa, with mucus as well as blood in the stools, enteritis or colitis is probably the cause. If there are symptoms of large bowel obstruction, with streaks of red blood in the stools, the most likely lesion is a carcinoma of the pelvic colon or rectum. The physical examination must include a search for evidence of general systemic disease such as purpura or uræmia. There may be an obvious source of bleeding in the mouth or nose: splenomegaly may suggest bleeding from œsophageal varices; and so on. Rectal examination, which must be done in every case, may reveal an anal polyp or fissure, or a carcinoma of the rectum. The finger should always be examined for blood after it is withdrawn. Piles can only be diagnosed by proctoscopy unless they are prolapsing or thrombosed. Internal piles are the commonest source of blood in the stool, but we must remember that the piles may be secondary to pregnancy, portal obstruction, or carcinoma of the rectum. Anyone who complains of piles for the first time over the age of 40 should be examined with a sigmoidoscope. Many cases of bleeding per anum will need further investigations. Radiography with the barium swallow, barium meal, and barium enema can be very helpful. Sigmoidoscopy is essential for the examination of the rectum and pelvic colon, but œsophagoscopy and gastroscopy are usually reserved for cases in which the X-ray findings are inconclusive. The fæces must be examined for pathogenic bacteria and for amœbæ when an infection is suspected. Blood diseases, hæmorrhagic states, enteric infections, and uræmia, all of which may cause intestinal bleeding, can be detected by blood examination. In a few cases, especially when bleeding is the only symptom or sign, the cause will remain obscure. These must be followed carefully and re-investigated if the bleeding is repeated or if new features develop. Occasionally laparotomy is necessary to establish the cause, and more rarely it has to be done urgently to stop bleeding from an unknown source.

In the U.S.A., Thompson and McGuffin[2] have analysed 293 consecutive cases with blood in the stools as a prominent feature, excluding those in which the bleeding was in the anal canal. Peptic ulcer accounted for 30% of the cases, and, though 80% of these had hæmatemesis at some time, the blood appeared *first* in the stool in 62%. Next came bacillary dysentery with 21% of cases, most of them in children, while non-specific enteritis and colitis accounted for less than 1%. In Britain there are

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1. Sprague, R. G., Power, M. H., Mason, H. L., Albert, A., Mathieson, D. R., Hench, P. S., Kendall, E. C., Slocumb, C. H., Polley, H. F. *Arch. intern. Med.* 1950, 85, 199.
2. Chase, J. *Endocrinology*, 1949, 45, 96.
3. Gordon, G. L. *Ibid*, p. 571.
4. Bachman, C. J., Collip, J. B., Selye, H. *Proc. Soc. exp. Biol., N.Y.* 1934, 32, 544. Severinghaus, A. E., Thompson, K. W. *Amer. J. Path.* 1939, 15, 391.
5. *New York Times*, suppl. March 12.

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1. Winters, W. L., Egan, S. *J. Amer. med. Ass.* 1939, 113, 2199.
2. Thompson, H. L., McGuffin, De V. W. *Ibid*, 1949, 141, 1208.

probably fewer dysenteric and more non-specific cases of enterocolitis. Œsophageal varices (9%), carcinoma of the stomach (8%), carcinoma of the rectum and pelvic colon (6%), idiopathic ulcerative colitis (5·5%), diverticulitis of the colon (4%), and uræmic colitis (3%) came next in frequency. Intussusception was the cause of only 1·4%, and there were no examples of blood diseases. Lesions of the small intestine, which formed only 2% of this series, are rare in most people's experience, though from time to time Meckel's diverticulum, Crohn's disease, mesenteric thrombosis, and tumours of the small bowel do cause bleeding without much other evidence of their true nature. The causes of small intestinal bleeding have lately been reviewed by Hodes and Edeiken.[3]

Tests for occult blood in the stools have fallen into disrepute in some quarters, but their results may be valuable if they are interpreted critically. Bleeding gums and piles, and meat in the food, may give positive reactions, and constipation may cause false *negative* results.[4] When using the benzidine test a meat-free diet for at least two days is essential, and the stools must always be examined for meat fibres. The test should be done on at least three separate occasions. Hoerr and colleagues [5] favour a modification of the guaiac test, easily performed in the consulting-room. This is not sensitive enough to be affected by meat and can therefore be done on outpatients, provided they are not taking iron. While negative reactions are unreliable, they claim that positive guaiac reactions denote significant organic bleeding in a high proportion of cases. The test is simple:

> A smear of fæces (from a fingerstall) is placed on a filter paper, and one or two drops each of guaiac solution, glacial acetic acid, and hydrogen peroxide, in that order, are placed near the fæces. If a blue or dark green colour appears within 30 seconds the result is positive.

Dunphy [6] reports 2 cases of resectable carcinoma of the small intestine which had produced positive guaiac reactions but could not be demonstrated by routine radiology. In each case a Miller-Abbott tube was passed until a level was reached from which the aspirated samples contained occult blood. That part of the bowel was then filled selectively with barium through the tube, and the lesion was demonstrated radiologically. This rather complex test will be worth the extra trouble if it will locate even an occasional growth of the small gut at a curable stage.

PENETRATION OF OVUM BY SPERM IN VITRO

EARLY in 1948 Menkin and Rock [7] announced that they had obtained fertilisation and cleavage of human ova removed from ovaries by dissection in vitro under aerobic conditions. They had made the attempt 138 times and had obtained cleavage in 4 ova. This caused a stir in the popular press; but more sober observers were not so readily convinced, and Rock himself admitted that parthenogenesis could not entirely be ruled out. After working on the subject for several years, Moricard and Bossu [8] report that their attempts to obtain fertilisation and cleavage of rabbit ova under aerobic conditions, as described by Menkin and Rock, were invariably negative in 60 cases; the spermatozoa never succeeded in penetrating the membrana pellucida. But, when rabbit spermatozoa and ova were brought together under relatively anaerobic conditions in the presence of tubular epithelium and seminal plasma, penetration occurred every time in 8 cases. By cutting serial sections they have observed and demonstrated the very earliest stages in the process of fertilisation. They believe that their technique will be applicable to human spermatozoa and ova, and, if so, this will mark a definite step forward in the struggle to unravel the complex physiology of mammalian ova, spermatozoa, and tubular epithelium.

FLUOROSCOPIC EXAMINATION OF THE CHEST

IN the early days of radiography "screening" was used freely in diagnosis; but as films became easier to take it dropped into the background. It is so pleasant and convenient to be able to back one's opinion with a permanent record that the temptation to ask for a film is very strong, both for the physician and the radiologist. However, things have reached such a pass that our X-ray departments are congested by the amount of work pouring into them, and our task is now to think of ways of lightening the load. Dr. Stephen Hall and Dr. William Tattersall, on another page, advocate a return to a much wider use of fluoroscopy. Not only would this save time and money, but it would also, they suggest, give information which could not readily be obtained in other ways. Thus it is possible by changing the tilt of the patient's body, and by making him bend, breathe deeply, or pant, to estimate the depth of various shadows, and to avoid some common pitfalls of diagnosis from the film. Fluoroscopy, they say, differs from inspection of the film in the same way that cinephotography differs from still photography; and they have found that the information it gives tallies well with that to be expected of the fixed film.

Fluoroscopy has its drawbacks however, one of them being that radiologists, like other people, differ in their powers of dark adaptation. Hall and Tattersall suggest the use of dark glasses to enable the radiologist to go on working while his visual purple is collecting; and evidently they are themselves both capable of good adaptation. But, as Mr. Cecil Ashwin, M.S.R., has pointed out,[1] in a review of prevailing opinion on the value of fluoroscopy in tuberculosis case-finding, "the ability of an individual to see in the dark depends on many factors such as temperament, physiological condition and vitamin intake: further, this function can vary from day to day." This variability probably accounts for the large body of opinion he is able to report *against* the value of fluoroscopy. He quotes Garland, who put the percentage error in the detection of tuberculosis with this method (as compared with radiography) between 13 and 35; Fellows and Ordway, from a study of 2500 cases, agreed with this figure, and Voigtlander, from another 2500 cases, concluded that in 32% the diagnosis by fluoroscopy was either incorrect or insufficient. Schaare found an error of 18% in fluoroscopic findings; while Edward and Ehrlich, after reviewing mass surveys of 100,000 people, decided that the drawbacks of fluoroscopy outweighed the advantages. Ashwin quotes other opinions of the same kind, but sets them against an equally weighty set of favourable reports.

It seems that if fluoroscopy is to be widely used we need some method of testing the accuracy of the observer. A test of visual adaptation in darkness has been devised by Chantraine and Cramer, which consists, Ashwin says, in enumerating, from a fixed distance, lead numbers of various sizes mounted on a standard fluorescent screen. Of 30 doctors tested in this way, only 6 were "good," 10 were "medium" and 14 were "poor." Two-thirds of them needed more than ten minutes to attain minimum dark adaptation. Ashwin suggests that patients should be sieved first by mass radiography; and that suspected cases should then be fluoroscoped by a capable observer, and a spot film taken of any suspicious area. This would enable the preliminary sifting to be done in the absence of the radiologist, and would make a full-size film necessary only in exceptional cases. Hall and Tattersall believe that screening alone can safely be used to exclude tuberculous lesions and will thus save many films which are at present wasted.

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[3] Hodes, P. J., Edeiken, J. *Ibid*, p. 1284.
[4] Necheles, H. *Ibid*, p. 1217.
[5] Hoerr, S. O., Bliss, W. R., Kauffmann, J. *Ibid*, p. 1213.
[6] Dunphy, J. E. *Ibid*, p. 1217.
[7] Menkin, M., Rock, J. *Amer. J. Obstet. Gynec.* 1948, 55, 440.
[8] Moricard, R., Bossu, J. *Bull. Acad. Méd. Paris*, 1949, 133, 659.

[1] Med. Lab. Progress, 1949, 10, 141.

Special Articles

DENTAL CRISIS

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THE dental part of the National Health Service has now been in operation for 1½ years, and even the most sanguine must concede that all is far from well. The dental profession, as a whole, has cooperated loyally, despite the fact that suggestions forwarded by the British Dental Association have consistently been ignored. It is true that a few unscrupulous practitioners have seized the opportunity to feather their own nests at the public expense, and such cases have received considerable publicity; but on the whole the profession has done its best to cope with the enormous amount of work that has accrued. Nevertheless we are clearly approaching a situation detrimental to profession and public alike.

QUALITY OF WORK

Dental surgery involves long hours of meticulous concentration, and the operator is additionally fatigued by dealing constantly with patients who are themselves in a state of nervous tension and require a continuous effort on his part to allay their fears. Whereas the general surgeon operates almost always with some form of anæsthetic, the dental surgeon doing conservative work has to be continually on his guard against hurting the patient, and is ever on the watch for the involuntary movement that betrays the fact that the drill is reaching a sensitive part. This applies, of course, chiefly to conservative dentistry; but conservative dentistry forms, or should form, the bulk of the average dental surgeon's practice.

To set against this, there is the pleasure obtainable from good craftsmanship skilfully applied, and in the higher flights of conservative dentistry not only precision but fine craftsmanship is needed. The preparations of crowns and bridges is arduous and exacting, but fundamental satisfaction comes from doing the difficult job well. In the field of prosthetic dentistry, the fitting of skeleton metal partial dentures—which as regards oral hygiene are far preferable to those made of vulcanite or acrylic resin—again takes time and skill, as well as more expensive materials. The extra time and trouble required to secure a perfect match of artificial teeth to natural teeth, and the arrangement of artificial teeth to assume a natural appearance rather than the even row of white teeth only too often seen, are well spent for the satisfaction obtained by the man who views his work as something more than oral plumbing.

In an endeavour to keep this sense of craftsmanship alive, the British Dental Association have, from the first, advocated a system of grant in aid. In effect, this would mean that patients requiring special work should be allowed to pay extra for the time and trouble involved, over and above the basic fees paid by the Ministry. The Ministry, however, apparently thought that this system would lead to abuses, and it has been consistently refused.

For the average dental surgeon working under the scheme there is, therefore, little incentive to do work requiring extra time and skill, and his incentive is bound to become more and more financial. Since its inauguration, patients have been flocking to the dental surgeries, and busy practitioners booked up for months in advance are quite unable to undertake anything beyond the routine procedures necessary to get the greatest number of patients treated in the shortest possible time. All agree, of course, that it is important to provide a service for the country as a whole, and that of necessity large numbers of patients have to be treated. The emphasis has, however, come to lie more on quantity than quality, which cannot be in the ultimate interests of the public, and must lower the respect in which the British dental profession is at present held.

SHORTAGE OF DENTISTS

It is not generally appreciated that the number of dental surgeons in this country at the moment is totally inadequate. With fewer today than in 1939, the profession is understaffed and overworked.

The most serious effect of the new scheme has been to withdraw dental surgeons from the services provided for the priority classes, especially for children. In almost every part of the country the school dental services are incapable of providing proper treatment. For example, in the Middlesex area, where the establishment is for 96 school dental officers, there are at present 51, and fully equipped surgeries are lying idle with no-one to work in them—this at a time when over 70% of London County Council school-children of the age of five are suffering from some degree of dental caries.[1] It was to be a leading principle of the National Health Service that the future generation should have the best possible attention. This attention, from the dental point of view, they are not receiving.

It is clear that action is urgently required if the scheme is to succeed—and all are agreed that some scheme is necessary and must be made to succeed. Can we get new recruits to the profession in time? Can we indeed get them at all if they know that immediately upon qualification they will enter a career where fillings have to be turned out in quantity daily, with little to alleviate the monotony?

Ross [2] has suggested that, in order to meet the present crying need for treatment for children, dental practitioners in the N.H.S. should give up some hours each week to their treatment. This, however, would certainly mean some reduction in the time given to adults, and it is hard to see how it could be arranged when practitioners' appointment-books are full for months ahead.

SALVATION BY ANCILLARIES?

The alternative is the employment of ancillary workers within the profession. This, though it has on the whole been resisted by dental surgeons, might in the end prove of great benefit. If routine fillings were done by such workers in a clinic under the supervision of a qualified dental surgeon, far more work could be undertaken, and the number of qualified men required proportionately decreased.

Admittedly the preparation of a cavity in a tooth, removal of dental caries, and the insertion of a filling require a knowledge of the reactions of the tooth, as well as of its anatomy and the physiology of its repair. In addition, manual dexterity and a knowledge of technique are clearly needed. But such work does not, in my opinion, demand the fundamental knowledge of physiology and pathology expected of the medical and dental student.

In the dental hospitals, and in dental departments of teaching hospitals with an attached dental school, the bulk of the work is carried out by students under the supervision of a qualified staff. The introduction of the National Health Service caused some anxiety to those responsible for training dental students, on the grounds that the numbers of patients attending hospitals might diminish, and that they would want to be treated by the qualified practitioner rather than by the unqualified student. Fortunately these fears have not been realised, and the numbers attending the hospitals have greatly increased. At the Royal Dental Hospital of London, for example, patients attending in 1949 numbered almost 24,000 more than in 1947.

Patients judge a hospital by the treatment that they receive in it. They are fully aware that their treatment

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1. Mellanby, M., Coumoulos, H. *Brit. med. J.* 1946, ii, 565.
2. Ross, W. S. *Brit. dent. J.* 1950, 88, 15.

is being carried out by unqualified students, yet their attendance signifies their satisfaction. If they are satisfied with the treatment given by unqualified dental students working under qualified supervision, why should they not be satisfied with the treatment given by ancillary workers specially trained in the necessary techniques, also working under qualified supervision ?

A precedent has been set in New Zealand, where dental nurses, trained but with no degree, undertake children's dentistry including fillings and extractions. The scope of the work which they are allowed to do is limited, since not infrequently they are working by themselves in isolated communities where they cannot easily get the advice or assistance of a fully qualified dental surgeon. At the same time the fact that they can undertake this work at all means that fewer qualified men are needed, and that more children can have adequate routine treatment.

If children's dentistry were to be undertaken mainly in special clinics many difficulties could be avoided. The course for the unqualified assistants, who would do no more than fill teeth, need not be so long as it is for the New Zealand nurses, who need rather wider knowledge. The unqualified assistants would be under constant qualified supervision.

If in a dental school one qualified demonstrator can supervise twenty students (at various stages of training), and if each student can finish two fillings in three hours, one qualified man can be responsible for forty fillings during this time. Clearly a much larger number could be dealt with by assistants trained in conservative technique and no longer working with the slowness of the student.

The training of the large body of assistants who would be needed to cope with the present situation presents certain difficulties. The dental schools in this country, already too few and too small, can scarcely handle their present students. It must be remembered, too, that increasing the number of dental students not only necessitates enlargement of the departments of the dental school but also throws an extra burden on the preclinical departments of the universities and medical schools, which are already overtaxed. For this reason entries to the medical and dental schools have had to be limited.

One incidental but grave result of this is that the more ambitious dental student who wishes to obtain both a medical and a dental degree is finding it almost impossible to get a medical school to accept him. He is told that a student who obtains his dental qualification is capable of earning his own living and should not take up the space and facilities needed for the training of his medical colleague. At the moment, this argument cannot be lightly swept aside ; but what a deplorable outlook for the profession ! Dentistry has had its dark ages when oral physiology and pathology were regarded as subject to laws different from those applicable to the rest of the body ; and the conception that dental surgery was but a specialised branch of medicine has had a tardy period of gestation. But the desirability of having the wider knowledge implied by the possession of a medical qualification is shown by the fact that the larger teaching hospitals demand that applicants for senior dental staff appointments should be qualified in medicine as well as dentistry. Where are such men to come from in the future if the present impasse is allowed to continue ?

Technicians undergoing training would probably derive some benefit from a short preclinical course, but this need not be long, and the main emphasis would be placed on purely technical training. The period necessary for this is hard to assess ; but, given an entrant with reasonable inherent manual dexterity, at the end of one year he or she should be able to undertake the normal routine cutting of cavities and filling of teeth. The shortness of this period of training, compared to the five years necessary for the dental student proceeding to the licence or degree, means that a large number of such technicians could be produced fairly quickly once a training scheme had been started.

To find centres for this training is not easy. The dental schools would not be able to accommodate any substantial number of such trainees without severe disorganisation of their present curricula and consequent disadvantage to their own students. Yet some association with existing schools would be necessary to ensure the supply of necessary patients. The difficulty, however, is not insuperable ; it could be overcome by the addition of special departments to selected hospitals or the adaptation of large existing clinics.

Such proposals in the past have been vigorously opposed by the dental profession, who fear that the entry of unqualified assistants would lead to numerous abuses. But some remedy for the present situation must be found, and if such technicians were given an adequate course of training, were properly paid, and were set to work under the supervision of qualified men, the man-power problem could be solved.

The fear of many practitioners, with the lesson of the pre-1921 era before them, has been that once unqualified assistants were recognised, not only might there be abuses, but in addition their livelihood might gradually be taken from them. Is this fear well founded ? Status has always been a sore point with the profession. Dental surgeons have felt that they were not regarded as having the same standing as medical practitioners ; the public has not regarded them as specialists in the mouth, jaws, and teeth but rather as makers of plates and fillers of teeth. But if ancillary workers were to be admitted to the profession—in the first instance to carry out fillings and possibly later to make and fit dentures—the result must inevitably be an elevation of the status of the dental surgeon, who would more and more come to be regarded as a specialist. In the end, indeed, the possession of a medical as well as a dental degree might be required of him, thus putting dentistry on a level with the other medical specialties. How much better for the embryo dental surgeon to envisage a career in which he is able to exercise his knowledge and his judgment, and does not become a mere automaton with a drill in one hand and extracting forceps in the other.

Some answer to the problem of the children must be found, and found quickly. It is intolerable that a health scheme in which they were rightly to be given every priority should have resulted in their receiving less treatment than ever before. The school dental service as at present constituted is moribund, and there is little if any chance that, before the last rites have to be administered, it will be revived by the large number of dental officers it urgently needs to bring it up to strength.

The time has come for both the profession and the Minister of Health to face these facts. Bold decisions have got to be taken, and they must be taken *now* before it is too late.

" . . . The concept that the biologic rôle of the father ends at the moment of impregnation is not correct in the case of the human young. Psychologic growth is a biologic function and the child is in need of an affective and warm father. This is especially true for the boy, who needs a father figure who is close enough to permit a positive masculine identification. In our culture, however, the father is very often a remote person who leaves the house early in the morning, often returning only after his small children have already gone to sleep ; on weekends too, he is either " tired " or too preoccupied with his own affairs to find time enough to pay much attention to the children. Many fathers . . . think that they are good and modern husbands if they leave all questions pertaining to the education and discipline of their children to the mother, to be consulted only in emergencies and as a kind of executioner to apply punishment."—Dr. WILFRED C. HULSE and Mr. LOUIS LOWINGER, *Amer. Pract. Dig. Treatm.* Feb. 1950, p. 139.

DANIEL WHISTLER, P.R.C.P. 1683

AN EARLY DIRECTOR OF NAVAL MEDICAL SERVICES

A MAN who makes a great stir in the world will have many biographers, some of whom may blame while others praise him. So Sir Francis Drake, shining in the pages of one as a perfect knight, appears in another's a common pirate; or King Charles II, whose morals for centuries have been exhibited as questionable, is now shown to us as a man of high virtue whose portrait might well hang in the offices of the Young Women's Christian Association. The range is considerable and the reader can use his judgment. But of those who have made less bustle in the world we are given but a few lines in a book of reference, or maybe a footnote in the Life of some illustrious person. Usually we have but one man's opinion and we know not whether it is right or wrong.

In books of reference the name of Daniel Whistler, M.D. Leyden and Oxford, stands for one who wrote the first printed book on rickets and came in the end to high office in his profession with little credit to himself, being written down as a negligent registrar of the Royal College of Physicians and as a president careless—or, worse—of its property. It is perhaps revealing that the name he proposed for rickets was "pædossplanchnosteocaces." Yet dull as he may have been on rickets and reckless as he may have been when he came to office, two of his contemporaries thought well of his abilities and found him good company: Evelyn in his *Diary* wrote of him as learned and "the most facetious man in nature," by which he meant urbane; while Pepys often notes "a good discourse" or "an extraordinary good discourse" with him on subjects ranging from Ancient Egypt to the preservation of masts. There is one subject however not mentioned in either diary on which we may be sure the three men held good discourse, and that was the care of wounded men, for in this all three were deeply interested. During the first Dutch war Cromwell had placed Whistler, then but 34 years of age, in charge of naval medical services, while in the second and third wars Evelyn was a commissioner for the care of sick and wounded and Pepys was Secretary of the Admiralty. Of course the testimony of the diaries hardly goes further than to show Whistler as a good talker. It is the State Papers which make it clear that he was something more.

THE FIRST DUTCH WAR

On his arrival in Portsmouth, in March, 1653, Whistler found the wounded had been pouring in for some time from the fight off Portland; and, there being no naval or civil hospital for their comfort, they had been of necessity scattered all over the town and countryside, in ale houses and hovels. He wasted no time. In reporting the taking up of his appointment to the Council of State, Whistler says he had already returned the slightly wounded to their ships "where salt meat will not do more hurt than strong drink will do here"; while the severely wounded, and those who had lost limbs and consequently were of no use for present service, were on their way to the London hospitals in horse waggons, 8 cases in each, with sufficient surgeons and nurses to take care of them. A grim and wearying journey it must have been for those badly damaged men, as the lumbering waggons climbed Portsdown and jolted and slid over Butser Hill; the ways would have been foul, for it was March. He goes on to say that, notwithstanding the double evacuation, the town was still choked with wounded, and in consequence the sick from the Fleet were being landed at Fareham, signs of malignity in the sickness making this the more advisable.

Five days later he is writing again to the council on the desirability of establishing a naval hospital for the port. He first points out the inconveniences of the boarding-out system, leading to shortcomings in treatment: how sick and wounded were left lying long on the ground until owners of houses would come to terms, and often had a long wait before the surgeons were told of their location: there was the want of linen and medicines which should be ready to hand, besides the difficulties of dieting and nursing: the crowding of weak men into "poor stifling houses": the temptations to them of "drinking inordinately in victualling houses who have no other but strong drinks." He ends by saying that he reckons "the expense of one man scattered, if to the satisfaction of his host, is so much as I believe would suffice two in a hospital."

Whistler was likely to have been unpopular with the publicans, for, though the Government allowance for board and lodging was only 7s. a week, the presence of a wounded man in the bar parlour must have been a great attraction. From time immemorial the controlled price for the exhibition of a cut finger has been the bite of an apple; one trembles to think what the price in cans of beer would have been for the display of a sawn-off leg. It is easy to appreciate Whistler's anxiety to get such cases away to a place where beer did not flow quite so torrentially and amputations were at a discount.

THE NEED FOR A HOSPITAL

Naturally with all these drawbacks he was all for "some one place, capacious and not ill situated in respect of air, water and conveniency of landing," and all these qualities were to be found at Porchester; but he questioned whether it would not cost as much to repair an old ruin as to build a new house. Attempts were made to acquire the castle, for the need was urgent; but the owners asked more than the Admiralty were inclined to pay, and the battle smoke soon after rolling away out of the Channel into the North Sea, the urgency passed, and Porchester Castle still stands as a brave old ruin at the head of Portsmouth Harbour.

The idea of building a new house was not Whistler's own. Before the arrival of the wounded, Francis Willoughby, the commissioner of the port, had suggested the building of a house to cost about £300, with a man and a woman belonging to it at a small salary, and a superannuated surgeon in medical charge. Doubtless as ships full of wounded and sick came crowding into harbour Willoughby would have revised his estimate for both building and staff—we know in fact that he was soon engaging several temporary surgeons in haste. But any who may have lost themselves in that great maze of brick and banisters, the Royal Naval Hospital, Haslar, will smile at the thought of its first conception, with a respectable married couple as caretakers.

CASUALTIES LANDED ON THE EAST COAST

What Whistler had to say he usually wrote down simply in his own clear handwriting, but he showed a little more emotion when writing of his most distinguished patient who had been wounded in the fight:

> "General Blake I hope mends, but I am checked from too presumtuous prognostics by that maxim *de senibus non temere sperandum*; it is the prerogative of the Great Physician in Heaven to presage life or death according to His secret decree, a ray of whose all-seeing knowledge appears but dimly to us through narrow crannies of conjectural guess."

When the East Coast became the base line, administrative difficulties increased, for casualties (which were heavier) might be landed in any of the small creeks and havens between Great Yarmouth and the Thames Estuary. Fortunately there was now a good supply of surgeons, and the people of East Anglia generally seem to have been helpful, doubtless inspired by the presence of Elizabeth Alkin who (two hundred years before Florence Nightingale) wore herself out in tending the wounded. Writing from Harwich to the Admiralty, she explains that her funds were exhausted in having the wounded "cleansed in their bodies and their hair cut, mending their clothes, reparations and several things else, so that I have spent both the money I had of you and my own money; and besides I am owing for my diet." In the last letter we have of this devoted woman, now broken in health and devoid of means, she is asking to be admitted to a hospital wherein to end her days in peace.

As at Portsmouth Whistler had always had the Commissioner's help in any scheme benefiting the seamen, so now he knew he could look for the same ready assistance from Nehemiah Bourne who ruled at Harwich. Bourne has left it on record that he knew the Lord of Hosts was interesting Himself on England's behalf in the war; he would have had none of the young doctor's "narrow crannies of conjectural guess," being himself on much more intimate terms with the Almighty; nevertheless religious enthusiasm never blunted his native shrewdness or his enthusiasm for hard work. Whistler's scheme was to concentrate the wounded in Ipswich, and very soon Nehemiah, whose principal business was the repair of broken ships, was providing the necessary transport, putting his shoulder to the wheel in aid of the man whose main business was the repair of broken men.

Then Whistler had the confidence of the Generals at Sea. Blake was soon again to come under his medical care, while Monck, now alone at sea in the *Resolution*, was writing to the Admiralty asking them to hasten Whistler down to take charge of the wounded. To show confidence in a man was to George Monck's way of thinking the highest form of praise.

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The Wider World

RURAL HEALTH PROBLEMS IN CHINA

E. TUCKMAN
M.B. Lond., D.C.H., D.T.M. & H.
LATE MEMBER, FRIENDS' SERVICE UNIT (CHINA)

WESTERN medicine was introduced into China over a century ago, and the training of doctors in the universities established in the large towns has closely followed the pattern in this country. In the whole of China, however, fewer than 20,000 students have graduated, and the total number of hospital beds is less than 40,000. Because of the high cost of general and medical education most doctors came from well-to-do families, and they have practised almost wholly in the large towns and smaller ports where private practice was available and where living standards were far higher than in the countryside. In the rural areas, where more than 85% of the country's 475 million people live, medical services have been virtually non-existent.

THE OLD CHINA

In 1947 I went to do medical relief work in Honan province in central China, territory then under the control of the Kuomintang. Society was entirely feudal, and the illiterate peasants, who were mostly tenants of big landlords, lived in scattered villages with houses of mud, or mud and brick. In these single or two roomed houses lived the peasant and his family and often, too, his ox—if he was rich enough to own one. Many families kept a pig or a few chickens. Agricultural methods were extremely primitive and the only implements were a simple wooden plough, a harrow, and a hoe. Basic sanitary measures in the villages were unknown. Water was obtained from open shallow wells, and the same wooden bucket might be used to draw water for the peasant and his animal or even to carry nightsoil. There were no latrines, and human and animal excreta were stored in the open to be scattered on the fields as fertiliser.

Local government was by a system of appointments. The governor of a province appointed the *shienn* (county) magistrate, who in turn appointed all the officials within the *shienn*. Heavy taxation—in 1948 this amounted to over 70% of the total crop—and high rents made it impossible to build up reserves and raise the standard of living. The peasant was a prey to the extortions of bandits and the demands of corrupt local civil and military officials. The only medical services available to him were those of the local herbists whose methods included cupping, leeching, and the application of hot plasters. Needling was a common practice, partly because it was believed that the needle made a pathway along which the evil spirits could escape, and partly because of the popularity of injection therapy. In the drug shops of the larger villages there were small supplies of Western drugs, such as the sulphonamides, calcium gluconate, and arsenicals, and these could be bought for self-medication or for injection by a herbist. But their cost was prohibitive to all but the richer landlords and merchants.

Against such a background it is not surprising to find a crude mortality-rate estimated at between 25 and 30 per 1000—that is an excess mortality of at least 15 per 1000 population. Part of this excess is accounted for by the infant mortality, usually estimated as at least 200 though it is undoubtedly much higher in some areas, and a maternal mortality varying between 15 and 20 per 1000 live births. The remainder is due mainly to gastro-intestinal disease, pulmonary tuberculosis, and the infections of childhood, particularly smallpox and diphtheria, which are common throughout the country. In addition, there are the main endemic killing diseases—kala-azar in the north, schistosomiasis in the centre, and malaria in the south—and the frequent epidemics of cholera, enteric, typhus, and plague. Crude morbidity is estimated at 4% of the population, so that every day there are nearly 20 million people who are ill. This morbidity is greatly increased by trachoma, which affects over a third of the entire population, and venereal disease, with an incidence of nearly 10%. Helminth infestation is widespread, some hundreds of thousands suffer from filariasis, and probably over a million have leprosy. Vitamin, protein, calcium, and iron deficiencies are rampant.

AND THE NEW

In the autumn of 1948 I went with a small team across no-man's-land into one of the border regions of the "liberated areas"—the name given to the districts where the Communists had taken over control from the Japanese or from the Kuomintang. There both military and economic conditions were stable. Beggars and bandits had disappeared. Under land reform, carried out by peasants' unions, landlordism had been abolished and the land distributed, roughly on a basis of half an acre per member of family, to anyone willing to work it. There was no collectivisation; each peasant held the title deeds to his own land, and women, who had complete equality, held land in their own right. As a result of the introduction of mutual-aid cooperatives, and of the establishment of schools for the peasants where they were taught improved methods of agriculture, food-production had increased by nearly 10% over the previous year. Taxes in 1949 amounted to about 23% of the spring wheat, the main crop. Elections had recently been held in the villages for local-government officials, among whom corruption was unknown, and these in turn had elected *shienn* representatives to the North China People's Congress.

My team was to try to deal with an epidemic of kala-azar. The border region in which we were to work had about 20,000 cases, an incidence of roughly 3% of the population. There were no suitable drugs in the border region and we took with us enough antimonials and aromatic diamidines to treat 8000 cases. Later, further supplies were transported so that all the 20,000 could be treated. The local-government officials were extremely coöperative, welcoming anybody who was, as they said, "willing to work for the people." They provided us with food, accommodation, and transport. We set up our clinic in a small village and the local government sent messages to all the other villages in the *shienn* announcing our arrival. Needless to say, many patients with diseases other than kala-azar arrived and if we had the time or the drugs we treated as many as we could. Ferrous sulphate, for example, was given to patients with iron-deficiency anæmia, but these patients were so numerous and the supply of ferrous sulphate so limited that the drug was reserved for those with hæmoglobin levels of less than 40%. During the six weeks that we stayed in one village over 200 operations for entropion were performed, besides many other surgical procedures.

The public-health department sent four doctors, graduates of the medical school of Yenan (for many years the Communist capital), to be trained as leaders of mobile teams for the diagnosis and treatment of kala-azar. Twelve student nurses were also sent for training and eventually four more mobile teams were set up. Our team provided the drugs and the public-health department supplied some of the equipment such as sterilisers and stills, which could be made locally. The aim of the campaign was to cover the whole area and to treat all the cases within a year, in the hope that this would decrease the epidemic proportions of the disease. Treatment was free of charge, and the peasants were grateful for the work we were doing to save the lives of their children; for our course of injections converted a 95% mortality into a 90% cure-rate.

A PREVENTIVE SERVICE

During my stay in the liberated areas, I met many of the leaders of the new public-health department and they showed themselves fully aware of the enormous problems facing them. Their first aim was to try to reduce the excess mortality, which it was felt could be done without the establishment of a curative medical service. Indeed, a countrywide curative service—taking the low figure of 2 hospital beds per 1000 population—would require almost 1 million beds, a demand far beyond the resources of the present economy. Hence, though some development of the hospital services is taking place, the emphasis is being laid on preventive measures. The importance attached to anti-epidemic work, for example, may be judged from the fact that the chairman of the central anti-plague committee of the newly established State administrative council is a vice-premier of the central government. This committee has recently dealt with an outbreak of plague in Chahar province, and as a result of the vigorous measures of control used only 144 cases occurred, whereas during the epidemic of 1947 there were over 30,000 cases. Insecticides were not available but a cordon sanitaire was created by the use of inoculation and the destruction of 15 million rats. In Manchuria during the summer and autumn of 1949 nearly 8 million people, a fifth of the total population, were inoculated against cholera, typhoid, and plague.

In many parts of the country the development of rural health services under the new government has yet to begin. But an indication of the shape they will probably take is given by the rural health services that were being established in the area under the jurisdiction of the North China People's Government (now merged with the central government) before the large towns had been captured. This area, stretching from the Great Wall in the north to the east–west Lung-Hai railway in the south, is roughly the shape and size of England and has a population of about 64 million. The plan in 1949 was to set up at least one hospital in each of the hundred or so *shienn* into which the area was divided, and by August nearly 120 had already been established. It had not been possible to put up new buildings, but disused temples, the brick homes of absentee landlords, or even the mud houses of the peasants themselves had been adapted. The only equipment to be had was that made from local materials, though some surgical instruments had filtered through the Kuomintang blockade. Drugs were very scarce, and many, such as antimonials, antibiotics, and insecticides, were almost unobtainable. Some hospitals were entirely free of charge, but in areas where land reform had been carried out the patients were usually required to pay for their medicines, though there was no charge for registration, advice, or investigation. In newly liberated areas where the land had not yet been distributed poor peasants could get free medicines on presenting a letter from a local-government official.

EDUCATION OF DOCTOR AND PATIENT

Part of the staff of the new hospitals had come from the new graduates of the North China Medical College attached to the First International Peace Hospital. This hospital, originally established in the caves of Yenan, was situated just outside the town of Shihchiachuang which was the first big town in north China to be captured by the Communists. The buildings which housed the department of surgery had been constructed by the Japanese when they were occupying the town, but a good deal of damage had been done by bombing and by the retreating Kuomintang. The department of medicine was housed in neighbouring villages, and altogether there were some 800 beds. The staff, which included a number of Japanese doctors, were adept at improvisation and keen to learn especially of new developments, since they had been cut off from all sources of literature for many years. A round-table discussion with them on kala-azar, for example, resolved itself into my being "ragged" for nearly four hours. I was invited to lecture to the senior students in the medical college and was surprised to find the hall filled with some 350 young men and women who sat attentively through three lectures each lasting about three hours. There were many questions at the end, and in Kaifeng, where I repeated these lectures to a similar group of students at the medical school of the Central Plains University, medical questions were interspersed with some on politics and religion.

There were over 1000 students in the medical college at Shihchiachuang. Their course lasted three and a half years, eighteen months being spent in preclinical studies, one year in clinical subjects, and one year as an intern. This course was recognised as being too short for the training of highly skilled personnel, but because of the vast field to be covered the immediate emphasis was, inevitably, on numbers. When, later, the large university towns were captured, this shortened course of training continued alongside the lengthier course given in the old medical schools. In the countryside, old-style feudal doctors, who often had a rich experience in the use of local medicines, were regarded as a valuable adjunct to the medical services, and it was found that they readily absorbed modern medical knowledge. The aim was to unite modern medicine with what was good in their methods, and to educate these old-fashioned doctors to rid themselves of their superstitions.

Schools of nursing and of midwifery had been established, and village health workers were given a course in on much more intimate terms with the Almighty; nevertheless religious enthusiasm never blunted his native shrewdness or his enthusiasm for hard work. Whistler's scheme was to concentrate the wounded in Ipswich, and very soon Nehemiah, whose principal business was the repair of broken ships, was providing the necessary transport, putting his shoulder to the wheel in aid of the man whose main business was the repair of broken men.

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After some months of indecision, being a Catholic, I decided to visit the shrine of Our Lady of Lourdes to pray for guidance. In July, 1949, I made the pilgrimage with some six hundred pilgrims from Liverpool. The weather during our ten days in France was intensely hot and, remembering my Army category of "B non-tropical," I was surprised when I took a bath at the piscine to note that my head was not immersed.

On the second day after my return home (it must have been Aug. 7) I was sitting on the edge of my bed before retiring when I had a very severe frontal headache spreading over the top of my head accompanied by a strange sensation like water running down the back of my neck, and followed by a violent rigor. Being already in my pyjamas I just tumbled onto my side and went into a heavy sleep. Next morning, when on my way to the bathroom, I must have fallen asleep in an armchair in the dining-room, where with great glee my two-year-old son found me.

For two days I stayed in bed, confused and disorientated regarding the passage of time, with photophobia and neck rigidity and occasional vomiting. On Aug. 10 I was admitted to the local hospital, where lumbar puncture confirmed a diagnosis of subarachnoid hæmorrhage. I remained semistuporose, with a slight rise of temperature, for about a week. I had no motor disability, apart from an inability to begin micturition unless my bladder was very distended (on one occasion I broke the ward record with 46 oz.). My memory for names and recent events was very poor, and for the first week I seemed to have little grasp of my situation—I had even insisted on walking to the ambulance. I recovered quickly, however, and decided to have a thoracolumbar sympathectomy as soon as it could be arranged. Three weeks later I was transferred to my old hospital again, little the worse for my experience. I had an occasional local and postural headache, with tenderness of the scalp in the same area, though I had had no injury. My peak B.P. was 250/170 mm. Hg.

* * *

My kidney-function tests were again satisfactory, and with the aid of 'Omnopon' and hyoscine and the sweetest 'Pentothal' induction my right side was sympathectomised in early September. I awoke to a severe pain in my right ribs, hæmaturia (from kidney biopsy), and bloodstained sputum. The next week was not very pleasant. The continuous pain on the right side of my chest made sleep almost impossible, despite sedatives, and being turned at night by vigorous young women was anything but a pleasure, so I soon forestalled nursing eagerness by turning myself with the aid of the chain handle and found I could use my shoulder muscles without discomfort. There was no vomiting or even any nausea.

Besides the pain in my chest I had frequent severe toothache-like abdominal pains, which seemed to move all round the abdomen and defy accurate description; they were made worse by cold and I was hypersensitive to draught. There was also an ulcer-like persistent tenderness in my right epigastrium and a general hyperæsthesia and tenderness of my whole abdomen on the right side. No doubt these pains were largely due to the unavoidable traction on posterior nerve-roots at the operation.

My B.P. fell to 190/111 mm. Hg for a day or two after the first stage but soon returned to a little below its previous average. I left hospital two weeks after the operation, still having aches and pains.

After three weeks at home, I returned to hospital, for the last hurdle. My abdomen was still sufficiently tender and hyperæsthetic on the right side to prevent me wearing elastic-topped under pants, and my ribs still ached considerably.

After further renal-function tests the second stage was done. I was given a blood-transfusion for the sharp fall in B.P. which occurs immediately after the operation, and the consolidation and effusion at the base of the left lung, with foul purulent sputum, which developed in the next few days responded as though by magic to penicillin. My B.P. remained at a normal figure for about ten days but soon rose again to 180/140 mm. Hg. I had the same abdominal pains as after the first stage but they seemed less severe and the epigastric tenderness was bilateral. I have read somewhere of a patient after sympathectomy feeling that he was suspended in mid air; I felt that my bed was not in its corner but half way down the ward, and in my memory of events during the first few days after operation it still occupies that position.

A fortnight after the second stage I was standing by my bed, but I soon realised I had postural hypotension (a good prognostic sign). This condition is not often met with outside neurosurgical wards, and the younger nurses seem to look on it as a vague psychogenic visitation calling for encouragement, exhortation, and sometimes stimulation. In fact it is purely physical, and the only immediate treatment needed in an attack is a change of posture. On standing upright one's radial pulse becomes increasingly rapid and shallow: there is a feeling of tenseness in the chest and breathlessness soon follows. Next one's vision becomes blotchy and if one is wise one quickly sits down with bent head. My B.P. in the arms was 90/60 mm. Hg when standing and 180/120 when lying down. I soon found, however, that I could remain upright without symptoms while walking rapidly short distances from chair to chair. By lengthening the distances I made gradual progress, and by three weeks after the operation I could wander up and down the ward, resting if necessary on the way. An abdominal binder was of some help at this stage.

I was now sent to a convalescent home in the country, where I could soon walk increasing distances without distress and before long managed a mile or so, keeping an eye open for a suitable seat (a shooting-stick would have been ideal). There were four psychosomatic "gastric" bus-drivers in my ward who should have had their mothers-in-law removed instead of their stomachs. We five used to go into the nearby town for recreation, and on these trips I discovered two useful methods of combating the postural hypotension.

The more effective of the two was to keep one's legs moving. When waiting in bus or cinema queues I either marked time or swayed from one leg to the other. The weather was cold at the time so these manœuvres did not attract much interest, though some people may have wondered why I did not avail myself of the nearby gentlemen's sign. The second method was by rhythmical contraction and relaxation of the abdominal wall. This, I feel, would have been the more effective had not my muscles been flabby and my abdomen tender at the time, so that the contractions were somewhat inadequate and the process laborious.

On Dec. 19, nine weeks after the second stage, I resumed work on a half-time basis and six weeks later I was working full-time again. The postural hypotension has now almost completely disappeared and is only noticeable on getting out of bed first thing in the morning, after standing still for more than five minutes at a time, and on standing after moderate exercise such as walking up several flights of stairs.

My back still aches slightly, particularly in damp cold weather. Among the other aches and pains one experiences after this type of sympathectomy is an ache in the thighs and an occasional one in the cords and testicles. There also appears to be an overactivity of the remaining sympathetic, making one's hands specially sensitive to cold and often giving one pins the principles of sanitation, disease prevention, and health education. Most of these courses lasted six months to a year, though some workers had only a three-month course. Most of the students were from peasant families, and they received not only free tuition but also full maintenance during their training. Teaching in foreign languages had been abolished, and education was continued after training by the distribution of literature and at frequent area conferences. All those working in the public-health department were full-time salaried employees—except Communist party members, who received no salary. There was no private practice.

Throughout the whole integrated plan emphasis was laid on close contact with the people and on the health education of the villagers. Midwives went into the villages not only to assist in deliveries, but also to train the old-style midwives in modern methods. Only everyday articles, obtainable in every village, were used, so that the local midwives could carry on after the trained midwives had left. Here the main emphasis was, of course, on the value of sterilising equipment, either by boiling or by using the locally brewed *baigar*—a liquor containing about 70% alcohol. Popular education was carried on by midwifery students who took a puppet show round the villages, and sang, in the style of the classical minstrels, their information on the prevention of tetanus neonatorum and on other subjects. Each *shienn* had a mobile team who could deal with an emergency or epidemic, and these, in coöperation with the village health workers, drew the peasants themselves into the task of securing and maintaining hygienic conditions. As a result, villages challenged each other for the title of "cleanest village in the district."

The Chinese peasant on the whole judges by results, and the obvious efficacy of the new methods soon breaks down any resistance he may offer to the introduction of new ideas. A little resistance was, however, met. Some peasants, for example, refused the free vaccination offered them during the spring anti-smallpox campaign on the grounds that vaccination should be performed only after the *chingming* solar period had passed. Others refused to believe in the value of a single linear insertion and demanded three areas of multiple insertions on each arm. Nevertheless hundreds of thousands were vaccinated. Great help in popular health education and in breaking down superstititions was given by simple articles and explanations in the daily newspapers—and by the new adult education classes where the peasants learned to read them.

CONCLUSIONS

The long-term solution of China's health problems depends on raising the standard of living of the whole population, on developing education, and on bettering social and economic conditions. These in turn depend on changing the country's economy from a predominantly agricultural to a predominantly industrial one. At present only 10% of China's production is industrial, and the declared aim of the new government is to raise this figure to 40% within fifteen to twenty years. There is little doubt that with this change the country's medical services in both rural and urban areas will develop rapidly.

Disabilities

47. PRIMARY CHRONIC HYPERTENSION; SUBARACHNOID HÆMORRHAGE; SYMPATHECTOMY

At the age of 34 I feel that my hypertension has been neither benign nor essential, so I shall call it primary chronic hypertension. Both heredity and environment have undoubtedly played their part in my case. Several of my forebears on either side have died before their allotted span with cerebral catastrophes; and which of us these days can claim that his environment has been free from stresses and strains. But far harder to bear than the tangible fears based on these reasonable foundations has been the more personal fear of the obsessional.

I have known of my hypertension since my student days, when its discovery aroused unwelcome interest in a drab practical physiology session. I have always felt hypertensed, but it did not obtrude much into my everyday life; I played for my hospital at cricket and soccer and generally led a full existence.

The Army graded me "B non-tropical," so I spent over 3¼ years in training and detention camps, with P.T. at 7 A.M. thrown in as a fillip. However, I survived, with occasional check-ups on my B.P., until the Christmas before war ended, when one night on washing my teeth I noticed that my tongue deviated to the right, and however hard I tried I could not fold it up longitudinally or push it to the left. I remembered then that in the afternoon there had been a slight slurring and clumsiness of my speech when lecturing. I reported sick a few days later and was rushed off to a military hospital labelled: "? Rt. hypoglossal palsy. ? due to diphtheritic neuritis. ? Hypertensive spasm." Diphtheria had been prevalent in the camp, but swabs proved negative and there was no clinical history of illness. My B.P. at this time was 230/150 mm. Hg. My paresis recovered completely in about a week. My hypertension was investigated thoroughly, and a considered diagnosis of hypertensive spasm was made. The war was all but over, so I was given two months' sick-leave and discharged medically unfit. With rest my B.P. had fallen to 180/120.

After a short spell in general practice I became an assistant medical officer at a mental hospital, which job I have held ever since, apart from six months as a supernumerary registrar at my alma mater. My B.P. remained a little above 180/120, and I still played some good games of mental hospital cricket, though running rather taxed my powers and I was too short-winded for soccer.

* * *

In our hospital it was the practice to hold a daily "office," first thing in the morning, when the staff congregated in the superintendent's room to discuss any matter of importance. In a quiet moment I tested my visual fields on a large calendar on the wall opposite and found that with each eye separately some of the figures appeared to have pieces missing. I consulted the eye specialist on his next visit and he confirmed my fear that there were some slight exudates in both eyes, but he could see no hæmorrhages or papillœdema.

I decided to go into hospital for a full investigation with a view to sympathectomy, and in May, 1948, I returned as a patient to my old hospital. I was thoroughly investigated and was made to "rest" for three weeks—so far as rest was possible for a hypertensive in a general ward suffering the whole time from a severe post-lumbar-puncture headache which prevented me from sitting even half up in bed. There was, of course, no fall in my B.P.; on the average it was higher being about 200/130 mm. Hg. However, apart from an occasional trace of albumin in the urine, my kidney function was normal—as indeed it seems always to have been, for I have never had any renal trouble. My electrocardiogram showed inverted T waves. I was advised to have a sympathectomy, but I preferred to postpone the operation until I had recovered my steam.

I took my annual leave in Cornwall with my wife and four children, and then went back to work for the next year, with little change in my disability. I carefully right direction, though there was still no justification for rejoicing. Although the number of deaths went down last year notifications went up, but firm figures were not yet available. The increased notifications were no doubt partly due to better methods of diagnosis. For instance, within the next few weeks the number of mass radiography units in Scotland would be increased to 7. With increased notification and longer periods of hospital treatment, there had been a tendency for the waiting-lists to grow. But in the West of Scotland, where tuberculosis was worst, waiting-lists were decreasing, largely through the energetic efforts of the Western regional hospital board to provide additional beds. In the last 18 months the board had diverted some 250 beds, mostly in infectious diseases hospitals. This work was continuing, but not so rapidly as it would be if more nurses could be recruited for tuberculosis cases. Another development was the use of lightly staffed accommodation for patients able to look after their own needs.

The press reports of the Edinburgh conference, Mr. Fraser continued, were misleading. The impression was given that if 100 trained nurses could be got, 1000 additional beds would be available. But the speaker had in fact said " If 100 trained nurses, working together with part-time and part-trained nurses, could be got." But how many? He did not know. Again, the Press report gave the impression that their recruitment programme had met with no success. The truth, however, was that their sanatoria were now working almost to capacity, and to recruit more nurses for the sanatoria would not necessarily mean more people under treatment. But he did not deny that the great need was for nurses and he was glad to report that recruitment was steadily improving.

Mr. Fraser held that to segregate active tuberculosis cases in one corner of a housing scheme, or in a separate scheme, would be the worst possible thing from a psychological standpoint. It would be exceedingly difficult to get people to live in a colony of tuberculosis sufferers.

The Department were now offering B.C.G. vaccination to nurses and medical students, and, through local authorities, to known contacts. At present it was necessary to obtain the vaccine from abroad. Production difficulties had caused an unfortunate hitch. However, experts from this country had returned from a visit to Denmark from which country it was hoped to get vaccine. He was hopeful that supplies would be available shortly. The Department still regarded the treatment of tuberculosis as number one priority among Scotland's health problems.

QUESTION TIME

Crimes of Violence

Replying to questions calling attention to the recent increase in crimes of violence and brutality, and suggesting the introduction of legislation to provide for heavier penalties, Mr. CHUTER EDE, Home Secretary, said: The question whether the criminal courts should have power to award corporal punishment for offences such as armed robbery and robbery with violence is a controversial one, on which the differences of opinion do not follow party lines. The question was fully debated when the Criminal Justice Bill was recently before Parliament, and Parliament then decided to include a provision in the Bill taking away such power from the courts. I have no evidence which in my view warrants the reopening of the decision then reached.

Sir HERBERT WILLIAMS: Is the Minister aware that the number of women attacked by men armed with coshes is so large that it is time he adapted his mind to the circumstances now prevailing?—Mr. EDE: The number of offences that were punishable by corporal punishment before the alteration of the law has, in fact, fallen since its repeal. In the nine months to September 1948, there were 711 such offences. Corporal punishment was abolished on Sept. 13, 1948, and in the corresponding nine months of 1949 the number of offences for which this penalty could otherwise have been awarded fell from 711 to 597. Mr. ANTHONY MARLOWE: Does the Minister appreciate that his figures are quite fallacious in view of the fact that before the abolition of corporal punishment the indictment was specially drawn in a way which would make that punishment awardable, but that since then indictments have been differently drawn, and there is no deduction whatever to be drawn from these figures?—Mr. EDE: The hon. member did not quite follow what I said. I alluded to cases known to the police, not to indictments.

Capital Punishment and Prerogative of Mercy

Mr. SYDNEY SILVERMAN asked the Minister what were the considerations to which he has regard in deciding whether or not to advise His Majesty to exercise the Royal Prerogative of mercy in capital cases.—Mr. EDE replied: It is not desirable or possible to lay down hard and fast rules as to the exercise of the prerogative of mercy in capital cases, or to give, within the compass of an answer to a question, any adequate statement of the variety of considerations which may in practice be taken into account. Information as to certain general principles and as to the practice followed by successive Home Secretaries in some classes of cases was, however, given in the memorandum submitted by the Home Office to the Royal Commission on Capital Punishment.

Mr. LYALL WILKES: Is the Minister aware that since July, 1945, in 5 cases where juries made a strong recommendation to mercy the death sentence was still carried out? Would not the Minister agree that as the jury probably knew more about the case than anybody else, it would be advisable to treat strong recommendations to mercy as an expression of the jury's view that the man should not be hanged?—Mr. EDE: The fact that a strong recommendation to mercy is made by a jury is one of the factors that are given the most serious consideration, but after nearly five years' experience in this matter I cannot accept the doctrine that that should be a final and determining factor when the Home Secretary has to consider the decision he has to take. Mr. S. SILVERMAN: Is not the Home Secretary aware that in a number of recent cases the decisions made have caused the widest possible public anxiety and distress?—Mr. EDE: I have a duty to discharge which is exceedingly difficult and delicate. I am only too well aware that on occasions when I reach decisions, for reasons which I cannot disclose, there may be, in consequence, great misgiving in the public mind which would be removed if I could disclose my reasons. I am, however, precluded, and I think rightly precluded, from doing so.

Care of Chronic Sick

Mr. G. W. ODEY asked the Minister of Health if he was aware that under the National Health Service there is no adequate provision for the aged chronically sick, many of whom are in hospitals which are urgently needed for the treatment of sickness of a temporary nature?—Mr. ANEURIN BEVAN replied: There are far more facilities than were available before. All that is happening is that now the needs are becoming articulate.

Colonel M. STODDARD-SCOTT: Will the Minister restore to the local authorities the provision of accommodation for the chronically sick, so as to ensure that these victims of the National Health Service are properly cared for.—Mr. BEVAN: I am not prepared to accede to the request to restore the poor-law.

New Hospital at Cardiff

Mr. GEORGE THOMAS asked the Minister whether he would make a statement concerning the proposed new hospital in the Cardiff area.—Mr. BEVAN replied: Discussions are now taking place between the board of governors of the United Cardiff Hospitals, the university, and the city council, about a site for a new teaching hospital and medical school to replace the present inadequate premises of the Cardiff Royal Infirmary.

Unregistered Practitioners

Brigadier FRANK MEDLICOTT asked the Minister what decision he had made on the question whether insured persons should be entitled to receive alternative forms of treatment such as osteopathy, naturopathy, and herbalism.—Mr. BEVAN replied: In accordance with the decision of Parliament, medical services under the National Health Service Acts are provided only by registered medical practitioners.

and needles in the fingers. My skin is rather dry below the level of the nipples (T4), but as Boyd and Monro[1] always find after thoracolumbar sympathectomy, there is fortunately (from some points of view), an "escape area" of sweating on the lower abdomen, groins, perineum, and inner surface of the legs. The urine tended for a while to dribble slightly at the end of micturition but the flow is now normal, and my bowels, previously somewhat constipated, now move regularly. My feet are beautifully warm and my vision has improved. My body hair generally seems coarser.

I have abandoned the morbid contemplation of my blood-pressure; my neurosurgeon tells me that it is "well down," and I have hesitated to lift the lid of Pandora's box any further. I am less easily irritated and flustered, and altogether I feel the sympathectomy has done me good. I am deeply grateful to those whose skill made this extensive operation possible, to those who looked after me so well, and to my chief for his consideration throughout my long illness and convalescence.

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[1] Boyd, J. D., Monro, P. A. G. *Lancet*, 1949, ii, 892.

Parliament

Cost of the Health Service

THE Vote on Account which was presented to the House of Commons on March 7 shows that the expenditure on the civil and revenue departments and the Ministry of Defence in 1950–51 will amount to £2375 million. The supplementary estimates amount to £148,402,365, of which £98,730,000 is needed to meet the excess over the estimated expenditure of £259,727,600 on the National Health Service in England, Wales, and Scotland. This will bring the total expenditure on the service for the year to more than £358 million from the Exchequer. The principal items in the supplementary estimate are: £48,395,000 for advances to regional hospital boards and boards of governors (original estimate £194,315,000); £17,744,000 for general dental services (original estimate £30,904,000); £14,550,000 for pharmaceutical services (original estimate £20,800,000); and £10,455,000 for supplementary ophthalmic services (original estimate £14,670,000). An additional £2,304,000 is required to meet liabilities transferred to the Minister of Health and the Secretary of State for Scotland, compared with the original estimate of £2,258,000.

Midwives (Amendment) Bill

This Bill was introduced and read a first time in the House of Lords on March 8.

School-children and the Health Service

In the House of Commons on March 8 Mr. GEORGE THOMAS urged that school-children should have priority for spectacles as they used their eyes more than adults. He was also perturbed by the serious delay in giving children dental treatment. For instance, the school medical officer for Cardiff reported that 2169 children had teeth which needed filling, and 3340 cases were awaiting extractions, of whom about 1000 actually had toothache. Could not an approach be made to the dental profession to ask if they could get the local dentists to give some sessions to school work? Could not new entrants to the profession serve a minimum period in schools?

Colonel M. STODDART-SCOTT said that before the National Health Service was introduced children were able to get not only ordinary spectacles, but splinterless spectacles which the N.H.S. had never yet provided. School-children were actually the victims of the service. Before the N.H.S. was introduced, he continued, there was 1 dentist for every 3000 children in the schools. Today, in spite of the fact that the Act instructed the Minister of Health to provide a priority dental service for the schools, there was only 1 dentist for every 6000 children.

Mr. ARTHUR BLENKINSOP, parliamentary secretary to the Ministry of Health, said that it had been agreed between the opticians, the manufacturers, and the Ministry that a 5% priority scheme would be reasonable if speedy delivery was to be assured in the most urgent cases. It was also agreed that the only person who could choose priority cases was the optician. Later it was found possible to increase the priority figure to 7½%. It was then agreed that the priority category should include children whose eyesight would particularly suffer from delay. All school-children in need of glasses could not be included be [illegible] to bring in other groups also [illegible] particularly those working in industry. This scheme had been successful on the whole. They had imported from abroad something like one million lenses, but the proper solution was obviously to improve the production of lenses by British manufacturers. During last quarter we had in fact produced some 33% above demand, and delays were being steadily reduced. Before long it was hoped to abolish the priority scheme altogether though there might still be some difficulties in the supply of special lenses, especially bifocal lenses, owing to lack of specially trained labour. It was possible under the health service to provide splinterless glasses where they were medically necessary, and these glasses were not provided automatically free under the old service.

The difficulty in the dental service, Mr. Blenkinsop said, arose from a shortage of dentists. Many had unfortunately been attracted into private practice by the higher rate of payment. Every effort was being made to train more dentists, but, of course, that was a long-term solution. In the meantime, some local authorities had secured the part-time services of practising dentists on a sessional basis. The position varied very much from one part of the country to another, but where there were difficulties the Ministry hoped that the local education authority, together with the local professional committees, would approach practising dentists to secure, if possible, their coöperation.

Mr. H. M. KING suggested that dentists might be required to undertake one or two sessions of school dental service as part of the condition of their going into the dental service.

Tuberculosis in Scotland

In the House of Commons on March 9 Mr. JOHN RANKIN called attention to the grave problem of tuberculosis in Scotland. A committee of the British Medical Association, which lately met in Edinburgh, had, he understood, charged the Department of Health with complacency in their approach to the problem. According to experts, if 100 trained nurses could be obtained about 1000 beds could be made available, thus breaking the back of the problem in Scotland. If the solution was as simple as that, 35,000 sufferers in Scotland, of whom only 4000 were in hospital or isolated, would look forward to the future with a hope which he trusted would not be shattered. Mr. Rankin also suggested that extra diet be provided for young women in the susceptible age-group of 17–25; and that the possibility of setting aside special accommodation for the tuberculous in new housing schemes might be further considered.

Mr. THOMAS FRASER, joint under-secretary of State for Scotland, agreed that tuberculosis was the least satisfactory feature of the health of Scotland. Why Scotland's record was far worse than most other Western European countries since the war remained obscure, but he understood that the committee, set up some 18 months ago to investigate the incidence of tuberculosis in Scotland, was on the point of presenting its report.

One new and encouraging fact was that for 1949 the Scottish death-rate from respiratory tuberculosis was 10% below the 1948 figure, and at 59 per 100,000 of the population was the lowest since 1939. When non-respiratory tuberculosis was added, the total death-rate of 67 per 100,000 of the population was the lowest ever recorded. Movement, he claimed, was thus now in the

Letters to the Editor

PHYSICAL ACTIVITY AND PARALYSIS IN POLIOMYELITIS

SIR,—I am glad that you found space to comment in your leading article last week, on Dr. Horstmann's[1] excellent paper. There is one practical point which I should like to add to this story of the danger of carrying on after the onset of the preparalytic stage.

One would have thought that when muscles are actually losing strength, most patients would be content to lie quietly and leave the battle to nature, but not so. I have been distressed to find on questioning several desperately paralysed patients that, far from resting while paralysis was developing, they have decided that they should keep their limbs moving till they will move no more. Almost the last remark of one young woman before she died was "at least I have kept my arms moving." In some of these cases paralysis continued to spread for three or four days—longer than is usual—while the patient struggled desperately to keep the limbs moving. Not only, therefore, should the patient go to bed at the onset of the preparalytic stage, but *he should be told to lie quite still and to use his muscles as little as possible.*

Oxford.　W. RITCHIE RUSSELL.

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[1] Horstmann, D. M. *J. Amer. med. Ass.* 1950, 142, 236.

AUREOMYCIN AND RELAPSING FEVER

SIR,—The following are the findings in eight cases of relapsing fever treated with 'Aureomycin' which I have been able to keep under close observation:

Of the 8 cases, 4 were in adults aged 18–25 years, and 4 in children aged 2–14 years. All were Africans from this region. Some had never been bitten by house-ticks (*Ornithodorus moubata*) until recently and some had lived in tick-infested houses in childhood but in recent years had not been exposed to contact with ticks.

All the patients were acutely ill when the diagnosis was made, and in all cases the diagnosis was made by the finding of *Borrelia duttoni* in blood-smears. Temperatures at the time parasites were found varied from 38·5 to 40°C: the average was about 39·5°C.

In the adults the average leucocyte-count at the time parasites were first found was 16,000 per c.mm.; in the children the average was 16,300 per c.mm. In 5 cases repeated differential leucocyte-counts were done, and they showed, at the time parasites were first found, pronounced neutrophilia and increase in staff (stab, band, "rhab") cells. The average for polymorphonuclear neutrophils was 77%, and for "stabs" 19%.

Treatment with aureomycin in capsules was begun as soon as the laboratory diagnosis was made, and the average dosage was 0·5 g. every 6 hours, by mouth. Treatment was continued on average for 6 doses.

In 4 of the cases the blood became free of treponema after one dose of aureomycin; in the other 4 the blood became free of treponema after the second dose. In 4 the temperature rose after the first dose; but in all the temperature returned to normal in 6–14 hours: the average time taken for the temperature to fall to normal was 10 hours.

In the 5 cases where repeated differential counts were done it was found that 8 hours after treatment was begun neutrophils (polymorphonuclears and "stabs") averaged 66% of the total leucocyte-count. In all but 1 of these 5 cases there were 11% or more of monocytes; in these 5 cases the average percentage of monocytes when treatment was begun was 14. In 3 of the cases there was a well-marked rise in monocytes after treatment was begun; and 8–10 hours after treatment was begun the differential count still showed 14% of monocytes. The laboratory technician, Miss Frances Botham, drew our attention to the distinctive appearance of many of the monocytes, and smears have been sent to competent hæmatologists for study.

Apart from the rise in temperature and rigors noted in a few cases for several hours after the first treatment, results were most pleasing. The relief of symptoms and fall of temperature were dramatic. It seems apparent that in aureomycin we have found a most valuable therapeutic weapon for the combat of a very widespread, disabling, and often fatal, infection.

On behalf of our patients and the hospital staff I should like to thank Lederle Laboratories for providing a generous supply of aureomycin for experimental purposes.

Dondi Mission,
Bela Vista, Angola,
Portuguese West Africa.　W. SIDNEY GILCHRIST.

CHOICE OF WEAPONS AGAINST INFECTIONS

SIR,—I read with great interest the leading article in your issue of March 4 on the choice of antibiotics in various infections. I feel, however, that one reason justifying combined therapy is worth elaborating in more detail.

The control of biochemical reactions by genes appears to be a widespread phenomenon.[1] There is already much evidence that, at least for certain species, the development of resistance to a given antibiotic by a strain (clone) of bacteria is due to spontaneous variation, which is heritable. It may be that several genes control the particular biochemical process, or processes, affected by penicillin: for the development of penicillin resistance by a sensitive strain of staphylococcus appears to be built up in the cells through an accumulation of successive mutations each leading to a higher degree of fastness.[2] Mutants possessing some degree of resistance tend to be selected during penicillin treatment, and, being relatively stable, may spread from individual to individual.[3] With a less perfect antibiotic such as streptomycin, highly insensitive strains not infrequently appear early, particularly in heavy infections. This suggests—and the idea is supported by some experimental evidence[4]—that genes of greatly differing potency cover the metabolic pathways blocked by streptomycin, and that a high degree of resistance may result from the mutation of a single potent gene.

In order to prevent the multiplication of these insensitive variants, some other antibacterial substance acting on a different enzyme system should be given simultaneously with streptomycin.[5] The justification for combined antibacterial therapy is this: that the chance of a mutant arising which is insensitive to 2 such antibacterial substances is the *product* of the frequency of their appearance to each substance separately. Since mutants resistant to a single antibacterial substance are relatively rare—in the order of 1 per 10 million cell divisions—the appearance of a mutant resistant to the combined action of 3 antibacterial substances, each possessing distinctive points of attack, is infinitesimal.

These considerations apply particularly to streptomycin when it is used to control infections due to relatively non-exacting strains with wide synthetic ability, such as *Pseudomonas pyocyanea* and *Bact. coli.*[6]

While the above explanation is admittedly controversial, and other more Lamarckian opinions are possible,[7] it does provide a rational account of drug resistance and removes from combined treatment the stigma of blunderbuss therapy. All this is, of course, apart from any synergism which may result from combined therapy, such as is presumably the reason for the better results obtained when a mixture of sulphonamides is substituted for the single drug.

In the future, no doubt, more attention will be paid to those antibiotics which affect metabolic pathways controlled by genes of low potency; 'Aureomycin'

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[1] Horowitz, N. H. *Proc. nat. Acad. Sci., Wash.* 1945, 31, 153.
[2] Demerec, M. Cited by Meads, M., Haslam, N. M.
[3] Cairns, H. J. F., Summers, G. A. C. *Lancet*, March 11, p. 446.
[4] Demerec, M. *J. Bact.* 1948, 56, 63.
[5] Alexander, H. E., Leidy, G., Rake, G., Donovick, R. *J. Amer. med. Ass.* 1946, 132, 434.
[6] Meads, M., Haslam, N. M. *J. Immunol.* 1949, 63, 1.
[7] Hinshelwood, C. N. *Biol. Rev.* 1944, 19, 150.

In England Now

A Running Commentary by Peripatetic Correspondents

THE amount of interest the general election raised in the United States was quite surprising. In our hospital even the janitors and elevator girls asked me if I thought the Socialists would be returned. When I gave my usual answer "yes," and added. "with a majority of about 20 seats," there was usually some expression of mild disappointment. Many Americans given to thinking, and certainly talking, in extremes seem to believe Socialism is akin to Communism and they cannot understand why the "freedom-loving British nation" tolerates such an awful political system. Most of the papers rather hoped for a Conservative victory and kept picking out any signs of improvement in the Conservative cause. Mr. Churchill being an almost legendary hero here, all his speeches were given very full "coverage" and often editorial comment as well. The Government was berated for not doing more to further the aims of Mr. Hoffman, and the old story of U.S. dollars subsidising free wigs under the National Health Service was often repeated. Results began to come through on the radio about 6 P.M. E.S.T., and it was amusing to turn from station to station to hear different news commentators reading the same results and phrases as reported by Associated Press. Just as you thought you were going to learn further details the announcer would say *in his most dramatic voice*: "Men, have you shaved today? If not, use *Beatabeard*, the only all-dry, non-brush, non-razor, non-soap preparation that removes your beard in a flash"; or "The time is now 6.13 and a half, by courtesy of Dr. A. B. Twister, Kalamazoo's leading homœopathic physician." Some stations arranged discussions between political commentators in New York, Washington, Chicago, and London, while others transmitted on-the-spot interviews with members of the major parties and voters. The tremendous interest in the Royal Family was illustrated by the frequent references to the King, unlike the President, having no vote, and to a description of how Princess Elizabeth had "*driven round to Buckingham Palace to hear the results with Mom and Dad*" (sic). As Labour's early lead increased, commentators began to stress the importance of the popular vote, which showed a Conservative lead: later their commentaries changed as much as the lead in the election. Once or twice there was a transmission from the B.B.C., when an extraordinarily English voice would enunciate the results with great precision and apparently considerable boredom.

The friends with whom I listened to the results were staunch Republicans who had been overjoyed at the result in the New Zealand and Australian elections. Their faces got longer and longer as Labour increased its lead during the night, but they were not really any happier when the final result was known, since they recognised that any further progress in Europe can only come when there is a stable Government in Britain. They could not understand why the English should give up counting votes at 9 P.M. to go home to bed: this, more than anything else, proved to them that the English, whatever their tribulations and whatever their government, had not lost their essential character and sang-froid.

The only worth-while comment that I heard next day in the hospital was at lunch, when a Texan drawled: "*Guess you called the play O.K. on your election, doc.*"

* * *

Locke's Beloved Vagabond assured Asticot, apropos of certain deprivations and inconveniences, that there were a devil of a lot of things we can do without. This we were all compelled to appreciate in the war and to a not inconsiderable extent in the subsequent years. I am tempted to extend Paragot's philosophy about material things to our physical requirements.

One of our patients was the unfortunate possessor of a bizarre blood-group, so the rather haphazard if conventional transfusions he received for hæmatemesis had led to complete anuria. My highly efficient registrar and H.P. got busy. He was soon enjoying a nutritious if monotonous and unappetising menu of 400 g. of glucose, 100 g. of peanut oil with acacia to emulsify it, and rather less than a litre of water continuously administered by intragastric drip—all very scientific, proving that it is possible to sustain a man completely devoid of renal function.

The surgeons are boldly extending their activities to eliminate not only apparent superfluities but structures which we had believed to be necessities. For centuries the field was restricted to the foreskin. Well, that is just a cuticular redundance. Next the appendix, accepted as a vestigial structure and a source of trouble. Then came the colectomists, who tried for a time to persuade us that we were best without this cause of all evils. Thyroidectomy, splenectomy, and total gastrectomy followed, to show still further what we can do without, though we presumed that their functions were vicariously supplied, that there were, so to speak, spare parts. Portions of the sympathetic nervous system are now removed without apparent disadvantage; and so far from deploring the loss of areas of the brain, it is even claimed that we may be all the better for the confiscation. To pneumonectomy we were reconciled on the principle that half a loaf is better than no bread, especially as with Drinker's apparatus and adequate oxygen we are in fact independent of breathing at all.

One can go even further than merely delegating the function of our ablated organs or systems to those that remain. Artificial insemination has demonstrated another aspect of supplementing or displacing a natural process.

Yes, as Paragot said, there are a devil of a lot of things we can do without. Time will show to what extent we are as well off or better without them and will demonstrate in due course the irreducible minimum for existence.

* * *

It is one of our minor social hypocrisies that we all like what we call "a good cup of tea" but that none of us will admit liking it *strong*. Idiosyncrasies we will own to—a preference for tea with sugar or without, with milk or lemon or neither—though there are those breezy unfastidious souls who reply briskly to their hostess's inquiry, "Just as it comes, please." But the good lady would probably drop the teapot a-clatter among the cups and saucers if anyone asked boldly for STRONG TEA; it is more manly, and almost more respectable, to profess an addiction to strong drink.

Doctors are largely to blame for this semi-moralistic attitude, so long have we preached about tannin-coated gastric mucosa and ruined nerves. The Briton's habitual melancholia also plays a part; he regards as sinful anything that he enjoys, and when sin is out of fashion he gets dyspepsia instead. He must needs suffer as he sips, consoling himself the while by eyeing some other fellow's brew and murmuring pharisaically, "My God, I couldn't drink my tea as strong as *that*!"

But what is the standard—what *is* the right strength for a cup of tea? The question seems as unanswerable as the famous one about the length of a piece of string.

* * *

Barkis may have gone out with the tide, but zero hour for our family is certainly 4.30–7 P.M. After tea the kids demand to be entertained; and even if the television does provide an alternative on Sundays, they will not look at the beastly thing alone, holding it to be closely related to ghosts. Then there is the back-breaking job of putting them to bed, a process spun out by every diabolical form of ingenuity known to the infantile mind. Next comes the story to be read—less odious since they discovered Dr. Dolittle and *What Katy Did*. Finally, their Fabian tactics over having the lights put out are masterly: "Just one more hug, Mummy"; "Do kiss me, Daddy—Oh! your whiskers—let me find a bit that isn't whiskery," and so on. We start supper vowing that procreation is the greatest of all human follies. Then as our blood-sugars rise, so do our spirits. Zero hour is past once more and if we can't be said, at our age, to face the evening with renewed vigour, at least we do face it.

* * *

Dear, dear! *Surely anyone can see that the solution to the 20-foot ladder problem of March 11 is:*

$$2\left[\sqrt{26}-1+\sqrt{23-2\sqrt{26}}\right]+4=19{\cdot}35 \text{ feet.}$$

office. We have all got used to this, and it does not interfere in the slightest with one's work. It is important to put the staple at least $^1/_4$ in. from the edge of the swab lest it pull off.

The accompanying illustrations show the swab, and also an X-ray picture, taken through an obese abdomen, a swab applied to the opposite side. The staple shows quite clearly, and were it in the abdomen I am told it would show even more clearly. Recently such a swab was inadvertently left in a limb after an operation for osteomyelitis, but its presence was detected by X rays and it was removed.

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My plea is based on sixteen years' experience at the Luton clinic, where about a thousand children a year are referred to me. Such a statute would save many a working mother the cost of a useless pair of shoes.

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The effect of trichlorethylene is cumulative because its elimination is slow, but my experience is that 0·5% trichlorethylene in air can be used in labour for periods up to six hours before the mother becomes drowsy. When used for longer than this, the mother does become drowsy, and I agree with Dr. Steel that the uterine action may, occasionally, become sluggish. In almost all labours supervised by midwives, however, intermittent inhalation is needed for periods less than five hours, and I see no reason why a vapour which is adequate for the end of the first stage and for delivery should not be used throughout.

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Thus, calcification has no relation to arterial patency, as judged by palpation of the foot arteries, and it can certainly be extensive in the absence of symptoms.

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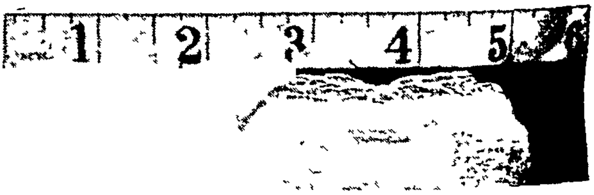

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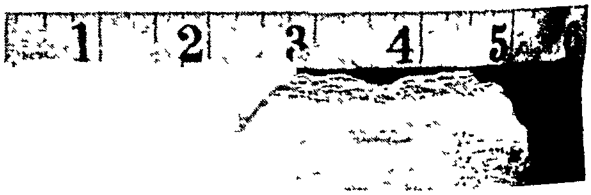

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There is a more serious problem. It is well known that many minor disabilities of the foot are caused by wearing short shoes during the growing period of life. Often when I have recommended shoes of a particular size for a child—usually a girl—I have later found that she has been sold a size shorter than marked. Some unscrupulous shoe manufacturers mark their ladies' shoes a size larger than they measure. There should be a law making it compulsory for the shoe manufacturer to stamp the correct size on the shoe in the same way that the weight of contents of a tin or package must be stated accurately.

My plea is based on sixteen years' experience at the Luton clinic, where about a thousand children a year are referred to me. Such a statute would save many a working mother the cost of a useless pair of shoes.

London, W.1. DAVID LEVI.

TRICHLORETHYLENE IN OBSTETRICS

SIR,—Dr. Steel raises some interesting points in his letter of March 4. I entirely agree with him that the relief obtained by self-administered intermittent inhalation analgesia is largely determined by the quality of the supervision, both before and during labour. But surely a fixed upper limit of trichlorethylene concentration is necessary in the interests of safety? If this fixed concentration is adequate for delivery, it will be more than adequate for a less painful stimulus, but does this matter? I have not seen any labouring woman acquire tolerance during labour to an effective analgesic drug. I have always thought that tolerance is only acquired after weeks or months of administration. Self-administered inhalation analgesia becomes a burden if protracted, and then loses its value.

The effect of trichlorethylene is cumulative because its elimination is slow, but my experience is that 0·5% trichlorethylene in air can be used in labour for periods up to six hours before the mother becomes drowsy. When used for longer than this, the mother does become drowsy, and I agree with Dr. Steel that the uterine action may, occasionally, become sluggish. In almost all labours supervised by midwives, however, intermittent inhalation is needed for periods less than five hours, and I see no reason why a vapour which is adequate for the end of the first stage and for delivery should not be used throughout.

Oxford. E. H. SEWARD.

CROHN'S DISEASE

SIR,—The Disabilities article by a doctor, in your issue of Feb. 11, is a valuable contribution to the literature on Crohn's disease, and it emphasises several points which are not generally appreciated. To us the account was of particular interest because we have just completed a follow-up investigation of 34 cases treated at the General Infirmary at Leeds during the past fifteen years, an account of which will shortly appear in the *British Journal of Surgery*. The case described might well be one of our series, so similar are the two cases.

A one-stage right hemicolectomy is believed to be the treatment of choice in uncomplicated cases, but it is not by any means 100% curative. In 20 of our cases a one-stage right hemicolectomy was carried out with no deaths, but recurrence took place in 4—i.e., 20%. Bockus [1] states that good results are probably not to be anticipated in more than 50% of resections. The interval between resection and recurrence of symptoms varied widely in our 4 cases, where it was $12^1/_2$ years, 5 years, 4 years, and one month, respectively. In each case pain was the prominent symptom: loss of weight, anæmia, and looseness of the bowels were present but were of quite subsidiary importance. In one case the appearance of a palpable glandular mass in the right iliac fossa seven years after the primary resection indicated at the outset the need for a wide glandular removal.

GEORGE ARMITAGE
Leeds. MICHAEL WILSON.

DEOXYCORTONE ACETATE AND ASCORBIC ACID IN ANKYLOSING SPONDYLITIS

SIR,—I have used the method reported by Lewin and Wassén [2] in cases of acute and chronic rheumatoid arthritis with the varying results recorded by subsequent investigators.

Most pronounced and surprising was the beneficial effect of this treatment in two cases of Bechterew's disease. The duration of the illnesses was 12 and 13 years. Radiologically both patients were shown to have severe ankylosing changes of the vertebral column:

> About 15 minutes after the first injection, one patient was able to move the head in all directions and to bend his back, which had been completely rigid; and during the next two hours mobility increased still further. After the second injection he was able to lie down quickly and to get up from the floor, to take off and put on his clothes (which previously had been possible only with the help of others), to lift and rotate his legs and arms, &c. The effect of the second injection lasted for 48 hours. The patient, who was an ardent tennis-player before the onset of the disease, felt as though he "might start playing again."
>
> The second patient, who complained particularly of complete stiffness of the neck, responded less dramatically than the first. Yet 15 minutes after the first injection he turned his head about 25° to each side, and after approximately one hour he managed to move it slightly forwards and backwards. After another half-hour the mobility of the thoracic and lumbar spine also increased somewhat.

I recalled having treated arthritic changes by ovarian transplants about twenty-five years ago. I wrote at that time [3]: "In einigen Fällen unseres Beobachtungsmaterials brachte Transplantation eines jugendlichen Ovars überraschenden Erfolg." (In some of our cases transplantation of a juvenile ovary led to surprisingly good results.) Accordingly I administered œstrogenic hormone (50,000 units) and 5 minutes later vitamin C (1 g.) intravenously to some female patients suffering from rheumatoid arthritis; there was either no response or at best a slight response. Progesterone (5 mg.)

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1. Bockus, H. L. *J. Amer. med. Ass.* 1945, 127, 449.
2. Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.
3. Zondek, H. Die Erkrankungen der Inneren Drüsen. Berlin, 1926; p. 347.

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These observations are intended to supplement the report of Landsberg [4] on the action of progesterone in such cases.

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While working in the medical laboratories of the Collis P. Huntington Memorial Hospital of Harvard University in 1947–48, I, in collaboration with R. S. Grier and M. B. Hoagland, also confirmed this work, and the results have already been presented in thesis form.[2] We gave rabbits repeated intravenous injections of 1% suspensions of beryllium oxide and zinc beryllium silicate. Of 28 rabbits injected, 5 developed typical osteogenic sarcomas which disseminated widely. In one instance a successful transplant into the eye of a guineapig was made. The dose needed to produce these tumours is not accurately known, but one of our animals developed a sarcoma after receiving 200 mg. of zinc beryllium silicate over a period of two weeks. There was a delay from nine to nineteen months between giving the injections and the development of the sarcomas.

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3. Mumford, L. The Culture of Cities. 1935.
4. Halliday, J. L. Psychosocial Medicine. 1949.

siderable amount of evidence from anthropology, history, and psycho-analysis which relates the desire to exercise power to mental abnormality, or at least to personality deviation. Dr. West himself has already drawn attention to the singular convenience of political office as a platform for the "unconscious play-actor from childhood." While it is possible to classify primitive societies into power-centred and life-centred types, the first aggressive and repressive, the second largely coöperative and social, in larger cultures like our own it is more accurate to speak of power-centred and life-centred individuals. Centralised authority selects the former, and tends to exemplify the syndrome of "cruelty, chastity, and coercion" which has been identified in aggressive primitive societies. Many writers, from William Godwin to Riewald,[5] have drawn attention to the rôle of political office under modern conditions as an outlet for psychopathy, but a culture which possesses the political background of Western Europe does not take very readily to such a conception. At a time when the crimes imposed by governments manifestly eclipse those committed by individuals, and the orthodox notions of the function of coercion in maintaining sociality have been seriously undermined by innumerable studies of the non-coercive management of delinquents, it is distressing to find Dr. West still ready to accept the traditional concepts of the function of power at their face value.

This whole argument throws a very different light on the issue of world government. The idea of such a government is part of the tradition of the State as guarantor of rights by the exercise of coercion—a construct which, in the light of recent work, it seems very difficult to maintain. In any politically likely form, such a world authority would be recruited, as is UNO, from members of existing ruling groups—in other words, from a panel where the selection of deviants and power-centred individuals had already once taken place. Office in such a body would offer little incentive beyond that of still wider and still less responsible authority, and there seems no reason for the view that those who already show themselves dangerously delinquent in their present limited scope would become less so if it were to be made universal.

The conception of power as the force which renders us social is defunct upon every evidential consideration, and there is nothing to be gained by propping it into a sitting posture. While sociological action against false ways of group thought, on the lines of the Tensions Project, is an urgent need, there comes a point at which the duty of psychiatry lies in a direct appeal to the sociality of the individual. What we need today is not more government but more responsible and rational disobedience. The individual in his capacity of citizen is the tool whereby the psychopath in office realises his psychopathy. The redirection of aggression from the external, stereotype enemy against this process itself (not against the ruler as another stereotype, as in many of the actionist ideologies of revolution) is a rational therapeutic measure. If it is true that wars originate in the minds of men, it is equally true that they will cease when individuals decline to follow their leaders into war. Fromm[6] has already pointed to the incentive mechanism upon which this may take place, in the growth of spontaneity and security in family life. The activities of power-groups present the main barrier today to any such realisation, and a show-down between authority and psychiatry, at least as violent as that which is taking shape in penology, seems inevitable. In the course of it, we may find it necessary to question the political assumptions of our civilisation, and of the whole conception of power, far more radically than Dr. West has so far been ready to urge.

London, S.E.23. ALEX COMFORT.

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5. Riewald, P. Society and its Criminals. 1949.
6. Fromm, E. The Fear of Freedom. 1948.

TREATMENT OF WHOOPING-COUGH

SIR,—Whooping-cough in infancy is a serious disease which becomes particularly grave when bronchopneumonia supervenes. The following case may be of interest.

A premature baby, born at the 7th month, had been reared on diluted cow's milk since the age of 3 months: at 2 months she had had bronchopneumonia.

When 7 months old she contracted whooping-cough. She was first seen after 10 days of severe coughing, frequently culminating in vomiting; weight 5·9 kg. When seen 12 days later, the baby was gravely ill, cyanosed, dyspnœic, temp. 39°C; rhonchi and crepitations (mostly crackling at the bases) all over chest. She had just had a 4-day course of sulphadimidine and penicillin without benefit.

Chloramphenicol was started with one capsule of 250 mg. 6-hourly. On the evening of the 2nd day the temperature began to fall by lysis; the next day it was normal and it remained so. The cough became infrequent and loose, and vomiting abated. Unfortunately the mother ran short of the drug after 2 days' administration (2 g. in all); but by the time the drug was resumed after a break of 2 days the baby was making steady progress. Chloramphenicol in the same dosage was continued for 3 further days; and 12 days later the chest was clear and the weight was once more 5·9 kg.

In an investigation now in progress two further cases (one in a 9-month-old baby, the other in a rachitic baby of 2 years and 9 months) of bronchopneumonia complicating whooping-cough and developing 17 and 19 days, respectively, after the onset of cough have been treated with 'Aureomycin' with equally good results; in neither case were penicillin, sulphonamides, or sedatives used.

In view of the difficulty experienced by Dr. Gray (*Lancet*, Jan. 28, p. 150) in administering the drug to young babies, I might add that the following method of preparation has been found satisfactory: aureomycin 4 g., liquid extract of liquorice 5 ml., gum acacia 10 ml., syrup q.s., and water 160 ml.

Pædiatric Section,
King Fuad the 1st University,
Cairo.

M. A. ABBOUD
Physician.

Public Health

Influenza

IN the 126 great towns of England and Wales the following pneumonia cases and deaths and influenza deaths have been recorded:

	Week ended								
	Dec. 31, 1949	*January, 1950*				*February, 1950*			
		7	*14*	*21*	*28*	*4*	*11*	*18*	*25*
Pneumonia									
Cases*	496	639	550	487	494	594	582	630	595
Deaths	310	299	300	233	305	354	378	353	304
Influenza									
Deaths*	28	52	47	39	47	61	80	76	73

* Including influenzal pneumonia.

Totals for the great towns in the first eight weeks of the last three years are as follows:

	1948	*1949*	*1950*
Pneumonia			
Cases	3748	5131	4575
Deaths	2210	2982	2526
Influenza			
Deaths	165	737	480

Notifications in England and Wales of primary and influenzal pneumonia have been as follows:

Week ended								
Dec. 31, 1919	*January, 1950*				*February, 1950*			
	7	*14*	*21*	*28*	*4*	*11*	*18*	*25*
842	1120	991	850	902	1187	1228	1189	1093
Corresponding week in 1948–49—								
1050	1184	1184	1050	935	1016	1139	1469	1607

It is learned from the Public Health Laboratory reports that virus B has been isolated from a few odd cases in widely scattered areas—e.g., Doncaster, London, Exeter, Inverness, and Ipswich.

The following cities had the largest numbers of notifications of pneumonia for the week ended Feb. 25:

London, 131, Sheffield, 58. Manchester 52, Birmingham 54. Liverpool 42. Sunderland 28.

As regards the North in particular, the following figures of pneumonia notifications in areas in which influenza has been prevalent are of interest:

	Week ended				
	Jan. 28	*Feb. 4*	*Feb. 11*	*Feb. 18*	*Feb. 25*
Durham	84	107	86	87	98
Yorks. East Riding	16	7	7	14	13
Yorks, North Riding	13	22	16	19	12
Yorks, West Riding	107	125	134	125	216

Local outbreaks of mild influenza due to virus B continue to occur and are widely distributed. There is no sign of an epidemic. There are casual reports of a high incidence of upper respiratory disease in some practices, and it seems probable that much of this is due to hæmolytic streptococci.

Notification by Hospitals

Infectious Diseases.—The Ministry of Health has directed (R.H.B. [50] 22) that on admission of cases of notifiable disease. including tuberculosis, hospitals should notify the medical officer of health of the area from which the patient has been admitted of the patient's name, age, address, and diagnosis. The medical officer of health should also be notified of any change in diagnosis, and on the patient's discharge from hospital or sanatorium. "This information is intended to facilitate the M.O.H.'s work, but it will also be useful in bringing to light previously unnotified cases." Infectious-disease hospitals have no statutory duty of notification. Nevertheless. "formal notification from hospitals should be sent to the M.O.H. of the borough or county district in which the hospital is situated, except in the County of London, where notifications should be sent to the M.O.H. of the Metropolitan borough from which the patient has been admitted"; and it is particularly important that the local medical officer of health should be notified without delay of diseases of serious epidemiological importance first diagnosed in hospital.

Aftercare.—The family doctor should have early information of the discharge of a patient from hospital and should arrange with the local health authority for services such as home nursing and domestic help.

> "There are, however, cases where direct information, including any necessary medical details, should pass from the hospital to the local health authority, in order to avoid a break in the services provided, e.g., in the provision of special nursing requisites for paraplegics, or more simply to arrange for immediate home nursing attention or domestic help. Such arrangements should, of course, only be made with the patient's agreement and the family doctor should be informed that arrangements have been made direct with the local health authority. A form agreed regionally for transmission of this information would be useful."

In maternity cases where either the local health authority's midwife and/or antenatal clinics have supervised the patient before admission to hospital, information regarding treatment and any abnormal occurrence should be supplied to the medical officer of health on the patient's discharge. "Advance information should. of course. be given whenever a maternity case is discharged early and requires care through local health authority service."

Children.—"The joint responsibility of the family doctor and the medical officer of health or school medical officer is recognised and it is suggested that the same information should be sent to the family doctor and. for a school child. to the school medical officer or, for a child under school age, to the medical officer of health of the county or county borough in which the child lives.

> "The arrangement . . . should include information on the discharge of babies born in hospital, especially premature births, necessary details of feeding in such cases, and deaths of children in hospital. If it is possible, information about premature babies should be sent before their discharge. The form signed by the parent on the child's admission to hospital should include a note intimating that, in the absence of a request to the contrary, information sent to the doctor will also be sent to the school medical officer or medical officer of health of the local health authority unless the parents object."

The arrangements for the supply of information should, the circular concludes. be extended to children who have attended as outpatients where the information would be of value.

Obituary

Prof. JOHN RYLE

FROM Cape Town, J. T. I. writes: "Guy's men the world over will be sad to hear of John Ryle's death. My own friendship with him went back over twenty years to my days as ward-clerk at Guy's. His teaching rounds were a delight, and one came away quite unaware of having stood for over two hours on hard ward-floors. No matter how foolish the suggestion one made, he listened without interruption and he pointed out the fallacies in such a kindly way that one felt one had made a contribution to the afternoon! Later I was lucky enough to win his friendship and spent many happy weekends and holidays at Glatting in Sussex, where. as we sat on the South Downs looking at the perfect view, he would discourse on all manner of subjects in his wise way. After I went into academic life and came to South Africa, we could keep in touch only by letter. It was therefore a great privilege for us all to see him again during his lecture tour here. Alas, it was already clear that he was stricken, and it is sad that he lived to enjoy so little of his retirement."

Appointments

ANDREWS, R. H., M.D. Lond., M.R.C.P.: deputy superintendent, Tehidy Sanatorium, Cornwall.

BLACK, W. R., M.B. Edin., F.R.C.S.E.: consulting surgeon, Weston-super-Mare Hospital.

CHAPMAN, MARGARET, M.B. Glasg.: asst. M.O., Renfrew County.

CRAIG, R. A., M.D. Lond., M.R.C.P.: consulting chest physician, Bristol clinical area.

LEITCH, J. A., M.B. Edin.: asst. M.O., maternity and child welfare, Nottingham.

LOVEL, K. W., B.M. Oxfd, M.R.C.P.: medical registrar, thoracic unit, Hospital for Sick Children, Great Ormond Street. London.

MILLING, P. F., M.B. Camb., F.R.C.S.: asst. surgeon. throat and ear dept., Brompton Hospital, London.

ROSTRON, K. W. B., M.B. Camb., D.O.M.S.: consulting ophthalmic surgeon, West Cornwall clinical area.

WARWICK. ELSPETH, M.B. Edin., D.P.H.: senior M.O., maternity and child welfare, Nottingham.

Births, Marriages, and Deaths

BIRTHS

ASHCROFT.—On March 4, at Newcastle upon Tyne. the wife of Dr. Anthony Ashcroft—a daughter.

BELL.—On March 4, in Edinburgh, the wife of Dr. J. D. Bell—a daughter.

FAWKES.—On March 3, at Port-of-Spain, Trinidad, the wife of Dr. M. A. Fawkes—a son.

HART.—On March 7, the wife of Dr. T. N. Hart—a son.

KAY.—On March 10, the wife of Dr. Ronald Kay—a son.

MURDOCH.—On March 4, the wife of Dr. Robin Murdoch—a son.

SHERLOCK.—On March 6, at Ipswich, the wife of Dr. A. Sherlock—a daughter.

SUCHETT-KAYE.—On Feb. 27, in London, the wife of Dr. A. I. Suchett-Kaye—a son.

MARRIAGES

HUGHES—PEEK.—On March 4, at Drewsteignton, Devon. Mark Henry Hughes, B.M., to Veronica Drewe Peek.

JONES—BARTHOLOMEW.—On Feb. 11, at Frimley, David Elgan Jones, M.B., to Elizabeth Maureen Bartholomew, S.R.N.

DEATHS

BAILEY.—On March 5, at York, Henry Bailey, M.R.C.S.

BRANSON.—On March 5, at Bury St. Edmunds, William Philip Sutcliffe Branson, C.B.E., B.A., M.D. Camb., F.R.C.P., aged 75.

BROWN.—On March 3, at Towyn, Merioneth, Eric Barlow Brown, M.B. Edin.

HOLLINS.—On March 5, at Amwell, Ware, Herts. Thomas John Hollins, B.A. R.U.I., M.D. N.U.I.

LEWIS.—On March 5, at Hove, John Stephen Herbert Lewis, M.D. Lond., aged 67.

MCKELVEY.—On March 5, at Penylan, Cardiff, Thomas McKelvey, M.B. R.U.I.

MORIARTY.—On March 5, in Birmingham, Rowland Eagar Moriarty, L.R.C.P.E., aged 75.

POOLE.—On March 10, Thomas Brice Poole, M.D. Durh., aged 80.

STEPHENS.—On March 9, at Coleshill, Harold Freize Stephens, M.R.C.S., aged 65.

STURDY.—On March 10, at Bognor Regis, Harry Carlile Sturdy, M.D. Durh.

WATSON.—On March 5, at Leigh-on-Sea, William Douglas Watson, T.D., M.R.C.S., D.P.H., aged 79.

Notes and News

EXCHANGE OF PRACTICES

BEFORE July 5, 1948, a general practitioner who for some reason, personal or domestic, wanted a change in the type of practice or area in which he worked was able to arrange an exchange with another practitioner. Thus the man with years of industrial practice behind him, who desired less arduous practice in the country or at the seaside, might exchange with a younger man who found his family commitments increasing. Since the National Health Service started, only two exchanges have been made within the service; but the Medical Practices Committee believe that normally no difficulty need arise in making the necessary arrangements. In a letter to executive councils they point out that before practitioners proceed with a proposed exchange they will require assurances (1) that one will be admitted to practise in the area of the other, and (2) that the transfer of patients from one to the other will automatically follow, subject of course to the free right of patients to choose for themselves. The committee hope that only in very exceptional cases will such assurance be withheld by the executive councils concerned (in consultation with their local medical committees). The fact that either area had been declared a "closed area" should not generally affect the decision to agree to an exchange.

The initiative must of course be taken by the doctors themselves. The normal channels would be by advertisements in the journals or through the Medical Practices Advisory Bureau at B.M.A. House, Tavistock Square, London, W.C.1. The bureau is anxious to play its part and remarks that "the greater the number of practitioners who are registered with the bureau for this purpose, the greater the opportunity of effecting suitable introductions."

THE TEACHING OF ANATOMY AT OXFORD

AN exhibition of unusual interest in the Radcliffe science library at Oxford shows the "History of the Teaching of Anatomy at Oxford, 1600–1950"; and some of the older books borrowed from the Bodleian carry the history back to still earlier centuries. The earliest known representation of dissection in England may be seen in a crude coloured illustration to an English anatomical treatise in Latin of the late thirteenth century. The story of anatomy teaching in the university is traced from its original home in the east quadrangle of the Bodleian in 1613, where a German visitor reported seeing "several skeletons, the skin of a man, a basilisk and a piece of the Pillar of Salt." Later the Ashmoleum museum became the headquarters for the teaching of this branch as well as for all branches of science in Oxford. In 1765 a new school was built at Christ Church and it was here that Dr. Kidd held office; an assortment of anatomical specimens and instruments from this building is shown. The department was moved to the university museum in 1860, and when Prof. Arthur Thomson was lecturer interested friends had a small tin shed erected to give to the subject a building unshared by others.

STANDARDISING SPOONS

RED spoons for measuring medicine are recommended by the British Standards Institution. In discussions with the Pharmaceutical Society and the Ministry of Health, the institution has been considering the question of variations in the size of teaspoons and tablespoons. Different-sized spoons for cookery and for medicine are now proposed. The American fluid ounce is larger than the Imperial fluid ounce; and to allow American and British recipes to be interchanged without confusion, it has been thought essential to specify American standards for spoons used in cookery. It is therefore suggested that spoons for medicines should be smaller than others. The new size proposed for medicine tablespoons is $^1/_{40}$, and for cookery tablespoons $^1/_{32}$, of an Imperial pint; for medicine teaspoons $^1/_{160}$, and for cookery teaspoons $^1/_{96}$, of an Imperial pint.

Tuberculosis on Television

Dr. R. R. Trail, director of Papworth Village Settlement, will introduce a group of experts who will demonstrate the diagnosis, treatment, and prevention of tuberculosis in the B.B.C. television service on March 20. The programme is being arranged by Dr. Brian Stanford and will be produced by Andrew Miller Jones.

University of Oxford

On March 7 congregation rejected by 69 votes to 35 a resolution to amend the statute of Dec. 13 which regulates salaries. The rejected amendment affirmed that there was no justification on academic grounds for paying salaries of different grades to members of comparable grades unless some had extra administrative or clinical duties. It accordingly proposed that no distinction should be made on the basis of a medical qualification between members of the departments specified in the statute.

University of Cambridge

On March 4 the following degrees were conferred:

M.D.—D. J. Conway, J. M. Ranking, A. S. Wigfield, D. G. Wraith.

M.B., B.Chir.—*F. W. Huddy, *D. H. Mackenzie, *P. M. Smythe.

* By proxy.

University of Birmingham

Prof. A. C. Frazer, who has been appointed to a guest lectureship by the United Universities of Sweden for the session 1949–50, visited Sweden from March 3 to 17 and lectured at Stockholm, Uppsala, and Lund. During April and May he is to lecture at a number of American universities.

Mr. A. J. H. Rains has been appointed lecturer in surgery from March 1. Dr. J. M. French has been made an honorary member of staff of the department of pharmacology.

University of Manchester

Dr. A. C. P. Campbell has been appointed Procter professor of pathology and pathological anatomy. Till he takes up his duties early this summer, Prof. S. L. Baker will continue to hold the chair of pathology together with the directorship of the pathological section of the centre for research in chronic rheumatism, which will then become a full-time appointment.

Professor Campbell was educated at Foyle College, Londonderry, and the University of Edinburgh where he graduated in medicine in 1930. In 1932 he became a member of the Royal College of Physicians of Edinburgh. After holding junior hospital appointments he became a clinical tutor in the Edinburgh Municipal Hospitals and Crichton research scholar of the department of [illegible] h University. In 1935 he was elected to a [illegible] ellowship and became a research fellow in [illegible] rvard University. On his return to this [illegible] was appointed an assistant in pathology at Edinburgh and in 1937 he became lecturer in neuropathology and lecturer in morbid histology and, in 1939, pathologist to the Edinburgh Royal Infirmary. In the same year he became F.R.C.P.E. During the late war he served in the R.A.F. as pathologist to the General Hospital at Ely with the rank of wing-commander. His original work has been principally in the fields of neuropathology, and the pathology of the skin and of certain lesions consequent on exposure to high altitudes.

University of Bristol

Dr. A. H. Gale has been appointed full-time director of medical postgraduate studies, and lecturer in epidemiology, in succession to Mr. A. J. M. Wright, who retires at the end of the present session. Dr. Gale is at present a medical officer of the Ministry of Health, and he was formerly a medical officer of the Ministry of Education.

Royal College of Surgeons of England

At a meeting of the council on March 9 with Sir Cecil Wakeley, the president, in the chair, Prof. Ian Aird, Mr. F. W. Holdsworth, and Mr. C. Price Thomas were admitted to the court of examiners. Honorary fellowships were awarded to Prof. P. Bailliart of Paris and Dr. Derrick Vail, professor of ophthalmology, North Western University, Chicago. Mr. R. D. Owen, F.R.C.S.E., of Cardiff was elected to the fellowship ad eundem.

Dr. James Craigie, F.R.S., and Dr. L. Foulds were appointed Imperial Cancer Fund lecturers for 1950. A diploma of membership was granted to J. W. Fullerton.

On March 20 the Queen will visit the college to receive the honorary fellowship.

Glasgow Royal Infirmary Club

This club held its first annual dinner since 1939 on March 9, when Sir Alexander Macgregor was in the chair. The guests were Dr. O. H. Mavor, Lord Boyd-Orr, F.R.S., and Mr. W. A. Sewell, and 120 members from all parts of the United Kingdom attended. The secretary is anxious to get in touch with all former residents of the Glasgow Royal Infirmary, so that the roll of the club may be complete. Any who did not receive notice of this year's dinner are asked to send their names and addresses to Mr. W. S. Mack, 20, Royal Terrace, Glasgow, C.3.

Renal Association

The first meeting of this association will be held on Thursday, March 30, at 4.30 P.M. at the Ciba Foundation, 41, Portland Place, London, W.1. After the election of officers and other business, Mr. D. F. Ellison Nash will read a paper on Form and Function in the Renal Tract.

French Honours

On the occasion of his visit to the French Hospital in London on March 9, the French President, M. Auriol, decorated Dr. James Moore, Mr. H. W. Wright, and Dr. Andrew Morland as chevaliers of the Legion of Honour.

Claims to Sickness Benefit

In England and Wales new claims to sickness benefit under the National Insurance Act during the weeks ended Feb. 7, 14, 21, and 28 were as follows: 189,700, 180,400, 177,300, and 165,000; during February, the weekly average was 178,100. The weekly averages from February, 1949, to January of this year were: 179,800, 185,200, 114,400, 97,700, 83,500, 78,600, 88,800, 100,900, 119,100, 136,200, 96,700, and 154,900.

Regional Psychiatrists

The chairmen of regional hospital boards have already been informed of the approval by the Ministry of Health of fixed salaries of £1800, £1900, or £2000 for regional psychiatrists. A further circular (R.H.B. [50] 20) points out that boards may adopt any of three arrangements:

1. The appointment of a whole-time officer who would give his whole time to administrative work as regional psychiatrist and would be remunerated at one of the rates mentioned above.

2. The appointment of a whole-time officer who would give part of his time to administrative [illegible] iatrist, for which he would be remunerated [illegible] roportion of the fixed rate mentioned abov[illegible] of his time to clinical work for which he would be remunerated according to his status as consultant or senior hospital medical officer.

3. The appointment of a part-time officer. In this case the arrangement would be as follows: (*a*) for the part-time work as regional psychiatrist on the staff of the board, the officer would be paid the appropriate proportion of the fixed salary (£1800, £1900, or £2000, as the case may be); (*b*) for clinical work the officer would have a separate contract and would be paid in accordance with section 5 of the Terms and Conditions of Service which deals with part-time appointments. Under this third arrangement, relating to part-time officers, nine is the maximum number of notional half-days in respect of which remuneration for work as regional psychiatrist and for clinical work combined can be claimed.

Difficulties in the Dental Service

Mr. A. E. Rowlett, president of the International Dental Federation and a vice-president of the British Dental Association, is reported by the *New York Times* (March 11), to have said in New York last week that Britain's National Health Service had failed disastrously to better the dental health of a large number of people, especially children of school age. "The plight of British dentistry today is deplorable because the Labour Government insisted on setting up a comprehensive scheme to care for every man, woman, and child in the country, without first experimenting on a small scale"; and "everyone now agrees that it was a disaster for us not to ensure school children their fair share of treatment." The great majority of patients were "terminal" cases—elderly people who required dentures or other intricate work. Whereas dentists catering for such people had been well paid, school dentists had been "miserably underpaid"; and there had been a mass exodus of dentists from the service of youthful patients to the fitting of dentures for elderly persons. The priority given to terminal cases threatened to undermine Britain's dental health. Furthermore, British dental standards were deteriorating because dentists were discovering that they must receive prior approval before they might undertake any but minor treatment. Mr. Rowlett estimated that since the service started demands for dental treatment had increased by more than 300%. Comprehensive dental training had suffered heavily. When the most inexperienced dentist could make a fairly large income by doing only the simplest work, there was little incentive for research or apprenticeship with dentists of high standing.

The Lancashire education committee, according to the *Times* (Feb. 21), has decided to pay a bonus of £200 a year to all school dentists, in an attempt to keep them from resigning to take up more lucrative private practice. The committee was told that, without early action, the remaining school dentists would be lost. Already thirteen clinics had been closed, and 40,000 school-children were without dental supervision.

Course on Rheumatic Diseases

As already announced, a weekend course on the chronic rheumatic diseases will be held at the rheumatism unit of St. Stephen's Hospital, Fulham Road, London, S.W.10, on March 25 and 26.

Institute of Almoners

The annual general meeting of the institute will be held on Saturday, March 25, at 2.30 P.M., at the Town Hall, Leamington Spa. Dr. Thomas McKeown, professor of social medicine in the University of Birmingham, will give an address.

North of England Ophthalmological Society

Dr. Ramón Castroviejo, of New York, is to deliver two lectures to this society. On Thursday, March 30, at 3.30 P.M., at the Royal Infirmary, Manchester, he is to speak on Cataract Surgery, and on Friday, March 31, at 3 P.M., at the Leeds Medical School on Keratoplasties and Keratectomies. Further particulars will be found in our advertisement columns.

International Hæmophilia Society

The annual general meeting of this society will be held on Sunday, March 26, at 2.30 P.M. at the Society for Visiting Scientists, 5, Old Burlington Street, Piccadilly, London, W.1. Anyone who wishes to attend should send a stamped addressed envelope to the secretary of the society at the Galton Laboratory, University College, W.C.1.

Medical Society of London

Proposing the toast of The Medical Society of London, at its 170th anniversary dinner on March 9, Mr. Laurence Irving commented on the kindly faces of the general practitioners, the wise and benevolent faces of the physicians, and the eager faces of the surgeons, by which he was surrounded. He had relied in life on the friendship of practitioners and a bathroom cupboard full of proprietary preparations. (How immutable these were! The one he used for cholera bore the testimony "without it I should never have got through the Second Matabele War.") His mother, having abandoned playing the part of *Trilby* for pioneer work in infant welfare, had later taken up astrology and foretold disaster if ever he should get wet feet. During the first world war he had joined the Royal Air Force, "and so passed safely over the dangers which threatened me"; but in the second war he was too old to fly, got his feet wet, was evacuated to hospital with what felt like a fox gnawing at his vitals, and (just when a comfortable bed and much kind attention were what he and his fox most needed) was interviewed by a man with piercing eyes who said "Are you happy in your married life?" This surprised him, and he feared that "my unwitting falsehood has gone echoing down the corridor of scientific medicine." After which brief autobiography Mr. Irving was good enough to say that artists and doctors had their similarity; but the artist was preoccupied with self-expression and the doctor with self-denial. Doctors were like lifeboatmen, constantly at the call of shipwrecked humanity. Mr. Lionel Norbury, responding as president, spoke with approval of the recent innovation of bringing young non-members to the society's meetings to describe new work. The Lettsomian lectures had been given, very notably, by Mr. Dickson Wright, and Sir Henry Souttar would give the oration in May. The society's quarters at 11, Chandos Street had been renovated, thanks largely to Dr. Hope Gosse. Dr. Cuthbert Dukes, proposing The Guests, said that they had at least one desirable quality in common: they were all males. But he abandoned his original intention of classifying them into those born great and those whose greatness had been thrust upon them—the congenital and the acquired. The presence of Sir Gordon Gordon-Taylor (shortly off to lecture again around the Mediterranean) reminded Dr. Dukes of the cadet's answer on the function of the cavalry in modern war: "The cavalry give an air of distinction to what would otherwise be a vulgar brawl." But he seemed to see less advantage in medical journalism, and went so far as to quote an old statement that "disease as it stalks through the land cannot keep pace with the incredible vice of writing about it." Responding in his rôle of president of the Royal College of Surgeons, Sir Cecil Wakeley ignored this aspersion; but he could not conceal his inside knowledge that the Medical Society of London had always been "an interesting, jolly, friendly society."

Auxiliary Royal Army Medical Corps Funds (1939)

The annual general meeting of the fund will be held at 11, Chandos Street, London, W.1, on Monday, April 3, at 5 P.M.

Rugby School Appointment

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VAGOTOMY AND PARTIAL PYLORECTOMY

A NEW PROCEDURE FOR DUODENAL ULCER

A. DAVIS BEATTIE
M.B. Lond., F.R.C.S.
SURGEON, LEICESTER GENERAL HOSPITAL

DUODENAL ulceration is becoming an increasing economic problem. Not only does the rising stress of modern life, in certain occupational classes of the population, lead to an increasing incidence of peptic ulcer in these groups but also it is responsible for a similar failure-rate from medical treatment. Partial gastrectomy, which for nearly twenty years has been the recognised surgical answer to this problem, is not the entire success originally anticipated. The initial Polya technique has gradually had to be modified to eliminate, so far as possible, the problem of recurrent ulceration. This has necessitated an increasingly drastic resection of the gastric mucosa, the culmination of which is seen in the various types of subtotal gastrectomy now in vogue. Such radical procedures certainly effect a cure of the ulcer diathesis by reducing the gastric acidity, but they are both unæsthetic and needlessly drastic operations for duodenal ulcer, particularly when the ulcer has sometimes to be left in situ.

RESULTS OF GASTRECTOMY

The relatively small stomach which results from the radical resections of modern gastrectomy is often incapable of carrying out its physiological functions adequately. It can neither hold a sufficiency of food nor digest it properly; and not surprisingly this leaves much to be desired from both physiological and economic standpoints. Recent analyses of the after-results of this type of operation confirm the original view of St. John et al. (1939) that they are not nearly so satisfactory as was originally believed. Gastrectomy is a mutilating procedure, and a high proportion of patients suffer afterwards from recurrent gastro-intestinal upsets, which are often sufficiently severe to affect adversely their whole economic life. The symptomatic and economic results in over 1000 cases of gastrectomy, reviewed by six different workers, were as follows:

	Gastro-intestinal symptoms	*Easy fatigue*	*Poor economic results*
Gastric ulcer:			
Warren and Meadows (1949)	58·8%	52 9%	35·2%
Watson (1947)	62·7%	..	16·9%
Duodenal ulcer:			
Jordan (1941)	60 0%	..	..
Watson (1947)	58·9%	..	13·2%
Warren and Meadows (1949)	40·5%	32·4%	8·1%
Allen and Welch (1946) ..	34·0%	..	..
Peptic ulcer (unspecified):			
Kemp (1947)	45 0%	..	17·0%
St. John et al. (1948) ..	31·2%	..	9·4%

It will be seen that about a *sixth of the* apparently successful surgical cures are poor economic results, and that half of them are relative physiological failures.

Though this may be a comparatively small price to pay for freedom from dangerous complications or possible malignant change in the case of medically resistant gastric lesions, it ought not to be necessary in chronic duodenal ulceration which is not subject in the same degree to such hazards.

ADVANTAGES OF VAGOTOMY

A great volume of detailed research during the past ten years has proved conclusively that it is possible, by the less drastic and simpler procedure of vagotomy, to achieve an equally effective and permanent reduction of the hyperacidity which is the cause of duodenal ulceration. This operation, first successfully performed by Dragstedt and Owens (1943) in America, provides the logical and more satisfactory physiological alternative to subtotal gastric resection. Division of the vagus nerves leads not only to a great diminution in the dangerous fasting secretion and in the high acid values of the early neurogenic stage of gastric secretion but also provides considerable reduction in the acidity during the second phase of digestion (Beattie 1948). Moreover, the relief of local muscle spasm which follows it is an important contributory factor towards ulcer healing. Vagotomy is not a mutilating procedure and does not interfere radically with gastro-intestinal physiology. It is a much more rapid procedure than gastrectomy, thus producing less operative shock; and this is reflected both in its relatively lower mortality and in its safer extension to patients in the older age-groups.

The first clinically successful vagotomies were done through a transthoracic approach, but increasing experience has shown the abdominal approach to be much more satisfactory. It is indeed doubtful whether the transthoracic operation is ever justified, since it does not permit either inspection of the lesion or assessment of its clinical pathology. There is always the possibility, in the absence of inspection of the abdomen, of an occasional disaster resulting from failure in diagnosis. Abdominal exposure and section of the vagus nerves, by a modification of the technique originally described by Dragstedt et al. (1947), is an easy and rapid procedure. It takes rather less than twenty minutes in an average case, and enables complete neurectomy to be more consistently attained than is possible through the transthoracic approach. It is only beneath the diaphragm that the plexiform vagal branches are invariably grouped together into well-defined main trunks.

RESULTS OF SIMPLE VAGOTOMY

Though more than 3000 successful vagotomies have been reported in the world literature during the last eight years, recurrent ulceration has only been demonstrated at subsequent laparotomy in three cases of duodenal ulcer in which the postoperative insulin test-meal has shown complete nerve section. Recurrent ulcer symptoms are, however, relatively common after simple vagotomy and are always due to the secondary pylorospasm which follows—the result of overaction of the sympathetic system at the pylorus after abolition of its vagal supply. This is not surprising when it is appreciated that most of the symptoms of duodenal ulcer are due to the associated pylorospasm and not to the ulcer lesion. Peptic-ulcer pain of remittent type, unlike the continuous deep pain resulting from secondary involvement of adjacent structures, is always due to muscle tension. In duodenal or pyloric lesions it results from reflex pylorospasm following irritation of the ulcer by acid gastric contents and thus occurs during the later stages of gastric digestion, when enough time has elapsed for the build-up of the requisite degree of acidity. The length of time which this requires will obviously depend both on the acidity of the gastric secretion and on the rapidity with which the stomach empties; and this fact explains the varying time-interval experienced clinically in these cases. Similarly, the typical nocturnal pain is due to a gradually increasing hyperacidity from the abnormally high night-secretion present in these patients. Reduction of the gastric acidity by alkalis, food, or vomiting allows relaxation of the associated pylorospasm, with consequent relief of symptoms; and similar results are obtained by the exhibition of antispasmodics such as belladonna. Vagotomy produces the same effect by the *immediate* reduction in gastroduodenal tone which follows it; and it is only some months after operation, when this muscle tone has returned more nearly to normal, that the clinical effects of pyloric imbalance begin to become evident.

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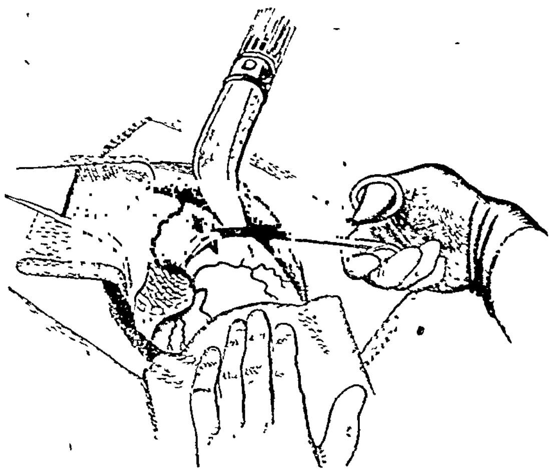

Fig. 3—Division of parietal peritoneum over lower œsophagus.

and practised by Orr and Johnson (1949). The former operation is a difficult technical feat in the presence of gross duodenal deformity, and the latter operation has several disadvantages. Besides involving the additional operation risks attendant on gastrectomy, it also leads to the removal of most of the mucosa responsible for the hormonal phase of gastric secretion. This must produce a considerable reduction in the digestive powers of the stomach—the avoidance of which constitutes one of the major advantages of vagotomy and, indeed, was the main reason for its development. An associated partial gastrectomy is therefore an unnecessarily mutilating operation from both anatomical and physiological viewpoints.

The relative failure of gastro-enterostomy combined with vagotomy to achieve perfect results in some of my cases led me to investigate the possibility of carrying out some alternative procedure at the pylorus. The first attempts along these lines were in the nature of a pyloroplasty, but it soon became apparent that this operation was not uniformly successful in providing complete relief and that it was not always feasible. It is an almost impossible technical undertaking in the presence of gross deformity of the parapyloric area, and accordingly had to be abandoned in about half the cases in favour of an associated gastro-enterostomy. The true solution to the problem was found to lie in a combined partial pylorectomy and pyloroplasty, the anterior half of the pyloric ring being excised. This operation is not only relatively easy, even in the presence of gross duodenal scarring and distortion, but also has the advantage that it often enables anterior ulcers to be excised at the same time. Moreover, it is a simple and rapid manœuvre, the whole procedure of vagotomy and pylorectomy taking little over half an hour.

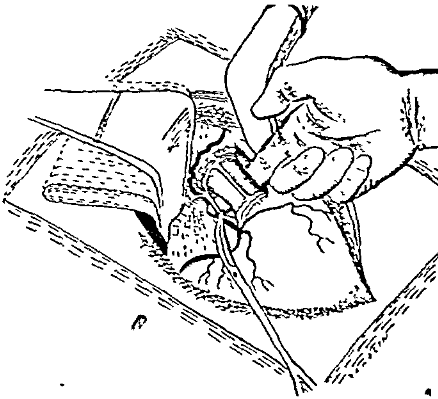

Fig. 4—Isolation of right vagus nerve.

OPERATIVE TECHNIQUE

The first essential to ease in operating lies in correct positioning of the patient on the table; fig. 1 shows the position adopted, which is a reverse Trendelenburg tilt of about 15°. The second necessity is adequate lighting, which is obtained by inclining the main lamp to about 45° and using a 'Coldlite' retractor. An upper midline incision is made, thus obtaining the necessary high exposure and avoiding the falciform ligament.

After the peritoneum has been opened, the coldlite retractor is used to lift the left hypochondriac area while the liver is mobilised by division of the left suspensory ligament (fig. 2). It is important to avoid injury to the subphrenic vessels during this manœuvre, or troublesome bleeding will ensue. The left lobe of the liver is then rotated downwards and held out of the way under an abdominal pack on the right side of the wound with a broad reflecting retractor held by a second assistant. The parietal peritoneum over the lower œsophagus is divided transversely (fig. 3) between the uppermost branches of the left gastric vessels and the point where it covers the œsophageal opening in the diaphragm. Dissection with a gauze swab on a holder will then readily expose the whole anterior surface of the abdominal œsophagus.

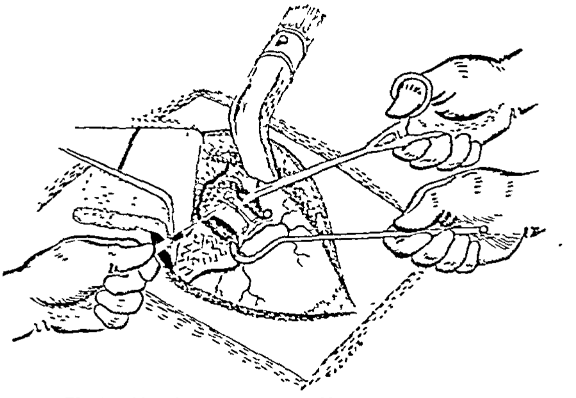

Fig. 5—Clearing œsophagus of branches of vagus.

It is now easy to insinuate the right forefinger into the lower mediastinum and to mobilise the thoracic œsophagus within it; 2 or 3 in. of this can be pulled down into the abdomen and the right vagus nerve readily identified by digital dissection in the space between the œsophagus and the right crus of the diaphragm, where it lies buried posteriorly in loose areolar tissue. It is seized with long curved forceps (fig. 4), and a lead hook is then passed round the lower œsophagus to facilitate manipulation of the latter during the subsequent steps of the operation. About 1¼ in. of the nerve is excised between forceps, and both ends are tied with silk.

Traction on the œsophagus causes the anterior vagus to stand out clearly, and it is dealt with in a similar manner, care being taken to divide all the numerous tiny branches to the œsophagus and cardia (fig. 5). Finally the œsophagus and its entire surroundings are carefully explored with the finger to ensure that no nerve branches have been missed. These stand out like taut strings in the loose connective tissue and are readily recognised. After complete hæmostasis has been obtained, the gap in the mediastinum is closed by suturing the peritoneum in front of the œsophagus (fig. 6); and the left lobe of the liver is then returned to its normal position, after it has been carefully inspected for any bleeding points which may not have been successfully controlled by pressure from the pack during the preceding stage of the operation.

The duodenum is next freed from adhesions and mobilised sufficiently for the ensuing pylorectomy.

ANALYSIS OF RESULTS OF SIMPLE VAGOTOMY

No. of years since operation	No. of cases	No symptoms	Mild symptoms	Subsequent pylorectomy	Subsequent gastro-enterostomy	Subsequent gastrectomy	Total no. of cases requiring secondary operation
1–2 ..	35	3	5	8	13	3	24
2–3 ..	59	8	24	23	1	3	27
3–4 ..	9	2	4	2	1	..	3
Total	103	13	33	33	15	6	54

The symptoms of heartburn and waterbrash are similar evidence of hyperacid gastric contents which cannot escape through the spastic pylorus; and flatulent distension is largely the direct result of ærophagy—an attempt by the patient to relieve the sensation of muscle tension resulting from the pylorospasm, which he feels subjectively as gastric distension. In fact, the only direct symptoms in duodenal ulcer which are not due to pylorospasm are those resulting from such complications as penetration into neighbouring structures, hæmorrhage, or perforation.

It is therefore not uncommon for patients to experience what seems to be a recurrence of ulcer pain some months after successful vagotomy, though flatulent distension and regurgitant vomiting are more common symptoms. They are often followed by offensive diarrhœa, as the fermenting gastric contents are finally released through the spastic pylorus to irritate the lower reaches of the gastro-intestinal tract. The distribution of such symptoms in my cases was as follows:

Occasional mild diarrhœa	35·9 %
Attacks of severe diarrhœa	14·5 %
Incapacitating diarrhœa	3·9 %
Total cases exhibiting diarrhœa ..	54·3 %
Occasional mild flatulence and eructation ..	17·4 %
Attacks of severe flatulence and vomiting ..	46·6 %
Repeated and prostrating vomiting	12·6 %
Total cases of gastric retention ..	76·6 %

Even symptoms mimicking closely those of perforation or minor gastric hæmorrhage may occur, but these too are due to acute gastric distension consequent on the pylorospasm. It is the knowledge of the occurrence of such sequelæ, and a lack of appreciation of the factors responsible for them, which have led so many surgeons to abandon vagotomy, and others to delay its adoption. My own experience regarding the unhappy consequences of simple vagotomy is shown in the accompanying table. I have had so far to reoperate on no less than 54 of my 103 cases of simple vagotomy to relieve their retention symptoms. A further 14 patients show progressive deterioration and will probably come to secondary operation in time, hence the final failure-rate is likely to approach 70%. Yet in every instance laparotomy has shown healing of the original duodenal lesion, and the only pathological finding has been the typical hypertrophy and dilatation of the stomach which follow protracted pylorospasm.

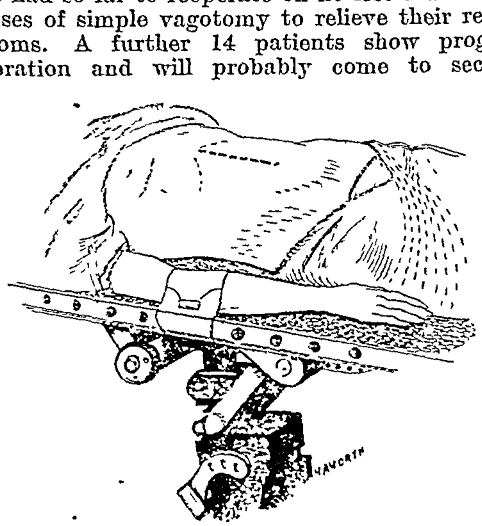

Fig. 1—Position of patient for vagotomy and partial pylorectomy.

DEVELOPMENT OF PARTIAL PYLORECTOMY

It therefore became evident to me more than two years ago, after carrying out over 100 simple vagotomies, that some associated procedure to prevent the subsequent development of pylorospasm was essential if the true value of the operation was to be obtained. There are obviously two possible approaches to this problem. Relief of the spasm could be obtained if it were possible to carry out an associated sympathectomy of the pyloric area. I attempted this in several instances without success, which is not surprising in view of the fact that the complexity of the sympathetic nerve supply to this region makes any attempt at complete denervation practically impossible. The alternative approach is by means of some mechanical procedure to eliminate the functional block at the pylorus. Gastro-enterostomy has recently been largely used for this purpose, particularly in America, but it is not without its disadvantages. Unless it is carried out at the pyloric antrum, which is a difficult technical proceeding, the distal portion of the stomach beyond the stoma can still sometimes give rise to unpleasant postoperative symptoms. Vigorous peristalsis of this segment, working against the highly spastic pylorus, can produce considerable postprandial discomfort and even typical ulcer pain.

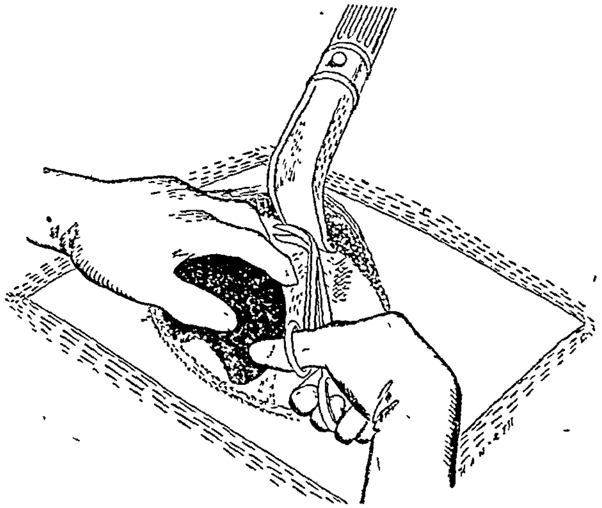

Fig. 2—Mobilisation of liver.

Moreover, the effect of an associated gastro-enterostomy is to prevent true assessment of the results of the vagotomy, besides running possible risks of subsequent jejunal ulceration in some cases. Though vagotomy has been used successfully on many occasions to cure anastomotic and jejunal ulceration following ill-advised gastro-enterostomy or inadequate gastrectomy, cases have recently been reported in which these complications have followed vagotomy with an associated gastrojejunostomy. It seems likely that, even when their neurogenic secretion has been eliminated by complete vagal section, some people may still produce a sufficiently high concentration of acid during the hormonal stage of gastric digestion to damage the susceptible jejunal mucosa.

Other possible procedures which could be undertaken as an adjunct to vagotomy, to prevent later pylorospasm, include pylorectomy with subsequent gastroduodenostomy along the lines of a Bilroth I operation; and an associated partial gastrectomy, such as that advocated

Of these 260 vagotomies 210 were done for duodenal ulcer; and of these 210 patients, 206 have been followed up for three months or more and 4 have not been traced. In addition to the 131 cases listed above of vagotomy associated with either pyloroplasty or pylorectomy there were 33 cases in which such an operation was done later to relieve gastric retention, making a total of 164 cases of vagotomy associated with either pyloroplasty or pylorectomy.

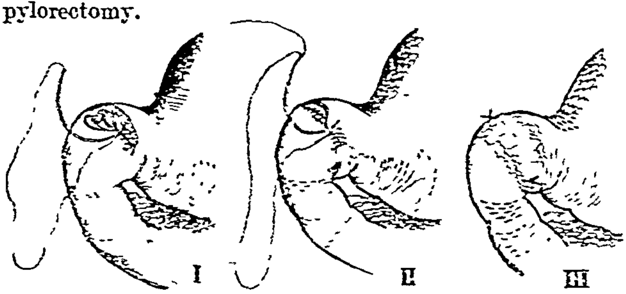

Fig. 9—Closure of duodenum.

There have been only two deaths in the total series of 210 operations. Both occurred within six days of operation and were due to leakage from the suture line. At that time I was using two suture lines of chromic catgut for the anastomosis, and neither case showed at necropsy any vestige of surviving suture material. These catastrophes were probably due to faulty catgut, but since then I have used silk for the outer layer of the anastomosis and added the covering omental "waistcoat" as an extra precautionary measure.

One other patient developed a small duodenal fistula on the fourteenth postoperative day, which closed spontaneously within a week. Apart from this there have been no postoperative complications, and the subsequent progress of all the patients has been extraordinarily satisfactory. Retention symptoms have been completely eliminated, and radiological investigation confirms the absence of pylorospasm and consequent gastric retention. Dr. Forbes Lawson (personal communication) summing up his experience from this point of view, reports:

> "In the early days, when the operation was simple vagotomy, the radiologist was more often than not defeated in his attempt to examine the duodenal cap by the very marked degree of pyloric resistance encountered. Large six-hour, and even twenty-four hour, barium residues were found in the stomach in nearly every case. Now that pyloric relief has been obtained by surgical means the picture has completely changed. The duodenal cap fills with ease, and gastric delay has disappeared, though an occasional six-hour barium residue is encountered in early postoperative cases."

There has been complete relief of ulcer symptoms in every case, and the improvement in the psychological attitude of the patients is quite outstanding. This is understandable, since they are restored to completely normal digestive life and can eat, drink, and smoke with absolute impunity. As a result there is much better adjustment to both general environment and work conditions than is possible after gastrectomy, where the "stomach consciousness" of the patient is often kept alive by the continued necessity for a modified gastric régime. A further cause of the new harmony with their surroundings experienced by these post-vagotomy patients may lie in their subsequent immunity from the reflex digestive instability which accompanies mental stress even in normal people. Many patients, at the postoperative review, volunteer the statement that their work is less effort than before and that their powers of concentration have been considerably improved. Almost all of them gain weight fairly rapidly after operation; and most of them are back at their previous trained occupations within six weeks, often despite protracted absence from it during years of previous incapacitation. Complete economic recovery and social readjustment have been obtained in every case in which the ulcer diathesis was the sole cause of the previous disability.

The only symptoms which ever arise after combined vagotomy and pylorectomy are occasional mild flatulence and intermittent attacks of transient hypoglycæmia. An admission of any digestive disturbance at all is only obtained after very close questioning, and it seems probable that the minor intermittent flatulence from which a small percentage of patients suffer does not exceed the occasional indigestion of the normal person after dietary indiscretions. Transient hypoglycæmia, on the other hand, occurs in about 10% of cases. The postoperative sequelæ not due to gastric retention were as follows:

Cases with temporary dysphagia	138 (*53·1%*)
Cases with transient hypoglycæmia:	
Following simple vagotomy	17 (*16·5%*)
Following vagotomy and gastroenterostomy ..	3 (*11·5%*)
Following vagotomy and pylorectomy or pyloroplasty	16 (*12·2%*)
Total ..	46 (*10%*)
Average gain in weight of last 135 patients during *the first three months after operation*	*9 lb.*

It is significant that the frequency of onset of transient hypoglycæmia is much the same in the gastric retention following simple vagotomy and in the much more rapidly emptying stomach after pylorectomy or gastro-enterostomy. *It cannot therefore depend on the rate of* stomach emptying, though the attacks are typical clinically of the "dumping syndrome" which may follow gastrectomy. My personal view on this subject is that, whether following gastrectomy or vagotomy, these attacks are the result of interference with the vagal supply to the liver or the pancreas, giving rise to intermittent alteration in sugar metabolism. They come on at gradually lengthening intervals and last only a few minutes; they are controlled almost immediately by oral glucose and have never yet persisted for more than eighteen months after vagotomy.

DISCUSSION

Up to now the bulk of surgical opinion in this country has looked askance at any suggestion that vagotomy should be substituted for gastrectomy as the operation of choice in chronic duodenal ulcer. This has been due in part to a knowledge of the unpleasant retention phenomena which may develop after it, but is largely the result of conservative prejudice based on the radical departure which it represents from accepted surgical custom. With the memory of the high ulcer-recurrence rate of gastro-enterostomy before them, surgeons have feared lest vagotomy should lead to similar disasters. Such an outlook is, however, no longer justifiable. The unpleasant sequelæ of vagotomy can be prevented by an associated pylorectomy; and an analysis of its after-results during the past seven years shows that the initial duodenal lesion invariably heals, and that ulceration does not recur if neurectomy has been complete and there is no gross gastric retention. Vagotomy is based on sound physiological principles (Beattie 1949). Gastro-enterostomy, on the other hand, was not established on a true physiological foundation. It did not deal radically with the hyperacidity which is the basic factor underlying the ulcer diathesis, and recurrent ulceration was bound to follow it in a high percentage of cases.

Vagotomy, in addition to the other advantages which it possesses over gastrectomy in the treatment of chronic duodenal ulcer, has the asset of enabling an effective surgical attack to be made on the recurrent subacute duodenal lesion. Cases of this type form a not inconsiderable proportion of those with persistent duodenal symptoms despite protracted and intensive medical treatment. Yet many of them never show a definite

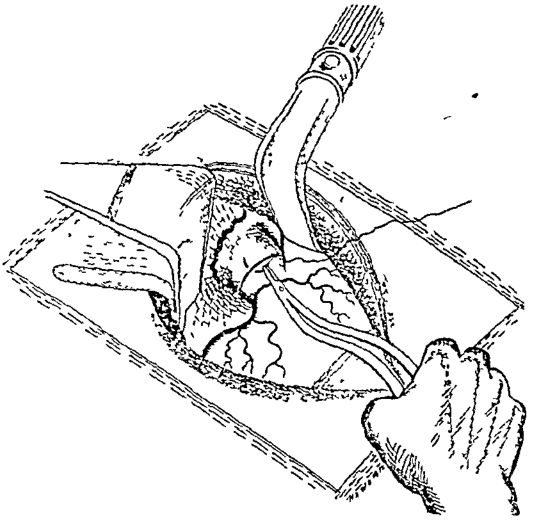

Fig. 6—Suturing of parietal peritoneum over lower œsophagus.

Stay-sutures are passed through the upper and lower borders of the pylorus and serve as retractors during the remainder of the procedure. If carefully placed they will also minimise hæmorrhage by controlling the main pyloric vessels. The general abdominal cavity is then isolated by suitably placed packs and the pyloric sphincter divided (fig. 7). A diamond-shaped segment of the stomach and duodenum, together with the whole anterior portion of the pyloric ring, is removed with scissors introduced through this opening, bleeding points being picked up with mosquito forceps as they arise and tied off subsequently. As much as possible of the scar tissue, together with any anterior ulcer, is excised during this manœuvre (fig. 8). There is often reflux of bile from the duodenum at this stage, which may require energetic use of the sucker to prevent contamination of the surrounding abdominal cavity.

Closure of this gap in the bowel is carried out, as shown in fig. 9, by two continuous intestinal sutures. The first, which is 00 catgut, unites the whole thickness of the duodenum to the gastric mucosa; the second, of no. 1 silk, again picks up the whole thickness of the duodenum and joins it to the muscular and peritoneal layers of the stomach. This forms an overlapping suture line, giving added strength against possible leakage. A final insurance in this respect is achieved by covering the suture line with a free omental graft, secured in position at each end by the stay-sutures. Before the abdomen is closed, the new pyloric opening is carefully tested for patency and size, and a last check made of hæmostasis at the site of the vagotomy.

AFTER-TREATMENT

No special postoperative care is necessary in most cases beyond the usual respiratory exercises advisable after any high abdominal incision; and the protracted gastric suction previously necessary after simple vagotomy is no longer required. Ileus of the stomach and small bowel always occurs and lasts for 24–48 hours, at the end of which time intestinal movements gradually return. But there is usually no gross abdominal distension and little discomfort; hence the patient can start a light Meulengracht type of diet twelve hours after operation. This is rapidly increased so that full normal diet is being eaten on the tenth postoperative day. The avoidance of any form of their previous dietary régime during the early stages of convalescence is, I believe, a major factor in dispelling any remaining "stomach consciousness" in these patients; and experience has shown that early return to normal diet does not delay healing either of the suture line or of any ulcer left behind after pylorectomy.

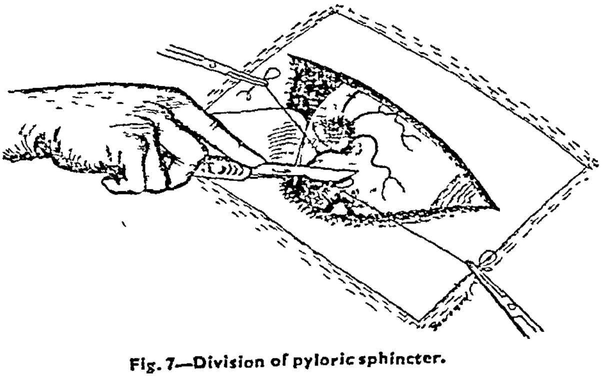

Fig. 7—Division of pyloric sphincter.

In occasional cases ileus is more protracted than usual, and such patients may require gastric suction for a few days before peristalsis returns. The administration of parasympathetic stimulants to hasten this process has not been successful. Though effective in some instances, they have caused severe pain and even collapse in others, so they have now been discarded. If continuous stomach aspiration has to be employed for more than twenty-four hours, intravenous therapy is also instituted; but this is only necessary in such circumstances and never has to be used as a routine postoperative measure.

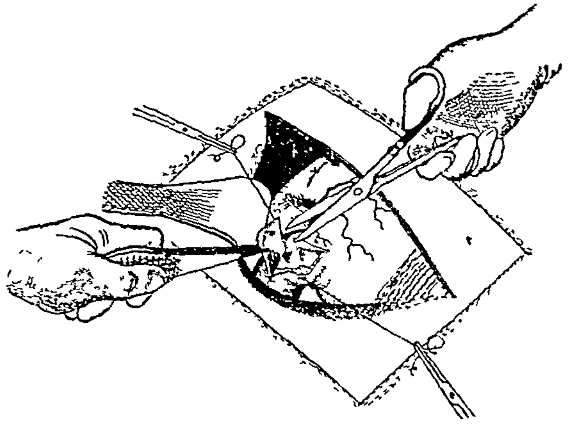

Fig. 8—Partial pylorectomy.

Early ambulation is practised, most patients getting up for the first time after forty-eight hours; the average patient leaves hospital fully ambulant on the twelfth postoperative day. The patients are discharged on a normal dietary régime, except that spirits and condiments are prohibited and smoking limited, until their first review at the outpatient department three months later.

The only unpleasant sequela during early convalescence is temporary dysphagia in over half the cases. This was formerly thought to be due to cardiospasm but is now known to result from partial obstruction of the œsophagus at its passage through the diaphragm, probably as the result of local reaction during healing. It may take place at any time during the first three weeks and usually only lasts a few days. It always passes off spontaneously and is never complete, but may sometimes cause the patient anxiety if he has not been previously warned of its possibility.

RESULTS

The number of vagotomies done by me to the end of 1949 was as follows:

Operation	*No. of cases*
Simple vagotomy	103
Vagotomy and associated gastro enterostomy .	26
Vagotomy and associated pyloroplasty	16
Vagotomy and associated pylorectomy	115
Total ..	260

it is always anticipated that some abscesses will remain open and have to be drained.

However, Sellors (1950) has lately restated his views on the usefulness of penicillin in pulmonary infections, and now says that he has not had to drain an acute lung abscess in the last two years; he recommends 2,000,000 units of penicillin per day in this condition. This is a great departure from his previous views and reflects his experience at our hospital and at the other centres where he works. No pulmonary abscess had been drained at our hospital in the last two years, and it seemed worth while to investigate the situation further.

PRESENT INVESTIGATION

The cases in our survey are those admitted consecutively to the London Chest Hospital from June, 1946, to June, 1949. We excluded those which had resulted from the inhalation of foreign bodies, obstruction by or breakdown of neoplasms, and pulmonary suppurations arising in a bronchiectatic area. We had difficulty in separating the entity "acute abscess," and criteria based on the duration of symptoms were found to be arbitrary. Thus we found that some abscesses, even though they had been present for six months, healed completely with medical treatment. Those which had been present longer than this were excluded, perhaps unnecessarily, from the series.

Samson (1948) states that within six weeks from the onset chronic changes have become established in the pulmonary parenchyma, and that therefore the best time for cure is past. Brock (1942), stating that the abscess should be watched for days not weeks, implies that he regards chronicity as established in the early stages. From the pathological point of view these writers are probably correct. From our cases it appeared that one could, from the clinical point of view, define an "acute" abscess as one which responded to penicillin therapy by complete resolution, and the "chronic" abscess as one which only partially healed. Alternatively, the diagnosis of acute or chronic abscess was retrospective and could only be made at the end of treatment.

INVESTIGATION AND DIAGNOSIS

Investigation and diagnosis were based on the history, physical signs, sputum, radiography, and bronchoscopy.

Onset.—The onset in most of our cases was insidious with no predominant factors of obvious ætiological significance; some cases followed operation. Various periods of general malaise, pyrexia, dry cough, and occasional pains in the chest, were followed by the expectoration of foul purulent sputum, sometimes preceded by small hæmoptyses.

Physical signs were generally scanty and unreliable, those of consolidation being the commonest.

Radiography generally revealed an opacity, with or without a fluid level, localised to one bronchopulmonary segment, though sometimes two adjacent segments appeared to be involved. The radiological appearances were not only important diagnostically but also a most valuable guide to the suitable position for postural drainage.

Bacteriology seemed to be of little importance so far as treatment was concerned, but sputum culture was performed as a routine, and sensitivity of the organisms determined to exclude the possibility of penicillin-resistant infections. In all our cases there was a mixed flora of penicillin-sensitive organisms, consisting mainly of non-hæmolytic streptococci, *Strep. viridans*, *H. influenzæ*, diphtheroids, *N. catarrhalis*, and occasional staphylococci; a few resistant organisms were present among the cultures sometimes. Such a mixed flora has been previously reported by Smith (1948). Anaerobic cultures were not done, and spirochætes and fusiform bacilli were not specially sought since they are penicillin-sensitive.

Bronchoscopy was done as a routine measure early in treatment, more from the diagnostic than the therapeutic aspect, since the presence of radio-translucent foreign bodies and of neoplasms had to be excluded.

TREATMENT

The two basic aims were to overcome the infection and to empty the abscess cavity. In the earlier cases in our series it was expected that these aims would be achieved by surgical drainage, with or without previous penicillin. In the later cases penicillin alone, combined with postural drainage, was used. Some abscesses responded satisfactorily to small doses, and some responded to inhalation therapy alone, but aerosol penicillin is not now being used because we regard the concentrations obtainable as inadequate for most cases. We now regard the optimal dosage of penicillin as 2,000,000 units of the calcium salt a day, given in four intramuscular injections six-hourly. This dosage was usually necessary for not less than three weeks, and seldom for more than four weeks.

After careful determination of the pulmonary segment involved and the best anatomical position for postural drainage, this treatment was given under the supervision of an experienced physiotherapist. It may be emphasised here that postural drainage is not merely a passive affair on the part of the patient—controlled coughing is required to assist drainage—nor is it to be given at long intervals for short periods. In the early days of treatment many hours a day should be spent in the correct posture for maximal drainage, and in some cases it may be possible for the patient to sleep in this position. As the sputum diminishes, six periods of half to three-quarters of an hour may suffice, gradually decreasing till the cavity is finally obliterated. Percussion of the chest wall by the physiotherapist was also most helpful. Bronchoscopic suction and the application of adrenaline swabs have not been required.

General measures, such as good diet, high vitamin intake, iron therapy, and blood-transfusion, according to the severity of the secondary anæmia, were necessary, as in the treatment of all infections. It was also important for the patient to have general physiotherapy, and to be got out of bed and on his feet soon after the initial toxæmia had been combated.

ASSESSMENT OF RESULTS

In assessing results we aimed at the following criteria. Most of the patients should become completely non-toxic in a few days, with rapid diminution of the amount of purulent sputum. By the end of the first week well-marked improvement or even apparent clinical cure should be found; in a fortnight radiological improvement should be visible; and by the fourth week there should be almost complete radiological resolution, or such significant radiological changes as to allow a confident prediction of complete resolution in the near future. If a cavity still exists at this stage the likelihood of a chronic abscess is great. In finally assessing cure, freedom from cough and sputum, normal temperature, radiological healing, and absence of damage to lung parenchyma and bronchi are essential. Bronchograms are performed after maximal radiological clearing has been obtained. Tomograms may be of great assistance in assessing the obliteration of a cavity, and may reveal bronchiectasis at a stage when the lung has not yet completely cleared and bronchograms are undesirable. Follow-up is essential; in most of our cases it has lasted for over a year and it is necessary to keep these patients under observation for considerably longer.

RESULTS

Of 32 acute cases seen in three years 7 have been treated by surgical drainage and 25 with penicillin and postural drainage.

ulcer crater, even after repeated radiography, and are therefore often wrongly labelled as "duodenitis." If, despite his misgivings, a surgeon is prevailed on to operate in such a case, the relatively slight pathological changes present make him justifiably doubtful of the expedience of proceeding to such a drastic measure as subtotal gastrectomy. But these patients often give histories of economic and social disability extending back over many years, and ought not to be denied the benefits resulting from successful surgical intervention. The answer in these circumstances lies in carrying out vagotomy with an associated partial pylorectomy—a relatively minor and non-mutilating procedure about which there need be no such qualms.

CONCLUSION

World-wide experience has now demonstrated, beyond all question, that vagotomy deals effectively and permanently with the basic hyperacidity underlying the ulcer diathesis. The bar to its universal adoption has been the unpleasant retention phenomena which so often follow. But these can be completely eliminated by an associated pylorectomy, and the door is now open for the recognition of vagotomy as the standard surgical procedure for duodenal ulcer. Gastrectomy should in future be reserved for the relatively rare instances where ulceration has penetrated deeply into surrounding viscera, producing complicated lesions which are no longer likely to heal spontaneously after vagotomy.

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TREATMENT OF LUNG ABSCESS

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FOR the last two years it has been felt at the London Chest Hospital that acute lung abscesses could be cured by proper postural drainage and adequate penicillin therapy; surgical drainage appeared to be unnecessary and even obsolete. This impression seemed so definite that it was decided to analyse results over the last three years, thus including a transition period when some cases were still being surgically drained, before the present "medical" regimen came into sole use.

The results of treatment of acute lung abscesses reported in the past have been, with few exceptions, depressingly and uniformly bad. There seemed little to choose between the results of "medical" and "surgical" treatment, each yielding a mortality of about a third. Smith (1948), reviewing 1750 cases collected from published reports, finds a mortality of 34·7% for medically treated and 32·7% for surgically treated cases. The number becoming chronic was considerably higher among the medical ones, and the bad results of surgical treatment were said to be due to delayed operations following over-persistent medical therapy. Before penicillin treatment was developed such therapy could be summarised under the headings of postural drainage, bronchoscopic aspirations, arsenical drugs, and sulphonamides.

Postural Drainage.—We can find no reference to the use of posture alone as a method of treatment.

Bronchoscopy as reported by Allen and Blackman (1936) gave a mortality of 6·5%; of 650 cases 61% were cured and 32·5% remained chronic. Flick et al. (1929) reported a 70% cure-rate in early cases.

Arsenical drugs, though strongly recommended by some (Joannides 1939, Fisher and Finney 1940), are as emphatically condemned by others (Cutler and Gross 1936, Rosenblatt 1940, Sweet 1940).

Sulphonamides were at first believed to hold out great promise, but usually, after early improvement, the cases receiving this treatment developed a well-marked tendency to chronicity (Smith 1948); and D'Ingianni (1944) found a mortality of 58·6% with sulphonamides, compared with 49·1% for his whole group.

SURGICAL DRAINAGE

In contrast with the rather hopeless outlook of the physicians, some surgeons were optimistically preaching the doctrine of early drainage. Brock (1942) urged surgical ("external") drainage at an early stage, preferably in the first few days after diagnosis. Neuhof and Touroff (1940, 1942), operating in the first six weeks, treated 152 cases with a mortality of only 2·6%. However, these figures are rarely attained elsewhere for various reasons. It is contended that the advent of penicillin has encouraged physicians to continue treating cases till the best time for drainage has passed. Surgeons are therefore called in when physicians have failed, and are more often required to deal with chronic abscesses than with acute ones.

PENICILLIN

The rôle of penicillin has been variously estimated, but in general workers have regarded penicillin therapy as inadequate—at best as an accessory to surgery and at worst as an obstacle to cure by delaying drainage beyond the best time. By the end of 1945 Kolmer (1947) had collected a mixed array of 65 cases of pulmonary suppuration, of which 37 were improved or recovered. Smyth and Billingslea (1945) reviewed 31 cases, of which 13 were cured, 8 improved, and 10 not benefited. Stivelman and Kavee (1946) treated 6 cases with penicillin and sulphadiazine, of which 5 completely recovered and 1 became chronic.

These early results were far from conclusive. Sellors (1946) felt that the use of penicillin was not as important as might have been anticipated. In his view the response to systemic and inhalational administration was not marked, and if the abscess did not rupture into a bronchus within a week or so surgical drainage should be considered. More recently greater credit has been given to penicillin as a prophylactic, and it is admitted that it might be of value in preventing the evolution of abscesses in areas of pulmonary infection (Donaldson 1947). However, there is a growing body of opinion that the advent of penicillin has provided not only a prophylactic but also a satisfactory therapy for most cases of lung abscess now being seen. Thus Blades (1947) found in a survey of cases in the U.S. Army that the almost universal use of chemotherapy and later of penicillin in all types of pulmonary infection was partly responsible for the relative rarity of lung abscess, and for the fact that those which did occur were of a less severe and more chronic type, rarely necessitating urgent drainage. Rubin (1947) stated that since the introduction of penicillin the need for surgical intervention had decreased considerably; he recommended doses of 1,000,000 units a day.

The modern view generally held seems to be substantially in agreement with that of Sellors in 1946. Nicholson (1947), Samson (1948), and Lester (1949) all advise a preliminary course of penicillin, and if improvement is not rapid, drainage is the treatment of choice. None of these writers suggest that intensive penicillin therapy has completely taken the place of drainage, since it is always anticipated that some abscesses will remain open and have to be drained.

However, Sellors (1950) has lately restated his views on the usefulness of penicillin in pulmonary infections, and now says that he has not had to drain an acute lung abscess in the last two years; he recommends 2,000,000 units of penicillin per day in this condition. This is a great departure from his previous views and reflects his experience at our hospital and at the other centres where he works. No pulmonary abscess had been drained at our hospital in the last two years, and it seemed worth while to investigate the situation further.

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ulcer crater, even after repeated radiography, and are therefore often wrongly labelled as "duodenitis." If, despite his misgivings, a surgeon is prevailed on to operate in such a case, the relatively slight pathological changes present make him justifiably doubtful of the expedience of proceeding to such a drastic measure as subtotal gastrectomy. But these patients often give histories of economic and social disability extending back over many years, and ought not to be denied the benefits resulting from successful surgical intervention. The answer in these circumstances lies in carrying out vagotomy with an associated partial pylorectomy—a relatively minor and non-mutilating procedure about which there need be no such qualms.

CONCLUSION

World-wide experience has now demonstrated, beyond all question, that vagotomy deals effectively and permanently with the basic hyperacidity underlying the ulcer diathesis. The bar to its universal adoption has been the unpleasant retention phenomena which so often follow. But these can be completely eliminated by an associated pylorectomy, and the door is now open for the recognition of vagotomy as the standard surgical procedure for duodenal ulcer. Gastrectomy should in future be reserved for the relatively rare instances where ulceration has penetrated deeply into surrounding viscera, producing complicated lesions which are no longer likely to heal spontaneously after vagotomy.

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TREATMENT OF LUNG ABSCESS

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For the last two years it has been felt at the London Chest Hospital that acute lung abscesses could be cured by proper postural drainage and adequate penicillin therapy; surgical drainage appeared to be unnecessary and even obsolete. This impression seemed so definite that it was decided to analyse results over the last three years, thus including a transition period when some cases were still being surgically drained, before the present "medical" regimen came into sole use.

The results of treatment of acute lung abscesses reported in the past have been, with few exceptions, depressingly and uniformly bad. There seemed little to choose between the results of "medical" and "surgical" treatment, each yielding a mortality of about a third. Smith (1948), reviewing 1750 cases collected from published reports, finds a mortality of 34·7% for medically treated and 32·7% for surgically treated cases. The number becoming chronic was considerably higher among the medical ones, and the bad results of surgical treatment were said to be due to delayed operations following over-persistent medical therapy. Before penicillin treatment was developed such therapy could be summarised under the headings of postural drainage, bronchoscopic aspirations, arsenical drugs, and sulphonamides.

Postural Drainage.—We can find no reference to the use of posture alone as a method of treatment.

Bronchoscopy as reported by Allen and Blackman (1936) gave a mortality of 6·5%; of 650 cases 61% were cured and 32·5% remained chronic.. Flick et al. (19 reported a 70% cure-rate in early cases.

Arsenical drugs, though strongly recommended by some (Joannides 1939, Fisher and Finney 1940), are as emphatically condemned by others (Cutler and Gross 1936, Rosenblatt 1940, Sweet 1940).

Sulphonamides were at first believed to hold out great promise, but usually, after early improvement, the cases receiving this treatment developed a well-marked tendency to chronicity (Smith 1948); and D'Ingianni (1944) found a mortality of 58·6% with sulphonamides, compared with 49·1% for his whole group.

SURGICAL DRAINAGE

In contrast with the rather hopeless outlook of the physicians, some surgeons were optimistically preaching the doctrine of early drainage. Brock (1942) urged surgical ("external") drainage at an early stage, preferably in the first few days after diagnosis. Neuhof and Touroff (1940, 1942), operating in the first six weeks, treated 152 cases with a mortality of only 2·6%. However, these figures are rarely attained elsewhere for various reasons. It is contended that the advent of penicillin has encouraged physicians to continue treating cases till the best time for drainage has passed. Surgeons are therefore called in when physicians have failed, and are more often required to deal with chronic abscesses than with acute ones.

PENICILLIN

The rôle of penicillin has been variously estimated, but in general workers have regarded penicillin therapy as inadequate—at best as an accessory to surgery and at worst as an obstacle to cure by delaying drainage beyond the best time. By the end of 1945 Kolmer (1947) had collected a mixed array of 65 cases of pulmonary suppuration, of which 37 were improved or recovered. Smyth and Billingslea (1945) reviewed 31 cases, of which 13 were cured, 8 improved, and 10 not benefited. Stivelman and Kavee (1946) treated 6 cases with penicillin and sulphadiazine, of which 5 completely recovered and 1 became chronic.

These early results were far from conclusive. Sellors (1946) felt that the use of penicillin was not as important as might have been anticipated. In his view the response to systemic and inhalational administration was not marked, and if the abscess did not rupture into a bronchus within a week or so surgical drainage should be considered. More recently greater credit has been given to penicillin as a prophylactic, and it is admitted that it might be of value in preventing the evolution of abscesses in areas of pulmonary infection (Donaldson 1947). However, there is a growing body of opinion that the advent of penicillin has provided not only a prophylactic but also a satisfactory therapy for most cases of lung abscess now being seen. Thus Blades (1947) found in a survey of cases in the U.S. Army that the almost universal use of chemotherapy and later of penicillin in all types of pulmonary infection was partly responsible for the relative rarity of lung abscess, and for the fact that those which did occur were of a less severe and more chronic type, rarely necessitating urgent drainage. Rubin (1947) stated that since the introduction of penicillin the need for surgical intervention had decreased considerably; he recommended doses of 1,000,000 units a day.

The modern view generally held seems to be substantially in agreement with that of Sellors in 1946. Nicholson (1947), Samson (1948), and Lester (1949) all advise a preliminary course of penicillin, and if improvement is not rapid, drainage is the treatment of choice. None of these writers suggest that intensive penicillin therapy has completely taken the place of drainage, since

NITROGEN METABOLISM AFTER SURGICAL OPERATIONS

USE OF A PROTEIN HYDROLYSATE AFTER PARTIAL GASTRECTOMY

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Since 1939 there have been numerous reports on the administration of protein hydrolysates before and after major surgical operations. Among other claims made for these preparations, it was said that with their aid the increased katabolism of protein which regularly follows injury could be largely or entirely prevented. This claim seemed to be unproven, but in some circumstances prevention of the postoperative loss of nitrogen would clearly be of great advantage. In 1946 the Protein Requirements Committee of the Medical Research Council proposed that the value of such hydrolysate therapy should be investigated, and invited us to take part in the investigation. The following report embodies some of the results we obtained in clinical trials on surgical patients.

METHODS

In all the cases a study of nitrogen balance was made involving measurement of the total intake and output of nitrogen in urine, fæces, and gastric aspirations. Though the urinary nitrogen excretion is closely related to the intake of protein and to the previous plane of nitrogen metabolism, two or more days may elapse before changes in protein intake are reflected in the urinary nitrogen excretion. The balance studies were therefore continued from some five days before the operation to ten or more days after it. Instead of pooling urine and fæces for several days, as has been done in many previous investigations, the urinary and fæcal nitrogen excretions were separately estimated every day, to obtain a more precise picture of the changes in nitrogen metabolism. Because of the difficulties involved in the separate collection of urine and fæces in women, men only have been studied.

Food of known caloric and nitrogen contents, estimated from the tables of McCance and Widdowson (1946), was provided from the diet kitchen of the Royal Infirmary, check chemical analyses being made from time to time. Unconsumed food was collected daily, and its nitrogen content was measured and deducted from the amount supplied. Urine, fæces, and gastric aspirations were collected in twenty-four-hour specimens as previously described (Wilkinson et al. 1949). Nitrogen was estimated by the micro-Kjeldahl method.

The nitrogen-balance studies were carried out on patients with peptic ulcer, because it was expected that a high incidence of nutritional disturbance would be found among them; this expectation was not realised. Partial gastrectomy was the commonest major operation in patients suitable for study.

The hydrolysate solution used was 'Casydrol' (Genatosan), prepared by the enzymic digestion of casein with pig's pancreas. This preparation is said to contain all the "essential" amino-acids in suitable proportions. We found that the solution supplied for parenteral injection contained, per 100 ml., 0·656 g. of nitrogen (0·339 g. of amino nitrogen and 0·16 g. of peptide nitrogen), 5·0 g. dextrose, and 0·3 g. of sodium chloride, its pH being 6·5.

FINDINGS IN CONTROLS

In spite of the existence of excellent descriptions of the metabolic disturbances after injury and operation, such as those of Cuthbertson (1936, 1942), it seemed desirable to study these disturbances after the particular operation of partial gastrectomy for peptic ulceration. Indeed, if there was any substance in the suggestion that underlying the "katabolic phase" there might be a pattern of amino-acid requirements and nitrogen excretion specific for different types of injury, it was essential to establish the excretion and metabolic pattern after partial gastrectomy, as Cuthbertson (1936) had done after fractures and operations on bones.

Controls Submitted to Operation

Of the 9 patients in this group, 4 had a partial gastrectomy, and for comparison 5 other patients were chosen of whom 1 was to have a vagotomy, 1 a lumbar sympathectomy, 1 a splanchnicectomy, 1 a subtrochanteric osteotomy of the femur, and 1 a spinal fusion and bone-graft.

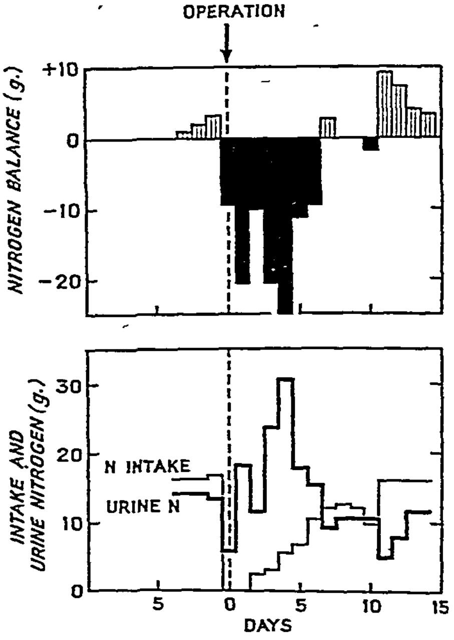

Fig. 1—Nitrogen intake, output, and balance in case 1 submitted to partial gastrectomy.

After partial gastrectomy in well-nourished men there was an increase in the urinary nitrogen excretion (compared with the excretion during the preoperative period) lasting from five to eight days, the greatest loss of nitrogen being between the second and fifth days (fig. 1). Coupled with this increased output of nitrogen there was a reduction in the intake of nitrogen as protein food, which was most marked during the first week after operation but might be severe for up to fourteen days. The resultant of these two factors was a period of negative nitrogen balance lasting from five to eight days or more after operation, the minimum of five or six days being found in those patients whose protein and calorie intake was so rapidly increased as to reach an adequate level (70 g. of protein and 1800 calories daily) within five or six days after operation. In well-nourished patients a still more rapid increase in the food intake after operation did not shorten the katabolic phase below five or six days. On the other hand, delay in restoring an adequate food intake postponed the regaining of a positive nitrogen balance, though it did

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RESULTS CLASSIFIED ACCORDING TO OUTCOME

Treatment	No. of cases	Outcome				
		Cured	Becoming chronic	Bronchiectasis symptomless	Bronchiectasis with symptoms	Died
Penicillin, high dosage ..	19	15	2	1	..	1
Penicillin, low dosage ..	6	3	..	1	2	..
Surgical drainage	7	3	..	3	1	..

Of the 7 cases drained the shortest history was of two weeks and the longest twenty weeks, the average history before diagnosis being five and a half weeks. Of the 25 medically treated cases the shortest history was of three weeks and the longest twenty-four weeks, with an average duration of nine and a half weeks.

The results have been classified in the accompanying table according to the ultimate clinical picture. We have found it necessary further to subdivide the medically treated cases into "high penicillin dosage" and "low penicillin dosage" groups, since there seemed to be a considerable difference between those receiving 1,000,000 or more units a day and those receiving less. In the low-dosage group are also included those who had inhalations alone. This "high dosage" scheme is the one which has been in use for the last eighteen months.

The patient who died in the high-dosage group was a diabetic admitted semi-comatose. Despite energetic treatment he passed into irreversible coma and had to be transferred to a general hospital, where he died, possibly of a cerebral abscess (no necropsy was obtained). Since he was never coöperative, effective postural drainage was impossible; penicillin was given for four days only before death, and it might seem almost pedantic to include him in the high-dosage series. It is felt that surgical drainage would not have offered any better prognosis in such a case.

Of the remaining 18 patients in the high-dosage group, 15 were completely cured, 2 became chronic in so far as they improved dramatically with abolition of constitutional symptoms and considerable diminution of sputum, but with radiological evidence of small residual cavities. One of these patients had a history of an extremely severe infection, and the other had had "low dosage" previously and had not been vigorously attacked from the outset. These patients were rapidly made fit for lobectomy, and at no time did their condition give rise to anxiety. Finally, 1 case gave radiological evidence of residual localised bronchiectasis. Whether this will cause symptoms owing to reinfection at a later date or not it is impossible to predict. This development of localised bronchiectasis is not confined to those healed medically. Of the 7 cases treated by early drainage 3 are clinically cured but have a residual symptomless bronchiectasis, and 1 other has a severe bronchiectasis involving only the area of the previous abscess in the upper lobe, with a copious purulent sputum.

Of the 6 patients in the low-dosage group only 3 were completely cured; the other 3 patients have a residual bronchiectasis, 2 producing symptoms, and 1 symptom-free.

A further consideration in the assessment of the results is the duration of disability. In the cases surgically drained the average duration of postoperative drainage before healing was twenty-eight weeks. For most of this time, certainly, the patients were out of hospital, some at work, and attending once a week for adjustment of the tube. Nevertheless this period represents a long, and, at the best, an uncomfortable and unpleasant time for the patient. The patients treated medically were out of hospital (except the 2 coming to resection) within four weeks, cured and ready for work. Even the 2 patients who had a resection were completely recovered and back at work, with the certainty of a cure, before this period had elapsed.

CONCLUSIONS

Even from this small series of cases it seems that penicillin and postural drainage can completely cure lung abscesses. The results obtained with the high-dosage scheme appear to be superior to those in the other groups. It may well be that the classification of lung abscess into acute and chronic is, from the clinical point of view, undesirable, and that all cases, whatever their duration, ought to be treated along these lines. The abscesses now being seen seem to be, on the whole, more indolent than those hitherto described, probably owing to the administration of sulphonamides and antibiotics, often in inadequate doses. These doses control the infection only partially, so that the whole pathological process is slowed down but not arrested. Diagnosis is therefore rarely possible at an early stage, and the general exhortation to drain early cannot often be implemented. This may very well explain the poor results obtained by drainage. Moreover, persistence with inadequate medical treatment itself predisposes to chronicity in so far as resistant strains of organisms are allowed to develop.

One of our chronic cases which came to lobectomy and 6 of the 7 which were drained had previously had inadequate medical treatment. It seems that the immediate institution of treatment with 2,000,000 units of penicillin a day and postural drainage is the safest course to follow; this obviates surgical drainage and promises the greatest freedom from immediate and remote complications. We feel that as energetic postural drainage and high penicillin dosage become increasingly used, surgical drainage will be regarded as obsolete; chronic complications will be minimised and those that arise will be readily curable by radical, not palliative, surgery, carried out on patients who are in the best condition to receive it.

SUMMARY

Recent tendencies in the treatment of lung abscess are reviewed.

Of 32 consecutive cases of acute lung abscess, 25 were treated by postural drainage and penicillin alone; the penicillin therapy is divided into "high dosage" and "low dosage" groups.

The numbers cured were: 15 out of 19 cases in the high-dosage group; 3 out of 6 in the low-dosage group; and 3 out of 7 cases surgically drained.

It is suggested that there is no place for surgical drainage of acute lung abscesses. They will heal under intensive medical treatment, and local complications, if any, will be treated by resection.

We wish to thank Mr. T. Holmes Sellors and Mr. Vernon Thompson for their suggestion to review these cases; the physicians of the London Chest Hospital for giving us access to the patients and records; and our colleagues who have so kindly given advice and help.

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or protein-components in the body, it seemed worth while to find out whether this response to injury in man could be modified after operation by varying the protein and calorie intake.

EFFECTS OF INTRAVENOUS CASEIN HYDROLYSATE

It seemed unlikely that the katabolic phase would be affected by an intake less than that necessary for nitrogen equilibrium. Accordingly it was decided to maintain throughout the postoperative period a daily intake equivalent to 11 g. of nitrogen, administering protein hydrolysate and glucose solution by intravenous infusion until food could be eaten in sufficient quantities. The hydrolysate (casydrol) was injected at a rate of 500 ml. in three to five hours, 2–3 litres being given in each twenty-four hour period for up to four or five days after operation. These volumes of casydrol provided 80–120 g. of protein (12·8–19·2 g. of nitrogen) and 100–150 g. of glucose—i.e., up to 1080 calories, of which rather more than half was derived from carbohydrate.

After gastrectomy 4 patients each received a total of 43–70 g. of nitrogen in the form of casydrol infusions in addition to ordinary food. The accompanying table shows some of the data derived from these patients and allows comparison with the controls and with 3 other patients receiving a milk mixture. Fig. 4 shows in detail the nitrogen metabolism of one of these patients.

In the table the total postoperative period, from operation to the return of stabilised protein metabolism, has been reckoned as ten days, and the period during which the urinary nitrogen excretion is much increased as six days. In both the six-day and ten-day periods all the patients given casydrol for the first few days after gastrectomy excreted more nitrogen in their urine than the controls. Comparison of the ten-day urine nitrogen excretions in case 1 (control gastrectomy) and in cases 2–5 (receiving casydrol) shows that this additional nitrogen excreted was nearly equivalent to the quantity of nitrogen injected as casydrol. The increase in urinary nitrogen was greatest in the first seven days, as is clearly illustrated in fig. 4 (case 2), and the intravenous infusion was associated with a well-marked increase rather than with a reduction in urinary nitrogen. In this particular case the postoperative daily urinary nitrogen excretion remained higher than before operation for more than two weeks, and this was probably due to superficial venous thrombosis which developed in the second postoperative week.

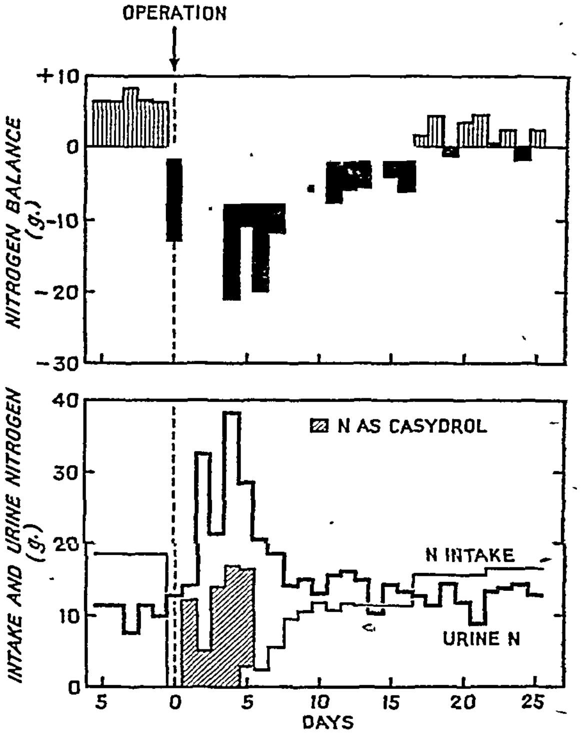

Fig. 4—Nitrogen balance, intake, and output before and after partial gastrectomy for duodenal ulcer in case 2, who was given intravenous hydrolysate for five days after operation.

Compared with other patients, those given casydrol intravenously had poorer appetites and consumed less food during the period of the casydrol infusion, and this affected their total daily calorie intake. In case 4 the calorie intake remained below 1000 a day throughout the infusion period, but in the other 3 cases the intake was 1000–1500 calories a day except on occasional single days. For the first day or two after the infusion was stopped, both protein and calorie intakes fell, but urinary nitrogen excretion continued at a high rate, and a considerable nitrogen loss resulted. In general, however, when the oral intake of food was restarted, it was possible to increase the daily quantities rapidly; nevertheless these patients were several days later in achieving nitrogen equilibrium. Hence the intravenous administration of

POSTOPERATIVE INTAKE AND OUTPUT OF NITROGEN

Case no.	Operation	Dietetic treatment	Intake of nitrogen 0–10 days			Output of nitrogen					
			Food (g.)	Casydrol (g.)	Total (g.)	Urine (g.) 0–6 days	Urine (g.) 0–10 days	Stool (g.) 0–10 days	Suction (g.) 0–10 days	Total output (g.) 0–10 days	Total negative balance (g.) 0–10 days
Control A	None	Calories constant 2500/day	72·0	..	72·0	45·1	89·1	6·7	nil	95·8	23·8
Control B	None	Calories not maintained	70·4	..	70·4	65·3	124·0	8·3	nil	132·3	61·9
Control (case 1)	Gastrectomy	Routine (as in control B)	65·5	..	65·5	107·0	147·5	8·8	7·8	164·1	98·6
Case 2	Gastrectomy	Casydrol infusion	31·2	66·8	98·0	147·4	215·6	7·6	1·8	225·0	127·0
" 3			48·5	69·0	117·5	143·0	215·8	6·2	4·5	226·5	109·0
" 4			53·0	43·9	96·9	126·7	205·3	4·5	nil	209·8	112·9
" 5			56·1	70·5	126·6	144·5	223·3	3·6	2·9	229·8	103·2
Case 6	Gastrectomy	Milk mixture after operation	171·6	..	171·6	94·1	164·7	20·2	2·8	187·7	16·1
" 7			129·7	..	129·7	104·1	144·8	9·8	4·0	158·6*	28·9*
" 8			133·9	..	133·9	67·0*	118·0*	8·7	2·7	129·4*	+4·5*

* One specimen of urine lost, probably containing about 15 g. of nitrogen.
The postoperative periods, 0–6 days or 0–10 days, include the day of operation and the succeeding 5 or 9 days.

not alter the duration of the postoperative rise in urinary nitrogen excretion.

There are important exceptions to this general rule. In a few cases the expected big increase in urinary nitrogen on the second or third day after operation did not occur; this seemed to be associated either with undernourishment or with relatively slight trauma. The relative absence of a katabolic phase in such cases may thus be due to the patient's inability to respond to the stimulus of trauma because of existing protein depletion, or to an insufficient stimulus, or to both these factors. In assessing these possibilities the preoperative period of study is of great importance, for it indicates the level of nitrogen excretion on a particular intake of protein and calories. The urinary nitrogen excretion was increased by complications such as wound infection, bronchopneumonia and other pulmonary complications, and superficial phlebitis.

From our own findings and those published in the United States and Canada, a postoperative daily intake of at least 70 g. of protein (11 g. of nitrogen) and 1800 calories seems to be necessary for the attainment of nitrogen equilibrium. After gastrectomy the restriction of food intake varies widely in degree and duration. In the surgical charge in which the present studies were made the intake was usually similar to that shown in case 1 (fig. 1), unless some disturbance compelled modification. To define how far the postoperative changes in nitrogen metabolism may be attributed to dietary restriction further control experiments were done.

Controls Starved but not Submitted to Operation

Four healthy male medical students volunteered to act as subjects. None was actively growing, all were well-nourished though varying widely in physical type, and all were younger than most of the patients submitted to operation.

In experiment A (3 subjects) the daily calorie intake was maintained at 2500 throughout. An initial daily protein intake of 90 g. (14·4 g. of nitrogen) was reduced to 10 g. of protein (1·6 g. of nitrogen) on the day of the hypothetical operation and the next two days; this incomplete protein starvation was designed to make the experiment less rigorous and unpleasant and to allow greater variety and palatability in the diet. From the fourth day onwards the protein intake was increased as nearly as possible at the same rate as in case 1; but a somewhat higher intake of both protein and calories was achieved in the controls than in the patients submitted to operation.

In experiment B (3 subjects) the preliminary period was similar, but for three days, starting on the day of the imaginary operation, the calorie intake was reduced to 500 a day and the protein to 10 g. a day. Thereafter calories were increased step by step with the protein until the original intake of both was regained. The amount of 500 calories a day was chosen because it is the equivalent of the glucose present in 2500 ml. of 5% glucose solution, the commonly accepted desirable maximum of daily fluid to be administered intravenously. During the fast activity was limited, the subjects spending most of the day in bed but rising to defæcate; activity was later gradually increased to normal. The water intake was not limited.

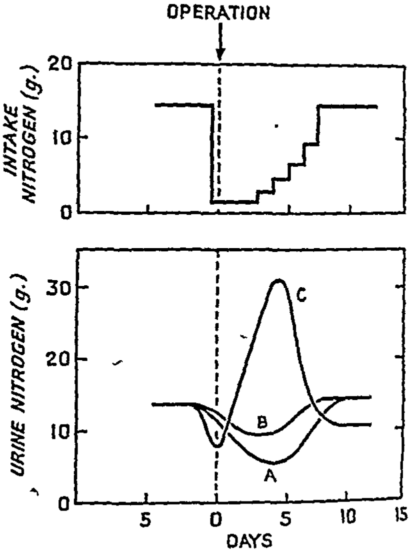

Fig. 3—Smoothed curves to show variations in urinary nitrogen excretion in controls submitted to dietary restrictions but not to operation (A and B), and in case 1 submitted to gastrectomy (C).

The results of both experiments in one subject are shown in fig. 2 and are typical of the two groups. When both calories and protein were restricted, the amount of nitrogen excreted daily in the urine fell from the previous 13–14 g. to 8–10 g., but rose again towards the initial level as food intake was increased from the third day onwards. When protein only was restricted there was a greater reduction in urinary nitrogen to 5 or 6 g. a day, and as the protein intake was increased the urinary nitrogen also increased. In no case in either experiment did the daily urinary excretion of nitrogen rise above the "preoperative" level. Nevertheless, it is important to note that the nitrogen balance was negative while the protein intake was low.

In fig. 3 the amounts of urinary nitrogen excreted in the two control experiments without operation and in case 1 are compared. In each kind of starvation the urinary nitrogen fell at a time when the patient submitted to partial gastrectomy combined with starvation showed a well-marked rise. It seems reasonable to conclude that, whereas the difference between the lower two curves is related to the protein spared by the maintenance of the calorie intake, the difference between the upper two curves reflects the protein katabolism resulting from partial gastrectomy in a well-nourished person. It is also evident that the quantity of nitrogen excreted in the urine is a more direct criterion of nitrogen metabolism than is nitrogen balance.

In the belief that the additional urinary nitrogen was derived from the breakdown of protein tissue, or from stores of protein

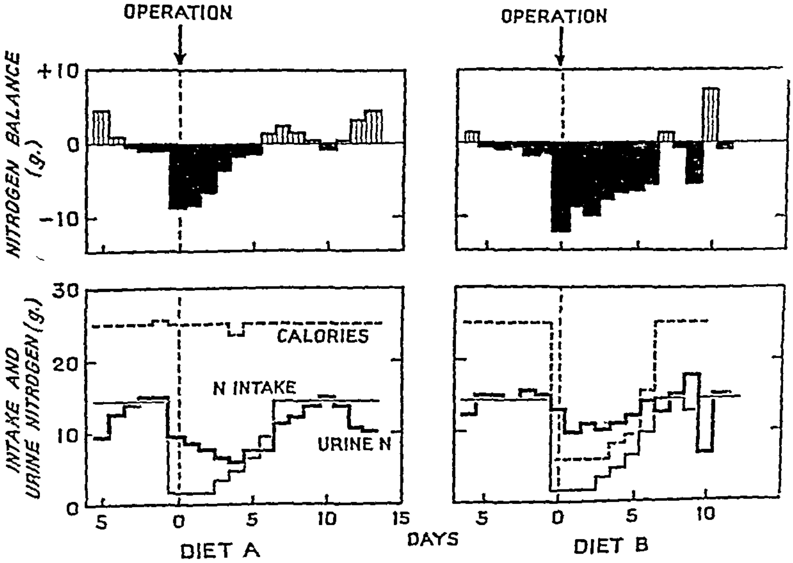

Fig. 2—Controls A and B showing variation in urinary nitrogen on the two types of diet. In this figure the "operation" is imaginary.

or protein-components in the body, it seemed worth while to find out whether this response to injury in man could be modified after operation by varying the protein and calorie intake.

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It seemed unlikely that the katabolic phase would be affected by an intake less than that necessary for nitrogen equilibrium. Accordingly it was decided to maintain throughout the postoperative period a daily intake equivalent to 11 g. of nitrogen, administering protein hydrolysate and glucose solution by intravenous infusion until food could be eaten in sufficient quantities. The hydrolysate (casydrol) was injected at a rate of 500 ml. in three to five hours, 2–3 litres being given in each twenty-four hour period for up to four or five days after operation. These volumes of casydrol provided 80–120 g. of protein (12·8–19·2 g. of nitrogen) and 100–150 g. of glucose—i.e., up to 1080 calories, of which rather more than half was derived from carbohydrate.

After gastrectomy 4 patients each received a total of 43–70 g. of nitrogen in the form of casydrol infusions in addition to ordinary food. The accompanying table shows some of the data derived from these patients and allows comparison with the controls and with 3 other patients receiving a milk mixture. Fig. 4 shows in detail the nitrogen metabolism of one of these patients.

In the table the total postoperative period, from operation to the return of stabilised protein metabolism, has been reckoned as ten days, and the period during which the urinary nitrogen excretion is much increased as six days. In both the six-day and ten-day periods all the patients given casydrol for the first few days after gastrectomy excreted more nitrogen in their urine than the controls. Comparison of the ten-day urine nitrogen excretions in case 1 (control gastrectomy) and in cases 2–5 (receiving casydrol) shows that this additional nitrogen excreted was nearly equivalent to the quantity of nitrogen injected as casydrol. The increase in urinary nitrogen was greatest in the first seven days, as is clearly illustrated in fig. 4 (case 2), and the intravenous infusion was associated with a well-marked increase rather than with a reduction in urinary nitrogen. In this particular case the postoperative daily urinary nitrogen excretion remained higher than before operation for more than two weeks, and this was probably due to superficial venous thrombosis which developed in the second postoperative week.

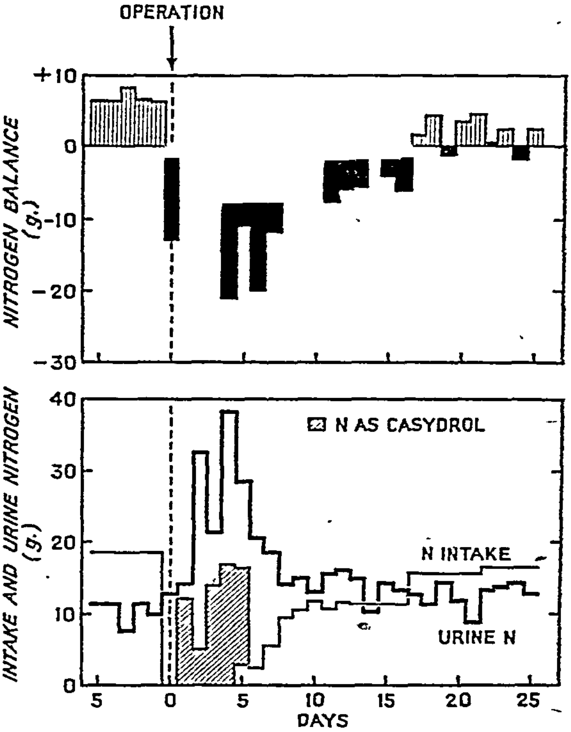

Fig. 4—Nitrogen balance, intake, and output before and after partial gastrectomy for duodenal ulcer in case 2, who was given intravenous hydrolysate for five days after operation.

Compared with other patients, those given casydrol intravenously had poorer appetites and consumed less food during the period of the casydrol infusion, and this affected their total daily calorie intake. In case 4 the calorie intake remained below 1000 a day throughout the infusion period, but in the other 3 cases the intake was 1000–1500 calories a day except on occasional single days. For the first day or two after the infusion was stopped, both protein and calorie intakes fell, but urinary nitrogen excretion continued at a high rate, and a considerable nitrogen loss resulted. In general, however, when the oral intake of food was restarted, it was possible to increase the daily quantities rapidly; nevertheless these patients were several days later in achieving nitrogen equilibrium. Hence the intravenous administration of

POSTOPERATIVE INTAKE AND OUTPUT OF NITROGEN

Case no.	Operation	Dietetic treatment	Intake of nitrogen 0–10 days			Output of nitrogen					
			Food (g.)	Casydrol (g.)	Total (g.)	Urine (g.) 0–6 days	Urine (g.) 0–10 days	Stool (g.) 0–10 days	Suction (g.) 0–10 days	Total output (g.) 0–10 days	Total negative balance (g.) 0–10 days
Control A	None	Calories constant 2500/day	72·0	..	72·0	45·1	89·1	6·7	nil	95·8	23·8
Control B	None	Calories not maintained	70·4	..	70·4	65·3	124·0	8·3	nil	132·3	61·9
Control (case 1)	Gastrectomy	Routine (as in control B)	65·5	..	65·5	107·0	147·5	8·8	7·8	164·1	98·6
Case 2	Gastrectomy	Casydrol infusion	31·2	66·8	98·0	147·4	215·6	7·6	1·8	225·0	127·0
,, 3			48·5	69·0	117·5	143·0	215·8	6·2	4·5	226·5	109·0
,, 4			53·0	43·9	96·9	126·7	205·3	4·5	nil	209·8	112·9
,, 5			56·1	70·5	126·6	144·5	223·3	3·6	2·9	229·8	103·2
Case 6	Gastrectomy	Milk mixture after operation	171·6	..	171·6	94·1	164·7	20·2	2·8	187·7	16·1
,, 7			129·7	..	129·7	104·1	144·8	9·8	4·0	158·6*	28·9*
,, 8			133 9	..	133·9	67·0*	118·0*	8·7	2·7	129·4*	+4·5*

* One specimen of urine lost, probably containing about 15 g. of nitrogen.
The postoperative periods, 0–6 days or 0–10 days, include the day of operation and the succeeding 5 or 9 days.

casydrol had increased the daily urinary nitrogen excretion, had increased the duration of excessive nitrogen excretion, and had so impaired appetite that the re-establishment of normal feeding was delayed, with the result that the period of negative nitrogen balance was prolonged.

The failure to maintain an adequate intake of calories might be an important factor in these results. The daily administration of a volume of 5% glucose solution sufficient to achieve, together with the casydrol, an intake of 1800 calories would have involved the infusion of another 4 litres of fluid, making a total of 6–7 litres per twenty-four hours. This was obviously undesirable; and moreover the use of hypertonic glucose solution in sufficient quantities leads either to loss of the injected glucose by urinary excretion or to an excessive incidence of venous thrombosis. The possibility of providing a supply of calories by injecting a glucose solution across the gastrojejunal stoma into the jejunum during the infusion of casydrol was then considered. As a preferable development of this idea, it was decided to provide both protein and calories by injecting a high-protein, high-calorie mixture (milk mixture) into the jejunum.

EFFECTS OF INTRAJEJUNAL OR ORAL MILK MIXTURE

In this group there were 6 patients who during the postoperative katabolic phase received, initially through a double-lumen tube inserted at operation into the distal limb of the jejunum and later by mouth, a mixture of whole milk, dried skimmed milk, and lactose. The mixture was prepared by adding to a pint of whole milk 120 g. of dried skimmed-milk powder, 100 g. of lactose, and sufficient water to ensure complete solution of the milk powder and lactose. These quantities provide 60 g. of protein, 23 g. of fat, and 187 g. of carbohydrate, sufficient to yield 1200 calories.

In 3 of the 6 patients the objective of maintaining an intake of more than 70 g. of protein and 1800 calories a day throughout the postoperative period was nearly achieved. The three failures were purely technical; too little mixture was injected in one; in another the large fæcal loss of nitrogen must have greatly reduced the nitrogen available for absorption; and in the third a blockage of the tube interfered with intake.

After operation, in all these patients, in spite of the large provisions of protein and calories, there was an increase in urinary nitrogen excretion, which, however, occurred a day or two later than in the patients of the previous groups (fig. 5). On the other hand, there was a much less severe negative nitrogen balance. These cases show that, even when the calorie intake is about 1800 a day, the daily administration of 70 g. of protein will not prevent the postoperative increase in urinary nitrogen excretion. However, it is evident that the jejunal instillation of whole protein accompanied by an adequate quantity of carbohydrate is less wasteful than the intravenous administration of a protein hydrolysate with inadequate quantities of glucose.

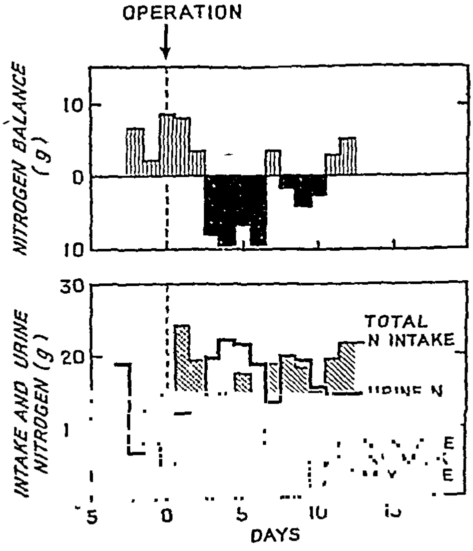

Fig. 5—Nitrogen balance, intake, and output in case 6, who was given milk mixture after partial gastrectomy.

DISCUSSION

The present investigation on well-nourished patients who had undergone partial gastrectomy has shown that an increased urinary nitrogen excretion begins on the second day after operation and lasts from five to eight days, the greatest loss being between the second and fifth days. This increase in urinary nitrogen can be resolved into three fractions: (1) due to starvation for protein; (2) due to the restriction of calorie intake: and (3) a major fraction related in some way to the operation injury. This third fraction seems also to be related directly to the initial total mass of body protein, which in turn is governed by the preceding state of protein nutrition together with factors such as previous disease.

That some part of the "katabolic phase" is due to injury and the subsequent recovery process is strongly suggested by its constant occurrence in well-nourished patients, irrespective of the food intake during the immediate postoperative period. The excessive breakdown of protein which constitutes the katabolic phase and is shown by an increased urinary nitrogen excretion rather than by a negative nitrogen balance has been found after injury and disease of the most varied kinds and in species other than man; it is not abolished by the intake of protein, even when the protein is adequately protected by carbohydrate, and is much less evident or even absent in undernourished persons with little or no protein available for katabolism. These considerations inevitably raise the question whether the katabolic phase is a pathological phenomenon to be combated by forced feeding or constitutes a fundamental biological reaction to injury. In the latter case it should be considered that the katabolic phase may even be a valuable reaction and ought not to be interfered with; at least it is associated in time with great reparative activity, it appears to do no harm, and it cannot be abolished by normal feeding methods.

SUMMARY

After partial gastrectomy and other surgical operations of similar severity in well-nourished persons there is an absolute increase in the daily excretion of nitrogen in the urine; this lasts from five to eight days, the greatest loss being between the second and fifth days.

The administration of protein (as such) or of protein hydrolysate intravenously during this period merely increases the urinary nitrogen proportionately and does not modify the "katabolic phase" in any essential way.

This increased urinary excretion does not occur in persons who are deprived of food protein but do not undergo surgical operation.

There is a negative nitrogen balance during the postoperative period, irrespective of the protein intake, and in persons who receive little or no protein but are not submitted to surgical operation.

Hence the postoperative change in protein metabolism is due partly to the usual reduction in food intake and partly to an increased protein katabolism which is inseparably associated with injury. The latter factor, the important part of the "katabolic phase," is most clearly demonstrated by the postoperative increase in urinary nitrogen rather than by the negative nitrogen balance.

We wish to thank Sir James Learmonth for providing clinical facilities and for his continued interest in the work; the four student volunteers in the control experiments; the dietitians who provided the diets; and the nurses without whose coöperation these studies would have been impossible. A grant was made to one of us (C. P. S.) by the Medical Research Council for technical assistance and materials; and one of us (A. W. W.) held the Syme Surgical Fellowship of Edinburgh University during these studies.

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In the U.S.A., where it is estimated that 2,500,000–3,000,000 children are vaccinated against whooping-cough annually, transient, serious, and even fatal neurological complications have recently been described following the inoculations. In the case reported here the child developed signs of severe cerebral damage shortly after the first inoculation with combined diphtheria-pertussis antigens. We have found only one other example of such sequelæ reported in this country (*British Medical Journal* 1949, 1950). This was a fatal case in a male infant, a twin, aged 8 months. The twins received their first dose of diphtheria-pertussis prophylactic in the morning. At 6 P.M. the boy began to cry and make strange movements with one arm. He was taken to hospital at 1.30 A.M. next day, and died an hour later. Death was ascribed to idiosyncrasy to the pertussis vaccine.

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CASE-RECORD

A boy, born on June 6, 1946, was the second child of a twin delivery (uniovular). This was a first pregnancy, and delivery was spontaneous and rapid, the second stage lasting an hour. There was no evidence of compression of the skull, asphyxia, or distress. The child was normal in health and development until the age of 2 years 4 months, when he was admitted to hospital on Oct. 3, 1948, because of a generalised convulsion. This passed off rapidly but left him with a transient right hemiplegia, from which he fully recovered in five hours, and he was discharged from hospital next day. At the time of this illness three other children in the same house were suffering from mumps, and he was diagnosed as a case of mumps encephalitis. No investigations were carried out.

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On admission, on Jan. 18, he was comatose, and his temperature was subnormal but soon rose to 101·8°F. The coma deepened, and a few hours later there were further generalised convulsions. There was no neck rigidity or Kernig's sign. The pupils were small and equal, and there was a doubtful reaction to light. The fundi were normal. The conjunctival, abdominal, and cremasteric reflexes were absent, the deep reflexes were brisk, and there were bilateral extensor plantar responses. The heart and lungs were clinically normal. The cerebrospinal fluid (C.S.F.) contained 2 lymphocytes and 21 red cells per c.mm., protein 25 mg. per 100 ml. (globulin not increased); chlorides 720 mg. and sugar 18 mg. per 100 ml. (not collected in a fluoride tube). No organisms were found. The urine was acid and contained a trace of albumin, no sugar, some acetone, and chlorides 2 g. per litre. The convulsions were controlled with intramuscular sodium phenobarbitone gr. 1. Glucose in saline solution was given rectally.

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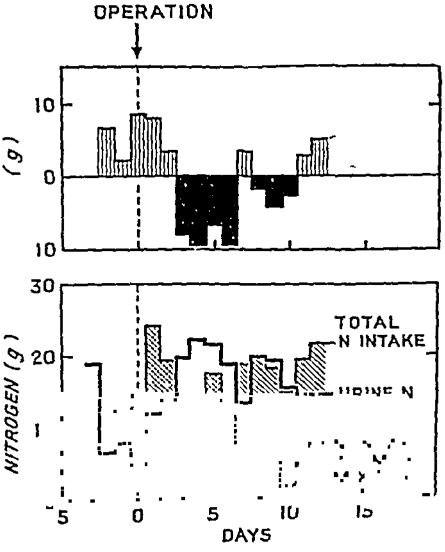

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State on discharge (Jan. 8, 1950, at the age of 3 years 7 months).—Some speech had returned, and he had a vocabulary of about ten words. He was progressing mentally, understood much of routine living, and was coöperative in the ward, though given to tantrums. He played with other children but with little sense of coöperation. The right arm and leg were still spastic, but the hemiplegia was diminishing, and he could walk without aid or support. A right homonymous hemianopia was present, but it was impossible to plot detailed visual fields.

DISCUSSION

Neurological complications are known to have followed the injection of pertussis antigen and combined diphtheria-pertussis antigens, but we have found no record of such complications following immunisation against diphtheria alone. It seems probable that the pertussis antigen was the cause of the sequelæ in the present case.

Among the suspected causes a specific toxin has been suggested. Bordet and Gengou (1906) suspected such a product of *Hæmophilus pertussis* in their original description of the organism, but it seems unlikely that such a toxin would survive in a properly aged vaccine, and few workers now support this theory.

In discussing constitutional predisposition, Byers and Moll (1948) emphasise the high incidence of a family history of neurological disorders in their cases and the fact that 12 of their 15 patients were males.

Toomey (1949), from the evidence he has collected, recommends that no child should be given pertussis vaccine if there is a family history of convulsions or if the child has a history of convulsions or other illness of the central nervous system, either present or past.

Ferraro (1944), from his own observations and from the published work, favours the view that an antigen-antibody reaction is the cause. The morbid anatomical findings of Werne and Garrow (1946) support this view. Brody (1947) states " it would seem likely that what is involved here is some sensitisation phenomenon " and emphasises the family history of allergy in his cases.

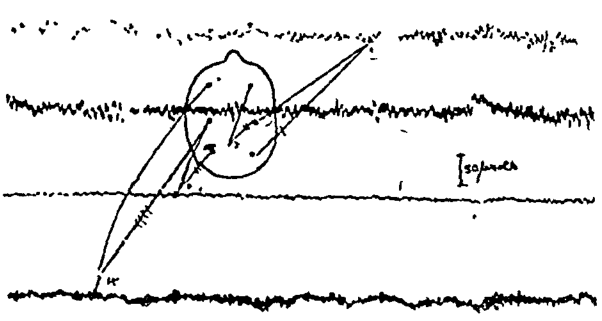

Fig. 5—Electro-encephalogram showing diminished electrical activity of left cerebral hemisphere.

He suggests that the mechanism resembles that of the neurological complications of erythroblastosis fœtalis, where there is a " plugging of the small cerebral vessels by agglutinated red cells . . . agglutinated as a result of a sensitisation phenomenon."

Many of the cases reported have occurred after a second or subsequent injection of the vaccine; in some there has been a history of previous convulsions. In the present case the convulsions followed the first inoculation (pertussis vaccination), but there had been a convulsion three months previously, when other children in the household had mumps.

Complications of pertussis vaccination are extremely rare, but the results are so serious that, until the prophylactic value of such vaccination is established beyond doubt, it may be desirable not to vaccinate a child in whom there is any suspicion of the stability of the central nervous system as shown by the personal or family history. If there is any untoward reaction to the first injection, no further injection should be given

SUMMARY

Severe neurological complications are described in a boy aged $2^1/_2$ years who developed convulsions thirty-six hours after the first injection of combined diphtheria-pertussis antigens.

Investigations made eight months later showed dilatation of the left lateral ventricle and diminished electrical activity of the left cerebral hemisphere.

A year later there was some recovery, but the patient still had a small vocabulary and was mentally retarded.

The pathogenesis is unknown, but in view of the reports of serious neurological complications it is suggested that pertussis vaccination should not be done if there is a history of convulsions in the child or the family; if there is any untoward reaction

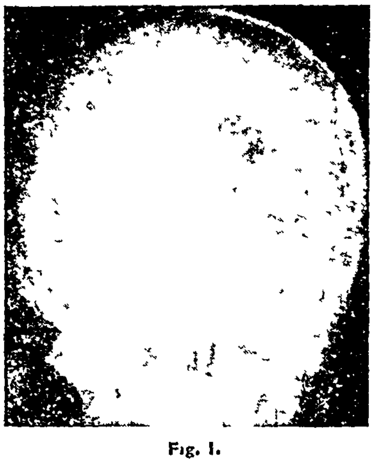
Fig. 1.

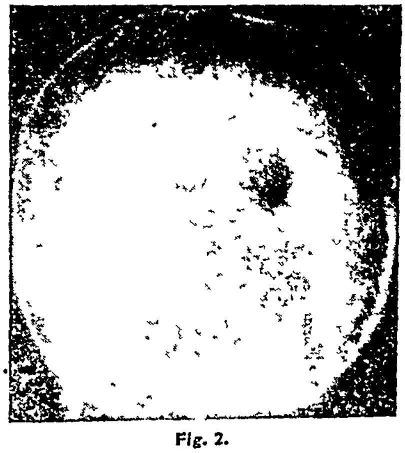
Fig. 2.

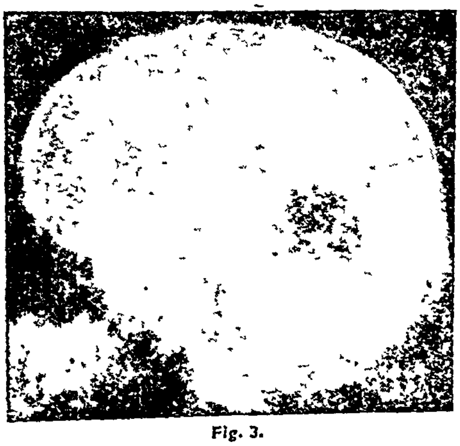
Fig. 3.

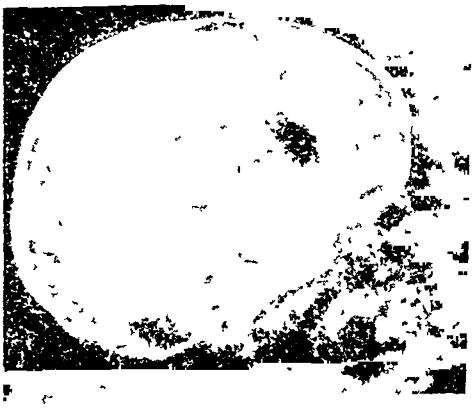
Fig. 4.

Figs. 1–4—Encephalograms showing left lateral ventricle much dilated.

to the first injection further vaccination should be abandoned.

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THE EFFECT OF REST IN BED ON PLASMA VOLUME

AS INDICATED BY HÆMOGLOBIN AND HÆMATOCRIT LEVELS

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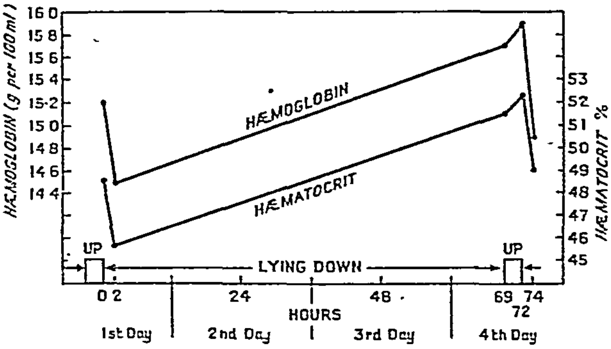
It has been known at least since Böhme's work in 1911 that a change from the vertical to the horizontal posture produces a fall in serum-proteins and hæmoglobin levels, and that a change from the horizontal to the vertical has the reverse effect. The alterations in serum-proteins and hæmoglobin occur within two hours, and it has generally been assumed that the values then reached are stable and do not change until the posture is altered once more. Widdowson and McCance (1950), however, found that the rise or fall in the circulating elements usually reached a maximum within two hours after the change of posture and the serum-protein, hæmoglobin, and hæmatocrit levels tended to return towards their original values in the next twelve hours or so. Further studies, with undernourished persons, showed that rest in bed led at first to a fall in protein, hæmoglobin, and hæmatocrit, but that after two hours these levels began to rise again, so that after three days they were no lower than before the persons went to bed. This increase in concentration could not be explained by loss of œdema fluid as measured by changes in body-weight.

Some experiments have therefore been made on well-nourished men and women, and the results are set out here. The previous experiments on undernourished persons are also mentioned.

MATERIAL AND METHODS

The subjects of the experiments were hospital patients whose complaints (hernias, indefinite gastro-intestinal troubles, &c.) were not likely to have any effect on the volume or composition of their blood. They were admitted to hospital at noon, and blood was at once withdrawn with a minimum of stasis. The subjects next undressed and lay quietly in bed for two hours, when a second sample of blood was collected with the same precautions as before. For the next sixty-seven hours the subjects remained in bed, with not more than two pillows, and on the morning of the third day after admission blood was again collected from some of the subjects, who then got up and stood and sat about in the wards till noon, when a fourth sample of blood was withdrawn. The subjects next lay on their beds again for two hours, when the fifth and last specimen of blood was taken. The other subjects were bled only once on the third day, and did not get up until the third and final sample of blood had been collected in the afternoon, at a time corresponding to the second specimen on the first day. A standard light midday meal was given on the test days.

For the determination of hæmoglobin and hæmatocrit, coagulation of the blood was prevented by adding to each 10 ml. of blood 0·02 g. of a mixture of two parts of potassium oxalate and three parts of ammonium oxalate. For the determination of serum-proteins the blood was collected without anticoagulant and was centrifuged within an hour of collection.



Variations in hæmoglobin and hæmatocrit levels induced by changes of posture and by three days' rest in bed.

Hæmatocrit was determined by centrifuging for 45 minutes at 3000 r.p.m.

Hæmoglobin was estimated by Gibson and Harrison's (1945) method. Both hæmoglobin and hæmatocrit were determined on the day the blood was collected.

Serum-proteins were estimated by precipitation with tungstic acid and subsequent digestion with sulphuric acid, copper selenide being used as catalyst. The nitrogen was determined by the micro-Kjeldahl technique (see Laboratory Techniques 1950).

CHANGES IN HÆMOGLOBIN, HÆMATOCRIT, AND SERUM-PROTEIN LEVELS IN 10 SUBJECTS AFTER LYING IN BED FOR TWO HOURS AND FOR THREE DAYS

Case no.	Sex	Hæmoglobin (g. per 100 ml.)			Hæmatocrit (%)			Serum-proteins (g. per 100 ml.)		
		On admission	After 2 hours' lying	After 3 days' lying	On admission	After 2 hours' lying	After 3 days' lying	On admission	After 2 hours' lying	After 3 days' lying
1	M	14·8	14·2	14·8	47·2	44·6	48·5	6·57	6·57	6·84
2	M	15·6	14·8	16·7	50·0	46·8	54·4	8·00	7·42	7·41
3	M	12·3	11·4	12·6	39·9	38·9	39·6	7·79	7·18	7·42
4	F	13·9	13·3	14·5	43·6	40·8	44·3	8·02	7·46	7·78
5	F	15·2	14·3	15·2	46·5	43·5	46·5	7·43	6·81	7·23
6	F	14·0	13·5	13·5	44·7	42·5	43·9	7·78	6·87	6·71
7	F	13·4	12·8	13·7	41·4	40·8	41·6	7·68	7·37	7·16
8	F	13·7	13·0	14·0	44·4	43·0	44·3	7·40	7·16	7·23
9	M	—	14·1	15·2	—	44·8	49·6	—	6·62	6·64
10	M	—	14·5	15·8	—	46·0	51·4	—	6·47	6·97
Averages:										
First 8 only ..		14·1	13·4	14·4	44·7	42·6	45·4	7·58	7·10	7·22
All 10 persons ..		—	13·6	14·6	—	43·2	46·4	—	7·00	7·14

RESULTS

The accompanying figure shows the average changes in the hæmoglobin and hæmatocrit levels of two subjects from whom blood was taken on five occasions, and the accompanying table the levels found in ten subjects who were bled when they were first admitted to hospital, after they had been recumbent for two hours, and after they had been in bed for three days. It will be seen from the figure that, after the well-known effect on the hæmoglobin and hæmatocrit levels of lying down for two hours, the values rose again over the next sixty-seven hours and were slightly higher on the morning of the fourth day than they had been on admission. They rose a little further when the subjects were up and about for a few hours in the morning, and after this period in the upright position they fell again when the subjects lay down. Though this fall was large and would certainly not have taken place had the subjects not got up, the final levels were still higher than those found after the subjects had been lying down for two hours on the day of admission. The net effect of three days' recumbency was therefore a rise in the hæmoglobin and hæmatocrit levels, which almost certainly was an expression of a fall in the volume of the plasma. These results are confirmed by the data in the table. It will be seen that the changes in serum-protein were less than those in the hæmoglobin and hæmatocrit, and not always in the same direction. It is suggested that this was due to some of the serum-proteins being taken up by the body cells or metabolised in the three days. At all events the changes in the serum-protein followed the changes in hæmoglobin and hæmatocrit much more closely over the shorter than over the longer periods of time.

Since rest in bed for three days produced alterations in the hæmatocrit and hæmoglobin levels comparable with those which follow a change from the horizontal to the vertical position, and since the rate of diuresis has often been shown to be reduced by this change (McCance 1950), 1200 ml. of water were given to nine of the patients after two hours in bed and again after three days in bed. When the water was given after two hours in bed the average volume excreted in the next five hours was 1268 ml., and when it was given after three days in bed the average volume was 1274 ml.; hence it may be concluded that, though three days in bed reduced the plasma volume it did not reduce the diuretic effect of water.

DISCUSSION

These observations are in entire accord with those made on undernourished men in Germany (Widdowson and McCance 1950), and it is evident that lying in bed for three days raises the hæmatocrit and hæmoglobin levels of well-nourished as well as of undernourished persons. The figure shows that the reasons for the changes are undoubtedly very complicated, for (1) protracted recumbency has exactly the opposite effect of short-term recumbency, and (2) *after* protracted recumbency a change to the vertical position for a few hours somehow alters the conditions so that a large and characteristic fall in concentration is observed when the person once more lies down.

It is generally assumed that the changes which take place in the two hours after a change of posture are the result of alterations in the volume of plasma, and possibly the increased concentrations which follow three days in bed are to be explained in a similar way by a fall in the plasma volume. If this is so, it remains to explain why the plasma, which appears to increase in volume during the first two hours after lying down, should then decrease in volume over the next three days. Posture and inactivity are probably both involved in these changes, and the secondary rise in concentration may be the result of protracted inactivity rather than of recumbency *per se*. This could be tested by making the persons take exercise in the recumbent position, but so far this has not been attempted. It seems desirable, however, to call attention to these results now, since the early effects of a change of posture on the constituents of the blood are at last becoming widely recognised, and their significance has been emphasised in assessing the true levels of hæmoglobin and serum-protein (Committee on Hæmoglobin Surveys 1945). It is evident that the protracted effects of recumbency may be equally important, and it cannot be assumed that lower values for hæmoglobin and serum-proteins will be found in blood taken when a person is recumbent than in blood taken from the same person when he is up and about. They may be quite as high in the recumbent as in the upright position if the person has been in bed for some days.

SUMMARY

When normal persons rested in bed for two hours their hæmoglobin, hæmatocrit, and serum-protein levels fell in the expected way; but if the rest was continued for three days the levels rose again to their original height.

Similar effects had previously been observed in undernourished persons.

It is suggested that this secondary rise in the concentration of the circulating elements may be the result of inactivity rather than recumbency.

The diuretic effect of 1200 ml. of water was not altered by three days in bed.

We are indebted to Dr. M. Shutter and Miss L. A. Thrussell for assistance in the collection of the samples of blood.

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DEOXYCORTONE WITH ASCORBIC ACID IN MENTAL DISORDER

SOME CLINICAL AND LABORATORY FINDINGS

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Hench et al. (1949) found that treatment of rheumatoid arthritis with adrenocorticotropic hormone (A.C.T.H.) or 'Cortisone' often caused euphoria. Lewin and Wassén (1949) reported benefit in rheumatoid arthritis from giving deoxycortone and ascorbic acid together. We have tried Lewin and Wassén's technique in the following cases:

Schizophrenic psychoses	13	(2 of less than one years' duration.)
Depressive psychoses ..	17	(11 ,, ,, ,, ,, ,,
Manic psychoses ..	4	(3 ,, ,, ,, ,, ,,
Neuroses	3	
Rheumatoid arthritis ..	1	
Angioneurotic œdema	1	
Normal individuals ..	6	
Total	45	

The dose of deoxycortone varied from 2·5 to 10 mg., and after the first few trials it was always injected into the thigh muscles, three or four inches below the greater trochanter. The dose of ascorbic acid was always 1·0 g. intravenously.

CLINICAL RESULTS

Schizophrenic psychoses.—The 2 cases of less than a year's duration showed immediate benefit and have since maintained their improvement.

Before treatment both showed retardation of thought, and thought disorder at times amounting to "blocking." Both were lonely and asocial and suffered from derealisation-depersonalisation syndrome. Both showed anergia and emotional shallowness. After the combined injections, both showed rapid changes within thirty minutes; they became easy in social converse, showed more emotional depth, lost their anxious preoccupation with feelings of unreality, and became energetic and helpful in the ward. One of them, who had had auditory hallucinations and delusions of reference, developed full insight into these, and lost the feeling that time was "painfully fast" of which he had complained. He had 3 treatments and the other patient had 4; and, though the first treatment was followed by relapse in about a week, they have now remained well without further treatments in the past twelve weeks.

The single treatments given to the schizophrenics with a history of more than twelve months produced no changes that seemed significant.

Depressive psychoses.—In the 11 cases of less than a year's duration there were well-marked changes, whereas only 1 of the 6 chronic patients showed significant and lasting changes. The clinical changes noted were generally a feeling of well-being, amounting in some cases to euphoria, a decrease of retardation of thought, and an increase of activity and sociability. Delusions and hallucinations, which became much less prominent early in treatment, were not, however, lost, and tended to become prominent again as the patient relapsed. However, it was found that they were much less concealed during the phase of improvement, and it was possible to discuss them amicably with the patient. In general, a dose of 2·5 mg. deoxycortone was found more effective than one of 5 mg. A dose of 10 mg. was usually depressing: one patient complained bitterly of feeling worse than ever he had before. In the early stages of treatment, relapse usually took place within two days. As a rule, patients could be improved again by another treatment; but in 3 depressives with considerable amounts of neurotic reaction improvement failed to appear with later injections. In 1 case treatment failed on the fifth occasion, and in the other 2 on the third occasion. These failures occurred in spite of the patient's considerable confidence in the treatment.

In 1 chronic case the patient showed an initial striking improvement, into euphoria out of a state of misery and lethargy, an hour after the treatment. This improvement lasted twenty-four hours but was succeeded by a phase of more intense depression with the addition of negativistic and aggressive features. Further treatments failed to lift him out of this state, and recourse had to be made to electro-convulsion therapy (E.C.T.) before improvement set in again.

In 4 of the cases where treatment was persisted in on each relapse, there was a maintained remission; 1 patient has died from bronchopneumonia but the other 3 have had no treatment now for twelve weeks, without relapse. One of these is a man with chronic depression of twenty years' standing.

Our general impression from these cases and others now under treatment is that the patients do well if they have a history of less than twelve months, and if there is not a large neurotic element in their condition. A notable feature of the positive reactions has been their similarity to those following E.C.T. Of 12 patients who benefited previously or subsequently from E.C.T., 11 also showed benefit from deoxycortone with ascorbic acid. The 4 patients in this series who had E.C.T. without benefit did not improve on deoxycortone and ascorbic acid.

Manic psychoses.—2 patients with less than a year's history showed temporary great improvement following treatment. The improvement consisted in a feeling of calm ("loss of energy") and reduction of activity, aggressiveness, elation, and garrulousness. Improvement lasted one or two days. Both these cases benefited also from intensive E.C.T. One other case of less than a year's duration, who had previously responded temporarily to intensive E.C.T., did not show any response to deoxycortone and ascorbic acid. The fourth case, of longer standing, improved with neither method.

Neuroses.—Only 1 patient improved (still well after three months). The other 2 showed no change.

Somatic disturbances.—Deoxycortone with ascorbic acid was given to 2 members of the staff suffering from rheumatoid arthritis and angioneurotic œdema.

A woman of 51, who for three months had been under treatment at a general hospital for rheumatoid arthritis, had made very little improvement, and had considerable pain and stiffness in the left shoulder, elbow, and hand. There was wasting of the interossei in the left hand, and considerable swelling of the finger-joints. She displayed anxiety-tension and pessimism about her illness. At the time of her first injection she had a "streaming cold"; ten minutes later her colour was better, pain and stiffness rapidly began to leave the joints, mobility quickly returned, the rhinorrhœa disappeared, and she experienced considerable euphoria, amounting perhaps to elation. That night she was unable to sleep, being full of hopeful plans about the future. The first remission lasted eleven hours; treatment was resumed whenever relapse set in, and now, after 13 treatments, she has apparently completely recovered, having had no injections for the past five weeks. There has been no rise of blood-pressure during treatment, and weight has not increased. There appears to be a slight increase in the amount of hair on the legs, but no other changes. Emotionally she is now alert, confident, and optimistic.

The second patient was suffering from angioneurotic œdema involving face, scalp, ears (with watery otorrhœa and partial deafness), and scrotum. He was anxious, irritable and preoccupied with his condition. Half an hour after the first treatment all œdema had vanished, and he was quite elated. This elation was noted particularly by his family when he arrived home that evening. It prevented him from sleeping on the first night. Remission lasted from one to three days, and after 3 treatments he has remained well for three months.

Normal individuals.—Effects on normal people were either nil, or only subjective. One of us (E. H. C.)

TABLE I—CLINICAL RESULTS WITH DEOXYCORTONE AND ASCORBIC ACID

Condition	No. of cases	Under 12 months' duration			Over 12 months' duration			Ratio of response to E.C.T.*	No. in remission following this treatment alone
		No.	+++ reaction	Other reactions	No.	+++ reaction	Other reactions		
Schizophrenia	13	2	2	—	11	0	1 ++ 1 +	0/2†	2
Depression	17	11	10	1 Nil‡	6	2	4 Nil	11/12	4 §
Mania	4	3	2	1 Nil	1	0	1 Nil	2/3†	—
Neuroses	3	0	—	—	3	1	2 Nil	—	1
Rheumatoid arthritis	1	1	1	—	—	—	—	—	1
Angioneurotic œdema	1	1	1	—	—	—	—	—	1
Normal	6	—	—	2 +	—	—	—	—	—

+ = Subjective feelings of relief without definite objective changes.

++ = Some subjective and objective changes not lasting twenty-four hours.

+++ = Marked subjective and objective changes lasting more than twenty-four hours.

++++ = Changes so great as to reverse the clinical picture.

Nil = No change either subjective or objective.

* Ratio of response to E.C.T. means the number of patients actually benefiting from deoxycortone with ascorbic acid—i.e., Deox.-Asc., who also benefited from E.C.T., shown as a ratio of the number of patients benefiting from E.C.T. who also were given deoxycortone and ascorbic acid.

† Benefit from E.C.T. was only obtained from intensive E.C.T.

‡ This man was considerably improved after twenty-four hours, but it is impossible to be sure whether it was due to deoxycortone and ascorbic acid.

§ One patient died from bronchopneumonia four weeks after last treatment.

TABLE II—LABORATORY FINDINGS

Patient	Diagnosis	Treatment	Result §	Eosinophils per c.mm.				Urinary uric-acid/creatinine ratio			
				Basal	2 hr.	4 hr.	Max. change	Basal	2 hr.	4 hr.	Max. change
1	Depression	Ascorbic	Nil	135	142	130	−4 %	0·36	0·34	0·38	5 %
		Deoxycortone	+ +	164	148	156	−10 %	0·29	0·32	0·33	14 %
		Deox.-Asc.	+ + +	138	125	64	−54 %	0·28	0·38	0·49	75 %
2	Depression	Ascorbic	Nil	346	362	350	5 %	0·31	0·34	0·32	10 %
		Deoxycortone	Nil	324	316	304	−6 %	0·39	0·27	0·20	−48 %
		Deox.-Asc.	+ + +	369	312	221	−40 %	0·34	0·41	0·72	112 %
3	Depression	Ascorbic	Nil	184	225	205	18 %	0·47	0·43	0·30	−36 %
		Deoxycortone	Nil	218	204	162	−26 %	0·26	0·41	0·53	104 %
		Deox.-Asc.	+ + +	208	187	86	−54 %	0·19	0·87	0·54	358 %
4	Schizophrenia	Ascorbic	+	114	98	87	−24 %	0·35	0·44	0·49	43 %
		Deoxycortone	Nil	100	100	112	12 %	0·30	0·47	0·47	56 %
		Deox.-Asc.	+ + +	164	93	104	−43 %	0·33	0·77	0·71	115 %
5	Normal	Ascorbic	Nil	194	225	244	25 %	0·62	0·63	0·56	−10 %
		Deoxycortone	Nil	431	369	336	−22 %	0·36	0·38	0·44	22 %
		Deox.-Asc.	Nil	334	319	325	−5 %	0·49	0·48	0·67	37 %
6	Depression	Deox.-Asc.	+ + +	124	65	49	−60 %	0·36	0·61	0·69	92 %
7	Hypomania	Deox.-Asc.	+ + +	130	82	51	−61 %	0·54	0·79	0·76	46 %
8	Depression	Deox.-Asc.	+ + +	156	131	75	−52 %	0·29	0·95	0·63	227 %
9	Rheumatoid arthritis	Deox.-Asc.	+ + +	330	270	327	−33 %	0·30	0·65	0·82	173 %
10	Mania	Deox.-Asc.	+ + +	270	160		−41 %				
		Intensive E.C.T. (3 G.M.S)	+ + + +	324	136	80	−75 %				
	Mild depression	Ascorbic	+	320	172	121	−62 %	0·24	0·72	0·78	225 %
11	Depression	Deox.-Asc.	Nil	189	164	172	−13 %				
	Mild depression	E.C.T. (1 G.M.)	+ + +	114	75	41	−64 %				

§ Key as under table I *All reductions shown as* −.

experienced no notable change with the usual dosage. With a dosage of 10 mg. deoxycortone in the combined treatment, after half an hour there was a feeling of irritability, anxiety, fatigue, and precordial oppression. The diastolic pressure rose from 90 to 120 mm. The symptoms abated in four hours. In the third experiment 2·5 mg. was used; after fifteen minutes there were feelings of euphoria coupled with tranquillity, whilst a colleague reported that there seemed to be a reduction in the psychomotor activities. Another normal subject noted similar changes after the standard treatment. No changes were noted in the other 4 normal individuals.

Side-effects.—All the early cases in this series had frequent observations of the blood-pressure and pulse, after the injections. Only when the dosage of deoxycortone exceeded 5 mg. was any rise in the blood-pressure noted, and most of the depressives showed a slight fall. None of the patients showed any notable gain in weight. No investigations of blood sodium or chloride were made.

E.C.T.—Of the patients who reacted positively to deoxycortone with ascorbic acid, 2 were given E.C.T. during this investigation, to compare the clinical and biochemical changes. One was a case of mania and one of depression, and their improvement after E.C.T. was *rather greater than their improvement after deoxycortone* and ascorbic acid.

Summary.—The clinical results are set out in table I.

LABORATORY INVESTIGATIONS

To test whether the changes following treatment were due to the elaboration of a cortisone-like substance, a number of patients, both positive and negative reactors to the treatment, were investigated for changes in the eosinophil count, and the urinary uric-acid/creatinine ratio. These investigations were carried out under basal conditions with standard biochemical techniques, and the results are shown in table II.

Blood and urine specimens were taken from the patient at the time of the injection, two hours after the injection, and then four hours after. Hæmatocrit estimations, were carried out on all blood specimens. Only one (no. 9), showed any change, 54 in the basal value and 43 and 42 in the next two values. The others were of normal value and remained the same throughout.

DISCUSSION

It will be seen that in all but 1 case the +++ reaction was associated with a fall of at least 40% in the eosinophils. In the case (no. 9) where the fall was lower (33%) there was a change in the hæmatocrit value and a 173% plus change in the urinary uric-acid/creatinine ratio. When the reaction was below +++ the maximum fall of the eosinophils was 26%. With a +++ reaction all cases showed a rise of urinary uric-acid/creatinine ratio of at least 75%—except case 7, in which the eosinophil fall was 61%. When the reaction was *below* +++ the maximum rise in the ratio was 56%, except in case 3 where *it* was 104%; but the corresponding eosinophil fall was only 26%.

These findings strongly suggest that a cortisone-like substance is formed in the body by the interaction of deoxycortone and ascorbic acid, because only the 11-17 oxysteroids have *this joint action of reducing* the eosinophils and increasing the urinary uric-acid/creatinine ratio. American workers have suggested that E.C.T. acts through adrenal stimulation via A.C.T.H. (Altschule et al. 1949a and b). In our cases 10 and 11 the effects of E.C.T. were rather stronger than those of deoxycortone with ascorbic acid, which supports the above hypothesis. It *is interesting to note* that ascorbic acid alone, given in case 10 three days after the completion of a course of intensive E.C.T. (2 grand-mals a day for three days), produced a change just as great as any recorded with deoxycortone and ascorbic acid together. Perhaps the injected ascorbic acid replaced the *ascorbic* acid which had been metabolised during the intensive stimulation of the adrenal cortex by E.C.T. This would serve to stimulate adrenocortical activity again.

Le Vay and Loxton (1950) have shown in experiments *that deoxycortone and cortisone may act* peripherally. However, the effects we observed on the eosinophils and on uric-acid excretion, suggest in addition a central action—e.g., on *the adrenal cortex itself.*

Selye (1947) has pointed out the antagonism between deoxycortone and cortisone; and it may well be that the varying effects we have reported are due to antagonism between the cortisone-like substance formed and the deoxycortone left unchanged. Thus, injected ascorbic acid may convert some of the endogenous desoxocortisone (Selye 1950) into cortisone-like substance [see Brownlee (1950) on beneficial effects of ascorbic acid alone in normal animals], or, alternatively, injected deoxycortone may react with endogenous ascorbic acid to produce the cortisone-like substance.

Further work may show that it is possible to regard some psychotic states as an "exhaustion stage" in Selye's "alarm—adaptation syndrome" (Selye 1946) with the typical syndrome reduction of adrenocortical activity. Important American work already has demonstrated that, in chronic schizophrenics, there is often "adrenal unresponsiveness" both to A.C.T.H. and to stress (Pincus et al. 1949).

In conclusion, we wish to emphasise that the primary aim of these investigations was not formulation of a new therapy, but rather to note any changes that might follow administration of these substances. It appears to us now that there is justification for proceeding to cautious systematic trials of varying therapeutic régimes along these lines.

SUMMARY

1. Deoxycortone with ascorbic acid, given as suggested by Lewin and Wassén, has been tried in 45 persons of whom 37 had mental disorder, 2 had somatic disorder, and 6 were normal.

2. In general, mental cases with histories under twelve months showed euphoric reactions, whose effects were beneficial and in some cases led to a good remission.

3. The fall in eosinophil counts, and the changes in the urinary uric-acid/creatinine ratio, associated with response to this treatment, suggest that it causes, in the body, the production of a cortisone-like substance.

4. There has been a close correlation between the reaction of patients to this form of treatment and to electro-convulsive therapy.

We wish to thank Dr. H. Weil-Malherbe, director of research at Runwell Hospital, for advice and help in the carrying out of this investigation, and Mrs. P. R. Kent for help in the presentation of the results and setting out of the paper.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

The Newer Antibiotics

THE section of experimental medicine met on March 14, with Prof. G. W. PICKERING in the chair.

Prof. ROBERT CRUICKSHANK traced the development of modern chemotherapy through the work of Ehrlich, Domagk, Fleming, Florey, Dubos, and Waksman. The bacteriologist had played a great part in this development and he also played a great part in the daily use of these new remedies. He must identify the organism responsible for the illness, test its sensitivity, and advise on the most suitable chemotherapeutic agent. Professor Cruickshank reviewed some of the antibiotics from four aspects:

Therapeutic effectiveness.—The relative sensitivity of the different organisms to the different drugs in vitro was no sure guide to their therapeutic efficiency in vivo. Thus in vitro polymyxin was very active in preventing the growth of *Salmonella* organisms, but it had proved disappointing in the treatment of typhoid; on the other hand *Pseudomonas pyocyanea* often responded well to polymyxin when applied locally.

Pneumonia might be due to numerous different organisms, which differed in their response to the main antibiotics; for rational therapy the organism should be identified. In some cases the organism, when isolated, might appear in the laboratory to be resistant to penicillin (or to some other antibiotic), but this did not always mean that a therapeutic response was unobtainable; when the dose of penicillin was increased from 100,000 to 4 million units per day, a rapid clinical improvement often ensued. Moreover, sometimes the pathogenic organisms were located in a relatively inaccessible site, and, to reach such a site, it might be necessary to drench the tissues with antibiotic.

To evaluate the true value of any new drug, carefully controlled trials were necessary. Good examples of such trials had been those of streptomycin organised by the Medical Research Council. The Council was now arranging trials on whooping-cough, infantile gastro-enteritis, pneumonia of children and of adults, and other infections.

Toxicity.—The drug might cause local irritation of the stomach—for example, large doses of 'Aureomycin' might cause nausea and vomiting. In this connection, it might be questioned whether starting treatment with a loading dose was really desirable, particularly in chronic infections, such as brucellosis.

There might be allergic reactions to the drug itself or to bacterial products suddenly released; hitherto this had not happened much with either chloramphenicol or aureomycin. There might also be definite toxic effects on the tissues. Thus streptomycin tended to damage the labyrinth and auditory apparatus; and it had been suggested that 'Chloromycetin' tended to cause abnormal fatigue in the muscles and ophthalmoplegia. The antibiotic might eliminate valuable bacteria from the intestine or respiratory tract, leading to the loss of valuable vitamins—e.g., vitamins B or K—or to the establishment of undesirable secondary organisms.

Finally, drug resistance might develop, as in tuberculosis treated with streptomycin: it had not yet been seen in typhoid treated with chloramphenicol.

Ease of administration.—Chloramphenicol and aureomycin could be given by mouth whereas penicillin was usually given by injection. But penicillin could be given by mouth if desired, using large doses (e.g., 1 g.) administered on an empty stomach. This was particularly effective for young children; and even with adults enough was usually absorbed to produce a good response.

Cost.—Weight for weight penicillin was cheaper than chloramphenicol and aureomycin; but these could often be administered to patients at home, whereas a course of injections with penicillin required admission to hospital. In this light chloromycetin and aureomycin were often less expensive than penicillin.

Among the disadvantages of the newer antibiotics must be reckoned the bitter taste; but in children under 1 year the taste-buds were not fully developed and so they did not object to the taste, and children older than 4 years could usually swallow capsules. Another disadvantage of these drugs was that their action was bacteriostatic rather than bactericidal, as was proved by the tendency of some infections to relapse after treatment had ceased; perhaps it might be possible to reinforce their action with antiserum.

The value of these drugs for meningitis, especially when due to Pfeiffer's bacillus, was still uncertain. Unfortunately nothing had yet been found which would sterilise carriers of typhoid or similar organisms. Urinary infections due to *Proteus* or *Ps. pyocyanea* were still difficult to treat. Apparently psittacosis and trachoma responded well to chloramphenicol and aureomycin, and it was reported that herpes zoster and herpes simplex also responded. But these substances had no effect in smallpox or chickenpox. There was still much scope for further study of these remedies, and for further new ones with a different range of action.

Dr. R. LEWTHWAITE described the work on chloramphenicol which had been done in Malaya by the American team. This work began with Prof. J. E. Smadel's discovery that rickettsial infections in fertile eggs could be cured by this compound. With the cordial welcome of the Malayan government he went to Malaya in 1948, taking with him one pound of chloramphenicol, which represented almost the total world supply at that time. Scrub-typhus was a virulent infection spread by a mite (*Trombicula dehliensis*) living in the grass; and the disease had caused serious casualties among our troops during the Burma campaign. The mortality was usually about 15%. The response of scrub-typhus to chloramphenicol was dramatic; within forty-eight hours of the beginning of oral treatment the clinical condition improved greatly.

Experiments were made to see if chloramphenicol would have prophylactic action, the drug being given while volunteers were exposed to infection. As long as the drug was being given, scrub-typhus did not develop; but about 10 days after the end of treatment almost all the volunteers fell ill with the disease. Further work showed that the disease could be prevented if chloramphenicol were given once weekly, continuing for several weeks after exposure to infection. During this time symptoms of incipient scrub-typhus might appear, but they were cut short by the next dose. The drug did not kill the rickettsiæ, but it prevented their multiplying until at last the body could deal with them itself.

Typhoid fever also responded to chloramphenicol (a discovery which had since been amply confirmed elsewhere). If the treatment were continued for less than 9 days, relapse often occurred; and so Smadel recommended that treatment should continue for at least 12 days. Unfortunately chloramphenicol did not prevent the patient becoming a carrier; nor did it free him from the organism when he had become a carrier.

Among other infections, gonorrhœa was readily cured by chloramphenicol, and patients might lose all symptoms within 1–2 days of taking a single oral dose. More recently Dr. A. J. Boase had reported from Uganda that trachoma responded very well too aureomycin, given by instillation; apparently it also responded well to chloramphenicol. If these findings were confirmed (as was expected) this would be a development of the greatest importance, since trachoma was very common and very troublesome in most of the warmer parts of the world.

Prof. J. M. SMELLIE spoke about the treatment of infantile gastro-enteritis—a condition which had been the subject of much research for many years and which still caused about an eighth of the deaths in the first year of life. Possibly a virus was concerned in the ætiology. At present, treatment was mainly symptomatic, with an attempt to correct dehydration and electrolytic disturbances. Hopes had been raised by sulphonamides, penicillin, and streptomycin; but each in turn had failed. During the past eight months, chloramphenicol had been used to treat 27 children (mostly under 6 months old) at the Children's Hospital, Birmingham; of these, 17 were critically ill at the start, and had to be given intravenous alimentation. Each was given a minimum of 2½ oz. of fluid per lb. body-weight per day. The dose of chloromycetin was 75 mg. per lb. per day in divided doses every 3–4 hours, the dose being mixed with a little syrup and given by a teaspoon. Despite the bitter taste, there was no difficulty in persuading the children to swallow it. Treatment usually lasted 10–12 days. In all but one of the cases (a hopeless one from the start) the clinical condition improved appreciably within 1–2 days of the administration of chloramphenicol. Diarrhœa abated, pyrexia (when present) ceased, and the toxæmia diminished. In a few of the patients a superimposed parenteral infection was also present, but this also responded well to the chloramphenicol. Untoward reactions to the drug were few. In some cases the infants suffered from sore buttocks, but this was probably not due to the drug. In 2 a cutaneous eruption was seen—one a generalised papular type of urticaria, and the other an allergic dermatitis of the buttocks and groins.

The assessment of any treatment of infantile gastro-enteritis was very difficult since the disease itself varied greatly in severity and intensity. But, even by the most cautious estimate, the results obtained with chloromycetin were more promising than any which had been achieved with other chemotherapeutic and antibiotic remedies.

Dr. E. N. ALLOTT said that 21 cases of typhoid fever had been treated with chloramphenicol at Lewisham Hospital. Some were given 20 g. during 48 hours. Others received the course recommended by Smadel—i.e., a loading dose of 4 g. followed by 1·5 g. twice daily until symptoms stopped, and then a maintenance dose for a total of 12–14 days. The relapse-rate was equally high whichever course was followed, but all the relapses responded well to further treatment. Relapses tended to occur 11–15 days after the end of treatment; this was also the incubation period. He suggested that short courses should be given and repeated at the time when a relapse might be expected—i.e., after 10–11 days.

Chloramphenicol in Typhoid Fever

At the meeting of the section of epidemiology on March 17, the discussion was opened by Dr. W. H. BRADLEY, president of the section, who was in the chair.

Dr. Bradley recalled that it was Smadel's success with chloramphenicol in typhoid fever that led the Ministry of Health to ask Parke, Davis & Co. to import some of the drug for a trial in this country. An outbreak at Crowthorne, Berkshire, provided the first opportunity, and a preliminary note on the early findings was published in THE LANCET a year ago (1949, i, 869). Shortage of the drug and the condition of some of the patients led to changes in the plan for this trial, and eventually chloramphenicol had to be used in "control patients" to save life. The outbreak was due to *Salmonella typhi* of phage-type E.1. In his preliminary communication Dr. Bradley stated that after resolution of temperature when chloramphenicol had been given for 8 days, recovery appeared complete. This proved not to be so, for subsequently 6 of the 12 treated patients, and also 6 of the 12 untreated cases relapsed. In the treatment of these relapses the effect of chloramphenicol was again dramatic and consistent. On the advice of Dr. R. Lewthwaite, treatment was continued for several days over the eight originally proposed by Woodward; this seemed to prevent relapses, but in Smadel's more recent experience treatment for eighteen days was guarantee against relapse. Woodward had suggested that relapses were particularly common in patients treated with this drug, but Dr. Bradley was not satisfied that this was so. There might be better ways of preventing relapses than merely continuing the treatment longer. A clearer picture of the natural history of relapses was needed; Dr. Bradley's impression was that they occurred with a fairly regular periodicity, and it might be wise to give a short second course at the time when relapse might be expected. Alternatively, more intensive treatment early in the disease, or (improbably) a boosting dose of vaccine or a course of serum might reduce the incidence of relapses. In the treatment of the 70-odd moderately severe cases in the outbreak originating from the R.M.S. *Mooltan*, Dr. Bradley suggested that Dr. Armstrong should use massive doses comparable with those which Gray gave in whooping-cough. The results seemed no better than with the original Woodward dosage—in fact, there were little "flicks" in the temperature charts not observed with the smaller dosage; and signs of muscle weakness (blurred vision, for example) appeared, confirming Gray's observations. It was, however, learnt that patients with severe typhoid could be given 20 g. in two days without undue risk.

There was no doubt about the value of chloramphenicol in typhoid. The disappointing feature was its failure to prevent the development of the "chronic carrier" state. Thus in one case, although two courses of chloramphenicol had been given, the stools were still positive on discharge from hospital on the 83rd day. So far the the drug had failed, even in massive doses, to clear chronic carriers. However, hope should not be given up of applying chloramphenicol, "using some cunning and at present unsuspected technique," to the prevention of the carrier state and the cure of the carrier.

Dr. R. A. GOOD described the results in the Crowthorne cases treated at Winchester. The 5 men and 8 women admitted were divided, by the alternate case method, into 6 treated with chloramphenicol and 7 controls: later 2 of the controls were given the drug as a life-saving measure. The temperature fell in 72 hours in all the treated cases, but an equal number relapsed in the two groups; the relapses occurred about the 35th day in the treated cases and about the 25th in the untreated. One of the treated cases, a woman of 24, who had had T.A.B. vaccine during the war, developed a chronic carrier state.

Dr. A. L. K. RANKIN described 18 cases admitted between May, 1949, and January, 1950; 10 of them were from Crowthorne. Altogether, 13 primary or relapsed cases were given chloramphenicol: one of these patients, a man of 77, died. No toxic or side effects of the drug were observed, and no increased resistance to chloramphenicol was demonstrable in the organisms. The prognosis of typhoid, Dr. Rankin recalled, was progressively less favourable in elderly patients. In this series a third of the patients were over 58, and apart from the one man admitted in a hopeless condition, all recovered. He felt that chloramphenicol was responsible for this result in at least some of the cases. Given in adequate doses, chloramphenicol was most effective. It also eased the strain on the nursing staff, although the success of any treatment of typhoid still largely depended on the efficiency and enthusiasm of the nurses.

Dr. R. LEWTHWAITE described 2 relapses among his early patients in Malaya, and referred to Woodward's "interrupted" method of treatment, as described by Smadel, in which the drug was given for five days, then treatment was stopped for five days, and then the original course was repeated. Even after eighteen days' treatment, relapses would still happen occasionally; when the morbid anatomy of the disease was considered, this was not surprising. Dr. Lewthwaite was pleased that the synthetic drug worked as well as the one made by fermentation.

Dr. STANLEY WHITE added that chloramphenicol was the only antibiotic which it was possible to synthesise on a practical basis. Smadel considered that its action was bacteriostatic, not bactericidal, but some workers would not accept this statement in its entirety. Assuming that Smadel was right, it followed that unless the drug was given in sufficient amount over a sufficient time, there were going to be relapses. The method now advocated was to give a total of 30 g. over not less than a fortnight. When a relapse occurred, it responded even more dramatically than the primary attack to chloramphenicol therapy, presumably because the defence mechanism was already in action. In Smadel's opinion there was no reason to believe that the carrier state would develop more often in patients who had had chloramphenicol than in those who had not. Dr. White advocated large doses in paratyphoid. Chloramphenicol interfered with carbohydrate metabolism, and affected vitamins B_1 and B_2 and nicotinic acid: vitamin K might also be involved. A possible explanation was that chloramphenicol not only sterilised the upper respiratory tract but killed the organisms which synthesised the B group; therefore one should give large doses of vitamin-B complex when treating any infection with chloramphenicol.

Dr. C. F. L. HILL described the results in 21 cases from the *Mooltan*, 10 being given a short course of chloramphenicol (an initial dose of 4 g. followed by eight-hourly or six-hourly doses of 2 g.), and 11 a longer course (an initial dose of 4 g. and then 20–35 g. over nine to eighteen days). There was no significant difference in the relapse-rate of the two groups, relapse occurring in about half of the cases. It might be possible to suppress a relapse by giving a further course of the drug ten days after the completion of the first course. He was not convinced of the efficacy of the two-day course.

Dr. C. K. MCDONALD, discussing blood-cultures and stool-cultures, said it would be helpful if there could be some standard method of assaying the drug in the blood. There did not seem to be any chloramphenicol-resistant strains of *S. typhi*.

Dr. D. C. LIDDLE spoke of the outbreak of typhoid at Salford in October, 1949. Of 20 patients admitted to hospital, 17 were treated with chloramphenicol. Two of them died—a man of 58 whose death was primarily due to arterial thrombosis, and a man of 40 who was given a five-day course. His temperature settled and he seemed well, but a fortnight before he died he complained, once only, of a pain in the calf, and he died of pulmonary embolism. In the first case no organisms were found in the bile but they were present in the spleen, bone-marrow, and liver. In the other the organisms were present in the bile, spleen, and lungs, but not in the liver. The patient who had organisms in his bile had been excreting them in his fæces: the one who had none in his fæces was found to have none in his bile. Relapses occurred in 5 inadequately treated cases. All the cases who developed complications were those who had been partially treated. Some patients were given a full course, and he had formed the impression that a thorough course, lasting over fifteen days, was necessary to prevent complications. Whenever chloramphenicol was given, a patient should have his blood-sedimentation rate estimated before being allowed up. The patients responded so rapidly to treatment that they tended to become euphoric about the 3rd or 4th day, but they should not get up before they were fit to do so.

Dr. STANLEY BANKS, discussing the question of chloramphenicol's bacteriostatic or bactericidal action, said that though Smadel considered it to be the former, there was some clinical evidence of the latter. The French had noted the psychiatric reaction which might be thought to be in the nature of a Herxheimer reaction, due to rapid killing of the organisms. He mentioned a case of paratyphoid B in a child in which chloramphenicol appeared to have no effect, though the French seemed to have found that it had the same effect as in typhoid. The interference with vitamins B and K in the gut was a point in favour of intermittency of treatment.

Dr. IAN TAYLOR produced some figures in relation to relapse-rates. In the Croydon outbreak of 341 cases, the relapse-rate was 20% and the case-mortality 15%. At Bournemouth 495 cases produced 38 deaths and "a few" relapses. It did seem that the consistent finding and it was reported that herpes zoster and herpes simplex also responded. But these substances had no effect in smallpox or chickenpox. There was still much scope for further study of these remedies, and for further new ones with a different range of action.

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THE LANCET

LONDON: SATURDAY, MARCH 25, 1950

The Collings Report

Dr. COLLINGS, whose report on the present state of English general practice we publish this week, is a young Australian who had previously studied medical work in his own country, in New Zealand, in Canada, and in the United States. His one-man reconnaissance of a territory so often surveyed by its inhabitants may seem unnecessary or even impudent; but a single scout sometimes learns more than a party, and the chief features of a countryside are often picked out most easily by a stranger. COLLINGS had the advantage of knowing other comparable countrysides, but he has looked on England with fresh eyes. His report is quite unlike the compilation of a committee; if it lacks the kind of wisdom attained by compromises and qualifying clauses, it has the merit of saying plainly what he saw and what he thinks. His capabilities as observer and commentator are obvious: indeed in presenting such a report he presents his own credentials.

On what he saw, he concludes that "the over-all state of general practice is bad and still deteriorating." In industrial areas, where the demand for good medical care is greatest and most urgent, practice "has reached a point where, despite the efforts of the most conscientious individual doctors, it is at the best a very unsatisfactory medical service and at the worst a positive source of public danger." Conditions of work are sometimes such as to change a good doctor to a bad doctor within a short time, thus neutralising much of the sound teaching of the medical schools. Paradoxically, practice is worst in close proximity to large hospital centres and "improves in both scope and quality almost in proportion to the distance away from those centres." But even in the country districts present-day practice "remains an anachronism, though one which has retained many of the virtues of the past." The National Health Service Act has increased the load on general practice and at some points has caused serious strain; but "many of the shortcomings attributed directly to the Act are the result of basic weaknesses," and "blame rests on the service only in so far as it has failed to provide the means of reinforcing general practice, so that it can take the new load."

To anyone accustomed to think of the English general practitioner, and English general practice, as the best in the world, these blunt statements from an outside observer come as a surprise; and they raise two questions: (1) were the 55 English practices examined a fair and representative sample, as COLLINGS believes, and (2) has he assessed them accurately? Those interested will need to read the report before reaching an opinion. Statistically, of course, the 55 practices are a small sample, and they were not selected at random; hence it is quite possible that an unduly large proportion of unsatisfactory ones were seen. More important, however, is the question whether the estimates formed after a period of one to four days "sitting in on" the practice were sound. Doctors who identify their own practices, and the far larger number to whom the criticisms might equally well apply, will often feel that a partial view has been taken; that the best features of their work have been ignored while insignificant details have been emphasised; that the essentials of medical care have little to do with filing-cabinets and examining-couches; and that wrong impressions can easily be gained from a few hours' observation under somewhat artificial conditions. They may say, with some reason, that for COLLINGS, as an Australian, the ideal general practitioner seems to be a man equipped and ready to deal with anything five hundred miles from anywhere; whereas in England, with its hospitals and specialists, the G.P.'s rôle is different. But those who read his report carefully will find him expressing as much admiration as disapproval. They will note, too, that the criticism is professional, not personal, and is directed almost always against the system and not the people working it. Some of the practices he criticises most strongly are run by the doctors whom, as men, he most respects. Of the industrial areas he writes "it is neither my purpose nor my desire to defame the overworked and often conscientious doctor who has to suffer the indignities of this way of working." If some feel that the picture is painted in colours too dark, or with contrasts too sharp, let it be remembered that the artist's aim is neither to praise nor to blame, but to display these indignities that they may be removed. They may or may not be as widespread as he supposes, but the fact that they exist at all calls for determined action.

"I regard the errors," COLLINGS says, "as merely symptoms of the chronic illness of general practice today"; and he reviews the causes of this illness. For several decades general practice has adapted itself to the growth and development of hospital, specialist, and other medical services; but "this process has resulted in the decline rather than the progressive evolution of general practice, and in wide departure from both the idea and the ideal of family doctoring." The scope and interest of the practitioner's work has steadily contracted. The local-authority services undertake much that was once in his charge: though supposedly complementary to the practitioner, they are in fact substitutes for him. The hospitals, in excluding him from their staffs and removing patients from his ken, have gone far to isolate him professionally and depress his standards. More and more the specialist invades general practice, the latest invaders being the pædiatrician ("nothing seems to be too menial for him") and the geriatrician, both of whom seek responsibility for whole age-groups of society. The current tendency, as COLLINGS sees it, is always to compensate for deficiencies in general practice, by extending the activities of specialists and hospitals. "This trend has been going on for a long time: but if it continues it is bound to result in over-compensation, unnecessary expense, further dehumanising of medical care, and ultimately the elimination of the general practitioner as a responsible person."

Here some will say: "But none of this is new. Does Dr. COLLINGS imagine that we don't know it?

of a relapse-rate of 50% in cases treated with chloramphenicol was abnormal.

Prof. **Robert Cruickshank** said that the methods for assaying the drug in the blood were at best crude; he thought the best was with the agar-diffusion method. Dr. Liddle's evidence about the organisms in the gall-bladder was interesting. When one was dealing with a drug which could not get into the gall-bladder, one would not expect it to sterilise the bile, and excretion of organisms from the gall-bladder would continue. It would be interesting to know if the carriers had fully functioning gall-bladders. If not, this might be why one did not obtain a cure in these cases.

Dr. **Liddell** replied that in the two carriers he had mentioned, the gall-bladders were examined, and it was found that the dye-stuff was not excreted in these cases. It did appear that delay in emptying the gall-bladder had something to do with the carrier state.

Dr. **White** remarked that chloramphenicol appeared in the bile in conjunction with another substance which rendered it inactive and which was broken down on reaching the gut. In mice chloramphenicol had been given with sulphadiazine, but he did not know of this being tried in man. In the laboratory the drug appeared to be bacteriostatic in vitro, but if combined with a specific antiserum it was bactericidal. Chloramphenicol had been successful in a chimpanzee at the Dublin Zoo when its pneumonia had not responded to penicillin; but the president had implied that chimpanzees and other animals were not likely to receive much chloramphenicol in this country while the Ministry of Health continued to control it and it was in short supply.

Reviews of Books

An Autobiography

Sir ARTHUR KEITH, M.D. Aberd., F.R.S. London: Watts. 1950. Pp. 703. *25s.*

A BOOK by Sir Arthur Keith about his work and himself is not likely to be dull, and this one has most of the qualities which go to make good autobiographical writing. Though not a diary, it is clearly based on one, and it has a Pepys-like sincerity in what he writes of the man he sees in himself. Of his faults he is a merciless critic—faults, it is safe to say, which have seldom been apparent to his many friends and admirers. He is like Pepys too in the skill with which he selects the dramatic incident of the moment.

Thus of his presidential address to the British Association in 1927: "I could evoke no response from the sea of faces in front of me—only a stolid attention; and the feeling grew within me that I was committing the most heinous sin possible from a platform—boring my audience." Hastily he cut his address short, jettisoning his most treasured paragraphs.

A visit by the Prince and Princess of Wales to the museum of the Royal College of Surgeons led to a duel of will between Sir Henry Morris, the president, and Sir Frederick Treves, the courtier. Morris was determined that the royal party's attention should be called to the specimen of the first stone removed from a kidney—his own contribution to the advance of surgery. Treves was equally determined that it should be passed by in silence—and it was.

Like Pepys too, he can sketch his opinion of his contemporaries in a phrase, as when he says of Havelock Ellis, his neighbour in the country, "I never made that projected call and since reading his biography I believe I decided rightly," or of Lord Moynihan, "Lady Moynihan loved the shade and he the sunlight," or of Elliot Smith, "I strove for coöperation but somehow it developed into rivalry."

Perhaps to some it is the story of Keith's boyhood on the Aberdeenshire farm and of his early struggles in London which will most appeal. When he set out from home to seek fame and fortune, it was one Willie Murray who drove him in the cart to the station. "In after years, if any honour came my way, I could always count on a letter from Willie reminding me that it was he and his dung cart which launched me on my career." The book is long and diffuse, intermingling records of domestic events, anatomical investigations, and self analysis; but it will be read.

Occupational Eye Diseases and Injuries

JOSEPH MINTON, F.R.C.S., ophthalmic surgeon to the Hampstead General Hospital; lecturer on industrial ophthalmology at the Royal Institute of Public Health and Hygiene. London: Heinemann Medical Books. 1949. Pp. 184. *21s.*

MR. MINTON has spent some years on the study of industrial eye problems, and the results of his investigations are set down in this book. The subject matter falls into three parts—industrial eye accidents and how they may be avoided, industrial lighting, and the employment of persons of defective eyesight in industry. Industrial eye accidents often end in the law-courts, and many case-histories are quoted to illustrate the awards of these courts; it is evident that the author's sympathies are—commendably but not always impartially—with the injured man. (Would all agree, for instance, that with a detached retina coming on "a few months" after a cut on the eyebrow, there was "no doubt" that the one was due to the other?) The book will be helpful to industrial medical officers, showing them the methods employed in different factories both in preventing and in treating eye accidents.

Diagnosis of Pancreatic Disease

LOUIS BAUMAN, M.D., formerly assistant professor of clinical medicine, Columbia University, New York. *Philadelphia and London: J. B. Lippincott.* 1949. Pp. 74. *40s.*

THIS monograph on pancreatic function tests and their application in the diagnosis of pancreatic disease is based upon the author's 25 years' experience at the Columbia-Presbyterian Clinic, New York. The difficulties and errors inherent in estimating pancreatic function have held up progress in this important problem for many years, and though more recent work on the purification of secretin, and analysis of pancreatic secretion, have greatly advanced knowledge, the book does not suggest much headway. Dr. Bauman gives an account of some 550 pancreatic function tests, using 'Mecholyl' as the pancreatic stimulant; but though his case findings are given in detail it is not easy to find that he has drawn any conclusions of outstanding clinical application. Two short chapters, one on fat-absorption in pancreatic deficiency, and one on serum-amylase estimation, are also included.

Round the Fountain. Pieces from *St. Bartholomew's Hospital Journal*, 1893–1949. (5th ed. Pp. 243.)—In 1893 the various hospital clubs at Barts merged into a students' union with a single monthly journal as its official organ and its rendezvous round the fountain which stands athwart the path, used by Rahere, from the Smithfield to the Little Britain gate. In the centre of the quadrangle, says a modern historian rather unkindly, is a fountain where students are accustomed to sit and gossip away the fine summer days. That they gossip with insight and charm is clear from this gallimaufry (or medley), as the editors call it, which is an essential documentary of the light-hearted side of hospital life.

Perspectives in Neuropsychiatry (H. K. Lewis & Co., 1950. Pp. 236. *15s.*).—Prof. F. L. Golla succeeded Sir Frederick Mott as director of the Central Pathological Laboratory at the Maudsley Hospital, and later took his present appointment as director of the Burden Neurological Institute at Bristol. This little book, designed by some of his associates and past pupils to honour his 70th birthday, carries a collection of fourteen stimulating essays on neuropsychiatric subjects, each signed by a distinguished name. The subjects chosen range through cerebral anatomy, electro-encephalography, the biochemistry of cerebral function, the endocrinology of mental disturbance, the concept of the schema in neurology and psychiatry, the relation of mind and matter to personality, and psychiatric genetics, to forensic psychiatry, aims and methods of treatment, and mental hospital problems. Dr. Derek Richter has edited the collection and contributes one of the essays. All have a background of hard thinking, and ask as much from the reader.

unwilling practitioners to form a group, it is at least equally unwise not to encourage those who want to form one. This kind of spark needs to be fanned, not watered. Perhaps nothing in the report is more significant than the story of the keenness shown by the Scottish practitioners when they got together at their local hospital of a Saturday afternoon.

In conclusion we would say this. The report is the work of one man, necessarily reflecting his predilections, and therefore open to criticism. But if it condemns much in general practice today it also demonstrates the value of general practice to the public, and the need for positive effort if this value is to be preserved. "General practice as we know it could, if we wished, be converted into general practice as we like to imagine it." But do we wish it? The issue is placed squarely before us, and our reaction should be constructive rather than merely defensive. The Collings report, coming at so critical a time, is a major challenge, demanding that we should think straight and act accordingly. We have to decide what the general practitioner should be doing, and then—whatever it is—enable him to do it properly.

Diet in Hypertension

Despite almost fifty years' intensive investigation, the therapeutic value of diet in hypertension is still undecided. This is largely because of confusion of thought on three aspects of the problem. In the first place, as Ayman [1] points out, there is a tendency to overlook the natural history of hypertension, a disorder characterised by wide variations in blood-pressure, and changes in pressure well within the normal range for hypertensives have been taken to indicate that a particular diet is effective. If this error is to be avoided, observation must be continued over many years. The second confusing factor is the lack of careful differentiation of essential hypertension from hypertension secondary to renal disease, particularly nephritis. The third factor is the confusion between essential hypertension without heart-failure and essential hypertension with heart-failure. Thus improvement in hypertensive heart-failure resulting from a low-sodium diet has often been taken to indicate improvement in the hypertension, whereas all that has happened is that the heart-failure has been controlled.

Most attempts to control hypertension by diet have been based on either a low-sodium or a low-protein intake. The low-sodium diet was first popularised by Ambard and Beaujard [2] in 1904, and received a new lease of life from Allen's [3] work in America. Allen, who is still an ardent believer in his régime,[4] emphasised the importance of sodium restriction, whereas other workers put the emphasis on sodium chloride and often regarded the chloride radicle as more important than the sodium. One of the difficulties attached to very low sodium diets, which Allen always appreciated, is that in hypertension associated with renal disease sodium restriction may lead to renal failure and that it is therefore contra-indicated in nephritic hypertension. The rôle of dietary protein in hypertension has been debated for twenty years. Saile [5] compared the diet and blood-pressure in monks of the Carthusian and Carmelite orders with those in Benedictine and Franciscan monks, the first two being vegetarians whereas the second two are not. Saile found that the systolic blood-pressure in the vegetarian monks was on average 30–40 mm. Hg lower than among the non-vegetarian monks. In England Harris [6] was a keen advocate of low-protein diets; but few workers have been able to confirm his results. The work received fresh impetus in the late war from observations on the effect of semistarvation. In Leningrad during the siege the number of cases of hypertension diminished, whereas in the next two years, when food became more plentiful, hypertension became a major medical problem.[7] These observations were confirmed experimentally by the Minnesota experiment of Keys and his colleagues.[8] Among 34 healthy young men submitted for six months to a 1600-calorie diet containing 49 g. of protein, the mean systolic blood-pressure fell by 11·1% and the diastolic by 7·7%. In Budapest, on the other hand, Kohári-Kuchárik [9] found no change in the blood-pressure of 39 patients with essential hypertension after the ten months of rigorous dietetic restriction (predominantly protein) which the city underwent in 1945.

Fresh interest in the effects of diet has been raised by Kempner's enthusiastic reports on his rice diet in hypertension.[10] This diet, which has been described as "combining practically all the theories that have been advanced for the dietary treatment of hypertension, being low in sodium (200 mg.), low in protein (20–25 g.), low in fat (5 g.), and restricting fluid intake to 800–1000 ml.,"[11] consists mainly of rice and fruit juice. In this country it has received a measure of official sanction since the requisite amount of rice can be obtained by patients on presentation of a medical certificate. The diet is ingeniously comprehensive, but neither its originator nor his followers are clear whether it is to be used for the treatment of (*a*) essential hypertension, (*b*) nephritic hypertension, or (*c*) hypertensive heart-failure. Renal failure has arisen through its indiscriminate use, and the original claim that it produces nitrogen balance has been disproved by Schwartz and Merlis.[12] Even those who say that it causes a significant fall in blood-pressure add that careful supervision is necessary [11]; and others have recommended modifications.[13] In one of the more careful studies, Schroeder and his co-workers [14] found no appreciable response to the diet in 13 cases of severe hypertension: "In general, when the disease was relatively advanced and treatment was mandatory neither restriction in salt nor the rice diet appeared to be of much benefit." The position has been ably summed up by Keys and his colleagues [7]:

> "... few workers familiar with the Kempner and similar diets will deny that patients frequently cannot or will

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Has he never heard of the Medical Planning Commission, and the British Medical Association's constructive evidence to the Goodenough Committee and its notable reports on health centres and on medical education, all of which have shown awareness of the need for upgrading general practice ?" To which COLLINGS might fairly reply that he is not compiling other people's opinions but expressing his own. He might point out that the actual effect of the admirable sentiments expressed by the B.M.A., by Medical Planning Research, by *The Lancet,* and by so many other people, during the past ten years has evidently been precisely nil, since the state of general practice (he found in 1949) was bad and still deteriorating. And he might add that, though for the first time deliberate planning of our medical services as a whole is possible, the fate of general practice is now being decided—unintentionally, but rapidly and remorselessly—by people who know and care little about it. "It is being determined mainly by the people responsible for hospital and specialist development, and in terms of compensation for recognised, or half-recognised, deficiencies, instead of the correction of these deficiencies." The situation has in fact become critical.

For some time we have been trying to draw attention to this situation. At the beginning of last year we wrote:

> ". . . there are evidently two schools of thought. The first holds that under modern conditions medicine dwells in the hospitals, where alone accurate diagnosis and scientific treatment of major illness is possible. According to this school the emphasis of the new service should be on hospital and specialist services, which will deal with all the illness that matters, and the rôle of the general practitioner is chiefly to feed the hospitals. The second school, on the other hand, regard the investigation and treatment of major illness as secondary to the enormous task of relieving the troubles of everyday life, and of helping people to pursue health: the heart of medicine, they feel, is in general practice, and it is at least as important to have really good general practitioners, bringing medicine to the home, as it is to provide pleasures and palaces for patients who qualify for institutional care. Polemics apart, all will agree that the two parts of clinical medicine are complementary, and that what we have to do is to strike a suitable balance between them; but there certainly seem to be special reasons at present why the hospital school should not be in the ascendant."[1]

Within the profession there is indeed a very real, if unavowed, difference of opinion: on the one hand are those who see no future for the general practitioner except as an appendage to the hospital service, while on the other are those who believe he must be brought back to his former position as a highly responsible doctor. Somewhere between these opposites are those who hold, by no means unreasonably, that ideally the practitioner should concern himself less with organic disease and more with elementary psychotherapy and preventive medicine. Whoever is right, it is certain that the development of the National Health Service cannot be rationally planned without a clear idea of what the function of the practitioner is and should be; and this is the subject that should now be uppermost in the minds of those responsible for the service—not least, perhaps, the Central Health Services Council. Our own opinion that the practitioner must be a man who knows and practises medicine[2] is supported by COLLINGS's argument that, within the present cultural pattern, "the doctor's ability to establish rapport with his patient, and thus place himself in a position to cope with psychological problems, rests largely on his ability to handle physical diseases—not only the minor physical disorder but also, to a great extent, the major one." It is further strengthened by Dr. LESLIE COLE's contention in last week's *British Medical Journal* that the discovery of new and effective remedies, whose immediate administration may mean so much to the patient, has greatly increased the clinical responsibility of the man whose task it is to detect the disease and take initial action. Maybe Dr. COLLINGS is taking an Australian view when he would like to see every practitioner exercising many different skills; but as a minimum we should surely demand conditions under which doctors can and will examine their patients. Can we not also go further and restore the practitioner to his position as the person in medical charge of the case? Always down the breeze comes the siren song of the specialists, *Anything you can do I can do better*; but, as COLLINGS says, we should "firmly resist the conclusion that therefore we must keep on fractionating and specialising." More and more, as the years go by, it is seen that patients need to have some one doctor looking after them; and that is the reason behind COLLINGS's "reactionary thought" that "the patient, as a person, is better off receiving his medical attention, through the undeveloped New Zealand service than he will ever be through any highly developed service depending chiefly on hospitals and specialists."

There is also an economic argument. As we said a few weeks ago, "in terms of expenditure, the cheapest form of medicine is preventive medicine; the next cheapest is efficient care of patients in their homes; and the most expensive is hospital treatment."[3] COLLINGS points out that, "quite apart from human values, it is doubtful whether the policy of concentrating on hospital and specialist care is economically justifiable or even possible, and its hazards will certainly not be lessened by drifting into it." He holds that our programme should be based on the premise that as many people as possible should be kept out of hospitals. But there is at least enough truth in his picture of existing practice to show that changes in its character and conduct will be required if we are to put more rather than less responsibility on the general practitioner. The principal change COLLINGS proposes is a rapid development of professional grouping. His other premise, that medical care should be integrated not fractionated, is related to this because he holds that continuity of medical care "cannot be achieved unless the general practitioner assumes high-level responsibility in a wide range of activities" and that often he cannot safely do this unless he is working with others. "Even the most elementary steps towards organising the present chaos of individual general practice must result in improved medical service and a fairer deal for doctor and patient," and COLLINGS urges that these steps should be taken now, without waiting for some possibly distant future when local authorities may be ready to build the kind of health centres some of them have in mind. In this he is undoubtedly right; and, though it would be most unwise to put pressure on unwilling practitioners to form a group, it is at least equally unwise not to encourage those who want to form one. This kind of spark needs to be fanned, not watered. Perhaps nothing in the report is more significant than the story of the keenness shown by the Scottish practitioners when they got together at their local hospital of a Saturday afternoon.

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[1] *Lancet,* 1949, i, 25.
[2] *Ibid,* p. 571.
[3] *Ibid,* Jan. 7, p. 27.

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14. Schroeder, H. A., Goldman, M. L., Futcher, P. H., Hunter, M. *J. Amer. med. Ass.* 1949, 140, 458.

not adhere to such restrictions. Out of the Minnesota and Leningrad experience grows the possibility that such a patient may be worse off when he modifies or abandons his dietary restrictions than he was before the treatment was initiated . . . . Patients so selected [i.e., for the Kempner diet] should be warned beforehand that once instituted the regimen must be followed carefully, and that modification, particularly if sudden, may be dangerous."

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This emergency, of grave if localised economic importance, was tackled with commendable vigour and thoroughness, a team of workers being appointed by the C.S.I.R. and the department of agriculture of Western Australia to study the trouble from various aspects. Quite early on it seemed likely to be nutritional rather than infectious in origin and an interesting relationship soon became apparent. For some years efforts had been made to improve the Western Australian pastures by introducing an early variety of subterranean clover, *Trifolium subterraneum L.* var. *Dwalganup*. This plant found local conditions so much to its liking that in many pastures it became the dominant species. And it was on precisely these luxuriant pastures, which for a few deceptive years had seemed to be so outstanding a tribute to the skill of the agrostologist, that the breeding troubles occurred. A significant and profitable clue to the probable nature of the nutritional factor involved was provided by some other remarkable effects described by Bennetts et al.[18] in sheep grazing on this clover. Though rams showed no clinical abnormalities and their breeding powers were unimpaired, wethers (castrated males) often exhibited unmistakable metaplastic changes in the accessory reproductive organs, of which the most striking was the prominence of a cystic gland lined by epithelium homologous with that of the vagina. This pointer towards sex-hormone imbalance was decisively reinforced by the most significant clue of all—the finding of abnormal teat and udder development not only in virgin females but also in wethers. In the females this was extensive enough to result in fairly copious lactation. Since it is now well known that udder growth and lactation can be induced in farm animals by treatment with œstrogens,[19] the team of investigators justifiably inferred that the affected sheep were ingesting a potent œstrogen from the pastures, or at least some substance which so modified their hormone balance as to establish an excess of œstrogen. On this view the whole complex of clinical syndromes fell neatly into place. It was not long before an œstrogenic extract was prepared from subterranean clover by Curnow et al.[20] and the substance involved is now being investigated both in Australia and also by a member of the original team working with Prof. E. C. Dodds at the Courtauld Institute of Biochemistry in London.

These remarkable findings clearly open up a new field with wider applications than were at first apparent. For example, the fact that herbage may contain an œstrogenic substance in sufficient concentrations to evoke a response in the mammary glands of grazing animals suggested that the presence of œstrogens in English pastures might be connected with the flush of milk and improvement in its composition often observed when cows are turned out to spring grass. Indeed, workers at the National Institute for Research in Dairying and the Courtauld Institute of Biochemistry have jointly shown [21] that potent œstrogens can be extracted from English herbage. This coöperative investigation is now being pursued side by side with the study of the œstrogen of Western Australian clover, and it has already produced further evidence of significant amounts of œstrogenic material in English pasture plants.[22]

The idea that plants may contain animal sex hormones is not new; Loewe and Spohr [23] demonstrated œstrogens in plants as long ago as 1926 and they have

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15. Levy, R. L., White, P. D., Stroud, W. D., Hillman, C. C. *Ibid*, 1946, 131, 951.
16. Chapman, C. B., Gibbons, T. B. *Medicine*, 1950, 29, 29.
17. Bennetts, H. W. *J. Dept. Agric. W. Austral.* 1944, 21, 104.
18. Bennetts, H. W., Underwood, E. J., Shier, F. L. *Austral. vet. J.* 1948, 22, 2.
19. Review by Malpress, F. H. *Brit. med. Bull.* 1947, 5, 161.
20. Curnow, D. H., Robinson, T. J., Underwood, E. J. *Austral. J. exp. Biol. med. Sci.* 1948, 26, 171.
21. Bartlett, S., Folley, S. J., Rowland, S. J., Curnow, D. H. Simpson, S. A. *Nature, Lond.* 1948, 162, 845.
22. Legg, S. P., Curnow, D. H., Simpson, S. A. *Proc. Biochem. Soc.* Jan. 21.
23. Loewe, S., Spohr, E. *Anz. Akad. Wiss. Wien.* 1926, 63, 167.

since been identified in various species. What is new and important is the finding that, exceptionally, pasture plants can contain enough to have pathological effects on grazing animals. This poses the question as to the part played by pasture sex hormones ingested regularly by herbivores in subtoxic amounts, in the regulation, not only of fertility but of growth, fattening, and lactation, all of which are under endocrine control. These aspects merit serious study in relation to modern techniques of pasture improvement, particularly since the successful efforts to improve the pastures in Western Australia had such unexpected and undesirable consequences. So we may hope to apply the knowledge gained from this strange happening to the benefit of mankind. This work would clearly come within the scope of the concerted international effort in the field of steroid science that Sir ROBERT ROBINSON called for in his anniversary address to the Royal Society.[24]

Annotations

DEATH ON THE BEDPAN

STRAINING at stool may be a fatal activity for the elderly, the hypertensive, and those with defective hearts. A group of American workers [25] have looked up the records of all patients in Cincinnati General Hospital who died on bedpans and came to necropsy between 1936 and 1946; and they have also studied the effects of "bearing down" on the blood-pressure and electrocardiograms of normal people and patients with heart-disease. There were 11 bedpan deaths recorded among notes on 6700 necropsies; and no doubt there were more of them than this at the hospital during the ten years under review, for not all cases ending fatally were examined post mortem. All the patients except one (a child of six with rheumatic carditis) were over forty, and 5 of them were over sixty; most of them had serious organic heart-disease. The accidents which overtook them were such things as rupture of a dissecting aneurysm, cerebral or subarachnoid hæmorrhage, myocardial infarction, pulmonary embolism, or other accidents associated with a damaged heart or vessels.

Those normal subjects and patients who provided material for the practical study were asked to take a deep breath, hold it, and strain down vigorously as if trying to have a bowel movement. Electrocardiograms taken before, during, and after the strain were correlated with blood-pressure readings from the radial artery, and with records of intrapleural pressures measured by water manometers on patients with a pneumothorax. The systolic blood-pressure fell slightly as the deep breath was taken; but as the straining began systolic and diastolic pressures rose abruptly—from 147/80 to 203/142 mm. Hg (average in 10 subjects). While the strain lasted, both pressures slowly fell, but since the systolic fell more than the diastolic, the pulse-pressure was much reduced by the end of the period of strain—sometimes almost disappearing altogether. At the moment when the strain ended the blood-pressure fell still further—to an average of 84/58. Within 5 seconds, however, the "after-fling" came into play, the pressure rising quickly again to well above the normal level. Normal blood-pressure was only regained some 30 sec. later. Pressure curves made from the left ventricle and the femoral artery, of a patient with a defect of the ventricular septum, showed that the blood-pressure changes matched those in the left ventricle; similar types of pressure curve were obtained from the right ventricle, right auricle, superior and inferior vena cava, and also the rectum and bladder. Intrathoracic pressure fell slightly as the breath was taken, rose abruptly by some 20 mm. Hg as the strain began, and maintained a plateau at that level until the strain ended, when it fell at once to normal (average in 10 patients with a pneumothorax).

The dangerous moment came with the after-fling; for during the first rise of blood-pressure, at the onset of strain, the great vessels were supported on the outside by the rise of intrathoracic pressure. During the after-fling the intrathoracic pressure had already fallen to normal, and thus there was nothing to buffer the vessel walls against the strain. The authors suggest that the fall in pulse-pressure towards the end of bearing down may favour intravascular clotting and also sharply reduce the flow in the coronary arteries. Moreover sudden changes in intravascular pressure may dislodge thrombi not firmly attached to the walls of vessels. The electrocardiogram showed that the heart-rate increased slightly during the intake of breath, slowed, and then increased again during the bearing-down period; at the moment of relaxation bradycardia developed in normal people, and in some ectopic rhythms appeared as well. Bradycardia also developed in patients with rheumatic heart-disease, but was less common in hypertensive or arteriosclerotic patients. The changes in rate and rhythm were abolished in normal subjects by atropine gr. $^{1}/_{75}$ given intravenously. Since the study shows that cardiac arrhythmias, vascular hæmorrhage, and pulmonary embolism are the common causes of death on the bedpan, the authors comment that the avoidance of constipation, early ambulation after operations (to reduce the chance of venous thrombosis), and atropine may be the means of reducing such deaths. It looks as though the best friend of the elderly patient with morbus cordis is a gentle laxative.

ACTION OF EMETINE

FOR forty years emetine has been looked on as a specific for amœbiasis. That it will not reach the amœba in every tissue in which this parasite is lodged has, of course, been recognised at least since the 1914–18 war, though this limitation was rediscovered many times during and after the recent war by physicians new to tropical experience. However, in an organ such as the liver, where emetine reaches a relatively high concentration and comes into very close contact with the amœba, its action is more certain. Even when an abscess has already developed, emetine will stop the active processes in the surrounding liver tissues, symptoms will rapidly subside, and the abscess itself, already sterile, will usually dry up; but in amœbic hepatitis where the amœba is fighting an evenly matched battle with the liver tissues, the effect is more dramatic. Here even a single injection of one grain of the alkaloid will often tip the balance in favour of the tissues and cause a sharp clinical improvement. A course of three injections is regarded by many workers as a very useful therapeutic test.

The frequency with which a hepatitis in tropical countries responds in this way to emetine has been explained in two ways: some workers claim that it indicates the frequency with which the liver is involved in amœbiasis; others hold that emetine has a specific action on the liver whatever micro-organism is infecting it. From time to time the latter school of thought recruits a fervent disciple, such as Professor Melchior, of Ankara University, who has now gone even further in his enthusiasm for emetine and has used it in infections of other organs and tissues—e.g., malignant furuncle of the lip,[1] purulent traumatic meningitis,[2] abscesses of

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[24] *Nature, Lond.* 1949, 164, 1023.

[25] McGuire, J., Green, R. S., Hauenstein, V., Courter, S., Branenstein, J. R., Plessinger, V., Iglauer, A., and Noertker, J. *Amer. Practit. Digest Treat.* 1950, 1, 23.

[1] Melchior, E. *Surgery*, 1948, 24, 724.

[2] Melchior, E. *Arch. ital. Chir.* 1948, 70, 110.

> not adhere to such restrictions. Out of the Minnesota and Leningrad experience grows the possibility that such a patient may be worse off when he modifies or abandons his dietary restrictions than he was before the treatment was initiated . . . . Patients so selected [i.e., for the Kempner diet] should be warned beforehand that once instituted the regimen must be followed carefully, and that modification, particularly if sudden, may be dangerous."

For the practising clinician, the position seems to be as follows. The one definite indication for dietetic restriction in hypertension is obesity. There is overwhelming evidence [15] that the prognosis in the obese hypertensive is worse than in the hypertensive of normal or subnormal weight. Every obese hypertensive should therefore be given a moderate reducing diet—e.g., 1100 calories a day—which will gradually bring down his weight. If he is a heavy salt-eater, then salt should also be restricted. In hypertensive heart-failure the diet should be modified as for all cases of congestive heart-failure—i.e., low sodium and restricted fluids. Particular care should be taken in hypertensive patients liable to indigestion; for hypertensives are in any case more prone to coronary disease than are normotensive people, and there is some evidence that disturbed gastric function may impair the coronary circulation. This will usually mean putting the patient on a bland diet. Chapman and Gibbons,[16] who have reviewed the whole field of diet in hypertension, are convinced that in some hypertensives the Allen or Kempner régime causes a significant fall in blood-pressure; but to most of us the evidence still does not seem firm enough to justify a doctor putting his hypertensive patients on a dull and monotonous diet which is also difficult to acquire and prepare.

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The idea that plants may contain animal sex hormones is not new; Loewe and Spohr [23] demonstrated œstrogens in plants as long ago as 1926 and they have leucotactic effect. In addition, while a single dose of cord factor causes no ill effect, repeated small injections in mice lead to death after the ninth day. Severe hæmorrhages were seen in the lungs of these animals and the agent appeared to damage the capillaries, though the mode of action was not clear. The fact that at least two injections are needed to cause tissue damage suggests the possibility of some type of sensitisation. The American workers have not been able to show that virulent tubercle bacilli stripped of their lipid coat, fall an easy prey to the body's defences in the same way as naked pneumococci. Stripped tubercle bacilli still produce infection, though its progress is slow. Clearly it is not possible to equate virulence with cord substance, but there can be little doubt that it is an indispensable covering for the fully virulent tubercle bacillus.

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[15] Levy, R. L., White, P. D., Stroud, W. D., Hillman, C. C. *Ibid*, 1946, 131, 951.
[16] Chapman, C. B., Gibbons, T. B. *Medicine*, 1950, 29, 29.
[17] Bennetts, H. W. *J. Dept. Agric. W. Austral.* 1944, 21, 104.
[18] Bennetts, H. W., Underwood, E. J., Shier, F. L. *Austral. vet. J.* 1948, 22, 2.
[19] Review by Malpress, F. H. *Brit. med. Bull.* 1947, 5, 161.
[20] Curnow, D. H., Robinson, T. J., Underwood, E. J. *Austral. J. exp. Biol. med. Sci.* 1948, 26, 171.
[21] Bartlett, S., Folley, S. J., Rowland, S. J., Curnow, D. H. Simpson, S. A. *Nature, Lond.* 1948, 162, 845.
[22] Legg, S. P., Curnow, D. H., Simpson, S. A. *Proc. Biochem. Soc.* Jan. 21.
[23] Loewe, S., Spohr, E. *Anz. Akad. Wiss. Wien.* 1926, 63, 107.

FORESIGHT IN THE U.S.A.

THROUGH the smoke of the battle over medical services in the United States one can discern agreement at least on certain fundamentals. For example, everybody wants to see more hospitals provided, particularly in rural areas, and everybody would like coördination of hospital and health-services areas. Also everybody agrees on the need to have all relevant facts; and to this end a number of valuable and non-controversial reports have been produced. The latest of these[1] gives estimates of the number of doctors that will be required in the future. Prepared by Dr. Joseph Mountin, assistant surgeon-general to the United States Public Health Service, and Elliott Pennell and Anne Berger, statisticians, it follows an earlier work entitled "Health Service Areas: Requirements for General Hospitals and Health Centres."

The central purposes of the report are "to describe the existing distribution picture for physicians against . . . a pattern of medical service areas, to present estimates of the number of physicians that might be utilised as health services are extended more uniformly throughout the Nation, and to forecast possible physician resources." The authors begin by tracing the expansion in the number of doctors practising in the United States since the turn of the century. From a total of 134,000 in 1909 this has grown to an estimated total of 200,000 in 1949. Even so, however, the increase has not kept pace with the growth of the general population. Thus in 1909 there were 149 doctors per 100,000 persons and in 1949 only 137. Side by side with this growth has been the increasing trend towards specialisation: in 1923 some 15,000 doctors limited their practice to a specialty, but last year the estimated figure was 50,000. During this time the inequalities of distribution of doctors have become more pronounced and the New England and Middle Atlantic States have now beaten the claim of the Pacific States to the highest doctor-patient ratio, with 174 per 100,000. On the other hand, the South Central States have declined to 99 per 100,000. The report emphasises that doctors are attracted to areas with relatively high per-capita incomes, and within these areas to centres of population generously supplied with hospital facilities. Such facilities, even apart from per-capita income, serve to attract and retain physicians.

The principle is accepted without question that hospital or related facilities should be accessible to every doctor, and that even in rural areas they should consist of a small hospital or health centre. It is also regarded as axiomatic that doctors in all locations should have access, directly or indirectly, to the physical facilities of a complete hospital system. On this understanding an attempt is made to estimate the number of doctors required by 1960. In 1940 a quarter of the inhabitants of the United States lived in regions which had 146 or more doctors per 100,000; a third lived in regions with a doctor-patient ratio below 146 but above 136; and the remainder lived in areas with a ratio below 136 but above 118. The estimated requirement for 1960, based on raising regional ratios to 146 if below that level and keeping them constant if above it, is 241,172. The corresponding requirements for levels of 136 and 118 are 229,785 and 213,523 respectively. This excludes doctors employed by the Federal government, the Veterans Administration, the public-health services, and the defence services. (If the needs of the various Federal agencies are included and allowances made for retirement the totals for 1960 become 272,172, 260,785, and 244,532 respectively.) On present output the medical schools will barely be able to maintain an over-all ratio of 136, and "even if another decade were allowed to take care of expected deficits, present medical training facilities would still have to be expanded considerably." On the other hand, it is expected that of the doctors available in 1960 no fewer than 70,640 will have been trained as specialists, compared with the highest estimated requirement of 58,540. The only type of specialist who may be scarce is the tuberculosis expert.

As a step towards discovering the deficiencies which have to be made good in providing adequate medical services this report is valuable. It can be criticised on the grounds that it does not deal in detail with under-doctored districts; but it is refreshingly modest, and the authors content themselves with their estimated figures. By implication they make it clear that the difficulty of getting doctors to settle in under-doctored areas can be largely met by providing better hospital facilities and by the integration of hospital and health services. On this score alone the report should do good, in helping to prevent in the U.S.A. the rift between hospital and health services now so painfully evident in this country. It demonstrates also the value of thinking ahead: for the estimates will enable existing medical schools to plan precisely for the next ten years and will assist the authorities to decide what extensions and new schools are required. Political and administrative action will thus be based on fact rather than expediency.

COMPOSITION OF MATCH HEADS

IT appears that the children of Victoria, Australia, are addicted to eating the heads off matches, especially the coloured ones. A firm of match manufacturers (Bryant and May Ltd.) has been receiving so many telephone calls from doctors about the composition of match heads, that the managing director has sent to the Victorian branch of the British Medical Association a letter giving the information and asking that it be published.[1] The main chemical in the heads of safety matches is, he says, potassium chlorate (60 match heads containing about half a gramme), and there are smaller amounts of glue, sulphur, and what are claimed to be "inert" filling materials like powdered silica and asbestine. In the coloured matches is a small amount of an aniline dye, of the type used in foodstuffs. No phosphorus is used in the safety matches. The heads of wax matches contain the same ingredients as those in safety matches, with the addition of a "non-poisonous compound of phosphorus and sulphur," presumably phosphorus sesquisulphide. It is pointed out that white phosphorus has not been used for over 50 years in these "strike anywhere" compositions.

The striking surface of the match-boxes contains red or amorphous phosphorus, which is said by the manufacturers to be non-poisonous and to pass unchanged joints, puerperal peritonitis, septicæmia, cholecystitis and cholangitis,[3] and appendicitis. He has gained the support of Prof. Corinaldesi, of Bologna, who has used emetine with success in a large series of surgical and gynæcological infections, many of a grave nature.[4] Dr. Bernoulli [5] demonstrated that, in vitro, emetine had little lethal action on streptococci, staphylococci, pneumococci, and coliform organisms, but that it had a pronounced bacteriostatic action. Others have noted striking dramatic effects of emetine in acute appendicitis, but in many such cases the amœba has been found to be the cause. In circumstances where it is at all possible to delay operation, some surgeons in the tropics prefer to give emetine first in cases of acute appendicitis, since the results of operation on the amœba-infected appendix are sometimes very unsatisfactory, whereas emetine treatment often obviates operation.

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[1] Public Health Bulletin No. 305. Health Service Areas: Estimates of Future Physician Requirements. Federal Security Agency, Public Health Service, Washington, D.C.

[1] *Med. J. Aust.* Dec. 31, 1949, p. 958.

If Professor Melchior is right and emetine is curative in non-amœbic liver infections, we can no longer assume that response to emetine means that a hepatitis is necessarily of amœbic origin; and one of our few diagnostic criteria for this condition will no longer be valid. On the other hand it is now a good many years since he made his first observations on the non-specific action of emetine in 1943, and it is a little surprising that so few others have observed the protean effect of a drug which was used so extensively throughout the war years.

HOME HELPS FOR THE TUBERCULOUS

IN our correspondence columns Miss E. D. Andrews describes the difficulty a tuberculous patient—even when non-infectious—may experience in getting help in the home during illness. Such patients have more difficulty than most in gaining admission to hospital; and at home, she suggests, they are unable to get even the small amount of help available to other sick people.

General provision for the tuberculous is inadequate, as we recently pointed out [6]; and it seems that here is another way in which they may be penalised. All the same, the position of the health authorities is not easy, and the difficulty certainly does not arise from lack of good will. She writes from London; and the London County Council have taken much advice on the very point she raises. Would it be justifiable to send home helps into the households of tuberculous patients without giving them some warning and choice? The L.C.C. thought not, and therefore decided that they would send only volunteers to such households; they decided, too, that if possible such helps should be over the age of 45; that if possible they should not work in tuberculous households for more than 3 months at a time; that their chests should be radiographed at the discretion of the divisional medical officers; and that each should receive a short note on precautionary measures.

A further suggestion that the chest of every home help should be periodically radiographed has met with the objection that this practice would prove alarming and dry up the source of voluntary labour. Yet we are not at all certain that this fear is well founded: people are far more commonly reassured than alarmed by precautions for their protection, as we all learned in the war. In 1934, when Geer,[7] in St. Paul, U.S.A., instituted his precautions for the protection of nurses against tuberculosis, everyone predicted a decline in recruitment; but in fact from the time they were started the hospital never lacked staff. Clearly, though the L.C.C. have taken sensible steps to protect their home helps properly, the problem is not yet solved; and it is a problem of growing importance. If the domiciliary care of the tuberculous is to be considerably increased, as we believe it should, it looks as though we should have to develop, somehow or other, a volunteer home-help service specially for them. Much might be done perhaps by making a clearer distinction between the open and the closed case. Once people learn that the closed case is not infective they will be far less likely to hang back; and this change of attitude would be of help to tuberculous patients everywhere.

MORPHOLOGY AND VIRULENCE

BACTERIOLOGISTS have long been aware that the morphology of organisms and their colonies may be related to virulence. Smooth and rough colony variations often connote virulent and non-virulent phases, and the loss of pneumococcal capsule brings both roughness and loss of virulence in its train.

The pattern of growth of *Myco. tuberculosis* has often been studied, and it is well established that on solid or in liquid media virulent strains and also some B.C.G. strains form tight bundles or cords of organisms lying parallel to each other; avirulent strains, on the other hand, merely grow in irregular clumps. The colonial forms which any single strain of tubercle bacillus may take on different media are notoriously variable, but Dubos [1] made it clear that in a large number of strains cord formation and virulence were closely associated and that the tighter the cord the greater the virulence. Cord formation can be enhanced by chick-embryo extract or diminished by adding certain surface-acting agents. Such a characteristic mode of growth of virulent tubercle bacilli could presumably depend either on chemical or physical forces, or on both. A chemical substance present in virulent but not in avirulent strains could bind the bacilli in parallel; and Dubos and Middlebrook [2] demonstrated by a colour reaction that such a cord substance exists. Bloch [3] has now shown that the bacillary cords can readily be disrupted when virulent strains are suspended in hydrocarbons, such as paraffin oil or petroleum ether. So long as the bacilli are surrounded by a watery layer they are protected from disruption, but in a lipophylic phase the binding substance readily goes into solution leaving the bacilli dispersed as single organisms or small clumps. Bloch has thus been able to isolate in crude form the binding or cord substance and to study some of its properties. There seems little doubt that it differs from the numerous other fractions which have been isolated from tubercle bacilli, and that it is not concerned in sensitivity to tuberculin. Avirulent organisms do not possess the cord substance; and virulent organisms, from which it has been stripped, are still able to grow on culture media. Bloch [4] also shows that the possession of the substance prevents virulent strains from reducing methylene-blue, while in avirulent or stripped organisms the permeability of the bacterial surface permits the cell's enzyme to make contact with its substrate.

While there is good reason to believe that the lipid substance and virulence are associated properties it is much harder to show what part cord factor plays in the disease itself. Organisms already tightly packed together may be better able to withstand attack, and we do know that dispersed organisms in a test-tube are more readily killed than those in solid phalanx. The American workers, however, had already shown that when leucocytes phagocytose virulent tubercle bacilli the white cell loses much of its power to migrate on plasma gel while avirulent organisms migrate freely. Cord factor itself has been shown to have both a leucotoxic and a

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3. Melchior, E. *Helv. chir. Acta*, 1948, 15, 75.
4. Corinaldesi, F. *Bull. Sci. med., Bologna*, 1948, fax. 2.
5. Bernoulli, L. *Z. Path. Bakt*, 1944, 7, 525; 1945, 8, 96.
6. *Lancet*, 1949, ii, 1225.
7. Geer, E. K. *Amer. Rev. Tuberc.* 1934, 29, 88.

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1. Dubos, R. J. *Bact. Rev.* 1948, 12, 173.
2. Dubos, R. J., Middlebrook G. *J. exp. Med.* 1948, 88, 81.
3. Bloch, H. *Ibid*, 1950, 91, 197.
4. Bloch, H. *Amer. Rev. Tuberc.* 1950, 61, 270.

leucotactic effect. In addition, while a single dose of cord factor causes no ill effect, repeated small injections in mice lead to death after the ninth day. Severe hæmorrhages were seen in the lungs of these animals and the agent appeared to damage the capillaries, though the mode of action was not clear. The fact that at least two injections are needed to cause tissue damage suggests the possibility of some type of sensitisation. The American workers have not been able to show that virulent tubercle bacilli stripped of their lipid coat, fall an easy prey to the body's defences in the same way as naked pneumococci. Stripped tubercle bacilli still produce infection, though its progress is slow. Clearly it is not possible to equate virulence with cord substance, but there can be little doubt that it is an indispensable covering for the fully virulent tubercle bacillus.

FORESIGHT IN THE U.S.A.

THROUGH the smoke of the battle over medical services in the United States one can discern agreement at least on certain fundamentals. For example, everybody wants to see more hospitals provided, particularly in rural areas, and everybody would like coördination of hospital and health-services areas. Also everybody agrees on the need to have all relevant facts: and to this end a number of valuable and non-controversial reports have been produced. The latest of these[1] gives estimates of the number of doctors that will be required in the future. Prepared by Dr. Joseph Mountin, assistant surgeon-general to the United States Public Health Service, and Elliott Pennell and Anne Berger, statisticians, it follows an earlier work entitled "Health Service Areas: Requirements for General Hospitals and Health Centres."

The central purposes of the report are "to describe the existing distribution picture for physicians against . . . a pattern of medical service areas, to present estimates of the number of physicians that might be utilised as health services are extended more uniformly throughout the Nation, and to forecast possible physician resources." The authors begin by tracing the expansion in the number of doctors practising in the United States since the turn of the century. From a total of 134,000 in 1909 this has grown to an estimated total of 200,000 in 1949. Even so, however, the increase has not kept pace with the growth of the general population. Thus in 1909 there were 149 doctors per 100,000 persons and in 1949 only 137. Side by side with this growth has been the increasing trend towards specialisation: in 1923 some 15,000 doctors limited their practice to a specialty, but last year the estimated figure was 50,000. During this time the inequalities of distribution of doctors have become more pronounced and the New England and Middle Atlantic States have now beaten the claim of the Pacific States to the highest doctor-patient ratio, with 174 per 100,000. On the other hand, the South Central States have declined to 99 per 100,000. The report emphasises that doctors are attracted to areas with relatively high per-capita incomes, and within these areas to centres of population generously supplied with hospital facilities. Such facilities, even apart from per-capita income, serve to attract and retain physicians.

The principle is accepted without question that hospital or related facilities should be accessible to every doctor, and that even in rural areas they should consist of a small hospital or health centre. It is also regarded as axiomatic that doctors in all locations should have access, directly or indirectly, to the physical facilities of a complete hospital system. On this understanding an attempt is made to estimate the number of doctors required by 1960. In 1940 a quarter of the inhabitants of the United States lived in regions which had 146 or more doctors per 100,000: a third lived in regions with a doctor-patient ratio below 146 but above 136; and the remainder lived in areas with a ratio below 136 but above 118. The estimated requirement for 1960, based on raising regional ratios to 146 if below that level and keeping them constant if above it, is 241,172. The corresponding requirements for levels of 136 and 118 are 229,785 and 213,523 respectively. This excludes doctors employed by the Federal government, the Veterans Administration, the public-health services, and the defence services. (If the needs of the various Federal agencies are included and allowances made for retirement the totals for 1960 become 272,172, 260,785, and 244,532 respectively.) On present output the medical schools will barely be able to maintain an over-all ratio of 136, and "even if another decade were allowed to take care of expected deficits, present medical training facilities would still have to be expanded considerably." On the other hand, it is expected that of the doctors available in 1960 no fewer than 70,640 will have been trained as specialists, compared with the highest estimated requirement of 58,540. The only type of specialist who may be scarce is the tuberculosis expert.

As a step towards discovering the deficiencies which have to be made good in providing adequate medical services this report is valuable. It can be criticised on the grounds that it does not deal in detail with under-doctored districts; but it is refreshingly modest, and the authors content themselves with their estimated figures. By implication they make it clear that the difficulty of getting doctors to settle in under-doctored areas can be largely met by providing better hospital facilities and by the integration of hospital and health services. On this score alone the report should do good, in helping to prevent in the U.S.A. the rift between hospital and health services now so painfully evident in this country. It demonstrates also the value of thinking ahead: for the estimates will enable existing medical schools to plan precisely for the next ten years and will assist the authorities to decide what extensions and new schools are required. Political and administrative action will thus be based on fact rather than expediency.

COMPOSITION OF MATCH HEADS

IT appears that the children of Victoria, Australia, are addicted to eating the heads off matches, especially the coloured ones. A firm of match manufacturers (Bryant and May Ltd.) has been receiving so many telephone calls from doctors about the composition of match heads, that the managing director has sent to the Victorian branch of the British Medical Association a letter giving the information and asking that it be published.[1] The main chemical in the heads of safety matches is, he says, potassium chlorate (60 match heads containing about half a gramme), and there are smaller amounts of glue, sulphur, and what are claimed to be "inert" filling materials like powdered silica and asbestine. In the coloured matches is a small amount of an aniline dye, of the type used in foodstuffs. No phosphorus is used in the safety matches. The heads of wax matches contain the same ingredients as those in safety matches, with the addition of a "non-poisonous compound of phosphorus and sulphur," presumably phosphorus *sesquisulphide*. It is pointed out that white phosphorus has not been used for over 50 years in these "strike anywhere" compositions.

The striking surface of the match-boxes contains red or amorphous phosphorus, which is said by the manufacturers to be non-poisonous and to pass unchanged through the alimentary tract. Schwarz et al.,[2] who give a more complete account of the chemicals used in match manufacture, say that bone necrosis does occur from the use of red phosphorus, though few cases have been reported. The sesquisulphide is less toxic, but not completely harmless. The banning by the Berne Convention (1906) of the use of white phosphorus in the manufacture of matches is rightly regarded as a notable advance in preventive medicine. And the neo-Victorian children, who like the "taste of pink," will come to less harm than their Victorian forebears would have done if they had committed similar dietary indiscretions.

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[1] Public Health Bulletin No. 305. Health Service Areas: Estimates of Future Physician Requirements. Federal Security Agency, Public Health Service, Washington, D.C.

[1] *Med. J. Aust.* Dec. 31, 1949, p. 953.

CHEMOTHERAPEUTIC LESSONS FROM BOVINE MASTITIS

OVER 70 years ago Dr. Milroy in his "suggestions" for lectures at the Royal College of Physicians emphasised the valuable information likely to accrue from studies on comparable diseases in man and animals; but only in recent times have the natural infections of animals, as opposed to those experimentally induced, received detailed attention. Some of these natural infections may be transmitted to man, and uncontrolled diseases in domestic animals sometimes have a serious effect on the national economy. An obvious example of the latter is bovine mastitis. Although mastitis occurs as a human infection, it is fortunately not so common as the disease in cattle, though the basic pathology is similar. Bovine mastitis occurs in both acute and chronic forms. The acute disease when not fatal commonly causes disorganisation or destruction of the affected quarters, while the chronic form has a serious effect on the cow's general well-being and milk yield. Several well-recognised pathogens may cause the infection, the commonest being *Streptococcus agalactiæ*, which can be recovered from acute or chronic cases. Other streptococci, including strains found in human disease, may be found, particularly in acute infections. *Staphylococcus aureus* causes about 20% of all the cases of mastitis, among which are the most serious. These staphylococci are morphologically similar to many seen in human infections.

The clinical efficacy of the sulphonamides in streptococcal mastitis is irregular; but penicillin injected up the teat canal, alone or combined with sulphanilamide by mouth, has proved strikingly successful. *Streptococcus agalactiæ* infection has been eradicated from many herds in this way. Systemic penicillin does not provide a sufficient concentration in the udder to deal adequately with the local infection. As in the human disease, staphylococcal infections have often proved difficult to treat satisfactorily, even when the organism is sensitive to penicillin in vitro. The result in dairy herds has been an increasing number of subacute or chronic cases producing contaminated milk. As Thrower[3] has pointed out, pasteurisation alone provides an undesirable safeguard against risks of this kind; it may delay the proper clearing-up of herds, and also retard improvements in milking technique and teat hygiene which will reduce the incidence of cross-infection.

Other compounds which may be useful in the resistant cases are being tried, and the findings are instructive from the point of view of chemotherapy in general. Dibromopropamidine ('M. & B. 1270') has been shown to be bactericidal in high dilutions for staphylococci and streptococci,[4] including those recovered from cases of bovine mastitis. When, however, it was tested against these in the presence of milk, the concentration necessary for bacteriostasis was found to be five hundred times that required in a milk-free medium. Analysis demonstrated that the inhibitory factor was lecithin.[5] This inhibitory effect of lecithin has been observed independently by Elson.[6] Together dibromopropamidine and sulphathiazole, in the correct proportions, seem to have a synergistic effect. After repeated experiments it was found that a mixture of dibromopropamidine and sulphathiazole in the proportions of 4:1 was four times as active in a milk medium as dibromopropamidine alone. A trial of the combination of the two in arachis oil and beeswax injected into the udder gave clinical results in keeping with the experimental findings and quite as good as those with penicillin given locally.

The tendency of natural fluids to interfere with the bactericidal powers of antibacterial substances has been troublesome since the early days of chemotherapy, but apparently not much attention has been paid to the individual factors responsible. This work on dibromopropamidine is a step in the right direction. There are, incidentally, good reasons for avoiding the use of penicillin in the udder. The milk from a cow treated for mastitis may contain enough penicillin to interfere with the action of the streptococci used as "starters" in cheese-making, and it will give an optimistically fallacious answer to the methylene-blue test for keeping quality.[7] Few changes have brought as much benefit to mankind in recent years as the reductions in the price of penicillin; perhaps there is good reason for not making it any cheaper.

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Sir NORMAN HAWORTH, D.SC., F.R.S., for many years professor of chemistry in the University of Birmingham, where he also held the office of vice-principal, died on March 18. In 1937 he shared the Nobel prize for his work on the chemistry of the carbohydrates and particularly his establishment, with E. L. Hirst, of the structural formula of vitamin C which later made its synthesis and large-scale production possible.

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[7] Hunter, G. J. E. *J. Dairy Res.* 1949, 16, 39, 152.

GENERAL PRACTICE IN ENGLAND TODAY

A RECONNAISSANCE

JOSEPH S. COLLINGS *

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GENERAL medical practice is a unique social phenomenon. The general practitioner enjoys more prestige and wields more power than any other citizen, unless it be the judge on his bench. In a world of ever-increasing management, the powers of even the senior managers are petty compared with the powers of the doctor to influence the physical, psychological, and economic destiny of other people.

But unlike the manager, who exercises his controls over whole groups of society, the doctor exercises his in a microcosm and in relation to individuals; and for this and other reasons he is largely free from the limitations which democratic principles set on the acquisition of power.

General practice is unique in other ways also. For example, it is accepted as being something specific, without anyone knowing what it really is. Neither the teacher responsible for instructing future general practitioners, nor the specialist who supposedly works in continuous association with the G.P., nor for that matter the G.P. himself, can give an adequate definition of general practice. Though generally identified with the last-century concept of "family doctoring," usually it has long ceased to be this. Nevertheless its stability and its reputation rest largely on this identification.

While other branches of medicine have progressed and developed, general practice, instead of developing concurrently, has adapted itself to the changing patterns; and sometimes this adaptation has in fact been regression.

There are no real standards for general practice. What the doctor does, and how he does it, depends almost wholly on his own conscience.

The conduct of general practice and of the individual practitioner is inextricably interwoven with commercial and emotional considerations, which too often negate the code of medical ethics by which the public are supposedly safeguarded and from which the high reputation of medicine stems. Hence material and moral issues have become inseparable, and it is impossible to discuss general practice without discussing morals, and therefore without moralising. In this report the issues are kept separate as far as possible, but this is not very far.

Section I describes how the observations were made; section II is an account of general practice as I found it; and section III deals with the National Health Service in relation to general practice as I found it. I contrast this with the usual endeavour made to interpret the Act in terms of what general practice is supposed to be or what we might like to think it is.

I know well that many of my deductions rest on subjective impressions rather than objective fact, though I have tried to keep the two apart. Very little statistical evidence is used—principally because little valuable evidence of this kind is available, and secondarily because the major problems of general practice are not soluble in terms of statistics.

My observations have led me to write what is indeed a condemnation of general practice in its present form; but they have also led me to recognise the importance of general practice and the dangers of continuing to pretend that it is something which it is not. Instead of continuing a policy of compensating for its deficiencies, we should admit them honestly and try to correct them at their source. If I do no more than convey this, I shall be satisfied.

I. SCOPE AND METHOD OF STUDY

At the outset I was advised that no accurate picture could be obtained by detailed inquiries in the London area, with its aggregation of teaching hospitals and many other complicating factors peculiar to a city of this size. I therefore decided to work outside London, in regions selected so that a mosaic might be constructed which would present the general picture. Having no knowledge of British geography or economy, I was guided by various advisers who knew the country, and eventually decided on three regions—in the north, the north-west, and the south. For purposes of comparison I also spent some time in Scotland.

Thanks to the willing coöperation of all the doctors approached, I have been able to see their work, both in their surgeries and in the homes of their patients, to become conversant with their difficulties, professional and personal, and to learn a great deal about their individual and collective attitudes to the new service.

Though others were visited, I have studied in some detail the work of 55 English practices, operated by 104 doctors. These 55 may be classified as:

Industrial	16
Urban-residential	17
Rural	22

The 16 industrial practices can be further divided into complete industrial 9 and "mixed" (industrial better-class residential) 7. The 22 rural practices can be divided into rural-town 8 and isolated rural 14. Some 30 of the practices were run by individual practitioners; the rest were partnerships or partner-assistantships with 2–6 doctors working together.

The 55 practices visited varied greatly in size (both number of patients and area) and in history and development.

Of the one-man practices some had full lists (4000) while others ranged down through 3000 and 2000 to less than 1000. Examples of different sizes were seen in all areas, though in the industrial areas only two practices were seen where the doctor's list was less than 2000, and in the rural areas only three where the lists approximated to or exceeded 3500. The partnerships and partner-assistantships studied covered much the same wide range of patient numbers, though very few had less than 2000 per partner.

In terms of area covered by a practice and accessibility of patients, conditions ranged from the most compact type of practice, in densely populated urban areas, to remote rural practices with less than 1000 patients living miles apart.

The history and development of the practices showed a similar wide range of variation. Some were over a century old; others had been established before the war but had since been entirely re-established. Many of the industrial practices had had large "panel" and "club" lists since the early days of the old National Health Insurance scheme, and had depended on these for the greater part of the income; but there were various gradations of the panel-private ratio through to completely private practice.

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II. THE STATE OF GENERAL PRACTICE

THREE MAIN PATTERNS

General practice is not, as generally assumed, something specific and definable. There are different patterns of practice, and I must distinguish these before describing specific examples.

From the first, I suspected that there were big differences not only in the quality of practice in different areas but also in its nature; but I did not imagine that the differences would be so great or so basic as they proved to be. I thought, rather naïvely, that it was an easy matter to select "good," "average," and "bad" practitioners, and to identify the "good" doctor with good practice or the "bad" doctor with bad practice. I supposed that the "good" doctor would practise well in spite of the social environment in which he worked; but this assumption likewise proved to be false.

The three main patterns of general practice are set by the social environment. They are:

1. General practice in urban industrial areas. (Henceforth called industrial practice.)
2. General practice in better-class urban residential areas. (Henceforth called urban-residential practice.)
3. General practice in rural areas. (Henceforth called rural practice.)

Industrial Practice

Industrial practice has departed a very long way from the ideal of family doctoring. The facilities for medical work are almost always unsatisfactory.

SURGERIES

Consider first the surgeries—the buildings which serve as the doctors' workshops. These are usually located in what was once a shop, or a residence above a shop, or in the downstairs rooms of a house tenanted by some person who takes care of the surgery or occasionally by the doctor himself.

The adaptation of shop or house to doctor's surgery is usually very elementary. As a rule two adjacent rooms serve as waiting and consulting rooms, and where dispensing is undertaken a third room may be set aside for this purpose. That is the basic plan, and there is very little variation from it. Where two or more doctors are working together, there may be two or even three consulting-rooms adjacent to a common waiting-room. The size and plan of the original premises largely determine any other differences between surgeries in industrial areas. I did not see a single industrial surgery which was built for its purpose.

In most cases the waiting-rooms are too small, cold, and generally inhospitable. In peak hours in big practices it is usual to see patients standing, waiting their turn to consult the doctor, and it is not uncommon to see them standing in the garden, where there is one, or queueing in the street where there is not. The comfort of patients and the needs of the sick have certainly not determined the nature of the industrial-practice type of waiting-room.

Consulting-rooms vary greatly in size and furnishings, but are generally comparable from a functional standpoint. Everything is done in this one all-purpose room. The patient is interrogated and the history taken; if he is to be examined he removes such clothing as is necessary (or is convenient) and either hangs it on a hook or piles it on the chair on which he was previously sitting (very rarely a screen is provided, behind which he can change in relative comfort with minimum embarrassment, and very very rarely there may be a changing-room, though I have not myself seen one in an industrial practice); and then the examination is made, sometimes including the collection of a specimen of urine, which is tested at a sink in the same room. It is indeed an all-purpose room.

Quite often the consulting-room is far from soundproof and the most intimate details of a consultation can be distinctly heard in the waiting-room beside it.

The equipment contained in these consulting-rooms also varies considerably. In the sample of practices studied, the range was from satisfactory to dangerously poor—with too many approaching this last category. If we set the basic "heavy" equipment at desk, chairs, examining couch, filing cabinet, instrument cupboard, steriliser, and wash-basin with hot and cold water, and take this as a minimum level of essential heavy equipment for satisfactory practice, we immediately have to classify many industrial practices as unsatisfactory. In several of the surgeries I visited there were no examining couches; in many there were no filing cabinets, and such records as were kept lay around the room either loose or in boxes; in one there was a chair for the doctor only (the patient remained standing throughout consultation and examination); in some a saucepan on a gas-ring served as steriliser; frequently I observed that instruments were kept in odd drawers, or on a table, window-ledge, or mantelpiece, exposed to the atmosphere; and sometimes the doctor had to walk to another part of the premises to wash his hands.

I noted a similar range in the instruments of diagnosis and therapy with which these surgeries were provided. Always obvious were stethoscope, thermometer, tongue-depressor (sometimes of the old bone type, standing in a jar of "antiseptic"), sphygmomanometer, watch, syringes, and needles. Apart from these indispensable articles of practice, there was usually an ophthalmoscope, an auriscope set, and a variety of instruments of varying vintage and type. Proctoscope and vaginal specula were usually in evidence, although frequently there was also abundant evidence of their long disuse. Besides these, a variety of other instruments, antique or sometimes relatively modern, were often to be seen lying around as mementos of past interest in various aspects of medical work.

I have laboured these points of detail somewhat, because it is necessary to recognise the unsatisfactory nature of the doctor's workshop in an average industrial practice; for this factor in itself sets a limit to the scope and quality of his work, to the treatment his patients receive, and to improvement of the situation. Few skilled craftsmen, be they plumbers, butchers, or motor mechanics, would be prepared to work under conditions or with equipment as bad (comparably) as that tolerated by many doctors working in industrial practices.

But even more important than these material conditions is what goes on inside the surgeries and what use is made of the resources they possess.

EXAMINING THE PATIENT

The frequency with which the examining couch is used is a good index of the nature of medical practice under these conditions. I noticed on some occasions that a perfectly serviceable couch was piled with boxes and bottles; the adherence of these articles to the leather cover showed that they had occupied this position for some time. Often I have sat on a doctor's examining couch throughout a consulting hour; and, though many patients gave histories and presented symptoms which indicated the need for thorough examination, they left without any attempt being made to examine them or any arrangements being made for a future examination.

I particularly noted cases where, in my opinion, the history suggested an urgent need for rectal or vaginal examination; and I had listed over forty such cases

Each practice was reviewed in respect of three factors which jointly seem to determine the nature, scope, and quality of medical care :

1. The doctor.
2. The doctor's working environment :
    - (a) Surgery.
    - (b) Equipment.
    - (c) Patient load.
    - (d) Ancillary facilities.
3. The general social environment.

Of these, nos. 2 and 3 lend themselves to objective evaluation. No. 1, the doctor, is much more intangible ; but being undoubtedly the most important single unit in the whole field of medical care, he must be discussed with whatever objectivity is possible.

METHOD OF STUDY

My observations were made by " sitting in on " each practice—a term which requires careful explanation because the validity of these observations, and of some of the conclusions reached, depends on the technique adopted.

In retrospect, " sitting in on " a practice connotes to me a very wide range of behaviour ; everything, in fact, from sitting quietly in a corner trying to efface myself, while the doctor in an embarrassed and artificial way attempted to conduct his consultations, to a nearly complete identification with the doctor's work and behaviour. In the latter cases I found I was able to join in examinations, to interrogate patients, and to discuss points at issue without embarrassment to any of the parties concerned. Fortunately, as a rule the situation approximated, at least after a time, to the last-mentioned happy state of affairs. In the few cases where it did not, I have endeavoured to make allowances or write off the evidence obtained.

Similarly the domiciliary work I did with the doctors ranged from sitting in the car outside the patient's residence and discussing the case with the doctor, or being entertained by the relatives in the front parlour while he had his consultation in the bedroom upstairs, to complete and uninhibited participation in the consultation and examination. Here again the last-mentioned circumstances usually prevailed, and full allowances have been made where they did not.

The time spent " sitting in on " the work of a practice varied from one to four or five days. It depended sometimes on advance arrangements made through a third party, but more often on a personal estimate of the value of the practice as a source of relevant information.

SELECTION OF PRACTICES

The selection of practices and practitioners to be seen was as much beyond my control as the selection of geographical areas in which to work. It was obviously not feasible to take a completely random sample, and precautions had to be taken against the selection of a whole group of " good men." Different people did the selecting in different areas. In most areas a number of people helped to make the selection ; they were asked to select some " good," some " fair," and some " bad " practices. Those usually consulted were regional medical officers who had experience of " refereeing " in the area ; consultants who knew, sometimes personally, always by repute, the practitioners in the area ; local-authority medical officers ; and in some parts of Scotland the chairman and secretary of the local medical committees. Sometimes it was possible to choose the common factors from the lists suggested by two or three people ; sometimes the choice depended partly on which practitioners were available.

The selection among the rural practitioners in the southern region was much more random. It was made by one person, who knew most of those selected by name only. They were chosen largely on geographical situation and not on reputation. In north-west Scotland particular areas were selected and all the practitioners in them were visited.

Occasionally I was passed on from one practitioner to another ; but generally I tried to avoid this. Once I asked to see the work of a particular " group " practice. Always I was introduced to the practice concerned by a disinterested third party who was kind enough to undertake this task.

I am well satisfied that, by this diverse means of sampling, a fair and representative sample of general practice under the various environmental conditions was obtained.

In the northern and north-western regions, before any approach was made to the question of general practice, I sought information from people working for regional hospital boards, executive councils, and local authorities. In the southern region, as a rough control to any bias which might result from this sequence of activity, the general practitioners were visited before I consulted the authorities.

HOSPITALS AND GENERAL PRACTICE

Originally it was proposed that, after reviewing the work of a number of practices in a given area, observations should be made in the outpatient department of the hospitals fed by these practices. It was never intended to follow up particular cases, but to see whether the outpatient work would provide some sort of index of what was happening in a particular type of practice. It was also hoped that some statistical data might be obtained—e.g., the volume and nature of outpatient work before and after July 5, 1948—which would throw light on trends in general practice since the introduction of the service.

In some places it proved possible to do such a " follow through " ; in others, either because the practices fed too many hospitals or because the hospitals were too far away, I could not make any real correlation between the work of the practices and of the outpatient department. However, in every instance I visited some hospitals in or beside the area of study and considered what was happening in the outpatient department.

THE ACT AND THE PROBLEM

When the study began, the National Health Service had been in operation less than six months, and I recognised that it was very early to start assessing its effects on general practice. I also recognised that many of the initial difficulties, often described as " teething troubles," could obscure or complicate the picture. I have therefore tried to separate the " teething " problems from the more formidable long-term problems, and at this early stage I have concerned myself with general trends in the pattern of medical care rather than with the difficulties facing individual practitioners.

It soon became obvious that many problems which had existed for years, and were inherent in general practice as we know it, were being interpreted as results of the new National Health Service. This was very serious because it was preventing clear thought on important issues. Accordingly I decided to attempt first an assessment of general practice at this point of time, out of relation to the new Act, and secondly an interpretation of the actual and possible effects of the Act upon it.

Straight away, some very elementary questions presented. What constitutes general practice *today* ? What does the general practitioner do ? How does he do it ? What criteria have we for judging the quality of general practice ? How does general practice integrate with other medical services—hospital, specialist, and preventive ? To these and other apparently simple yet fundamental questions there are no simple ready-made answers. To some there are just no answers.

I shall begin, then, with a general account of what was seen in the practices studied.

II. THE STATE OF GENERAL PRACTICE

THREE MAIN PATTERNS

General practice is not, as generally assumed, something specific and definable. There are different patterns of practice, and I must distinguish these before describing specific examples.

From the first, I suspected that there were big differences not only in the quality of practice in different areas but also in its nature; but I did not imagine that the differences would be so great or so basic as they proved to be. I thought, rather naïvely, that it was an easy matter to select "good," "average," and "bad" practitioners, and to identify the "good" doctor with good practice or the "bad" doctor with bad practice. I supposed that the "good" doctor would practise well in spite of the social environment in which he worked; but this assumption likewise proved to be false.

The three main patterns of general practice are set by the social environment. They are:

1. General practice in urban industrial areas. (Henceforth called industrial practice.)
2. General practice in better-class urban residential areas. (Henceforth called urban-residential practice.)
3. General practice in rural areas. (Henceforth called rural practice.)

Industrial Practice

Industrial practice has departed a very long way from the ideal of family doctoring. The facilities for medical work are almost always unsatisfactory.

SURGERIES

Consider first the surgeries—the buildings which serve as the doctors' workshops. These are usually located in what was once a shop, or a residence above a shop, or in the downstairs rooms of a house tenanted by some person who takes care of the surgery or occasionally by the doctor himself.

The adaptation of shop or house to doctor's surgery is usually very elementary. As a rule two adjacent rooms serve as waiting and consulting rooms, and where dispensing is undertaken a third room may be set aside for this purpose. That is the basic plan, and there is very little variation from it. Where two or more doctors are working together, there may be two or even three consulting-rooms adjacent to a common waiting-room. The size and plan of the original premises largely determine any other differences between surgeries in industrial areas. I did not see a single industrial surgery which was built for its purpose.

In most cases the waiting-rooms are too small, cold, and generally inhospitable. In peak hours in big practices it is usual to see patients standing, waiting their turn to consult the doctor, and it is not uncommon to see them standing in the garden, where there is one, or queueing in the street where there is not. The comfort of patients and the needs of the sick have certainly not determined the nature of the industrial-practice type of waiting-room.

Consulting-rooms vary greatly in size and furnishings, but are generally comparable from a functional standpoint. Everything is done in this one all-purpose room. The patient is interrogated and the history taken; if he is to be examined he removes such clothing as is necessary (or is convenient) and either hangs it on a hook or piles it on the chair on which he was previously sitting (very rarely a screen is provided, behind which he can change in relative comfort with minimum embarrassment, and very very rarely there may be a changing-room, though I have not myself seen one in an industrial practice); and then the examination is made, sometimes including the collection of a specimen of urine, which is tested at a sink in the same room. It is indeed an all-purpose room.

Quite often the consulting-room is far from soundproof and the most intimate details of a consultation can be distinctly heard in the waiting-room beside it.

The equipment contained in these consulting-rooms also varies considerably. In the sample of practices studied, the range was from satisfactory to dangerously poor—with too many approaching this last category. If we set the basic "heavy" equipment at desk, chairs, examining couch, filing cabinet, instrument cupboard, steriliser, and wash-basin with hot and cold water, and take this as a minimum level of essential heavy equipment for satisfactory practice, we immediately have to classify many industrial practices as unsatisfactory. In several of the surgeries I visited there were no examining couches; in many there were no filing cabinets, and such records as were kept lay around the room either loose or in boxes; in one there was a chair for the doctor only (the patient remained standing throughout consultation and examination); in some a saucepan on a gas-ring served as steriliser; frequently I observed that instruments were kept in odd drawers, or on a table, window-ledge, or mantelpiece, exposed to the atmosphere; and sometimes the doctor had to walk to another part of the premises to wash his hands.

I noted a similar range in the instruments of diagnosis and therapy with which these surgeries were provided. Always obvious were stethoscope, thermometer, tongue-depressor (sometimes of the old bone type, standing in a jar of "antiseptic"), sphygmomanometer, watch, syringes, and needles. Apart from these indispensable articles of practice, there was usually an ophthalmoscope, an auriscope set, and a variety of instruments of varying vintage and type. Proctoscope and vaginal specula were usually in evidence, although frequently there was also abundant evidence of their long disuse. Besides these, a variety of other instruments, antique or sometimes relatively modern, were often to be seen lying around as mementos of past interest in various aspects of medical work.

I have laboured these points of detail somewhat, because it is necessary to recognise the unsatisfactory nature of the doctor's workshop in an average industrial practice; for this factor in itself sets a limit to the scope and quality of his work, to the treatment his patients receive, and to improvement of the situation. Few skilled craftsmen, be they plumbers, butchers, or motor mechanics, would be prepared to work under conditions or with equipment as bad (comparably) as that tolerated by many doctors working in industrial practices.

But even more important than these material conditions is what goes on inside the surgeries and what use is made of the resources they possess.

EXAMINING THE PATIENT

The frequency with which the examining couch is used is a good index of the nature of medical practice under these conditions. I noticed on some occasions that a perfectly serviceable couch was piled with boxes and bottles; the adherence of these articles to the leather cover showed that they had occupied this position for some time. Often I have sat on a doctor's examining couch throughout a consulting hour; and, though many patients gave histories and presented symptoms which indicated the need for thorough examination, they left without any attempt being made to examine them or any arrangements being made for a future examination.

I particularly noted cases where, in my opinion, the history suggested an urgent need for rectal or vaginal examination; and I had listed over forty such cases before I saw a general practitioner pull on a rubber glove and make the examination, or arrange with the patient to do so at a later date. A small proportion of these people were referred to hospital outpatient departments, on the strength of their history alone; but the majority received reassurance and local symptomatic treatment.

In fact, under the prevailing conditions of industrial practice, anything approaching a general or complete examination is out of the question; "examinations" are usually confined to the offending organ and even then are cursory. Certain routine procedures are followed, sometimes almost religiously: throats and tongues are looked at, pulse-rates and temperatures are taken, blood-pressures are recorded on indication, and chests are "listened to," either at the patient's request or for some specific reason. (The process of "listening to" must not be confused with a chest examination: it consists merely in applying the stethoscope to some area readily exposed by unbuttoning a shirt or pulling down an undergarment.) On urgent indication an abdomen may be palpated: I have often seen this done with the patient standing, and I have rarely seen what could be termed a thorough abdominal examination made in an industrial practice.

Once or twice I have seen a doctor, working under these conditions, take a blood sample to send to the laboratory for examination; but as a rule, when such an investigation is thought necessary, the patient is sent in person to the hospital, without consideration for his convenience or sensitivity.

EFFECTS OF ENVIRONMENT

One could go on listing the shortcomings of general practice in industrial areas; but it is neither my purpose nor my desire to defame the overworked and often conscientious doctor who has to suffer the indignities of this way of working.

Where these shortcomings are admitted, people are apt to attribute most of them to the volume of work which the industrial practitioner has to handle. This provides a convenient rationalisation of an otherwise embarrassing situation.

There is no doubt that the volume of work *is* too great, but this is merely a secondary factor. If the doctors' surgeries were better from a functional point of view; if they were equipped at least to some minimum standard; if a little order were brought into the chaos which characterises the organisation of the average practice (e.g., by employing clerical assistants); and if the work of the industrial practitioner were coördinated with that of other medical agencies—then the same volume of work could be handled at a much higher level and with due regard to the safety and comfort of the patient. (As I shall show later, the average industrial practitioner, though he works in close proximity to the great urban medical centres, is more isolated from the benefits these could bestow on him than is his colleague working out in the countryside.)

I found that the working environment of general practitioners in industrial areas was so limiting that their individual capacity as doctors counted for very little. In the circumstances prevailing, the most essential qualification for the industrial G.P., from the standpoint of public safety, is ability as a snap diagnostician—an ability to reach an accurate diagnosis on a minimum of evidence, objective or subjective. The skill attained in this type of diagnosis is sometimes really remarkable, but it very seldom bears any relation to our accepted ideas of "quality" as assessed by academic qualifications or conventional clinical experience. Some of the doctors with least to show in qualifications or hospital experience proved to be the best snap diagnosticians, and therefore the best and safest industrial practitioners, whom I met.

These facts have obviously affected the type of doctor who has entered the jungle of medical practice in industrial areas. Broadly speaking, I came across two types, which one might call the mercenaries and the missionaries. Among the latter are men of outstanding character, sincerity, and occasionally medical ability as displayed by qualifications and experience, who have gone into the industrial areas to "do good." Among the former are some who, by our accepted standards, are judged undesirables.

I saw and worked with some of both of these types and formed the opinion that their environment levels them to a degree where, in effectiveness, there is little to choose between them. In fact, the "mercenary" who is a good snap diagnostician may be of greater value than the "missionary" who cannot match him in this. Under the conditions of industrial practice the "good" doctor has little or no opportunity to exercise his humanistic, psychological, or educational function, which we accept as an essential and integral part of general practice.

Thus in industrial areas medical practice has moved far from the last-century concept of family doctoring; it has not progressed in terms of modern scientific knowledge; and it has reached a point where, despite the efforts of the most conscientious individual doctors, it is at the best a very unsatisfactory medical service and at the worst a positive source of public danger. This is no sudden or recent happening, but is the result of long neglect of the important medical and ethical principles to which we so readily pay lip service.

In 1924 Abraham Flexner[1] wrote:

> "Less than half a century ago the office of an able urban practitioner consisted of two rooms, one for waiting and the other for consultation. There was little to indicate which was which beyond the ancient tilting haircloth examining chair, the wash basin, . . . a few simple instruments which, used for all sorts of purposes, were never boiled, two or three vials containing mercury or carbolic acid for local applications, and the mantelpiece strewn with proprietary preparations in dust-covered bottles. Urinalysis was employed—practically no other laboratory procedure. The doctor made up his mind on the basis of symptoms and obvious physical indications. Long experience and natural shrewdness sharpened by necessity carried the best of the old family physicians far . . . inability to penetrate beneath the surface constantly forced the practitioner to guess or fumble."

Flexner's description of medical practice in the last decades of the 19th century is almost a perfect word-picture of general practice as I found it in the industrial areas of England in 1949. This section of general practice indeed provides an example of what Mannheim has defined as "non-contemporaneous contemporaneity."

If, in the process of becoming an anachronism, this branch of medicine had retained the ideals and the human elements of the old concepts of family doctoring we might even be able to defend and applaud what has happened; but it would be dishonest to pretend that it has.

SCOPE OF WORK

To display more fully the pattern of medical practice in industrial areas I must summarise the work done under these conditions.

Diagnosis

With limited time, facilities, and equipment, the doctor attempts to arrive at diagnoses and to refer those patients requiring more skilled attention to a place where such attention can be given. Much of this diagnostic work is empirical and some almost intuitive.

For the most part he deals with people of ages ranging from the late teens to the early sixties—the working section of the community. The school clinics and maternity and child-welfare clinics have relieved him of responsibility for caring, in a comprehensive way, for the school and preschool child, and also for the expectant and nursing mother. While he may attend many patients over sixty years of age, it is more a question of attending than caring for them: the time and the inclination to bring medical skills to bear on the problems of this age-group are sadly lacking.

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[1] Flexner, A. Medical Education. London, 1925; p. 9.

Therapy

Treatment is even more restricted than diagnosis. Most of it is symptomatic, and nearly all of it is medicinal; for there is neither time nor opportunity for physical therapy or psychotherapy.

Without access to hospitals, doctors working under these conditions naturally do no major surgery. Most of them do no minor surgery either. It is rare indeed to see a practitioner in an industrial area open an abscess, put in a suture, remove a fingernail, or indeed undertake any procedure requiring sterilisation of instruments.

Midwifery

Before July, 1948, most industrial practitioners had long since yielded all responsibility for midwifery to the midwives and the maternity and child-welfare clinics. The few who continued to dabble in midwifery were mostly considered by midwives and other responsible observers to be a menace, and from what I saw of the antenatal work of some of them I can endorse this opinion.

Minor Laboratory Work

This is almost confined to testing urines for albumin and sugar, and then only on specific indication (e.g., an apparent toxæmia of pregnancy as opposed to routine antenatal test). A microscope is seldom seen among the G.P.'s equipment. Estimations of hæmoglobin and sedimentation-rates, and other simple and useful tests, are seldom done: though, as I said before, the surgery often contains odd pieces of apparatus, the instruments of such tests.

To analyse the doctor's work beyond this point is scarcely possible at present; nor, in my opinion, is it necessary. With a problem so crude, greater detail is of little but academic interest. Time-studies, age, sex, pathological, or other breakdowns of the doctor's work are out of the question with medical records either non-existent or so superficial as to be valueless for this purpose.

The important point is that this form of practice constitutes the pattern for most industrial areas, and that the pattern is accepted by doctor and patient alike. It is far away from the ideal of family doctoring on the one hand, and of modern scientific medical practice on the other; yet it is still wilfully identified with both of these.

Rural Practice

Rural practice is in many ways the antithesis of industrial practice; and in judging the quality of rural medical care we have to employ different criteria.

SURGERIES

Though built to the same pattern, and functionally little different, the country surgeries I visited were much pleasanter places than their town equivalents. For the most part they were better equipped—though I did see two without an examining couch and others where this was merely an adornment. Moreover, functional imperfections in a rural surgery are less important than the same imperfections in an urban one, where time and efficiency are paramount factors in the quality of the service which can be offered. In fact, premises which would be deplorable under urban conditions may pass as interesting and quaint examples of last-century architecture and custom when they are found, say, in a small south-country village. I saw some surgeries which had served successive doctors for over a century, and they served well enough today, though they might not satisfy an efficiency expert.

In a rural town the doctor's surgery must be considered in association with the cottage hospital, as a combined unit, the one supplementing the other. In isolated rural practice, on the other hand, the doctor's surgery assumes a new importance; it needs to be well enough equipped to enable him to meet responsibilities and demands which his colleagues nearer centres of civilisation can pass on at a moment's notice. At least by existing standards, the rural-town cottage-hospital combination is nearly always satisfactory (if we exclude the requirements for major operations): but the surgery of the isolated country practitioner is as often unsatisfactory in the extreme, and places him, and accordingly his patients, at a serious disadvantage.

I saw this latter point illustrated many times. For example, I have seen a patient sent many miles when a microscopical examination of urine might have confirmed a diagnosis of pyelitis rather than one of appendicitis; but there was no microscope. Similarly the absence of a microscope necessitates more empirical diagnosis, and consequent empirical therapy, than is desirable, and causes unnecessary inconvenience, expense, and sometimes danger to patients who have to travel to the nearest hospital. The microscope, indeed, is almost indispensable to the isolated country practitioner, yet is seldom included in his equipment; and other simple things, such as hæmoglobinometers and blood-sedimentation apparatus, are very uncommon. It is, of course, debatable how much the individual practitioner should attempt on his own; but it is surely fair to expect him to do whatever he is able to do for the convenience and benefit of his patients.

I saw some isolated rural practices which were quite as badly equipped as the worst industrial practices I visited. But in spite of the poorness of these surgeries and equipment, and the question of how a serious emergency would be met in them, it is impossible to assess the quality of such a practice on the same basis as would be appropriate for an urban practice. Not only has the country doctor the time to examine his patients but he also has the time to know them intimately: and his judgment is usually based on a greater knowledge and a deeper consideration, both of the person and of the ailment, than his city colleagues can compass.

This is not to say that he could not do much better work under better conditions, but rather that the good country doctor can and does overcome the obstacles of bad environment, in terms of surgery and equipment, in a way impossible for the city doctor. Furthermore, the country G.P. is fulfilling a function, in the psychological as distinct from the organic field, in a real way which again is impossible for the city doctor. A rural practitioner, who may only be "fair" so far as organic medicine is concerned, may still qualify as an excellent family doctor.

STANDARD OF WORK

Under the conditions prevailing in rural practice, the quality of the medical care is governed chiefly by the quality of the doctor himself. This is very difficult to assess but not difficult to recognise.

During my study, I met and worked with some men who could be graded, on an absolute standard, as first-class. They were good clinicians, good technicians, and fine humanists. Of the others, the majority, while belonging to the third category, rapidly fell away through fair to bad in the first and the second. Yet, as I have just said, this does not necessarily mean that they were not "good" doctors.

This again brings up the question of criteria. In seeking a sample of "good," "average," and "bad" practices, I found it hard to get people to nominate "bad" doctors in rural areas. There is a tendency to regard the country doctor as "good," if for no other reason than the urge to identify him with our concept of the ideal—the real family doctor. However, in the south, where a more or less random sample was taken, before I saw a general practitioner pull on a rubber glove and make the examination, or arrange with the patient to do so at a later date. A small proportion of these people were referred to hospital outpatient departments, on the strength of their history alone; but the majority received reassurance and local symptomatic treatment.

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1. Flexner, A. Medical Education. London, 1925; p. 9.

The range of work undertaken in different practices is wide; but it seems clear that the rural practitioner on the one hand still approximates to the ideal of the family doctor, and, on the other, at least aspires to meet the demands of modern science and procedure. It must be said, however, that over a considerable section of rural practice these aspirations do not take us very far, and that, compared with his colleagues in the industrial areas, the rural practitioner must accept a greater measure of responsibility for his own shortcomings. Conversely he is entitled to due respect for his achievements.

In the final analysis present-day rural practice remains an anachronism, though one which has retained many of the virtues of the past.

Urban-residential Practice

Urban-residential practice is dealt with out of turn because, though it is intermediate between the extremes of industrial and rural practice, it is less easily defined in terms of scope or quality. "Good" practices of this type resemble the best of rural practice, and "bad" practices the kind of thing so common in industrial areas; yet urban-residential practice has certain features which establish a distinctive pattern.

Some of these are superficial—no more than a veneer of sophistication on the crudities of industrial practice. Others are more basic, and quite characteristic. The superficial differences are perhaps the more obvious.

SURGERIES

Take the surgeries, for example. Most of them follow the two-room design of the industrial type, but there is a world of difference in the furnishings, style, and regard for patients' comfort and tastes. A large proportion of these surgeries have been "made over" from the front rooms of a family home in much the same way as the surgeries of the industrial practitioner have been adapted from an erstwhile shop or residence. But I have been in surgeries built by the doctor for the specific purpose, and have been impressed by the fact that they too have usually followed the two-room (waiting-room and consulting-room) pattern. Evidently the belief that two rooms are all that is necessary to run a general practice is firmly rooted in the medical mind. Twice I have met doctors who at some stage were adventurous enough to build themselves three-room surgeries, but who, over the years, have reverted to type and are now working in two and using the third room for storage. There are, of course, exceptions to this rule, and some doctors have built surgeries which are excellent from the functional point of view; but these are very definitely exceptions. One cannot suppose that the difference in capital outlay required to construct a good as opposed to an unsatisfactory surgery has been the determining factor. The designs must be primarily the result of an unquestioning acceptance of the traditions of the last century and a failure to think about general practice in contemporary and constructive terms.

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I would say that though most of the urban-residential surgeries I visited were better equipped and better appointed, they were functionally almost as unsatisfactory as their industrial-area equivalents.

NATURE OF THE WORK

In urban-residential areas the capacity of the individual doctor has more free play than in industrial areas, but usually less than in the countryside. The few doctors left with hospital privileges have much the same scope of work as the rural practitioner, and may know their patients in much the same way. The majority, however, work under greater pressure and lack these hospital privileges, and on the average they represent a rather unhappy compromise between the two extremes.

The number of patients handled by the urban-residential practitioner is very variable, and an extra 500–600 can reduce the standard of his work much more appreciably than a similar numerical increase will reduce the standard of work of the industrial practitioner.

As local-authority services do not operate to nearly the same extent in these better residential environments, the general practitioner should carry a greater responsibility, for example, in the care of mother and child. But I saw little to suggest that he does so; and I can only conclude that in these areas the work which is done elsewhere by the local-authority clinics is usually not done satisfactorily or not done at all.

Compared with the industrial doctor, the urban-residential doctor spends a considerably longer time on each patient. But on the whole there seems to be little difference in the time spent on physical examination. There are, of course, exceptions.

The scope of the urban-residential practitioner's work has possibly undergone more change of late years than that of either of the other two groups; and for this if no other reason it is harder to establish a pattern. The doctor's individual capacity is still reflected in his work, but to an ever-decreasing extent. He has more social contact with his consultant colleagues than doctors have in either of the other environments, but probably no more professional contact.

Urban-residential practice is certainly the most difficult to assess. It represents the transition from the ideal of family practice to the "casualty-clearing station" type of practice seen in industrial areas. While it obviously does not meet all the requirements of medical care, it is more or less immune from the contrary criticisms which can be directed against rural practice on the one hand and industrial practice on the other.

I was better able to make an unbiased classification of the doctors I visited.

From the strictly technical standpoint many of them were "bad": though they all had a working knowledge of the use of such modern preparations as penicillin and the sulpha drugs, their knowledge on the whole was out of date. But if the skills they exercised were very limited in any one field, they embraced many fields; and so long as the man was a good and conscientious observer he was usually a "good" doctor in the circumstances in which he practised.

However, I worked with some who, though regarded as "good" by both the profession and the public, were in fact "bad" in absolute terms. All the men I would put in this category were well qualified from reputable medical schools; most of them had been in practice for many years and were regarded, more or less, as "the squire." Their chief fault, as I saw it, was that they were not good or thorough observers of either organic or psychological problems, and took no pains to check their impressions and opinions by objective investigation. They worked to a routine and within limits that had long since dulled their curiosity and their sensitivity. For example:

> Taking a surgery with a practitioner who enjoyed a high reputation both professionally and publicly, I saw a man come in who was icteric and almost emaciated. The object of his visit was to get a bottle of medicine for his wife. I asked, after he had gone, what was the cause of his strange colour and condition. The answer was "Oh, I don't know, there's nothing much wrong with him; he's been like that for three years."
>
> At another time a doctor took me to see a case of which he was particularly proud—an old man of sixty-five with a dry gangrenous leg, which had been preserved by keeping the patient in bed for twelve months since the sudden onset of the condition, still undiagnosed. The doctor visited regularly to "dress" the dead appendage, and his attitude was that here was an old man comfortable enough in bed and not requiring any active therapy.

In the same region I spent some days with a young doctor who had only a small number of patients but who tried to give a service satisfying his own high standards. As this practice was very isolated and poorly served by consultant and laboratory services, he had built his own little laboratory and fitted it with apparatus which enabled him to do many things not normally considered part of general practice. He did a lot of microscopy and such tests as blood-sugars, blood-ureas, and clotting-times; also he had a portable electrocardiograph and other equipment which enabled him to do a most comprehensive job of diagnosis and therapy.

While I am not saying that this should be the model of general practice, or that this man was not taking on too much, I must emphasise that as an individual, looking after 1300 patients, he was exercising a wider range of skills than any other G.P. I have seen, and in my opinion exercising them within the limits of safety. Beyond dispute he was offering a quality of service far above anything his colleagues could offer. The point I want to make is that these colleagues, who had larger practices, enjoyed unassailable reputations, and had no cause for jealousy, regarded this doctor as crazy. In their unqualified opinions he was mad—merely because he endeavoured to exercise to the limit the skills of which he was capable in the interests of his patients. Because of his small practice, and in spite of his excellent work, he was suffering serious financial embarrassment, and has probably by now been forced out of his practice and into some more lucrative field.

I also came across a "group" practice, which had been operating for about eighteen years in a small village. It was run by a group of four—three partners and an assistant. Their surgery was the first and only one I saw which had been carefully planned and built as a separate working unit, and, though they would like to improve on the design, it was far better than any other surgery I visited in Great Britain.

In qualifications and experience the doctors working this group were wholly comparable with their neighbours. But, from the point of view of the patient, the service they offered was vastly superior to anything that could be provided by the surrounding doctors. They ran a highly organised group practice, and by virtue of their good organisation alone they had more time to devote to their work and interests. One was particularly interested in surgery and another in obstetrics, but they were all general practitioners in the full meaning of the term. Their records were better than any others I have seen in England (I still would not say that they were good); they employed clerical and nursing assistance; and they did not share the common opinion that the expense of such assistance was unjustified or could not be carried by a practice of moderate size and income. Their whole attitude of mind was different from that of the average doctor; they were constantly trying to improve their equipment and to widen their scope of work, and they were interested in children and old people to a degree not usual in the general practitioner.

THE RURAL PATTERN

Enough has been said to illustrate the two points I want to make at this stage:

1. That the whole pattern of practice in rural areas differs greatly from that in industrial areas.
2. That we must apply different criteria when judging the quality of medical care offered by, or possible within, these two types of practice.

For purposes of contrast I summarise the scope of work undertaken by the rural practitioner:

Diagnosis

Rural practitioners often undertake a high level of diagnostic responsibility, though some of them work in the same empirical way as their industrial colleagues and to about the same elementary level. The difference is that in the country the level usually depends on the doctor's choice and is not imposed by his environment.

With reasonable cottage-hospital facilities the rural practitioner can and often does work to much the same level as the consultant physician, with the added advantage that he knows his patients intimately and often over a long period.

He deals with people of all ages—not primarily with the working section of the community. Nevertheless, for the most part he has the same attitude as his urban colleagues towards the medical problems of his elderly or "chronic" patients.

Therapy

The therapeutic responsibility of the rural practitioner is also wide. He seldom limits himself to medicinal treatment. Physical and psychological therapy come well within his terms of reference; minor surgical procedures are almost a daily routine; and, where he has access to a cottage hospital, he commonly undertakes major surgery.

Midwifery

Though the trend for many years has been away from general-practice obstetrics, the country doctor still usually does some of the midwifery of his area. From such observations as I was able to make, the average rural G.P. is no obstetric paragon. However, through his association with mother and child he retains an intimacy and a bond which marks him as a family doctor.

Minor Laboratory Work

Again, the amount of minor laboratory work undertaken by the rural G.P. is determined by his own interest rather than by the circumstances which restrict the man in industrial practice. A still significant proportion of country doctors carry their side-bench work beyond casually testing an odd urine for sugar and albumin. Some do quite advanced laboratory work even within the confines of their own surgery.

The range of work undertaken in different practices is wide; but it seems clear that the rural practitioner on the one hand still approximates to the ideal of the family doctor, and, on the other, at least aspires to meet the demands of modern science and procedure. It must be said, however, that over a considerable section of rural practice these aspirations do not take us very far, and that, compared with his colleagues in the industrial areas, the rural practitioner must accept a greater measure of responsibility for his own shortcomings. Conversely he is entitled to due respect for his achievements.

In the final analysis present-day rural practice remains an anachronism, though one which has retained many of the virtues of the past.

Urban-residential Practice

Urban-residential practice is dealt with out of turn because, though it is intermediate between the extremes of industrial and rural practice, it is less easily defined in terms of scope or quality. "Good" practices of this type resemble the best of rural practice, and "bad" practices the kind of thing so common in industrial areas; yet urban-residential practice has certain features which establish a distinctive pattern.

Some of these are superficial—no more than a veneer of sophistication on the crudities of industrial practice. Others are more basic, and quite characteristic. The superficial differences are perhaps the more obvious.

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SPECIFIC EXAMPLES OF GENERAL PRACTICE

I shall now describe a few examples of practice under the various environmental conditions, including one or two which illustrate the effect of differences in the number of patients or the history of the practice.

Industrial Practice

I

Two partners and an assistant. Approximately 10,000 patients on the list. No private patients.

This practice, locally classified as " good," had been established for many years and had always had a large " panel " list under the National Health Insurance Act. The district it served was densely populated, and in area no more than a few square miles; most of the housing was very bad, though some slum clearance had gone on at different times and there were rehousing estates of various dates. The inhabitants were largely engaged in heavy or light industry, the former predominating.

The surgery was on the ground floor of a tenement house and was difficult of access for many patients. It comprised a very small waiting-room, two consulting-rooms, and a dispensary; and, though the site was unsuitable, it was well equipped compared with most of the other industrial surgeries I visited.

The doctors held morning and evening consulting hours six days a week, two of them working simultaneously in the surgery while the third was out on " calls." The consulting " hour " always extended to two or three hours, and they were seeing anything from 30 to 50 patients each during the consulting period. They employed a lady dispenser, who also acted as telephonist and receptionist and undertook some clerical duties.

An attempt was made to keep a file record, but this consisted mainly of a very few brief notes pertaining to the " really serious illnesses," and such letters and reports as came back from the various hospitals to which patients had been referred. A remarkably large proportion of the record cards which I saw coming out of, and going back into, the files bore nothing more than the patient's name, age, and address.

Two of the doctors undertook domiciliary midwifery; between them they totalled about 25 cases a year.

On the occasions I attended the surgery, the waiting-room was packed and sometimes patients were standing in the front grounds. I was informed that this was not a heavy period, there being a relative absence of epidemics. The average length of a consultation was three to five minutes, whether it was a new case or a return visit; a " serious case " or one involving some degree of physical examination would take, perhaps, ten to fifteen minutes.

It is hardly necessary to say that, in such circumstances and working to such a schedule, physical examinations were cursory and were kept to a minimum. Most examinations were made with the patient sitting or standing, and with removal of the least possible amount of clothing. The examining couch was seldom called into use. I never saw vaginal, rectal, or ophthalmoscopic examination attempted, though during my time at this surgery many patients were seen who seemed to me to require one or other of these examinations. In all such cases I asked the doctor and/or the patient whether such an examination had been made at a previous time, and the answer was always No. It must, however, be said that a proportion of these people were sent to hospital for the opinion of a specialist. Indeed in most cases where the brief histories taken, or the examination made, suggested potentially serious organic disease, the patient was referred to an outpatient department. In this particular practice a great number of patients were similarly referred for laboratory and radiological diagnostic tests. Usually all the doctor wanted was the result of the particular test and not another opinion.

These practitioners undertook the antenatal care of their own patients. This was done in a very loose way. Inquiry was made as to how the patient felt; blood-pressures were taken only on some specific indication; samples of urine were brought only occasionally and then examined only if there was some special reason. In the only case of early pregnancy which came in during my stay no attempt was made to make a pelvic or general examination: the patient was told to "*come back in a couple of months to be antenataled " and it was left* at that. The chief purpose of the visit, so far as both patient and doctor were concerned, seemed to be the supply of certificates for the various benefits accorded to the expectant mother. No antenatal records were kept.

The treatment of the numerous children who were brought in during my time in this practice was similar to that of the adults, but on the least suspicion of serious illness they were referred to a pædiatric clinic at the local hospital.

Though this practice had run a dispensary for many years, the " bottle of medicine " mentality was not highly developed, and indiscriminate prescribing seemed to be at a minimum.

It is often very difficult to assess the legitimacy of claims made for sickness benefits and the like, but I formed the impression that these practitioners erred considerably on the side of leniency. The time and effort required to meet the demands of certification did not seem excessive.

I made a considerable number of domiciliary visits with these doctors. It was always a rush to get through the list, and the same factors as led to cursory examination in the surgery operated in home calls also. Except in special circumstances, three or four minutes sufficed for each visit.

In both surgery and domiciliary work a lack of interest in the non-acute cases was conspicuous—particularly with elderly or " chronic " patients. Though these were visited with scrupulous conscientiousness, it was apparently not thought worth bringing medical skills to bear on their problems. In fact, the over-sixties suffering from any condition resulting in long-continued immobilisation were regarded as more or less hopeless cases, worthy of pity and charity but scarcely of serious medical attention.

The many patients seen who presented themselves obviously for psychological and not for organic reasons were treated with hearty reassurance and quick dismissal.

These doctors had no hospital or nursing-home facilities for their own use. They had no visiting rights at the large general or special hospitals. They knew and were on good terms with the consultants of the district, but saw very little of them. They were very hard-working and conscientious, and, as far as one could ascertain from the limited clinical procedures they undertook, they were good clinicians, at least within the limits set by the type of work they were doing. Certainly they were highly skilled at snap diagnosis.

This was very much the picture in all the " good " industrial practices where the conditions of work were similar. The only absolute difference was that in most of them no midwifery was done. The man who, in terms of qualifications and hospital experience, was the best industrial practitioner I saw working under comparable conditions conducted his practice in just the same way. He was one of a partnership of four. In his company, I did a round which took us to 38 houses between 11 A.M. and 4.30 P.M. (with time off for lunch). There is little need to elaborate on the perfunctory nature of the visits or the effects of such a manner of practice on a man of very high clinical ability. This particular partnership was the only industrial practice I visited where there was any significant division of the field of work. One partner had taken responsibility for the "old chronics," which not only reduced the load on his colleagues handling "acute" cases but also greatly benefited the old patients.

Throughout the "good" industrial practices visited, premises and equipment were unsatisfactory; record-keeping, at the best, was not good; antenatal work, where done at all, was casual; and the routine work of diagnosis and therapy was limited by time and circumstance much as in the practice I have described.

II

Four partners and two assistants. Approximately 20,000 patients on the list.

This practice was of fairly long standing, and under the National Health Insurance Act had carried a very large "panel" list. It was in a densely populated area, where light industry predominated and housing conditions were deplorable; whole terraces of houses had been condemned for years, but little in the way of slum clearance had been undertaken. The boundaries of the practice encompassed several square miles, and the total mileage covered by the doctors in the year was large.

The surgery consisted of a small dilapidated waiting-room, three equally small and untidy consulting-rooms, and a kind of cupboard which served as a dispensary (the practice had always done its own dispensing). The consulting-rooms were dirty and ill equipped. There were no examining couches, and no apparent means of sterilising anything; indeed, apart from a few rusty and dusty antique instruments, there was no sign of any sort of equipment. Large stock bottles were standing all over the place, and the desk and floor were littered with papers. Only one of the consulting-rooms was equipped with a hand-basin and hot and cold water.

I made my visit during an afternoon consulting hour, and found a queue of people extending about 200 yards up the street, waiting their turn to see the doctors; they were standing packed in the waiting-room and I had to force an entrance. I was made welcome "to see the procession," given a seat and a cup of tea, and invited to stay "as long as I liked." I was told, not without pride, that "we have seen 500 already today"; and I have no reason to doubt it.

During my stay of an hour and a quarter about 120 more patients came in. They were "seen" by three different doctors, who replaced one another with almost bewildering rapidity. No pretence was made at real examination of any of these patients. An occasional temperature or pulse-rate was taken; four or five times a stethoscope was applied to a point somewhere below the thyroid gland and some such utterance made as "ah, a bit chesty."

The bottle of medicine was the sine-qua-non of this practice. One small child came in requesting "a bottle for the lady over the road." He could give no further information, apart from her name and address, which obviously conveyed nothing to the doctor; but he produced a dirty-looking bottle with some dregs in the bottom, and after a glance the doctor prescribed a small something, passed it to the child, and called the next patient. Other patients came requesting "a note for bronchitis" or some similar malady. With no further formality than "name and address?" this was issued and the patient dismissed. "Notes" and "bottles" were asked for by almost everyone seen, and were supplied on request. Almost everyone seemed to have "a slight touch" of something or other; bronchitis most commonly, occasionally pleurisy, once or twice rheumatism, and once measles.

One patient produced his identity card in lieu of his medical card, to be told "this isn't your medical card." He replied without hesitation: "I know that, and I've been using it here for three months. This is the first time you've noticed."

A number of patients, either because their complaints sounded serious, or because their history was suggestive and they looked really ill, were referred to hospital. This procedure seemed to be known as "sending them through."

Around 4 P.M. the queue, still extending well up the street, was broken off and the front door was locked. I was told that sometimes the housekeeper was posted at the back gate "to stop them coming in there," and that "if we did not do this the queue would remain from 9 A.M. to 9 P.M. and we'd never get our visits done."

The visiting-list was made up, and though I did not count the number of visits to be made it was certainly most formidable. When I asked about records, the reply was: "We have no time for that sort of nonsense. However, we have a secretary who comes in two or three days a week, and makes up records from these old prescription pads. Of course she's months behind." These practitioners do a considerable amount of midwifery and, I was informed, "run our own nursing-home." When asked about antenatal work, the senior member of the firm said: "We don't have much time for that sort of thing." Unfortunately I had no opportunity to pay any domiciliary visits with these doctors, or to see their nursing-home.

The doctors themselves seemed intelligent and made no real effort to explain or excuse their way of practice. Obviously the work had been done in this way for a long time, and the method was accepted, by them and their patients at least, as satisfactory or inevitable. The younger members of the partnership with whom I talked had a high regard for their seniors and claimed that they "don't miss much." One of them, who had been in the practice for only about two years, seemed somewhat perturbed by the nature of things; but "it is all that can be done in the circumstances," he said.

I set these two examples of large industrial practice at the upper and lower limits of "ordinary" industrial practice. Doubtless examples could be found that would be better than the example cited as "good," but I did not see them in England. If better practices existed within the industrial areas studied, I fancy I would have been referred to at least one.

III

Single-handed practices. Small patient-load.

I do not imagine that industrial areas contain many small single-handed practices; but I recall two. Practice A was run by a practitioner who had chosen to work in an industrial area and who limited his list to about 1500 patients, claiming that he could not do justice to more. Practice B was run by a practitioner who had been establishing himself before the war, but on returning from the Services had found his practice almost gone. He had had to begin again to build it up, and when I saw him he had just over 2000 patients. Obviously these two could be called special cases, and so probably could most others which would fall into this group. A few of the doctors would be young and recently started in practice.

Both the men I have mentioned had their surgeries at their homes. In both cases they had adapted two rooms, originally part of the dwelling, to their needs. Both surgeries were reasonably well equipped, that of the elder (practice A) particularly well. His waiting and consulting rooms were comfortably and tastefully furnished, and the latter was well supplied with the essential instruments of practice. This surgery was far more like the type of thing seen in the better-class residential practices than the usual industrial surgery.

The practices covered similar areas, and the housing and economic conditions in the two places were similar, housing being bad in both. There the comparison ceases, and I shall describe them separately. It should be noted that both these practices were locally described to me as "good."

Practice A.—All patients were seen by appointment; a quarter of an hour was assigned to each, but whenever necessary more time was given. Patients on return visits requiring certificates or repeat prescriptions were asked to come at the beginning of the consulting hour, and 10–12 came within the hour. Physical examinations were thorough, and reasonably full records were kept. During my time in this practice I saw no-one referred for an opinion until the case had been investigated as far as could be done in the surgery. When necessary, urine was examined microscopically, and hæmoglobin and blood-sedimentation rates were estimated. If possible, when further laboratory tests were required, a specimen rather than the patient was sent to the hospital.

Minor surgical procedures, such as the opening of superficial abscesses, strapping of sprains, removal of fingernails, and minor sutures, were done in the surgery. Psychological problems received careful attention and a good deal of time was devoted to them when necessary. No midwifery had been done for some years, but the doctor was about to recommence booking cases, because his income had dropped appreciably since July 5, 1948.

Though this had been a dispensing practice for many years, there was no evidence of the "bottle of medicine" mentality. All claims for sickness and other benefits were examined carefully from the social and psychological angle, as well as the organic.

There was ample time for domiciliary visits, and the same thorough routine was followed in them. The doctor was on friendly terms with many of the consultants in the area, and, though he had no visiting rights in any of the hospitals, he managed to see many of his patients who had been admitted, and often did a round with one or other of the local consultants.

Practice B.—With only a small difference in the patient-load of this practice, the doctor was seeing about three times as many people at each consulting hour and making about twice as many domiciliary visits. There was no appointment system.

History-taking and physical examinations were cursory. The doctor told me that he did not attempt to do rectal examinations, but that if a case was sufficiently suggestive of cancer of the rectum he sent it straight to hospital. Wherever indicated, some sort of an examination was made of chest or abdomen, and if symptoms or signs were in the least suggestive of possibly serious organic disease the patient was referred to an outpatient department for another opinion. No great effort was made to define the possibilities before referring the patient.

During my stay in the practice no records were made of any of the patients seen. Files and record cards were kept on what were considered important points, but from what I saw of the cards the notes were mainly on prescriptions issued.

This doctor booked confinements and did most of his own antenatal work. He asked about the patient's health since her last visit, took her blood-pressure, and examined her urine. No records of these were kept unless there seemed to be some abnormality. None of the minor surgical procedures undertaken in the other practice were attempted here: the patient was sent to hospital.

Domiciliary visits amounted to 10–15 a day (except during epidemics, when they were considerably more numerous). This allowed the doctor to spend a reasonable time on each visit; but the actual examinations made were of the same cursory kind as in the surgery.

Rural Practice

I

Three partners. About 10,000 patients. Good cottage-hospital facilities and three small nursing-homes.

This practice, established for almost a century in a town now having 20,000 inhabitants, had never had more than a few hundred on the "panel." There were several other doctors in the town, practising alone or in pairs.

With two senior partners and one junior, the practice served an area extending about ten miles from the surgery, with good road communications. Most of the people were engaged in farming, but the town had some light industry. Both town and countryside could be described as prosperous.

The surgery was a converted shop and residence above the shop. The waiting-room was downstairs and was adequate and well furnished. There was also a dispensary with a dispenser-receptionist working in a small room opening on the waiting-room. Upstairs there were three consulting-rooms, and an office where records were kept and other clerical work was done. A full-time male clerk lived on the premises and worked for all three doctors. The consulting-rooms were spacious and typical of the all-purpose type described previously. They were well equipped both basically and with instruments.

The cottage hospital was run by all the G.P.s in the town, but this partnership made by far the greatest use of it. It was a 50-bed unit, with both medical and surgical wards, a fairly up-to-date operating-theatre, a small department of physiotherapy, an X-ray department, and a small recently acquired department of pathology. This last, though it was not very well equipped, employed a junior and a senior technician and met most of the requirements of the hospital and the local practitioners. Consultant surgeons and physicians visited the hospital once a month, or more frequently if asked.

There were three small private nursing-homes. One was a 5-bed unit for maternity cases only; the other two had about 10 beds each, and an operating-theatre, and took general medical and surgical cases.

To some extent the three partners divided their routine duties. One did most of the surgery, not only for his own practice but for the district; one did some "minor" surgery, such as tonsillectomies an[illegible] [illegible]mies; and the third gave most of the [illegible] duty was worked on a roster system and they relieved one another for days off. All three did their own midwifery, which amounted to 10–30 confinements each per year. The surgeon of the partnership undertook most of the abnormal midwifery for the district, including all cæsarean sections.

There were three consulting hours six days a week, with two doctors working simultaneously at each period. No routine appointment system for consulting hours had been introduced, but special appointments would be made when patients had to come a long way, or where transport communications were bad, or when it was expected that consultation and examination would take a long time. About 15–20 patients were seen by each doctor during a consulting "hour," which sometimes lasted as long as one and a half hours; and as much as twenty minutes would be devoted to a patient needing particular attention. If further or more detailed examination was deemed necessary he was brought back to the surgery by appointment or seen as an outpatient at the cottage hospital. Apart from simple urine-testing, all laboratory tests were done by a technician in the hospital pathology department.

Record-keeping was unsatisfactory, even on the more important and serious cases. Antenatal work was much as described for other practices; notes were made only if some abnormality was suspected.

At the time I was in this practice domiciliary visits were averaging some 10–20 per day per doctor—mostly nearer the lower figure—and I was told that this was usual except during winter epidemics. At this rate ample time could be devoted to those patients who required detailed attention and examination. Though the domiciliary visits involved a lot of driving, roads were good and farms and houses readily accessible, and the time spent "on the road" did not seem disproportionate.

The cottage hospital was used primarily for surgical cases, but a few beds were allotted to medical ones. Difficult surgery was undertaken by the G.P. surgeon, and as little as possible was "given away" to visiting consultants or sent to the larger city hospitals. I was told that potential cases for cæsarean section were kept in the district and admitted to the local hospital as "emergencies" rather than let the case be "lost" to a city hospital. I was also told that the figure for cæsarean sections in this area is 25 times the average figure for the United Kingdom. I have not verified this statement, but in the circumstances the rate would certainly be well above average.

The whole question of the general practitioner with cottage-hospital facilities, and the "excesses" of surgery performed under these conditions, will be considered later in this report.

Compared with those obtaining in industrial areas, the standards of physical examination in this practice were very good. If they were judged against the disciplines and routines of examination in any reasonable hospital, they would seem superficial and not too satisfactory; but they were thorough and comprehensive enough to assure that most organic diseases would not be missed. It was evident that the doctors knew the patients intimately and were constantly watching for aberrations from the personal norm; and within the limits set by time, equipment, and general facilities their routine work would pass as excellent. They paid serious attention to the psychological problems their patients brought them, and though they were obviously not versed in modern psychiatric theory their knowledge of the patients and their understanding of their ways and habits enabled them to give valuable help.

In short, these practitioners were "family doctoring" and at the same time aspiring to relatively good standards in organic medicine. Comparatively, if not in absolute terms, the organisational side of the practice was also good.

II

Three partners. About 10,000 patients. Fair cottage-hospital facilities.

This practice, established for many years in a town now having some 25,000 inhabitants, had also never had more than a few hundred on the "panel." Its general similarity to the one I have just described will at once be noted. Like the other, it was referred to me as a "good" practice, and I am describing it mainly to demonstrate how wide a range of medical conduct is still accepted in professional circles as within this category. The medical people I consulted about my sampling did not classify any rural practice as "bad," though they thought that some of the practitioners were doing too much surgery in the cottage hospitals.

The similarity between this and the previous practice extended beyond the broad description given above: the surgery lay-out, the staffing, and the organisation were all very much the same, except that this practice was less well equipped. But there was a big difference, I thought, in the work of the doctors. Though, like the others, they devoted ten to twenty minutes to each consultation, their standard of physical examination was about the same as I saw in the large industrial practices: it was superficial, restricted to the offending organ, or concerned with some expressed symptom. Similarly, the psychological problems were considered casually and treated by reassurance in a most empirical way. I did not myself see a single laboratory test done in this practice. A bottle of medicine was almost always prescribed, and certification for sickness benefits was generous and unconsidered. The antenatal work I witnessed consisted in a brief chat between the doctor and the expectant mother, without an examination of any kind.

In this particular practice there were many elderly patients, and they were treated with the greatest kindness—but not with medical skill. In the course of domiciliary visits I stood at the bedside of several old people suffering from congestive cardiac failure and receiving, as treatment, continuous bed rest and frequent injections of morphine. One such patient, with a generalised dropsy, had had six months' bed rest and morphine at home without investigation before being admitted to the cottage hospital, where paracentesis abdomini was performed as initial treatment. I also saw several patients who had had a mild "stroke," and they too were bed-ridden and receiving the morphine and reassurance therapy.

Bad as this account sounds, and bad as the practice in fact was, in terms of human kindliness these doctors were doing a job of "family doctoring" which, in contrast with what goes on in the industrial areas, must be considered good. Furthermore, at the more leisurely pace of work, and with some personal knowledge of their patients, I believe they were doing at least an equally good job of organic diagnosis, except for the elderly. Locally, their ability was highly regarded, primarily because they could open an abdomen and remove an acute appendix or untwist a torsion of the ovary; and they were well liked because they were essentially kind and human.

THE VILLAGE DOCTOR

The above type of country-town cottage-hospital practice is almost as distinct from isolated individual rural practice as it is from industrial practice. In many remote areas the country doctor has not moved very far from the horse-and-buggy days; he has learned to use some of the new drugs such as penicillin, and may have caught up on a few new techniques; but essentially he is comparable in most respects to the old family doctor of the last century.

His surgery has often served successive doctors for many decades, and sometimes there has been little change in, or addition to, his equipment over the same period. Occasionally you find the young doctor (or once young doctor) who has started practising in a quiet country village and who has set about revolutionising the way of practice and bringing modern medicine to the villagers; after a time these doctors usually strike a happy compromise between scientific zeal and human relations, and perhaps represent the very best of general practice.

In this realm the doctor is the absolute autocrat, and what he does and how he does it is no more and no less than a reflection of his personal capacity. So a description of this type of practice in any detail would amount to no more than a description of a number of individual men. I shall later say something about the problems which arise from such practices; and I must point out at this stage that many of them (some enjoying excellent reputations) are so badly equipped as to be quite unable to meet a serious emergency, even by way of offering satisfactory first-aid. This in no way alters the fact that the doctors running them are often first-class family doctors. We see again how hard it is to equate the dictates of modern medicine with the essential humanism of our concept of general practice.

Urban-residential Practice

I

One doctor. About 2000 patients. Access to two small nursing-homes.

This practice, about twenty-five years old, had been run by the practitioner for fourteen years, and he had never taken "panel" patients. It was one of the few I visited where the surgery had been built for its purpose, and there were three rooms, though the third had not been used (except for storage) for many years. The waiting-room was commodious, well furnished, and altogether pleasant. The consulting-room was well laid out and well equipped.

The doctor employed no clerical or nursing assistance, but he worked to an appointment system, kept fairly good records, and displayed much better organisational ability than is usual. Appointments were set at quarter-hour intervals, but if half an hour or more was needed to complete a consultation and examination this time was taken. Physical examination was thorough, and during my stay in this practice clinical laboratory tests were undertaken whenever indicated. They were done at the local hospital, but the doctor was having increasing difficulty about this because he had lately lost his place on the hospital staff. Similarly, he had been accustomed to doing his own minor surgery at the hospital, and as his private surgery was not equipped for this purpose he now had to send patients, whom previously he would have had no hesitation in treating himself, to another doctor.

This practice provided an excellent example of the really good doctor who is suffering in every respect from the curtailment of his terms of reference. Through his past association with the hospital, he knew intimately, and was on excellent terms with, his consultant colleagues, and this long association stood him in good stead after his exclusion from the hospital staff. He also knew his patients intimately and was at great pains to handle their psychological problems as well as possible; but at the same time he tolerated no abuse of his services and was certainly not burdened by "silly" claims on his time. He undertook no major surgery at all, but he did a good deal of midwifery and gave thorough attention to expectant mothers throughout pregnancy.

Within the present concept of individual general practice, the work here was as good as one could hope to see. But it was being done under increasing difficulties.

II

One doctor. About 2500 patients. Access to small local hospital and nursing-homes.

This long-established practice, run by the same doctor for the past dozen years, had had about 300–400 patients under National Health Insurance. The consulting-room and waiting-room were adapted from the two front rooms of the residence, and their arrangement gave no guarantee of privacy to either the patients or the doctor's family. Both rooms were tastefully and comfortably furnished, but the chaotic state of the consulting-room made smooth and efficient work very difficult. It was poorly equipped and no pretence was made of keeping records. There was no appointment system, and consultations involved a minimum of physical examination. A considerable amount of dispensing was done, and a bottle of medicine was the usual termination of a consultation.

The doctor had access to the local hospital, but he did not seem to take any great advantage of this and made very little use of the laboratory service, though he sent many patients for radiography. He did no midwifery and apparently had very little to do with the children of the area.

Comparing this practice with the previous one, the bigger demand for service was out of all proportion to the additional 500 patients on the list. The doctor worked really hard in his endeavour to meet this demand —proportionately much harder than the first doctor. But the necessity for this hard work arose from his failure to exercise reasonable discipline with his patients. Though the two practices were both nominated as "good," the first was in fact well above the average of the practices of this type which I studied, while the second was below the average.

Symptoms and Causes

An account of some of the patients who passed through surgeries I visited would make quite dramatic reading. I could list many who gave histories suggestive of malignant disease or other obvious and readily diagnosable conditions, but who left, bearing a bottle of medicine, without having had any physical examination; and I could tell some very sad stories of people dying in unnecessary discomfort for want (in my opinion) of a little elementary medical skill. However, I do not believe that such stories, however striking in themselves, would contribute anything to the analysis or solution of the problems of general practice. When an individual error is pointed out, the usual reply is "we can all make mistakes." This is certainly true in general practice, and the individual mistake pales into insignificance beside the predisposing factors which make serious mistakes not only possible but in some circumstances highly probable. I have concerned myself throughout with these causes and predisposing factors and not with collecting examples of errors. I regard the errors as merely symptoms of the chronic illness of general practice today.

It would be foolish, however, to examine general practice in a vacuum, and before I try to summarise its present state I must say something about the relationship of this branch of medicine with other agencies of medical care.

THE GENERAL PRACTITIONER, THE HOSPITAL, AND THE SPECIALIST

It is difficult to say very much about the general practitioner's relation to hospital and specialist services; for, except in a remote way, he has little to do with either.

He has no direct access to the larger institutions and sees little or nothing of the people who work in them. When he refers a patient he does so either by telephone or with a written introduction outlining the case-history and stating his own opinion. In due course he gets back a written summary of the consultant's views and suggestions, or, if the patient has been admitted for treatment, a statement of the principal things that have been done, with advice about further management.

His other line of communication with the specialist is through domiciliary consultations; but the average practitioner has few of these. Some I have talked with have as few as one or two a year, and I should think that ten or twenty would be quite a high figure.

The degree of liaison between practitioner and specialist varies from place to place. It is least in the industrial areas—i.e., in those practices closest to the large hospitals—and seems to be greatest in upper-middle-class residential areas. Of course, before the introduction of the National Health Service Act, domiciliary consultation was largely a function of the patient's ability to buy the service, and it will be interesting to note what happens now that it can be had by all. Such observations as I was able to make on this point will be discussed when I come to consider the effects of the Act on general practice.

In some places practitioners and specialists move more nearly on the same social plane, which undoubtedly brings them into closer professional contact also. This was particularly noticeable in a relatively small yet highly developed northern city which I visited. There the G.P.S and the specialists are often products of the same school and are not infrequently of about the same vintage. While one may have achieved specialist status and the other has remained a G.P., they have retained mutual respect and friendship, and this is reflected in their professional relations. The same observation applies to Scotland.

In larger cities one would expect to find that at the periphery of the town, where there are large secondary hospitals, the relations between the practitioners in the area and the specialists on the hospital staff would be good; but I have not found this to be the case. Practitioners will often completely by-pass the local hospital (even when it has a good reputation and is well staffed) and send their patients longish distances to see the men they "know." The "knowing" may have been ten or twenty years ago, but loyalties and personal sentiment often seem to outweigh objective judgment. Circumstances such as this certainly do nothing to improve the liaison or relations between G.P. and specialist on a local basis.

Actually the rural G.P. often has more contact with specialists than his city colleagues do; because the specialists periodically visit the country hospitals.

I met one hospital superintendent who used to hold Sunday meetings for the G.P.S who worked in the area round his hospital. He claimed that the attendances and results were good, and knowing the man and his reputation I fully believe they were. A few others say they have tried the same thing, but the attendances and response of the G.P.S were so disappointing that the venture was dropped. Intermittent meetings of medical societies seem to be only as successful as the organising ability and leadership of the local chairman or secretary make them. The many G.P.S with whom I have talked demonstrate a fairly constant lack of interest in this sort of thing.

In brief, I find it hard to imagine any circumstances which would more effectively isolate the general practitioner from the specialists and the hospital services than the circumstances now prevailing in most of the areas I visited.

THE GENERAL PRACTITIONER AND LOCAL-AUTHORITY HEALTH SERVICES

In whatever region or district I worked, I made a point of seeing the medical officer of health, and, whenever possible, of talking with representatives of the various branches of local-authority services—doctors, midwives, nurses, and health visitors. I also saw some examples of their work. However, I was not making a study of local-authority services as such, and my attention was directed to the relationship of the local authority with the general practitioner.

In practical terms it is fair to say that such a relationship hardly exists. Often there is a mutual animosity and distrust. The idea that the local-authority services are complementary to the work of the G.P. is, in my opinion, theoretical; in fact these services are substitutes for some of the work which was once his responsibility but has long since passed from his hands.

The one possible exception to this rule is the home nursing service. The doctors are ready enough to use the nurse to give injections, to do dressings, to give enemas, and to perform other routine nursing tasks; but even so it is rather a one-way business. Except in country districts. I met very few doctors who knew their nurses or had anything to do with them beyond telephoning instructions for them to go to such and such an address and do this or that thing.

Before July 5, 1948, the midwifery and maternity and child-welfare services had in many areas relieved the G.P. of almost all responsibility for conducting confinements or taking an interest in the health and welfare of the normal mother and child. There is practically no two-way communication between the clinic and the practitioner. The clinic doctor or the midwife will inform the G.P. of any abnormalities they discover; but the practitioner seldom seems to give any information to them, or to trouble himself about what goes on at the clinics, even where his own patients are concerned.

More than once I have seen a mother come into the doctor's surgery carrying in her arms a baby three or four months old, and this was the first intimation he had ever had that the lady had so much as been pregnant.

So far as I can ascertain, efforts made to use the G.P. as a part-time worker in the maternity and child-welfare clinics have met with little success.

Some of these issues were highlighted when the Act came into operation. The uneasy equilibrium which had been established between the G.P. and the local authority was disturbed as soon as the question of certain remuneration for maternity services was raised. The doctors, who had yielded a large measure of responsibility to the midwives, now sought to re-establish themselves. They claimed that, as they were licensed to practise midwifery, they were therefore the right people to be responsible for confinements—though very many of them had not done obstetric work for years. The final compromise by which practitioners were reclassified into two classes—those worth £5 5s. and those worth £7 7s. per confinement—speaks for itself.

All the midwives, local-authority doctors, and consultant obstetricians with whom I have spoken expressed the hope that the G.P.S who are now booking midwifery cases will leave the actual work to the midwives and clinics. Many doctors are doing this, but at the same time these incidents have upset the midwives considerably, and, I am told, have had bad effects on midwife recruitment. Certainly they have not improved relations between doctor and local authority.

Many of the same remarks apply to the relationship of the G.P. and the school doctor; but unless financial issues intrude, as they have done in the midwifery services, the present equilibrium is unlikely to be disturbed.

To the average practitioner the health visitor seems to be an enigma. He regards her with something between suspicion and cynicism, and I have not heard of a G.P., on his own initiative, using the services of a health visitor. Admittedly health visitors are more than fully occupied meeting the demands of the tuberculous patients and "new" mothers: but this is not the reason for the doctor's lack of interest in them or for his not seeking their assistance.

I must repeat that the local-authority services, instead of complementing the work of the general practitioner, have in fact assumed almost complete responsibility for some of the work that was once his concern.

THE STATE OF GENERAL PRACTICE: A SUMMARY

1. General practice is a term without specific meaning or definition. There are three distinct patterns, which are determined principally by social environment. These are:

General practice in industrial areas.
General practice in urban-residential areas.
General practice in rural areas.

the fact that the doctors running them are often first-class family doctors. We see again how hard it is to equate the dictates of modern medicine with the essential humanism of our concept of general practice.

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One doctor. About 2000 patients. Access to two small nursing-homes.

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This whole question of "patient abuse" is mostly a matter of speculation. The patient's reason for consulting a doctor is his own anxiety, which nobody else may be able to assess. Nevertheless the intensity of anxiety is largely governed by understanding of its causes, and the person with the most external control over it is the doctor.

Whenever a doctor has had a practice for any length of time, and has exercised a reasonable educational and disciplinary function, he is not a victim of patient abuse; the amount of this he suffers from is almost directly proportional to his laxity in these regards. It is interesting to contrast the current attitude of the doctors in Britain, where "patient demand" is probably now at its peak and where practitioners are beginning to appreciate the advantages of (even partial) emancipation from "patient blackmail," with that of the doctors in New Zealand, who have long since passed through this phase. I shall refer to this again in the appendix on New Zealand.

The demand for service is intimately tied up with the doctor's personal behaviour. I saw many practices where the doctor contended that the demand was very little greater than before July 5, 1948. I saw others, where, though there had been little or no increase in the number of patients covered by the practice, the demand had increased so much that the quality of the work was suffering.

Apropos of this, I met a number of doctors, running practices which before the Act were mainly composed of panel patients, who were actively refusing to keep on the "good paying patients" of former days unless they would come on their N.H.S. list. The doctor's attitude was usually expressed something like this: "I didn't mind wasting my time with these people before the service started, but they're not worth it any more." Various inferences can be drawn from this, but they hardly need elaborating.

I met one practitioner who had had several years' hospital experience before going into general practice, enjoyed a considerable reputation in professional circles, and had many doctors' families on his list. The rest of his practice was 80% industrial and 20% "private," the private part being made up of schoolteachers, clerical workers, skilled artisans, and the like. From July 5, 1948, he kept careful records of the demands for service that patients in the various groups made on him. In the first nine months of the new service the ratio of demand by members of doctors' families, "private" patients, and industrial patients was about 3 : 2 : 1.

Another doctor had built up a large partnership; commencing from humble origins in an industrial centre, he had finished up with a small and select practice of "good paying patients" in a high-class residential area. There were fewer than 2000 on his books and the financial returns were good. Soon after the introduction of the service, this man closed his practice and "retired" to the industrial part of the partnership, taking on a list of about 4000.

I cite these two cases to illustrate the difficulty of estimating, either in absolute or in comparative terms, the increase of work brought by the Act, or the doctor's reactions, private and expressed, to the new circumstances. The size of the doctor's list is *not a good* index of what is actually happening, though of course in the upper ranges (3500 and over), with conditions of practice as they are, there is no disputing that the load is grossly excessive.

The increased load, whatever its weight and nature, has clearly demonstrated points of basic weakness in the present structure of general practice. For these weaknesses the National Health Service Act is not responsible. Blame rests on the service only in so far as it has failed to provide the means of reinforcing general practice, so that it can take the new load.

REMUNERATION

I hesitate to enter the controversy on ways and means of remunerating the doctor. All sorts of extravagant statements have been made about the intrinsic evils of the capitation system of payment. The greatest tangible evil is the fact that it puts a premium on quantity rather than quality of work. It penalises the man with a small practice doing very good work, and it pays handsomely the man with a big list, however bad his work may be. But neither here nor in New Zealand have I seen any acceptable evidence that it operates to the detriment of the doctor-patient relationship.

It is too early to say whether the various devices, such as mileage-rates, special inducement payments, and basic salaries will successfully minimise or close the gap between quantitative and qualitative reward. In any case, we should recognise that the alteration in the method of payment has not altered the structure of general practice.

The desire of the doctor to relate the size of his income, and the manner in which it is received, to "patient benefit" has led to frightful confusion. It has complicated both political and professional issues and has obscured more fundamental considerations.

INTERFERENCE ?

The establishment of executive councils as the bodies responsible for general-practitioner services could be the means of interfering with the manner of general practice or of limiting the doctor's autonomy. I found no evidence that the councils were operating in this way. All those I visited regarded their function as purely administrative.

I always asked the doctors I met or worked with whether there was any sign of interference with their clinical freedom. Only one claimed that there was, and he showed me a circular, sent out by his executive council, which said: "It is considered that all cases of ringworm of the scalp should be referred in the first instance to specialist skin clinics." This was signed by the clerk of the council. Almost certainly the suggestion, or "directive" as the doctor called it, had its genesis at a higher level than the executive council. The doctor objected not to the idea as such but to the way in which it had been put forward, and to the precedent set. He argued that if he could be told what he should do about ringworm of the scalp he could similarly be told about the rest of his work. I agree with him, and I was surprised that many other doctors I saw, who had received the same memorandum, did not draw attention to it. Probably many of them had not read it. However, this was the only instance of direct clinical interference that any doctor gave me.

The chief direct implication of the Act for general practice lies in the provision made for developing health centres. But this is a matter for the future rather than the immediate present, and I shall consider it separately.

INDIRECT IMPLICATIONS OF THE ACT

The changes just considered are responsible for many of the teething troubles of the new service. It may be hoped that time and experience will provide remedies. But while there is little doubt that the present emotional tensions will subside fairly quickly, there is no assurance —indeed *no real hope*—that sound solutions will be found for these problems unless a great deal of thinking and a good deal of fact-finding is undertaken.

For the future of general practice the indirect implications of the Act are much more important than the direct ones, and chief among them is the new emphasis given to hospital and specialist services.

2. The three patterns have evolved from a common parent—the family doctor of last century. Their evolution has been largely a process of adaptation to the growth and development of other medical services, such as those provided by hospitals and specialists. This process has resulted in the decline rather than the progressive evolution of general practice, and in wide departure from both the idea and the ideal of family doctoring.

3. There are no objective standards for general practice and no recognised criteria by which such standards might be established.

4. The reputation of general practice has been maintained through a continued identification with the idea and ideal of family doctoring; but, except in certain circumstances, this reputation will no longer stand up to examination.

5. As a result of the process of adaptation, and the failure to establish and maintain standards, general practice is now worst in close proximity to large hospital and clinical centres and improves in both scope and quality almost in proportion to the distance away from those centres.

6. It follows that the worst elements of general practice are to be found in those places where there is the greatest and most urgent demand for good medical service—i.e., in areas of dense population.

7. The working conditions (surgeries and equipment, organisation and staffing) of many general practices are unsatisfactory. Some are bad enough to require condemnation in the public interest.

8. In some cases—particularly in industrial areas—the working conditions are so bad as to override the abilities and skills of the individual doctor. They tend to reduce the work of both good and bad doctors to a common level.

9. Many doctors have been isolated from hospital facilities and are now working under conditions which make useless much of their elaborate and expensive training, and negate the disciplines taught in hospital and medical school. Some conditions of general practice are bad enough to change a good doctor to a bad doctor within a very short time. These very bad conditions are to be found chiefly in industrial areas.

10. Rural practice represents the last outpost of real family doctoring, and in some respects it has gained more from modern medical knowledge and techniques than urban practice.

11. The over-all state of general practice is bad and still deteriorating. The deterioration will continue until such time as the province and function of the general practitioner is clearly defined, objective standards of practice are established, and steps are taken to see that these standards are attained and maintained.

III. GENERAL PRACTICE AND THE NATIONAL HEALTH SERVICE ACT

DIRECT IMPLICATIONS OF THE ACT

The National Health Service Act has made large and fundamental changes in both hospital and specialist services, and has considerably altered the medical responsibilities of local authorities. It has done little, in any direct or immediate way, to upset the status quo of general practice.

By extending National Health Insurance to cover 100% of the population, instead of the 40% previously covered, it has suddenly thrown a greater load (in terms of volume) on the existing structure of general practice, and by introducing new techniques for remunerating the doctors it has caused a redistribution of income within the profession. But neither of these things implies any basic or direct change in the nature of general practice.

THE GREATER LOAD

It is very difficult to assess the effects of the increased volume of work on any particular practice, or even its scale. It is certainly not possible to generalise about the over-all effects of this increase on the quality of medical care in Britain.

The weight of the patient-load depends, of course, not only on the number of patients registered with a doctor but also on the demands these patients make; and a great deal has been made of the increase in these demands since medical care became free to the patient. On this I have collected a lot of varied opinions, but very little in the way of actual data.

I tried to correlate what was happening in hospital outpatient departments with what was happening in general practice. I thought that hospital figures for periods before and after July 5, 1948, would provide some sort of index of what was going on in general practice. But the figures were not available, and to dig them out of hospital records would have been a long and formidable job. Absolute figures, not broken down into new and return patients and into the various branches of work, are of little value here; but, for what they are worth, those I did see indicated no significant increase in the volume of people attending outpatient departments, and this finding was usually supported by hospital superintendents, consultants, and resident staff.

Opinions collected from the same sources, when they seemed to be considered opinions, suggested that the medical character of the cases coming into outpatients had not materially altered since the beginning of the service. Considerable fuss was made about the time taken up in measuring people for appliances, but this seemed to be a matter of petty annoyance rather than serious grievance.

Opinions as to the increased demands on their time and effort since the beginning of the new service were also collected from all practitioners whom I visited. Almost without exception they said that, while they were seeing considerably more patients in the surgery (they estimated the increase at anything from 10 to 40%), their domiciliary work remained much as before. They generally agreed that in this regard the public were being very considerate, the chief complaint being of late requests to visit. Night work had not increased. Some doctors, indeed, expressed anxiety at the reluctance of patients to call them out in potentially serious cases, and one or two quoted examples of catastrophe narrowly averted.

Almost all spoke of the increased demands for spectacles, for appliances of various types, for drugs and dressings which the patient would previously have bought for himself without consulting the doctor, and for certificates. My own impression, based on all the practices I visited, was that so far as consumption of the doctor's time was concerned it was again a case of petty annoyance. The practitioners who complained most vigorously were usually those who took the line of least resistance and met almost all requests, without protest or discussion, and irrespective of the merits of the case. One doctor used to sign batches of forms certifying the need for ophthalmic tests, and put them on the waiting-room table for patients to help themselves. I saw very few who made any pretence of examining a patient's eyes, and I saw none make a physical or ophthalmoscopic examination before issuing a certificate for eye-testing. Requests for appliances of all types were usually dealt with by immediately issuing a note referring the patient to a hospital department where he could be fitted; I never saw a G.P. "waste" his time by carefully examining before referring.

as represented by housing and possibly nutrition, were relatively good in this area, and there was an excellent geriatric hospital surrounded by rural practitioners, who in my estimation are the best type of G.P.s. But I was unimpressed by the attention given to the old people of the community. Working with doctors within a few miles of the geriatric hospital, I found that they knew little or nothing of its work. The contrast between the handling of a case (say a paraplegic, an arthritic, or a cardiac failure) by the G.P. and by the people in the hospital was most striking.

At first, therefore, one was inclined to say that here, in the specialised hospital, was the answer to many of the problems of old age. But on reflection it was evident that much of the benefit obtainable there could be obtained at home if only the general practitioner would exercise his medical skills on his old patients. The efforts of the hospital to convey this to the practitioners of the area had met with little success.

The important point is that, if geriatric units could be used as an instrument for educating the G.P., and if the emphasis could be put on G.P. home care rather than on specialist-hospital care, the present perspective would appreciably change, and we should need to reconsider our ideas on hospital development for the care of old people. That this could in fact be done is in my opinion beyond question; but the work of the units would need to be oriented in this direction. Failing such action, it is almost inevitable that the success now being achieved in geriatric units will sooner or later receive the recognition it so well deserves and will set an institutional pattern for the care of the "chronic" and aged sick.

THE THREAT TO GENERAL PRACTICE

The socially conscious attitude of the pædiatricians, and latterly the geriatricians, when contrasted with the usual attitude of other branches of curative medicine, has justified their claims to work which normally would not be thought to require specialists. While this socially conscious attitude of mind is to be applauded, the consequences of making new specialties on the basis of whole age-groups of society should be watched very closely.

The current growth of pædiatrics and geriatrics represents another attempt to compensate for deficiencies in general practice in terms of more specialist and hospital care. This trend has been going on for a long time; but if it continues it is bound to result in over-compensation, unnecessary expense, further dehumanising of medical care, and ultimately the elimination of the general practitioner as a responsible person.

The greatest single threat to the future of general practice is the gap between the general practitioner and the specialist. This gap has been widened by the impetus given by the Act to hospital development, and the simultaneous neglect of general practice as an issue of policy.

ADMINISTRATIVE AUTHORITIES AND THEIR RELATION TO GENERAL PRACTICE

THE REGIONAL HOSPITAL BOARD

At this early stage in the history of the new service it is easy to be too critical of deficiencies and weaknesses, many of which are unavoidable and will be ironed out. It is equally easy to be too tolerant and to overlook major faults which might be corrected now but which otherwise will soon be firmly fixed.

The establishment of regional hospital boards, and the granting of the powers vested in them, is probably the most revolutionary feature of the whole Act. The difficulties of staffing these boards and the various committees and subcommittees which work under them, the difficulties of reaching a satisfactory compromise between central and peripheral control, and all the problems which arise from the assumption of new powers by new people strange to them, call for tolerance in comment and patience while early mistakes are overcome.

But the failure to provide a link between the regional hospital boards (responsible for hospital and specialist services) and the executive councils (responsible for general-practitioner services) cannot be classified as an initial or experimental error, and the lack of such a link must be regarded as a primary and serious defect in the structure of the service. The idea that members common to the two kinds of body might form the necessary liaison is not supported by the happenings to date.

The responsibility for this state of affairs rests mainly with the executive councils and others connected with general-practice policy who could take the initiative in defining the rôle of general practice in an integrated medical service. But it is hard to see how the regional hospital people can do their job properly unless they too interest themselves in this fundamental issue. Unfortunately none of the hospital-board members or executives I interviewed showed either a particular interest in, or understanding of, the problems or significance of general practice. They seemed to regard administration of hospital and specialist services as a separate task not concerning, or concerned with, the general practitioner. I do not know of any hospital board which has asked either an executive council or any other body for a statement of policy on general practice; nor do I know of such a statement being drawn up and tendered spontaneously.

Thus hospital and specialist requirements are being worked out with no real regard to the present state, or the future development, of general practice. I saw a good example of this when I visited two hospitals, of similar size and type, which had been included in a previous hospital survey and had lately been assessed for staff and equipment. One of them worked in association with a long-established group practice and the other in association with a number of doctors working independently. The work that was being done by the group completely altered the requirements of the first of these hospitals; yet nobody official had ever visited the group or taken any account of the things that were being done, or could be done, by it. Even in situations like this, where the whole history and development of the hospital had been in the hands of the general practitioner, the future of the hospital now seems to be considered as something apart from him. This is an extension of the attitude which has prevailed in larger hospitals for a long time—i.e., that the general practitioner has no place in hospital work and therefore merits no direct consideration in hospital planning and development.

The senior administrative medical officers hold, at least for the time being, the key position in the activities of the hospital boards. All those I met were either ex-public-health men or ex-members of the staff of the Ministry of Health. From the standpoint of administration this is probably the best background they could have; but from the point of view of medical-care policy, particularly general-practitioner services, it is probably the worst.

Whenever general practice came up for discussion, they drew attention to the surgical crimes of the G.P. working in a cottage hospital. Most of them expressed their determination to eliminate the G.P. surgeon. This seemed to be their focal point for thinking about general practice. Their attitude to the problems presented by industrial practice was one of resignation to the inevitability of that sort of thing, of hopelessness of doing anything about it at its source, and of consequent acceptance of the need to compensate for it through the agency of hospital and specialist services.

I have already given my opinion that:

1. The G.P. surgeon is the chief target in what I term the "attack" on general practice, and there is a tendency to extend the case against him into other provinces of the G.P.'s activity.
2. Up to the present, the development of hospital and specialist services, far from assisting the G.P. to do better work, has depressed both the scope and quality of his work.

I am not suggesting that it is impossible to increase both the amount and scope of hospital and specialist services and simultaneously to upgrade the G.P.; but there is no sign that the new service is going to bring about this desirable end. On the contrary, there is some indication that it is worsening the present unsatisfactory state of affairs.

As at present conducted, the upgrading of the smaller hospital units implies exclusion of general practitioners from the staff; it further implies the employment of many junior specialists, often with no experience of general practice; and it closes the already half-shut door on the G.P.'s chance of entrance into the realm of the specialist. I have just been told of two hospitals upgraded in this way, with exclusion of the G.P. obstetricians of the area. The reason advanced for such exclusion is of course that the G.P. is not the proper person to do midwifery; and similar arguments are brought against the G.P. surgeon, the G.P. E.N.T. man, the G.P. anæsthetist, and in fact any G.P. who shows a particular interest, and attempts to develop a particular skill, in almost any branch of medicine. So long as the general practitioner's province and function is undefined, he is in no position to defend himself against those who would constrict it further.

I met a number of G.P.S, of long experience and real ability, with well-established practices, who had sons either in medical school or recently graduated. These men told me that they had planned to retire relatively early and allow their sons to succeed to the practice; but they had now given up these ideas and were encouraging their boys to seek a different kind of life in one of the specialties. They were moved to this decision not by financial dissatisfaction or fears of bureaucratic controls, but because they foresaw limitation of the scope of the G.P.'s work and responsibility.

CHILDREN

Compared with the other specialties, which concern themselves only with anatomical or physiological parts of the body, the newer specialties of pædiatrics and geriatrics bite more deeply into general practice, because they assume responsibility for whole age-groups of society.

Pædiatrics, the longer and more firmly established of the two, has gained much ground in recent years. As a new and socially conscious group, the pædiatricians have made valuable contributions to both the medical and the social welfare of children, and in a lesser degree to that of mothers. But, unlike most other specialists, the pædiatrician does not confine himself to the more difficult parts of his subject. In fact nothing seems to be too menial for him. Child health, infant feeding, and minor ailments, in which the G.P. has shown a conspicuous lack of interest, have captured the pædiatrician's imagination and have all been drawn into his net. Apart from the obstetrician, he is probably the only practising doctor who can claim to have an active interest in preventive medicine.

No-one would argue that there is no place for pædiatrics, but it is a moot point whether the pædiatrician should take so much of the responsibility for the general medical care of a whole age-group, thus further fractionating the continuity of care and relieving the G.P. of yet another part of his duties. I have observed the work in several pædiatric clinics and have been struck by the large proportion of the specialist's time which is taken up with minor matters which a good G.P. should be fully capable of handling. I would estimate these minor cases at something like 50% of those I saw passing through the clinics. In New Zealand, for example, where midwifery and what one may call the lower strata of pædiatrics form the very basis of general practice, these 50% would never get near a clinic or a specialist pædiatrician, and it is my firm opinion that the mothers and children are better off because of this.

Often I was struck by the anxiety caused to the mother by a clinic visit—I refer here to hospital outpatient clinics, not to local-authority maternity and child-welfare clinics—and also by the failure of the pædiatrician either to appreciate this anxiety or to give time to allaying it. When working in G.P.S' surgeries I was similarly impressed by the obvious anxiety caused by the suggestion of a visit to the hospital pædiatrician, and even more by the anxious state of some of the mothers returning from such visits. Usually this anxiety seemed to be accepted by the doctor as a normal part of the procedure; and again little was done to allay it.

This problem of the creation or fixation of anxiety is not peculiar to pædiatrics. I think I hardly ever sat through a consulting hour without witnessing a case where anxiety had either been created or intensified by a visit to a hospital outpatient department. For this if no other reason, the aim of any good medical service should be the minimum use of hospital outpatient departments compatible with good medical care. Yet the trend seems to be in the opposite direction.

I visited one sick children's hospital where, though the bed capacity had not changed for ten years, the medical staff had increased by 300%, and the vast majority of these doctors were engaged on routine and not research work. I also worked with some of the G.P.S in the environs of this hospital. The best of these could obviously have handled capably many of the problems which they referred almost automatically to the pædiatrician. When asked about specific cases they had referred and the reasons for referral, the answer was always the same: "The pædiatrician is there to be used. Why should we assume the responsibility for the children?"

Thus the mere existence of the pædiatrician impels even the good G.P. to use his services. If the existing demand for pædiatricians is going to be taken as a measure of the real need for them, the figure reached is certainly going to be excessive, and ultimately the general practitioner, in towns, will be relieved of all responsibility for the care of children.

OLD PEOPLE

The position as regards geriatrics is somewhat different, though some of the same considerations apply. The problem of long-term illness in an ageing population has become very important. The G.P.'s attitude and attention to what he calls his "old chronics" is well known and has been mentioned already.

But is it certain that this problem will be best solved by having a new team of specialists, the geriatricians, and much more institutional care? At present, because of the indifference of the G.P. to the illness of old age, it looks superficially as though geriatric units and more geriatricians are the logical, if not the only, solution. Further force is given to this argument when one considers the way in which "chronics" have been dumped on general hospitals and have lingered there indefinitely, occupying beds needed for acute illness and putting up maintenance costs.

I studied the situation in a county where the population is ageing rapidly because the young people have been drifting to the cities. Environmental conditions, as represented by housing and possibly nutrition, were relatively good in this area, and there was an excellent geriatric hospital surrounded by rural practitioners, who in my estimation are the best type of G.P.S. But I was unimpressed by the attention given to the old people of the community. Working with doctors within a few miles of the geriatric hospital, I found that they knew little or nothing of its work. The contrast between the handling of a case (say a paraplegic, an arthritic, or a cardiac failure) by the G.P. and by the people in the hospital was most striking.

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But the failure to provide a link between the regional hospital boards (responsible for hospital and specialist services) and the executive councils (responsible for general-practitioner services) cannot be classified as an initial or experimental error, and the lack of such a link must be regarded as a primary and serious defect in the structure of the service. The idea that members common to the two kinds of body might form the necessary liaison is not supported by the happenings to date.

The responsibility for this state of affairs rests mainly with the executive councils and others connected with general-practice policy who could take the initiative in defining the rôle of general practice in an integrated medical service. But it is hard to see how the regional hospital people can do their job properly unless they too interest themselves in this fundamental issue. Unfortunately none of the hospital-board members or executives I interviewed showed either a particular interest in, or understanding of, the problems or significance of general practice. They seemed to regard administration of hospital and specialist services as a separate task not concerning, or concerned with, the general practitioner. I do not know of any hospital board which has asked either an executive council or any other body for a statement of policy on general practice; nor do I know of such a statement being drawn up and tendered spontaneously.

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The senior administrative medical officers hold, at least for the time being, the key position in the activities of the hospital boards. All those I met were either ex-public-health men or ex-members of the staff of the Ministry of Health. From the standpoint of administration this is probably the best background they could have; but from the point of view of medical-care policy, particularly general-practitioner services, it is probably the worst.

Whenever general practice came up for discussion, they drew attention to the surgical crimes of the G.P. working in a cottage hospital. Most of them expressed their determination to eliminate the G.P. surgeon. This seemed to be their focal point for thinking about general practice. Their attitude to the problems presented by industrial practice was one of resignation to the inevitability of that sort of thing, of hopelessness of doing anything about it at its source, and of consequent acceptance of the need to compensate for it through the agency of hospital and specialist services.

Incidentally, as an outsider, I was struck by the paucity of field work being done by the regional hospital boards. Shortage of staff no doubt limits what is possible, but the result is that many important decisions have to be taken in committee and founded on opinion instead of on investigation. I was also impressed by the tenuousness of coördination between the regional boards and central authority at the Ministry of Health.

For all practical purposes it must be concluded that at the policy level there is no coördination between the regional hospital boards and the people responsible for general-practitioner services.

LOCAL AUTHORITY

The relationship, or rather the lack of relationship, of the individual general practitioner with the local-authority services has already been discussed.

On the introduction of the Act the local health authority, while losing control over municipal hospitals, gained new powers with regard to general practice, in that it was given the responsibility for health-centre development. Except in terms of politics it is hard to see why this responsibility for health centres was vested in local government while responsibility for general-practitioner services was given to executive councils. The failure of all parties interested in the new service to define what they meant by a health centre, and the general acceptance that it had to do with health and therefore preventive medicine, which in turn is identifiable with local-authority services and not with general practice, no doubt made it plausible to hand the responsibility to the local authorities. In Scotland, where a more realistic view was taken and the political complications were less, the Department of Health retained central responsibility for health centres, and the possibilities of fairly rapid and sound development are therefore better than they are in England.

It is natural enough that the local health authorities, having these powers with regard to health centres, should think first of all about their own services and only secondarily about medical care and the general practitioner. It is *not* natural that the G.P., who expressed real concern about health centres at the time of negotiations before July 5, 1948, and who now thinks he has been let down badly over them, and the executive councils, which reputedly look after general-practitioner services, should be taking no active interest in the efforts of local authorities or in the possible alternatives.

The fact that executive councils are confining themselves to administration makes this state of affairs more understandable; but even that does not explain the failure of local authorities to take the initiative and "tie up" with those responsible for general-practitioner services.

The local medical committees similarly show no active interest in the health-centre question. They are interested in a passive way, but they seem to have accepted the edict of "no steel, and houses before health centres" as an absolute reason for doing nothing now.

I could find no evidence that the new responsibilities of local authorities had brought them into any close coöperation or connection with the G.P. Indeed, the construction which is being put on health centres as bigger and better local-authority services, with some secondary consideration for the general practitioner, is widening the breach. The fact that a medical officer of health or a local-authority doctor sits on an executive council, or even on a local medical committee, does not seem to make any difference to the over-all relationship.

Twice I met medical officers of health whose interest was as much in medical care as in problems of public health. Both these men were trying to interest G.P.s individually, and the responsible authorities, in health centres oriented mainly towards the requirements of general practice. They seemed to be having little success; but in both places the general relationship of the G.P.s with the local-authority services was better than I saw elsewhere.

EXECUTIVE COUNCILS

Executive councils sometimes deal in terms of policy with exigencies which crop up from time to time, but never with broad general issues. The local medical committees run a parallel course and seem to be wholly preoccupied with day-to-day affairs. There are any number of these, as can be expected in the early days of a new service, and everyone can plead lack of time to deliberate on underlying principles.

The permanent staff of most of the executive councils have been inherited from the old insurance committees of National Health Insurance, and while they are doubtless very competent to deal with the machinery of the insurance scheme, most of them seem to be well out of their depth when it comes to other matters concerning general practice. This reduces the likelihood of executive councils doing anything more than the most routine kind of job; and yet they are the only official body directly responsible for general-practitioner services.

THE DOCTOR'S ATTITUDE TO CURRENT PROBLEMS OF GENERAL PRACTICE

The British Medical Association has expressed the official attitude of doctors to the National Health Service. Just how far this attitude of organised medicine in Britain represents the summation of individual opinion is open to question. From my contacts with a large number of doctors—some approving the official attitude; some disapproving it; but mostly "ordinary" doctors, asking no more than to be allowed to get on with their job as they see it—I was unable to correlate the thoughtful opinions of the majority with the statements of the organisation which represents them.

It is perhaps significant that these thoughtful opinions rarely find their way into the channels of public communication. This does not imply that any censorship is exercised over them; but they remain unexpressed through the inertia of those who hold them, through a sense of modesty, or through a feeling of the futility of individual effort in issues as vast as this.

So far as general practitioners are concerned, I believe that a feeling of futility and insecurity, more than anything else, has prevented their expressing opinion on policy. Because of this, I am sure we are missing a wealth of experience and wisdom which would be available if general practitioners were given the necessary encouragement and opportunity to put forward their views.

As things stand, general practitioners are having little share in determining their own destiny or professional future, and this is leading to a demoralisation which can only accelerate the decline and fall of general practice.

In the course of this study I sought opinion from men long established in practice and from young men trying to enter it or make their way in it. The same sense of hopelessness pervaded both generations. Some of the best family doctors whom I met were actively discouraging their sons and daughters from succeeding them in general practice: as I have already explained, they believed that the eclipse of general practice is at hand—that it is to be supplanted by more and more institutional and specialist medicine.

It is noteworthy that even these fine family doctors, who for years have acted as family counsellors as well as ministering to the organic needs of their patients, give priority of interest to the organic aspects of their work. The reason for this, I feel sure, is that, within our cultural pattern, the doctor's ability to establish rapport with his patient, and thus place himself in a position to cope with psychological problems, rests largely on his ability to handle physical disease—not only the minor physical disorder but also, to a great extent, the major one. This dates from the time when patients had to rely on the family doctor for almost every kind of medical care; for many people still suppose that he carries this great burden of responsibility—which he rarely does. I have actually met doctors who believe that they must do a certain amount of major surgery or lose the respect or "faith" of their patients; and this is undoubtedly true in some degree.

While the doctors' attitude in this regard could probably be altered fairly rapidly by a reorientation of medical education, the corresponding change in the cultural pattern would probably take generations rather than merely years.

THE CONTRACTING SPHERE

This brings us back to the question of how much responsibility for medical care can be safely centred in one person.

I have drawn attention to the efforts to control the excesses of the general practitioner in surgery, and to the extension of similar empirical control (or limitation) to other parts of his work. Now, looking at the non-organic side of his activities, it is very obvious, in the light of modern psychological and psychiatric knowledge, that it is potentially dangerous to have a "half-trained" doctor handling psychological problems. Yet we are faced with a situation where he does handle them; and moreover one where—the cultural pattern being what it is—the patient accepts the ministrations of the general practitioner as orthodox, whereas he would be suspicious of the "modern heresies" of the psychologist, the psychiatrist, the psychiatric social worker, and the home visitor. So long as this is so, we cannot afford to reject the G.P. by over-curtailment of his responsibility for organic medicine, or to force the new heresies on the public in obedience to the dictates of organic statistics on the one hand and modern psychological theory on the other. The present trend towards institutional and specialist care is in fact a rejection of the general practitioner, an assault on our cultural patterns, and perhaps an indirect admission of inability to resurrect all that is good in general practice and turn it from an anachronism into a contemporary and inestimably valuable service.

Though the behaviour of the doctors I have mentioned was founded on these considerations, they did not express themselves in these words. Some saw the decline of general practice in terms only of a growing contraction of their sphere of activity in the realm of organic medicine: they resented, for example, the threat to their positions on the staff of cottage hospitals. In fact, while the consensus of opinion was that general practice is doomed, they very seldom volunteered a cogent analysis of why this is so, or what ought to be done about it. Nevertheless, once given encouragement and some sort of a lead, these same doctors, from their large personal experience, talked about general practice in a critical and constructive manner which is not often reflected in official or public utterance.

I think it highly significant that good established general practitioners should be advising the younger generation to stay out of this field, so long before their fears may become reality. It is even more significant, in view of what is said by their representatives, that none of the doctors I met expressed serious discouragement in terms of the evils of the capitation system of payment or of the bureaucratic tyrannies which are supposed to characterise the new service.

The foregoing is not an argument for stopping experiment with different kinds of medical care; nor is it a reactionary appeal on my part to retard progress in bringing modern medical knowledge and technique to those who need it. It is, however, an appeal not to throw away what is good in general practice, and relegate this part of medical care to the scrap-heap, but rather to use, reinforce, and bring up to date these good elements. General practice as we know it could, if we wished, be converted into general practice as we like to imagine it; and if this is to be our aim we must not rush too far ahead with the development of our so-called public-health services and specialist services, which are largely attempts to patch up obvious weaknesses in the provision of medical care. It is time that the cause of the weakness, rather than the symptom, received attention.

METHOD OF REMUNERATION

On the highly controversial issue of the capitation system of remuneration I found, as I have said, much less strong feeling than I had been led to expect. Those doctors who had big lists were as well off as previously, or even better off; and no serious complaints were made by this group. I met a few doctors who had previously had a small high-fee-paying clientele and who had been badly hit by the Act—particularly in urban areas where mileage-rates and special inducement payments did not function as a means of subsidy. Rural practitioners, it was argued, would fare worst; yet those with whom I came in contact were relatively unperturbed about either the method of remuneration or the size of the capitation fee. Indeed I found few doctors claiming that the different manner of remuneration had materially altered their way of practice. The few who spoke strongly about patient abuse and disturbance of doctor-patient relations since July, 1948, failed to support their statements to my satisfaction: and in most cases where such statements were made there was evidence of poorly organised and badly disciplined practice which seemed to be of more than twelve months' standing.

The attitude of some of these doctors to the various social and economic groups among their patients was interesting. Especially in the latter months of my study, I noted a growing resentment against those social groups which used to form the paying part of a given practice, with a developing interest in, and attention to, what was once the "panel" part (or its equivalent). This went deeper than a mere objection to the well-to-do patient wanting the benefits of the National Health Service. It arose chiefly from the demands of this social group for more time and attention than their less fortunate neighbours are accustomed to receive, and it was increased by the tendency of better-educated patients to question diagnosis or therapy, to seek reasons for statements and instructions, or even to challenge the doctor's edict.

One subject which cropped up continually in my talks with all manner of general practitioners was that of salaried practice: the hypothetical and real dangers of such a system, and the possibility that it would be the final outcome of the capitation service, were often discussed. I met many doctors who thought that, given reasonable guarantees of autonomy, a salaried service would be preferable to the capitation service. (Of course, emphasis was laid on the need for autonomy.) On this issue, as well as others, I found the thoughtful doctor, both in individual and group discussion, embarrassed when he was identified with the official professional attitude.

ACCEPTANCE OF BAD CONDITIONS

But my attempts to get individual doctors or groups of doctors to appraise the more basic conditions of their work met with little success. The traditional pattern of general practice—i.e., one man doing all his work in a single room with such equipment as he deems necessary

Incidentally, as an outsider, I was struck by the paucity of field work being done by the regional hospital boards. Shortage of staff no doubt limits what is possible, but the result is that many important decisions have to be taken in committee and founded on opinion instead of on investigation. I was also impressed by the tenuousness of coördination between the regional boards and central authority at the Ministry of Health.

For all practical purposes it must be concluded that at the policy level there is no coördination between the regional hospital boards and the people responsible for general-practitioner services.

LOCAL AUTHORITY

The relationship, or rather the lack of relationship, of the individual general practitioner with the local-authority services has already been discussed.

On the introduction of the Act the local health authority, while losing control over municipal hospitals, gained new powers with regard to general practice, in that it was given the responsibility for health-centre development. Except in terms of politics it is hard to see why this responsibility for health centres was vested in local government while responsibility for general-practitioner services was given to executive councils. The failure of all parties interested in the new service to define what they meant by a health centre, and the general acceptance that it had to do with health and therefore preventive medicine, which in turn is identifiable with local-authority services and not with general practice, no doubt made it plausible to hand the responsibility to the local authorities. In Scotland, where a more realistic view was taken and the political complications were less, the Department of Health retained central responsibility for health centres, and the possibilities of fairly rapid and sound development are therefore better than they are in England.

It is natural enough that the local health authorities, having these powers with regard to health centres, should think first of all about their own services and only secondarily about medical care and the general practitioner. It is *not* natural that the G.P., who expressed real concern about health centres at the time of negotiations before July 5, 1948, and who now thinks he has been let down badly over them, and the executive councils, which reputedly look after general-practitioner services, should be taking no active interest in the efforts of local authorities or in the possible alternatives.

The fact that executive councils are confining themselves to administration makes this state of affairs more understandable; but even that does not explain the failure of local authorities to take the initiative and "tie up" with those responsible for general-practitioner services.

The local medical committees similarly show no active interest in the health-centre question. They are interested in a passive way, but they seem to have accepted the edict of "no steel, and houses before health centres" as an absolute reason for doing nothing now.

I could find no evidence that the new responsibilities of local authorities had brought them into any close coöperation or connection with the G.P. Indeed, the construction which is being put on health centres as bigger and better local-authority services, with some secondary consideration for the general practitioner, is widening the breach. The fact that a medical officer of health or a local-authority doctor sits on an executive council, or even on a local medical committee, does not seem to make any difference to the over-all relationship.

Twice I met medical officers of health whose interest was as much in medical care as in problems of public health. Both these men were trying to interest G.P.s individually, and the responsible authorities, in health centres oriented mainly towards the requirements of general practice. They seemed to be having little success; but in both places the general relationship of the G.P.s with the local-authority services was better than I saw elsewhere.

EXECUTIVE COUNCILS

Executive councils sometimes deal in terms of policy with exigencies which crop up from time to time, but never with broad general issues. The local medical committees run a parallel course and seem to be wholly preoccupied with day-to-day affairs. There are any number of these, as can be expected in the early days of a new service, and everyone can plead lack of time to deliberate on underlying principles.

The permanent staff of most of the executive councils have been inherited from the old insurance committees of National Health Insurance, and while they are doubtless very competent to deal with the machinery of the insurance scheme, most of them seem to be well out of their depth when it comes to other matters concerning general practice. This reduces the likelihood of executive councils doing anything more than the most routine kind of job; and yet they are the only official body directly responsible for general-practitioner services.

THE DOCTOR'S ATTITUDE TO CURRENT PROBLEMS OF GENERAL PRACTICE

The British Medical Association has expressed the official attitude of doctors to the National Health Service. Just how far this attitude of organised medicine in Britain represents the summation of individual opinion is open to question. From my contacts with a large number of doctors—some approving the official attitude; some disapproving it; but mostly "ordinary" doctors, asking no more than to be allowed to get on with their job as they see it—I was unable to correlate the thoughtful opinions of the majority with the statements of the organisation which represents them.

It is perhaps significant that these thoughtful opinions rarely find their way into the channels of public communication. This does not imply that any censorship is exercised over them; but they remain unexpressed through the inertia of those who hold them, through a sense of modesty, or through a feeling of the futility of individual effort in issues as vast as this.

So far as general practitioners are concerned, I believe that a feeling of futility and insecurity, more than anything else, has prevented their expressing opinion on policy. Because of this, I am sure we are missing a wealth of experience and wisdom which would be available if general practitioners were given the necessary encouragement and opportunity to put forward their views.

As things stand, general practitioners are having little share in determining their own destiny or professional future, and this is leading to a demoralisation which can only accelerate the decline and fall of general practice.

In the course of this study I sought opinion from men long established in practice and from young men trying to enter it or make their way in it. The same sense of hopelessness pervaded both generations. Some of the best family doctors whom I met were actively discouraging their sons and daughters from succeeding them in general practice: as I have already explained, they believed that the eclipse of general practice is at hand—that it is to be supplanted by more and more institutional and specialist medicine.

It is noteworthy that even these fine family doctors, who for years have acted as family counsellors as well as ministering to the organic needs of their patients, give priority of interest to the organic aspects of their work. The reason for this, I feel sure, is that, within our cultural pattern, the doctor's ability to establish rapport with his patient, and thus place himself in a position to his behalf. His views have been severely limited by the political and emotional considerations which have governed professional policy since the Act was first mooted, and in another way even more severely limited by the deeply rooted traditions of the British "family doctor." But I found that whenever these considerations could be temporarily laid aside, and he could be induced to think critically, he had a valuable contribution to make to the whole field of thought on medical care.

The attitude of the young doctor to general practice is of special importance for the future. Medical education at present tends to direct the student away from general practice, and it is certainly not designed to equip him fully for this type of work. Before the introduction of the Act, economic and social pressures obliged a large proportion of medical students to accept general practice as the easiest way to a reasonable livelihood within a reasonable period of time. Nobody would suggest that this was a good means of recruiting general practitioners, but at least it was a means. Today, however, the National Health Service Act has lessened the economic pressure which previously kept some people out of the specialties, and has added few if any inducements for the young doctor to go into general practice. Over and above this, it has put new obstacles in his way.

Even in the hypothetical under-doctored areas, of which the Medical Practices Committee has published long lists, vacancies by death and retirement are few; and sometimes the circumstances in which they have been filled have been such as to discourage candidates from trying again. At the moment the one easy way into general practice is to secure an assistantship in a busy urban practice with the possibility of later partnership. But in the circumstances prevailing in this type of practice it is a shame to see potentially good doctors entering through this channel, since their chances of improving the bad conditions to which they are going are very slim, while the chances of their own retrogression are very great.

The attraction of an apprentice appointment with an approved established practitioner is not really very strong, and so far few such appointments have been made.

The very few young doctors I met who had entered general practice at or about the time the Act came into force were in difficult circumstances and looking for a way out. In section II I described the case of a very able young practitioner who, because he tried to exercise a wide range of medical skills, was regarded as a professional oddity, and who was facing financial disaster because of the limited nature (volumetrically) of his practice. He is perhaps an extreme example, but still an example, of the difficulties and the discouragement which confront anyone with a genuine interest in this type of work. Another illustration is provided by a doctor in a large city where one would imagine that establishment in practice was much easier. He had a senior qualification (M.R.C.P.) and a very strong desire to make his career in general practice. At the time I saw him and witnessed his quite superior work he had been in practice for about eighteen months. He then had some 800 patients on his list, a considerable overdraft at the bank, and a family to support. He had set his own deadline at 1500 patients on his panel by early 1950, failing which he would retreat from general practice into some form of specialist work which offered an assured future and less financial worry.

To the young doctor, as to the old, the promise of health centres as at present conceived is almost meaningless, though to the young perhaps it is not quite the same bogy. The new ideal certainly does not permeate back into the years of undergraduate training, and it is unlikely to have any appreciable effect on recruitment to general practice in the foreseeable future. And it is these foreseeable years ahead which are going to determine the patterns, quality, and nature of medical care for a long time to come.

I cannot report that I found any more spontaneous constructive criticism of general practice among young doctors than among old. Unless they are given a lead, it is useless to look to the latest generation to advance the field of general practice in any radical or fruitful way. They are as closely bound by tradition and the status quo as the generations preceding them; and, though they may resent the present nature of general practice, they tend either to accept it philosophically or to escape into other branches of medicine.

Nevertheless, I found many significant inconsistencies between the opinions of a large number of individual doctors and their opinion as represented by the spokesmen of the profession. More important, I found that, given encouragement, these same doctors, who apparently had nothing more to say than has been said officially, were ready to make a contribution to the planning of both their own future and the future of the medical service as a whole. It is to be hoped that they will be given the opportunity.

HEALTH CENTRES

Both before and after the introduction of the National Health Service, the promise of health centres represented the chief hope of the general practitioners for a "new deal." But though there was much talk about health centres for the future, this future has since been defined as the time when we have more steel, more building materials, more labour, and more money. Many practitioners now regard the promise of health centres as a political trick, designed to gain their support at the time of the negotiations, or at least as an unfulfilled promise whose fulfilment is now unlikely. There are still the optimists who see the health centre as the panacea for all the disorders of general practice; but few of this group can explain what they mean by a health centre, much less show the way to translate it into reality.

Apart from recent deliberative work by the Health Centre Committee of the Central Health Services Council, the only positive steps towards development of health centres have been taken by local authorities. This is natural in so far as responsibility for health centres has been vested in local government; but it has led to an interpretation of the health centre primarily as a large building in which to house the personal preventive health services—maternity and child welfare, health visiting, school medicine, &c.—with only secondary and small consideration for the work of the general practitioner.

Whatever the value of such a health centre may be, it will do little or nothing to improve the standards of general practice. Moreover, general practitioners may refuse to work in a centre of this kind. The vast majority of them are prejudiced against, and suspicious of, local-authority services, even at their present level of development, and for this if no other reason few doctors already established in practice will want to submerge their independence and individuality, as they see it, in the larger machinery of new local-authority health centres. Also there are more material objections—notably the benefits of tax allowances while they remain in their own surgeries.

Many local authorities have been very active in planning health centres, and have committed large and expensive schemes to paper. Perhaps fortunately, however, the great majority have been deterred by shortage of money and materials from proceeding at once with their projects. While they are held up there is time to think again about health centres and to define and design some functional units which might set the course for a better comprehensive medical service.

or can afford—is firmly established and readily accepted as being, if not "the best of all possible worlds," at least the best attainable for the time being. The doctor who worked in an unattractive surgery almost always criticised it from the point of view of his own and his patient's comfort, but very seldom from a functional point of view. The doctor with a nicely appointed surgery, though this was functionally little or no better than the other, usually had no criticism to offer, and often took pride in an establishment which, as regards ease and efficiency of work, was indeed very bad.

This limited outlook on general practice, by the general practitioner himself, is quite as important a factor in retarding health-centre development as is his expressed disinclination to sink his individuality or independence in the cooperative effort of a group. The one bright spot in this otherwise gloomy sky is the fact that, once shown possibilities beyond the present narrow and ever-narrowing limits of general practice, he exhibits a latent enthusiasm, and often a breadth of vision, not to be suspected from his normal conduct and attitudes.

The lack of critical faculty among doctors is curious. A well-trained man will throw over the hard-won disciplines of clinical training, and accept the stultifying limitations of general practice within its present concepts: a really good doctor will divide his working time between a well-equipped, well-run cottage hospital, and a poorly equipped, badly run surgery, without apparently noticing his changing environments of work. Such acceptance of bad conditions has a deadening effect.

REFRESHER COURSES

Efforts have long been made to help the general practitioner to keep abreast of modern knowledge and technique, and to encourage him to maintain standards of work. The so-called refresher courses have been the means mainly used for doing this, and there is much discussion about providing more of them and about ways of freeing the doctor from duty so that he may attend them. But many of the more thoughtful practitioners are sceptical about their value. My own opinion is that, with conditions of practice as they are, these refresher courses do the general practitioner about as much good as an injection of adrenaline does a patient with terminal heart-failure.

AID FROM SPECIALISTS

The attitude of the general practitioner to the specialist naturally varies from doctor to doctor and from circumstance to circumstance; but several points about it need to be noted. At the higher levels of work, exemplified by advanced surgery or medicine as practised in large hospitals, the respect of the G.P. for the good specialist is absolute and unqualified. But at the lower levels of work, as represented by domiciliary and some aspects of outpatient consultations, he does not show the same confidence. And it is at the domiciliary level that practitioner and specialist have most contact.

The line of demarcation between the patient who can be treated at home and the patient who requires hospital care is fairly clear so far as acute diseases are concerned. Hence the general practitioner rarely wants what one may call an emergency domiciliary consultation—his view being that anything as serious as this is not a matter to be debated in the bedroom. It is chiefly in the case of long-term or chronic illness, where there is no clear line of demarcation, that he needs the specialist's help in the homes of his patients. But as, on the whole, both G.P. and specialist lack interest in the chronic medical diseases, particularly those of old age, the demand for domiciliary consultation is not very great.

Thus the good general practitioners whom I met made little use of, and felt little need for, specialist assistance in the home. Many of them said that they have no more than three or four such consultations in a working year, and sometimes not that; and in retrospect they doubted the need for even these few. The specialists whom they called in could not help them much, they thought, with illness in old age. Indeed, so far as these good general practitioners are concerned, the chief reason for calling a consultant is to relieve the anxiety of relatives or the patient; they seldom expect any help for him physically. Such practitioners have made little or no more use of domiciliary consultation since the Act made it generally available.

One good practitioner with whom I worked used the domiciliary consultation for purposes of personal tuition: he collected a number of interesting cases and then arranged for one or more specialists to see them and discuss them with him on some suitable afternoon. While such an arrangement carries obvious benefit to both G.P. and specialist (and probably to the patient), it is perhaps an unnecessarily expensive mode of instruction, and something of an abuse of the system.

In the whole course of my study I did not attend any domiciliary consultations, and I had difficulty in ascertaining how this service is being used. Some practitioners spoke of checking their therapy in chronic or long-term cases (particularly cardiac); but they added that in fact they got very little useful assistance from the specialists. A few expressed satisfaction at being able to call in a specialist in cases involving children—particularly an otologist in cases of otitis media and possible mastoid. But I think the object of the consultation, as they saw it, was to relieve the parents' anxiety as much as to confirm their own opinion.

The relief of genuine anxiety in the patient or his relatives is certainly a very good reason for a domiciliary consultation; but I doubt whether this was the purpose for which the service was provided. The point that impressed me most was that the really good G.P. had, or believed he had, little need to call the specialist to the home, and little (or infrequent) desire to do so. On the other hand, the G.P. of lesser quality could legitimately call in specialists much more often than they were really needed.

On three occasions I met general practitioners who, in all good faith, were calling in young consultants in order to help them financially and get them established. This kindly personal gesture was, of course, billed back to the taxpayer. There was never any question of dichotomy.

From my observations and questions I can only conclude that the good doctor felt little need for specialist assistance in his everyday work as at present constituted, and had little faith in the specialist's ability to do more than he could himself. The less good general practitioner, if self-assured, took the same line as his more competent colleagues; if not self-assured, he used the specialist to compensate for his own weakness.

With general practice as it is today, there is little likelihood of domiciliary consultation being applied properly: indeed until the province and function of general practice has been determined, and real standards have been established, it is useless to speculate on the proper relations between the specialist and the general practitioner in domiciliary work. Both in money and in time, domiciliary consultation is a very expensive means of compensating for weaknesses in general practice; and in present circumstances it is a very dubious means of trying to correct these weaknesses at their source. Perhaps the greatest benefit is to the specialist, who is brought out of his world of institutional medicine and into the world of his patient.

THE PRESENT AND THE FUTURE

In general, I found the attitude of the established practitioner to the new health service only a pale reflection of the vehement stand taken by organised medicine on

The relationship of local-authority services with such a centre must be considered very carefully. Where such services are functioning even reasonably well, even under makeshift conditions, no elaborate provision should be made for them, in the first instance, within the health centre. Offices should be provided in the health centre for representatives of various branches of local-authority services (e.g., home nursing, midwifery, and health visiting), and the work of these people should be coördinated with that of the doctor working in the centre, who should in turn be encouraged to use these services to the full. Once equilibrium and understanding have been established between the G.P.s and the local-authority personnel—by no means a forlorn hope, given these conditions—the question of shifting the local-authority clinic into the health centre can be considered realistically instead of theoretically.

INDIVIDUAL AND GROUP

The ideal of "family doctoring" is still an excellent, desirable, and probably attainable ideal. However, the horse-and-buggy days are far behind, and it is absurd to try to recapture the 19th-century concept of the benign old doctor in his frock coat and silk hat sitting through the night, awaiting the pneumonia crisis or the delayed arrival of the first-born. Our task is rather to resynthesise all that is good in this concept and discard all that is anachronistic.

In this modern age such a resynthesis implies team-work between doctors, nurses, social workers, and technicians, with the general practitioner as the coördinating agent of the team. My own belief is that, as obstacles to such team-work, the so-called rugged individualism of the average doctor, and his antipathy to any form of organisation or imposed discipline, are much overrated. The general practitioner has acquired a position of great personal power, and naturally he is not prepared to yield any of it without adequate compensation. By this I do not mean merely financial compensation. The kind of compensation I chiefly have in mind is the opportunity to do better, more useful, and more satisfying work.

Our task, as I see it, is to re-establish general practice and make it the basis of a positive preventive programme. And I suggest that, as a first step, we should form "basic group-practice units" which could be developed quickly and become the nucleus of future health centres.

THE BASIC GROUP-PRACTICE UNIT

The primary consideration is personnel, not buildings. In the first instance any shell which could be renovated and adapted might serve to house the unit.

The number of doctors who would work together would be determined by population density and the nature of communications to the site. I picture small units of 6–10 doctors, looking after 15,000–25,000 people. The unit would be fully staffed with nurses, clerical assistants, and some form of all-purpose technician who could undertake urinalysis, blood hæmoglobins, sedimentation-rates, and the like. It would be furnished with all the equipment necessary for a good G.P. service.

The crucial question is, how can the incumbents of existing general practices be enticed to coöperate in these circumstances? And now that responsibility for health centres has been vested in local authorities, how can such a programme be made to work?

If conditions for doing good work are offered, and if assurances of professional autonomy can be given, I believe that the problem of recruitment will largely solve itself. The individual doctor, apart from running his car, should have no overhead expenses to bear; he should certainly not be charged even the non-economic rent which is at present mooted. (I found the idea of even a small rental charge a positive deterrent to coöperation in any such project—quite apart from the negative deterrent of loss in tax-rebates for the doctor who gives up all his private practice.) Under such an arrangement very good terms of service should be possible. For example, it would be practicable to offer good and regular vacation and study periods. (The present offer of refresher courses, even with the provision of paid locums, is merely pie in the sky so far as many general practitioners are concerned.) These inducements, once made realities, would strongly attract both present and future practitioners to the "basic group-practice unit."

I have suggested units of 6–10 doctors looking after 15,000–25,000 people. This sets an average of 2500 patients, instead of the permissible 4000, on any one doctor's list. But with the removal of all overhead expenses, and with the other inducements offered, the financial return from this number should be enough to attract anyone except perhaps those whose lists are at present full; and we should further be able, under these conditions, to recruit young doctors in large enough numbers to maintain a ratio of one doctor to 2500 patients.

Group practice is sometimes commended on the ground that it enables the good G.P. to do specialised work and thus make his way into a specialty. But if the conditions of general practice are made sufficiently satisfying, the desire to be a specialist may lessen, and general practice may then compete for the very best medical graduates.

At the "basic group-practice unit" level of development it will certainly be possible to integrate the general-practitioner services with the hospital and specialist services, and there will be no difficulty in bringing the specialist into the unit. (At present this cannot be done.) But, for emotional and political reasons if for no others, it will be necessary to go warily with the introduction of local-authority services, and at the outset no local-authority clinics should be brought into the unit, though, as I have said, an initial liaison should be formed by providing offices for representatives of the local-authority agencies most closely allied to general practice—e.g., home nursing, health visiting, and midwifery. From this liaison the more comprehensive type of health centre should eventually develop.

The capital expense of setting up such units should not be great; but in the circumstances it is hardly a burden to be carried by local authority. The most satisfactory solution would seem to be grants-in-aid from central funds to the local authority, to be spent within the terms set down.

ADVANTAGES

Only on some such basis as this is there a chance of correcting the paradox that general medical care is at its worst in closest proximity to the large clinical centres—at its worst not only for organic reasons but equally for human and psychological reasons. Again on this basis it should be possible to remove much of the empiricism, in diagnosis and therapy, at present prevalent in general practice, and to begin the development of some effective clinical and human research, which in itself would do much to raise the status of such practice.

There is also the question of the doctor as a teacher. He is potentially perhaps the most important of all teachers: he can and often does influence individual and family conduct to a much greater extent than all the other agencies of health education put together. Yet the approach of the average doctor to this part of his responsibility is even more empirical than is his approach to organic medicine. The same factors in a basic group-

WHAT KIND OF MEDICAL CARE ?

The health centre is merely a mechanism, a means to an end and not an end in itself; and unless we can define the end we may as well forget about the means.

If I am correct in setting down the three determining factors of the quality of general medical care as

1. The general social environment
2. The doctor as an individual
3. The immediate environment in which the doctor works

and in claiming that (3) is the only immediate variable and one which can greatly influence (2), then health centres can become the chief factor in raising the quality of general medical care.

As these three factors are by no means constant, there can be no absolute definition of a health centre: the needs of different environments will have to be met in very different ways. Nevertheless it should be possible to establish some criteria for what one might call a theoretical optimum health centre, and then to adapt this to different places and conditions. If we are to do this, we must clear our minds of two ideas:

1. That general practice, as it exists at present, is good or even good enough to meet the needs of any community.
2. That health centres are concerned primarily with preventive medicine as we recognise it at present.

We must then reverse our thinking on hospital and specialist services (medical and ancillary): instead of considering how far we can build these up, we must consider how far we can dispense with them. For both human and economic reasons, we should work from two premises:

1. That as many people as possible should be kept *out* of hospitals—whether as inpatients or as outpatients.
2. That the medical care of the patient should be integrated, not fractionated.

On this basis the optimum health centre must be, first and foremost, a high-grade diagnostic and therapeutic centre; which implies good (if necessary elaborate) equipment and all the people necessary to use it. Continuity of responsibility for medical care of a patient cannot be achieved unless the general practitioner assumes high-level responsibility in a wide range of activities. It is true that there is virtually nothing in his work which some specialist cannot in theory do better; but we must firmly resist the conclusion that therefore we must keep on fractionating and specialising.

Admittedly, general practitioners working with limited equipment and in isolation can easily become dangerous through taking on too much responsibility, but in a health centre well-staffed and well equipped it should be possible to minimise such dangers and ascertain by experiment the level of responsibility which suits practitioner and patient best.

APPLYING THE PRINCIPLES

There are very few places in England where the establishment of an "optimum" health centre is possible: except perhaps in rapidly expanding towns, medical services cannot be planned entirely afresh. So we must think mainly in terms of adaptations of the "optimum" which will fit in with the services already provided by the general practitioner, the hospital, and the local authority.

Our object will be to change the working environment of the G.P. and make it possible for him to do better work and to retain, instead of discarding, the good disciplines of medical school and hospital. If this one thing can be done, a lot of other difficulties should be overcome with relative ease. The schism between hospital-specialist and G.P. services will narrow rapidly instead of widening as at present, and the relationship—or rather the balance of power—between local-authority services and general practice should improve.

Though, in my opinion, it is impossible to draw up a blueprint for a widely applicable prototype health centre, we can set down some indispensable requisites—namely

1. Separate and private units for consultation and examination by each doctor working in the centre.
2. Adequate personal equipment for each doctor.
3. Such nursing staff as is needed to relieve the doctor of unnecessary and time-consuming duties.
4. Such clerical staff and office equipment as are needed for proper organisation, running, and record-keeping.

To these, various additions (differing in different circumstances) will be necessary. For example

1. Laboratory facilities and technicians.
2. Radiological facilities and technicians.
3. Physiotherapeutic facilities and physiotherapists.
4. Rooms for visiting specialists or consultants.

To this medical-care nucleus can be added offices for local-authority services and personnel, and for such welfare functions as may be considered desirable in given circumstances.

In the present situation, both medical and economic, priorities of attention must be allotted. Number 1 priority should go to general practice and not (as now) to local-authority services, and it should go to the worst part of general practice—i.e., general practice in dense urban areas.

In these industrial areas, where the level of general practice is low and where hospital and local-authority services are highly developed, it is unrealistic to think in terms of elaborate health centres. It is equally unrealistic to set out to duplicate an already existing service: for example, in a health centre adjacent to a large hospital unit it would be silly to have expensive diagnostic equipment. Nevertheless the health centre will fail in its purpose unless the necessary facilities are made available to the people working in it.—And I do not mean available in the sense they are available already, when a G.P. can send his patient to a hospital outpatient department and in course of time get back a brief report on what ought to be done (or what has been done) for the patient. The G.P. must have open access to these diagnostic facilities and to the specialists and consultants who are nowadays working in isolation from him.

The health centre should very largely replace the outpatient department. This does not merely imply changing the venue of the department; if it did, no useful purpose would be served. It implies cutting out the episodic care which characterises present outpatient work, by bringing the specialist into the health centre, where he should do the equivalent of his outpatient consultations in the presence of the G.P. concerned with the particular case. The G.P. would then be responsible for coördinating the efforts of the various specialists who handle the patients and for the continuity of care. More than anything else, this is a problem of organisation—and not a particularly difficult one. If the work and responsibility of the G.P. is upgraded and his facilities are improved, the volume of outpatient department work (or its equivalent in the health centre) will be considerably reduced (vide Appendix II).

In large urban health centres a good case can now be made out for the full-time employment of a consultant physician, who would be continuously accessible to all the G.P.s working the centre and who could follow up all cases which interested him. If a consultant physician, to remain at consultant level, must have hospital beds and inpatients, that could be arranged; but the bulk of his time should be devoted to work within the health centre and domiciliary work associated with this.

In the "optimum" health centre similar arguments can be adduced for full-time radiologists, pathologists, &c., working in the centre; but, as I have said, there will be little call for the "optimum" type.

(e.g., industrial practice). This is the result of the widening schism between the specialist and the general practitioner, and inability to see beyond the practitioner's few but dramatic sins of commission (e.g., surgical) to his many more serious, if less obvious, sins of omission (e.g., missed or mistaken diagnosis).

15. With increased inducements for the young doctor to enter the specialties, and a decreasing scope for work in general practice, the latter is becoming an unattractive proposition. Furthermore, it is difficult for the young doctor with a genuine interest in this field to find a satisfactory way into it. The easiest way is through busy urban practice, and under prevailing conditions this is the least satisfactory way.

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Quite apart from human values, it is doubtful whether the policy of concentrating on hospital and specialist care is economically justifiable or even possible, and its hazards will certainly not be lessened by drifting into it.

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The attitude of most general practitioners to both local and central authority, as represented by city and county health departments and the Department of Health for Scotland, seemed more reasonable and cooperative than that of English doctors to the corresponding authorities here. Though it could not be said that the relationships were by any means ideal, for the most part they were at least workable.

In England any association, real or imaginary, between my survey work and local or central authority militated against good relations and created obvious suspicion. In Scotland, on the other hand, wherever I went I found I could use either a local authority or the Department of Health as a means of introduction to general practice, without embarrassment and without arousing any serious misgivings. Indeed in one part of Scotland I actually travelled with an officer of the Department, who accompanied me into the various practices I visited; and the doctors were quite as frank in his presence as if I had been alone. In England, on the few occasions when I was introduced by such an officer, I found relations with the doctors strained until I had explained my association with, and established my independence of, officialdom.

The explanation that has been offered me for this difference—that it is merely a matter of the size of the community—is not good enough. The relationships even in country towns in England are often worse than comparable relationships in big cities in Scotland. There is a basic difference in attitude of mind.

This difference in attitude is reflected in other ways. In England discussion with general practitioners on the new health service usually centred on the size of capitation fees, the number of patients on the list, mileage-rates, basic salaries, and so on, until it was steered into professional as distinct from commercial channels. In Scotland I found much more spontaneous interest in professional issues such as the quality of medical service, the relation of general practice to hospital and specialist services, and the development of health centres.

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Judged on premises, equipment, and record-keeping, which can be assessed objectively, this practice was in advance of anything else I saw; and my subjective impression of the standards of work led me to think of it as a beacon in the darkness. Yet in its eighteen years of existence it has received no official or professional attention, and, as I have mentioned, the survey committee which looked at the cottage hospital where these doctors work did not so much as call at the "group clinic" to see what went on there. Fearing that they will in the long run be eliminated from this hospital, at least one of the group contemplates turning to a specialty.

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Even the most elementary steps towards organising the present chaos of individual general practice must result in improved medical service and a fairer deal for doctor and patient, and I am sure that these elementary steps should be taken before any grandiose or idealistic experiments in health-centre development are attempted.

The future of general practice depends on our ability to give definition to a concept which is at present nebulous. Having designed our ends, we must design means to achieve them and to maintain them. The "basic group-practice unit" is the first and most urgent necessity.

IV. CONCLUSIONS AND RECOMMENDATIONS

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1. The present state of general practice is unsatisfactory. Its defects existed before the National Health Service Act, and arise from failure to define general practice and to establish and maintain standards. For several decades general practice has adapted itself to the growth and development of hospital, specialist, and other medical services; but it has not developed concurrently.

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12. Hence the future of general practice is largely being determined without deliberate consideration of its problems. It is being determined mainly by the people responsible for hospital and specialist development, and in terms of compensation for recognised, or half-recognised, deficiencies, instead of the correction of these deficiencies.

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I was similarly impressed by the difference in attitude to general practice (in the two countries) among specialists who had thought at all deeply about general practice. In England I found that many of these specialists had little genuine respect for general practice or the average general practitioner. Much more respect was shown by the corresponding Scottish specialists, and their criticisms of general practice were almost always constructive and sympathetic. Similarly the attitude of representatives of organised medicine towards the new service seemed to me more objective in Scotland than in England.

Industrial Practice

I visited fair samples of industrial practice in both Edinburgh and Glasgow, but saw nothing to equal the kind of thing described in section II of this report. The worst industrial practice I visited in Scotland was at least equal to the "good" English industrial practice I have described.

The surgeries are much the same forbidding kind of places, built to the same two-room patterns and converted from shops or residences; but they are much better equipped. I was never in a surgery where there was not an examining couch; in some there were gynæcological couches; and both of them always seemed to be used for their intended purpose. Sterilisers were usually in evidence, and instrument cupboards seemed to be well kept and reasonably well stocked.

As a rule some sort of an effort was made to keep records. I never saw anything approaching good records, and most of them were poor in the extreme; but at least there was a consciousness of the need for records, and often apology and explanation was offered for their paucity.

In the practices I visited where lists were full (4000), the doctors were extremely busy—far too busy to do good or even satisfactory work—but there was nothing like the congestion or lack of organisation described for comparable practices in England. The discipline exercised by the doctors was notably stronger and sometimes of educational value.

During my periods in various surgeries, a conscientious effort was nearly always made by the doctor to conduct some sort of a useful physical examination. In absolute terms, they were by no means good examinations; they were quick and usually limited to the organ or area of complaint; but they were purposeful and at least eliminated some dangerous possibilities. Patients were not referred to outpatient departments with quite the same readiness and lack of inquiry or thought as in the industrial practices I saw in England.

As a rule there was evidence that the minor laboratory tests which one expects to be done in general practice were in fact done. Certainly urines were tested, whenever I was present, on every occasion that this was indicated. One did not see empty and dirty bottles of Fehling's solution, and test-tubes obviously disused for months or years, lying around the sink-boards. Some of the G.P.s owned and used microscopes, and some did such things as hæmoglobin estimations.

One industrial G.P. I met, who had a full list, had managed to do enough work at his side-bench to earn an M.D.; another was interested in, and working on, the diagnostic significance of the state of the tongue; and a third was making a study of infant feeding. I do not suggest for a moment that some doctors in industrial practices in England are not attempting similar work; but if they are, with conditions as I saw them, they are exceptional men. There was nothing exceptional about the Scottish doctors I have just mentioned: they were ordinary industrial G.P.s to whom I had been referred with no special recommendation; and later, when I took other checks to see whether I was being shown a demonstration sample I could find nothing to suggest that this was so.

It is well known that a considerable number of the less able graduates from Scotland and Ireland migrate to England and find their level in industrial practice here. I have even heard it suggested that the poor quality of Scottish and other immigrant doctors is responsible for the faults of industrial practice in England. This, in my opinion, is quite an untenable thesis. "Good" and "bad" doctors have migrated from Scotland to all types of medical practice in England, the migration being stimulated at times of economic difficulty in Scotland. Many have remained, some to do well in good practices, some to do badly in bad ones. What struck me most was the number of doctors I met who at some period had gone to England (usually into industrial practice) but had been unable to tolerate the conditions and had returned to Scotland. They could all recall the type of thing described in section II of this report, recount their experience of it, and express gratification that it does not exist in Scotland.

The difference in quality of practice is principally one of degree and is by no means absolute. The patterns are the same, but the standards and attitudes are different. There are, however, two major points of contrast between industrial practice in the two countries:

1. In Scotland dispensing practice has never reached the same proportions as in England, and the bottle-of-medicine mentality has not been developed, either by doctor or patient.
2. In Scotland the general practitioner has retained some responsibility (now diminishing rapidly) for midwifery. Because of this (whatever the standards of G.P. midwifery may be) he has remained much more the family doctor than his English counterpart.

Both these facts have materially helped to maintain standards of industrial practice in Scotland.

Urban-residential Practice

In this type of practice the difference between England and Scotland is much less than it is in industrial practice. The surgeries I saw were altogether comparable, as was the nature of the work. The scope of work was no more defined in Scotland than in England, and standards were quite as arbitrary.

As I have pointed out, relations between the G.P., the specialist, and the local-authority doctors favour the Scottish G.P. The retention of some responsibility for midwifery makes family doctoring more of a reality. Also, in the practices I visited, the G.P.s seemed to do more for themselves in minor surgery and elementary laboratory work.

Rural Practice

I took a particular interest in the isolated practices of the north and west, which formed part of the old Highlands and Islands service. For this service enjoys a high reputation internationally as well as locally. It is held up as an example of a well-organised medical service giving medical care of high quality to isolated communities.

I visited about a dozen practices in different parts of the Highlands and Islands. The doctors I met were as fine men as I have met anywhere. They were proud of the service of which they were part; they put up with the harshness of climate and country, and the difficulties of living and working in this rough isolation, because they liked their people and believed in what they were doing. In short they were men of character and integrity.

I make these points with some embarrassment, not to eulogise these doctors, for whom I have the greatest personal respect as men, and certainly not to soften the harsh comments I am about to make, but in order to illustrate a very important point which I have made previously but without the same emphasis. The point is this:

> The continued failure to establish and maintain standards of medical care, and the continued acceptance that general practice is good for its own sake, has deadened the critical faculty and sensitivity of the best of general practitioners, and has resulted in the decline of standards of practice to a dangerously low level.

Almost without exception, the doctors' houses I visited were in a state of bad repair, and some of their surgeries were hopelessly ill equipped. Perhaps I was expecting too much; but I thought that at least they would be well enough equipped to meet the emergencies always liable to arise in rough and rather inaccessible places.

Some, like the English industrial surgeries described previously, had no examining couches.

Once, when I was visiting a doctor in quite a populous area, a patient came in with a history suggestive of appendicitis. After he had been examined by the doctor it was proposed that I should have a look at him. I asked where I could lay him down, and someone went away to the back of the house and dug out a small folding camp-bed which when assembled was about a foot off the ground. We laid the patient down and knelt round him, and after abdominal examination we were still undecided. I asked for a rubber glove or fingerstall with which to make a rectal examination: there were none. I suggested examining a specimen of urine under the microscope: there was no microscope. Finally the patient was sent twenty miles to the nearest cottage hospital, where these things could be done.

On another occasion I was visiting a small maternity hospital in which most of the confinements for quite a large area of country and a considerable number of people were conducted. At this time there was a woman in the hospital suffering from a severe postpartum eclampsia and not responding to simple therapy. We discussed the case and it was suggested that she might go on to an intravenous hypertonic saline drip. There was no saline solution and no intravenous equipment. At this time the hospital was being repainted and refurnished, but not re-equipped.

These are only isolated examples, but they show that standards of practice in an organised general-practitioner service, enjoying an international reputation, can reach low levels.

Here are extracts from a letter written by a doctor who recently acted as locum tenens for one of the practitioners in an isolated part of rural Scotland.

> "The surgery was a back room, which contained a non-functioning stove, a desk, two chairs, and two bookcases. I looked in vain for the examining couch, the tools of diagnosis and minor surgical treatment; they just weren't there. Or rather there were a set of Michel clips tucked away among the cobwebs at the back of a cupboard. They came in useful, when boiled up in a pot on the kitchen stove, two or three times during my stay here.
>
> "There was a large selection of assorted drugs on the shelves, all a little dusty, with one or two large bottles of proprietary remedies on the front shelf. The doctor told me that he usually dispensed these, or else the other medicines he knew how to make. There was a bottle of procaine penicillin two years old and some rather more modern bottles of the sodium salt. This he usually used, 10,000 units daily, since the procaine variety 'was so difficult to inject without using a large needle.' There was some sulphadiazine.
>
> "I searched high and low for case records, X-ray and path reports—there weren't any. Nor were there rubber gloves, fingerstalls, or any item of sterile dressing. . . ."

These comments speak for themselves, need no interpretation, and demonstrate that, even with the best of men, failure to maintain *professional* standards can reach a point where public safety is involved.

Quite a few of the isolated practices I visited could be fairly described in similar terms. Others were better equipped and the standard of work was higher, or appeared to be. However, with one or possibly two exceptions, I saw no practice which could be considered "good" as measured against any reasonable standard. While it would be pleasant to write about these better practices, it would illustrate nothing significant, except perhaps that some individuals, of their own accord, have maintained higher professional standards than others. The important thing is that no minimum standards have been established; that in a service of this kind the work of some practitioners can fall below a minimum standard of safety; and yet that the service and the men who make it up can continue to enjoy a high and widespread reputation.

But I also have another observation to record.

I visited a cottage hospital in one place, which looked after the needs of a community extending over a radius of twenty or thirty miles from the site of the hospital. It was a ten-bed unit and was equipped with X-ray plant and operating-theatre. My visit was made on a Saturday afternoon, and I was greatly impressed by the fact that something over half the doctors who worked in the hospital's area were in attendance there. They were looking at X-ray films, discussing cases, and exhibiting an enthusiasm which was really remarkable. I learned afterwards that some of these men were running practices of the type just described, and the enthusiasm they showed in the cottage-hospital work is very difficult to reconcile with their scientific apathy in their private and individual practices. Or perhaps it really isn't; and perhaps in this simple observation lies the hope for the future of general practice and the betterment of medical services.

Nine of the ten beds were occupied by surgical cases. The one medical case was that of a girl suffering from bacterial endocarditis. Some years previously she had had rheumatic fever with cardiac involvement and she had been under more or less constant attention for several years. Her condition was regarded as hopeless, and the treatment she was receiving was 15,000 units of penicillin daily (she had received this dosage for about a week and was still acutely febrile). Professional interest centred mainly on two or three difficult surgical cases, which had been operated on by the G.P. surgeon during the previous week.

This surgical preoccupation of the G.P. who has access to a cottage hospital is important both for its own sake and in relation to the development of the medical service. It is not difficult to understand why so much interest focuses on surgery—a wholly tangible and satisfying outlet for men working mainly with intangibles and at that to only a low standard. The question is whether this interest can be turned from surgery to the less dramatic problems of medicine. I am sure that much of it can, but it is going to require a great change in the environment of general practice; it will not come about by preaching or teaching, but only by making it possible for the G.P. to do really satisfactory work in the field of general medicine.

Effects of National Health Service Act

In Scotland also I tried to correlate what was happening in outpatient departments with what was happening in general practice. I had no more success than in England; the records just were not available. However, hospital superintendents and consultants usually expressed the opinion that the volume and nature of hospital outpatient work (apart from application for appliances) had not altered substantially since July 5, 1948.

On the sample of practice I saw in Scotland, this could be anticipated; the doctors tried conscientiously to screen their patients before sending them on to the outpatient department, and those who undertook some minor surgery and elementary laboratory work were not talking about dropping it because they were no longer paid for every item of service.

Many doctors spoke of the bigger demand for prescriptions, particularly for small things which the patient would previously have bought for himself. But resistance to these demands was much firmer than I saw in England, and though in some of the larger city practices there was talk of patients changing doctors unless every demand was met, fear of this was certainly not the main factor determining the doctors' conduct.

The direct effects of extending National Health Insurance and of introducing new methods of paying the doctor are the same as for England, but they have caused much less emotional disturbance and accordingly less immediate disturbance of the conduct of doctors and patients.

The problem of differential scales of maternity fees for general practitioners does not arise in Scotland, where doctors have not been reclassified as worth either £5 5*s.* or £7 7*s.* per confinement. This does not mean that there is general satisfaction with the G.P. obstetrician; in fact, this is far from being the case. Many regard antenatal care as a task for the specialist, and favour division of midwifery between the midwife and the specialist obstetrician.

The main point of difference in the Scottish Act, so far as general practice is concerned, is that responsibility for health-centre development is vested in the Department of Health instead of the local authorites. Though the health centre was originally conceived as a large building which would house local-authority services, with, at some stage, some sort of provision for general practitioners, a new concept is developing rapidly. In the newer plans, though the centre serves as the coordinating agency for preventive and curative services, it is primarily a place for medical care and for better general practice.

The indirect effects of the Act are the same for the G.P. in Scotland as in England. His position is seriously threatened by specialist and hospital development unrelated to the development of general practice. His greatest hope for survival lies in a practical policy for health centres. For this reason, and also because he has on the whole maintained better standards than his English colleagues, his position is more hopeful and more defensible.

II. GENERAL PRACTICE IN NEW ZEALAND

The New Zealand experiment in health insurance and medical care has been cited by some as an example of the evils of "nationalised" medicine and by others as an example of its benefits. Indeed it has provided evidence for both sides on almost every contentious issue arising in the new British National Health Service.

Most of the objective reports on the New Zealand service have dealt with administration and planning, and have dwelt on the rather dramatic results of the fee-for-service method of paying the doctor. The attention given to this question of doctors' incomes and patient abuse of a "free" medical service has indeed obscured other important lessons to be learnt from the service, and before going further I must say something about it.

Remuneration

The New Zealand general practitioner can receive his remuneration in one of several ways:

1. Fee-for-service (with or without additional private fee, known locally as a "token" payment).
2. Capitation fee.
3. Salary (in "special area" practices: these are chiefly in remote rural areas and mostly populated by Maoris).
4. Private arrangements with the patient as before the Act was introduced.

To complicate this picture there are two methods by which the doctor can claim his fee-for-service: (1) directly from the State; or (2) directly from the patient, who in turn claims repayment from the State. Moreover any one doctor can use more than one of the methods listed above.

The vast majority of doctors work on the fee-for-service system in one of its forms. It is hardly necessary to point out the abuses to which this system is open and the difficulty of controlling these abuses. Proper control of any large fee-for-service system would require an immense bureaucracy and even then might not be feasible. I have seen one small fee-for-service scheme in the U.S.A. (the Maryland Medical Service for the indigent), which is thoroughly controlled for a population of about 100,000; but even the officials responsible for it are uncertain whether they could maintain their controls for a population greater than a quarter of a million. The questions which at once come to mind are:

(1) How great is the abuse by doctor and patient of the fee-for-service "free" medical scheme?

(2) What are the real effects of this abuse on the standard of medical care?

At its worst the abuse is very great. There are individual general practitioners in cities and large country towns making five-figure incomes on the basis of 7*s.* 6*d.* per item of service. These doctors see great numbers of patients (albeit nothing like the numbers seen in some English industrial practices); they encourage the patient to return with all kinds of trivialities, for repeats of prescriptions, or for courses of dubious injections; and they visit on the slightest indication or perhaps no indication at all.

There is evidence of even worse abuses than these—of doctors collecting "patients'" signatures, for service rendered, where no service has in fact been given. There are stories in plenty of doctors passing the "book" round to collect signatures at a party, of doctors standing a round of drinks in the local hostelry and collecting a fee for service in return, and of other such "amusing" incidents. All these things are possible and many doubtless true.

In ethical terms perhaps the worst offenders are those I call "company" doctors—men with well-established practices who employ juniors on a generous salary and on the basis that they see so many patients per week. This is the ultimate application of legitimate commercial behaviour to a profession we like to consider non-commercial in attitude and conduct. To those who regard medicine as an especially moral and altruistic profession, it is an ethical and moral outrage.

Such conduct is of course indefensible; but, apart from financial considerations (the cost of such behaviour to either the individual or the nation), what matters most is its effect on medical care, both directly on general practice, and indirectly by affecting recruitment to the specialties. Once again, this brings us up against the question of what is good general practice. It also highlights the difficulty of distinguishing between moral and material issues.

For example there is one "company" practice in New Zealand well known because its principal was an early and strong advocate of the service. This practice handles an enormous turnover in terms of numbers of patients and items of service and accordingly brings in an enormous income. It is equipped to handle the volume of work, and the men working in it are "good" men, the net result being that, at least from an organic point of view, the medical service offered by this practice is "good," if considered in relation to the average "good" practice I have visited here. However, the professional attitude to it is one of strong disapproval.

PRACTICE WITH ANCILLARIES

One practice in which I myself worked for a time deserves rather detailed description, because it illustrates many points which need thought.

This was a one-man practice looking after more than 7000 people scattered over a large rural district (some boundaries being as far as thirty miles away from the surgery). The population was mixed Maori and European, some receiving their attention as "capitation" patients and some as "fee-for-service."

The surgery was improvised in quarters above a shop. It was well planned, well equipped, and from a functional point of view very good. There were two consulting-rooms, two examining-rooms (one divided off with a place set aside for minor surgical procedures), a large waiting-room with a side-room equipped with ultra-violet, infra-red and short-wave instruments, a reception and record room, and a side-bench with sink, burners, reagents, test-tubes, and microscope.

Three nurses were employed. They were all trained at least for their general certificate; one had a special pædiatric training. One nurse spent most of her time "on the district": she took and "vetted" most of the calls coming in during the day. The doctor took those patients he chose for himself and any he was asked to see by the nurse, who made a first visit. Another nurse sorted out the patients into those requiring consultation, those needing some minor surgical procedure, and so on, and put them in consulting-rooms or prepared them for examination, dressing, suturing, &c. The third nurse saw principally mothers and children, did some of the antenatal work, tested urines, prepared slides for examination, and looked out records.

The doctor consulted, examined, did an item of minor surgery, and either wrote or dictated his notes immediately afterwards.

The volume of work handled was immense; almost no time was wasted; and yet the human relations between doctor and patient were excellent. The record-keeping was as good as any I have ever seen in general practice and enabled me as a locum to cope with the work without the floundering, searching, and misunderstanding usual in one's early days in a strange practice.

Besides the work in the surgery and the domiciliary visits, this practice handled a great deal of midwifery (I averaged almost a confinement a day during my tenure) and an appreciable amount of general surgery at the local cottage hospital.

Working with a team of nurses in this way is really a modified form of group practice. It grew up in response to demand and certainly not because of the doctor's hunger for a large practice. The overhead was great but by no means incompatible with the income. Patient discipline was intelligent and firm, and there was nothing that could really be called "patient abuse."

There seems something almost unreal about recounting this practice after the type of thing I have been seeing in England, where a higher patient-load has generally resulted in depression of the scope and quality of service rather than any positive endeavour to meet the difficulties by better organisation, individual or collective initiative, or even constructive planning.

This practice I have described illustrates one way of meeting such difficulties. It uses nurses to a level of responsibility I have not seen elsewhere; it maintains a humanism usually lost long before the load of work reaches these proportions; it works to a clinical level equal to the average of the "good" rural general practice in England which has cottage-hospital facilities, and it keeps records as good as any I have seen in general practice. Nevertheless this practitioner has the reputation of running a completely commercial type of practice, because his turnover is so large.

EXTENT OF ABUSES

None of this answers the questions of how great is the abuse by doctor and patient of the fee-for-service scheme and what is the effect of these abuses on the standard of medical care. But it does show that financial abuse is not necessarily synonymous with bad standards of care.

There is a great deal of evidence that many doctors frankly abuse the scheme at the expense of quality of service. The worst of the abuse is in the urban areas, where it is easy to attract large numbers of patients and where they can be encouraged to come back frequently.

One can only hazard a guess at the proportion of doctors who are flagrantly abusing the scheme. Thirty per cent. would probably be a high figure, and in any case the actual number of doctors misconducting themselves in this way is not the important thing, except for the cost involved. What is really important is the fact that some or any doctors can use their position thus, and that this can be known and tolerated both by the public and the medical profession as a whole. Indeed, in a sense, the profession does more than tolerate the abuse; for it actively endorses the fee-for-service scheme which permits and even creates this sort of thing.

This type of misconduct is bound to lower standards of medical care. But, without any definition of general practice and without any criteria of quality, it is impossible to talk in absolute terms about the rise or fall of standards. Generalising very widely I should say that a New Zealand practice where most of the possible abuses are carried out is usually, from the patient's point of view, as satisfactory as a "good average" practice in England. It must be remembered that in these circumstances the quality of the individual doctor may be the sole or primary determining factor in the quality of practice. As anywhere, there are some very bad doctors, and practice is very bad where they are settled; but it is impossible to correlate this with terms of service. The worst practice I saw in New Zealand was one run by a doctor who refused to work any of the State schemes and continued in private contract with his patients, among whom he enjoyed a high reputation.

After ten years in which to observe the advantages and the disadvantages of the service for their patients and themselves, the attitude and thinking of the doctors are still dominated by emotion and finance.

CAPITATION AND SALARY

The doctors working capitation practices are all men who from the beginning favoured a national medical service and as early as 1938 (i.e., before the amending Act of 1941, which introduced the fee-for-service system) agreed to work a national medical service on a basis of capitation. Hence these doctors were philosophically in line with a "State" service, and to that extent they must be considered partisans. But however much this may affect their appreciation and opinion of the service it cannot affect their quality as doctors or the quality of the practices they run. While in New Zealand I was reviewing their practices and not their opinions.

The situation is somewhat different as regards the salaried practices, which cover "special" areas. The most special thing about these areas is that before the introduction of the service there just weren't any doctors working there. Most of these places are in Maori territory, and the absence of doctors before the late '30s was due not to prejudice against Maoris but to the fact that Maoris could not afford to buy medical service. There are also some salaried practices on the west coast of the South Island in isolated and remote rural and mining communities. Before the war some of these practices were filled by displaced persons from Europe, most of whom have done remarkably well. It must also be pointed out that the autonomy of these salaried practitioners is absolute. They are paid a salary, given an area of country with a certain population to look after, and then left to their own devices. (They are of course given car allowances and mileage.) They are not worried by bureaucratic controls, demands for reports, or periodic inspections. This is a state of affairs usually regarded as impossible: salaried practice is assumed automatically to be synonymous with "civil service" or "bureaucracy" or call it what you will.

During my stay in New Zealand I worked in two capitation and two salaried practices and visited some others of both types. All these practices had been operating in their respective ways for at least five years. All of them, in terms of the standards I have witnessed in England, were "very good." None of the presupposed evils of either of these systems of practice were evident. The doctors did not grow lazy or slack, or develop the so-called civil-service attitude: so far from the patients and doctors trying to take advantage of each other, their relationship seemed better than I have witnessed or experienced in other types of practice. In fact, professional considerations took priority over commercial ones.

A COUNTRY PRACTICE

To illustrate some of these points I must relate an experience I had when I took over a practice in a completely Maori area in a remote and beautiful part of the North Island. The area of the practice was very large, the roads were very rough, and the population was about 2500.

I knew quite a lot about the doctor who ran the practice. Before the war he had worked in a city, and he had taken this country appointment for personal reasons in spite of the fact that he was opposed to salaried service or a national medical service of any kind. I thought that under these circumstances I would most certainly see the bad effects of salaried service.

At our first meeting he told me that I would have very little to do, and I jumped to the conclusion that here was an example of how to take it easy on a salary. It transpired that he had announced my coming and had stated that I would be available for all emergencies, for all maternity work, and for three hours a week for general consultation, and, as he put it, "for the curious to come and take a look."

He explained to me that he made these arrangements for all locums, however good or bad, and went on to explain that the majority of *his* patients were *his* dependants and that he did not want me or anybody else disturbing this relationship unnecessarily. This was certainly a change from the usual embarrassed intimation, from doctors (even the most conscientious) operating on a fee-for-service basis, that they usually saw about so many patients a day and please to try to maintain approximately the same figure. In some degree the healthy attitude taken by this doctor was reflected in all the capitation or salaried practices I worked in or visited.

To complete the account I must relate that this doctor was doing a most thorough job with about half the demand on his time usual in a practice looking after this number of patients. He had a very well-equipped surgery and well-kept records, and was doing some independent epidemiological investigation.

I am not trying to claim that in New Zealand salaried or capitation practice has made bad doctors good, or lazy doctors energetic; but I do want to point out that I found no evidence of the converse and no evidence that these ways of remuneration spoil the doctor-patient relationship.

In the most isolated practices I visited in New Zealand I found none so bad, professionally, as those I saw in similar situations in Scotland.

Differences

Considering New Zealand practice in broad terms, and within the framework used to consider practices in England, we can examine the differences.

For the most part the average surgery, urban or rural, is better functionally, and, except for the "good" practices I have seen here, it is much better equipped. I have described one rather extraordinary practice, but there are many where the surgery is planned to meet properly the requirements of a doctor's workshop. The traditional pattern of two rooms—one in which the patient waits and one in which everything else is done—is as much the exception as the rule in New Zealand.

The ordinary surgeries are nothing elaborate or special; they may consist of no more than three rooms instead of the usual two, but from a functional and organisational standpoint this makes a great difference to the doctor and so to the patient. Many doctors have some sort of clerical or nursing assistance at their surgery, and this reflects rather their recognition of the need for this assistance than any undue opulence on their part.

However, the really important differences lie not in organisation or mechanism but in the scope of the G.P.'s work, his degree of responsibility for medical care, and his relationship with hospital and specialist services.

I mentioned previously how some British doctors fear "patient blackmail"—i.e., loss of patients if all their demands are not met. This fear was apparently not shared by the New Zealand doctors, though some confessed that in the early days of the service they used to worry along the same lines. They seem to have learnt, in the few years of "free" service, that their patients respect and accept honest discipline and respond to personal education.

SCOPE AND RESPONSIBILITY

In a way, the New Zealand scheme is the antithesis of the British. In New Zealand the primary responsibility for medical care rests with the G.P.—not because of any deliberate plan but merely because G.P. services have been "free," whereas, outside the hospitals, consultant and specialist services have had to be paid for by the patients. In contrast to the elaborate regional planning which has gone on in England, there has been little or no planning of hospital and specialist services. The New Zealand G.P. has thus been left with a field of responsibility and a scope of work comparable to that of the rural G.P. in England; and there is no doubt, to my mind, that the reaction of the individual doctor to responsibility is one of the chief factors determining the quality of medical care.

Hence the equilibrium between general-practitioner and specialist services is quite different in New Zealand from what it is in Britain. In specialist and also hospital development, New Zealand is relatively backward; but from the point of view of the patient it is a much better place in which to suffer the worries and troubles of ordinary illness.

Nobody knows just what the equation between G.P., specialist, and hospital services should be. Because medical knowledge and technique have advanced so far and so fast, we feel compelled to make available in quantity the higher flights of knowledge and service. In the interests of his own subject, and hence of himself, each specialist and hospital planner feels justified in pushing his own interest to the limit. In this enthusiasm one is prone to lose sight of the patients' interest. In New Zealand, though there are no health centres or any other organised clinics, general practice is highly developed, while hospital and specialist services are relatively poorly developed. Because the balance is so different from what it is in England, I feel sure that an objective study of medical care in New Zealand would provide valuable complementary evidence on what division of function best serves the patient.

I put forward the reactionary thought that the patient, as a person, is better off receiving his medical attention through the undeveloped New Zealand service than he will ever be through any highly developed service depending chiefly on hospitals and specialists.

MIDWIFERY AND FAMILY DOCTORING

Another major difference between general practice in New Zealand and Britain is that the G.P. has retained his responsibility for midwifery. In New Zealand the G.P. is the specialist in normal midwifery. For the most part he does his own antenatal care and his own deliveries, and from my observation he does both of these things conscientiously and well. There are doubtless many bad obstetricians among the G.P.s there, but I came across no really incompetent ones. I never saw a doctor tell a four months' pregnant woman to come back in a couple of months to be "antenataled," as I have seen here, and in nearly all the practices I visited or worked in the antenatal records were well kept.

What I want to emphasise, however, is not the quality of the doctors of either country as midwives, but rather the benefit to general practice, as represented by benefit to the patient and emphasis on "family," which results from the G.P. doing the midwifery.

If "family doctoring" is to mean anything, to be worth anything, and to be an attainable goal, the G.P. must be the midwife. The New Zealand general practitioners for the most part can fairly be called family doctors. They know most of the mothers intimately and they get to know them principally through their attentions during pregnancy; they are proud of the babies they deliver and they watch their development with interest. The G.P.s themselves are the pædiatricians, and it would be very difficult to justify the development of pædiatrics as a specialty, as it is becoming in England and has already become in the United States. All this favours the patient even if it does not favour the future of potential and would-be specialists, and it also favours the national purse.

DIAGNOSIS, SURGERY, AND CHILDREN

The G.P. in New Zealand has open access to the diagnostic facilities of the hospital, both laboratory and radiological. In the bigger cities he is excluded from the larger hospitals as he is here. and accordingly the pattern is the same in that the standards of general care rise as one moves away from the large urban centres; but the differences between the various types of practice in New Zealand are less than in Britain. The urban G.P., never getting inside a hospital, can still do a very high level of diagnostic work. He can have his X-ray and laboratory tests done without referring his patient to an outpatient department or a consultant, and, if he is so minded, he can do a thorough job of investigation before making a referral. On the whole the New Zealand general practitioner screens his patients much more thoroughly than his counterpart in England. and those he sends to hospitals and consultants are much better selected.

Despite the better opportunity to do good work, and the wider range of work undertaken by the general practitioner, the problem of excessive surgery by the G.P. exists in New Zealand as here; and, if the reformers have their way, the patterns of medical care in New Zealand could well follow the English trends. The New Zealand situation should be studied before this happens.

Local-authority services in New Zealand are seldom developed to anything like the level in Britain. On the pro-rata basis, school medical services (though not run by local authorities) are comparable in the two countries, the chief difference being that in New Zealand they are probably quite redundant. because the general practitioners take an interest in, and look after, the children. It would be interesting to know how many children not previously examined by their own doctor are examined by school doctors, and how much significant disorder unknown to the family doctor is unearthed by the school service. On my reckoning and experience it would be very little (eyes may be an exception to this).

Significance of the Experiment

The real significance of the New Zealand experiment does not lie in the problems most commonly discussed —the fee-for-service system and its abuses, the over-prescribing, the under-specialisation, or the failure to develop a planned hospital programme. It lies in the rôle and conduct of the general practitioners.

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service. There are also some salaried practices on the west coast of the South Island in isolated and remote rural and mining communities. Before the war some of these practices were filled by displaced persons from Europe, most of whom have done remarkably well. It must also be pointed out that the autonomy of these salaried practitioners is absolute. They are paid a salary, given an area of country with a certain population to look after, and then left to their own devices. (They are of course given car allowances and mileage.) They are not worried by bureaucratic controls, demands for reports, or periodic inspections. This is a state of affairs usually regarded as impossible: salaried practice is assumed automatically to be synonymous with "civil service" or "bureaucracy" or call it what you will.

During my stay in New Zealand I worked in two capitation and two salaried practices and visited some others of both types. All these practices had been operating in their respective ways for at least five years. All of them, in terms of the standards I have witnessed in England, were "very good." None of the presupposed evils of either of these systems of practice were evident. The doctors did not grow lazy or slack, or develop the so-called civil-service attitude: so far from the patients and doctors trying to take advantage of each other, their relationship seemed better than I have witnessed or experienced in other types of practice. In fact, professional considerations took priority over commercial ones.

A COUNTRY PRACTICE

To illustrate some of these points I must relate an experience I had when I took over a practice in a completely Maori area in a remote and beautiful part of the North Island. The area of the practice was very large, the roads were very rough, and the population was about 2500.

I knew quite a lot about the doctor who ran the practice. Before the war he had worked in a city, and he had taken this country appointment for personal reasons in spite of the fact that he was opposed to salaried service or a national medical service of any kind. I thought that under these circumstances I would most certainly see the bad effects of salaried service.

At our first meeting he told me that I would have very little to do, and I jumped to the conclusion that here was an example of how to take it easy on a salary. It transpired that he had announced my coming and had stated that I would be available for all emergencies, for all maternity work, and for three hours a week for general consultation, and, as he put it, "for the curious to come and take a look."

He explained to me that he made these arrangements for all locums, however good or bad, and went on to explain that the majority of *his* patients were *his* dependants and that he did not want me or anybody else disturbing this relationship unnecessarily. This was certainly a change from the usual embarrassed intimation, from doctors (even the most conscientious) operating on a fee-for-service basis, that they usually saw about so many patients a day and please to try to maintain approximately the same figure. In some degree the healthy attitude taken by this doctor was reflected in all the capitation or salaried practices I worked in or visited.

To complete the account I must relate that this doctor was doing a most thorough job with about half the demand on his time usual in a practice looking after this number of patients. He had a very well-equipped surgery and well-kept records, and was doing some independent epidemiological investigation.

I am not trying to claim that in New Zealand salaried or capitation practice has made bad doctors good, or lazy doctors energetic; but I do want to point out that I found no evidence of the converse and no evidence that these ways of remuneration spoil the doctor-patient relationship.

In the most isolated practices I visited in New Zealand I found none so bad, professionally, as those I saw in similar situations in Scotland.

Differences

Considering New Zealand practice in broad terms and within the framework used to consider practices in England, we can examine the differences.

For the most part the average surgery, urban or rural, is better functionally, and, except for the "good" practices I have seen here, it is much better equipped. I have described one rather extraordinary practice, but there are many where the surgery is planned to meet properly the requirements of a doctor's workshop. The traditional pattern of two rooms—one in which the patient waits and one in which everything else is done—is as much the exception as the rule in New Zealand.

The ordinary surgeries are nothing elaborate or special; they may consist of no more than three rooms instead of the usual two, but from a functional and organisational standpoint this makes a great difference to the doctor and so to the patient. Many doctors have some sort of clerical or nursing assistance at their surgery, and this reflects rather their recognition of the need for this assistance than any undue opulence on their part.

However, the really important differences lie not in organisation or mechanism but in the scope of the G.P.'s work, his degree of responsibility for medical care, and his relationship with hospital and specialist services.

I mentioned previously how some British doctors fear "patient blackmail"—i.e., loss of patients if all their demands are not met. This fear was apparently not shared by the New Zealand doctors, though some confessed that in the early days of the service they used to worry along the same lines. They seem to have learnt, in the few years of "free" service, that their patients respect and accept honest discipline and respond to personal education.

SCOPE AND RESPONSIBILITY

In a way, the New Zealand scheme is the antithesis of the British. In New Zealand the primary responsibility for medical care rests with the G.P.—not because of any deliberate plan but merely because G.P. services have been "free," whereas, outside the hospitals, consultant and specialist services have had to be paid for by the patients. In contrast to the elaborate regional planning which has gone on in England, there has been little or no planning of hospital and specialist services. The New Zealand G.P. has thus been left with a field of responsibility and a scope of work comparable to that of the rural G.P. in England; and there is no doubt, to my mind, that the reaction of the individual doctor to responsibility is one of the chief factors determining the quality of medical care.

Hence, the equilibrium between general-practitioner and specialist services is quite different in New Zealand from what it is in Britain. In specialist and also hospital development, New Zealand is relatively backward; but from the point of view of the patient it is a much better place in which to suffer the worries and troubles of ordinary illness.

Nobody knows just what the equation between G.P., specialist, and hospital services should be. Because medical knowledge and technique have advanced so far and so fast, we feel compelled to make available in quantity the higher flights of knowledge and service. In the interests of his own subject, and hence of himself, each specialist and hospital planner feels justified in pushing his own interest to the limit. In this enthusiasm one is prone to lose sight of the patients' interest. In New Zealand, though there are no health centres or any other organised clinics, general practice is highly developed, while hospital and specialist services are relatively poorly developed. Because the balance is so different from what it is in England, I feel sure that an objective study of medical care in New Zealand would provide valuable complementary evidence on what division of function best serves the patient.

I put forward the reactionary thought that the patient, as a person, is better off receiving his medical attention through the undeveloped New Zealand service than he will ever be through any highly developed service depending chiefly on hospitals and specialists.

MIDWIFERY AND FAMILY DOCTORING

Another major difference between general practice in New Zealand and Britain is that the G.P. has retained his responsibility for midwifery. In New Zealand the G.P. is the specialist in normal midwifery. For the most part he does his own antenatal care and his own deliveries, and from my observation he does both of these things conscientiously and well. There are doubtless many bad obstetricians among the G.P.s there, but I came across no really incompetent ones. I never saw a doctor tell a four months' pregnant woman to come back in a couple of months to be "antenataled," as I have seen here, and in nearly all the practices I visited or worked in the antenatal records were well kept.

What I want to emphasise, however, is not the quality of the doctors of either country as midwives, but rather the benefit to general practice, as represented by benefit to the patient and emphasis on "family," which results from the G.P. doing the midwifery.

If "family doctoring" is to mean anything, to be worth anything, and to be an attainable goal, the G.P. must be the midwife. The New Zealand general practitioners for the most part can fairly be called family doctors. They know most of the mothers intimately and they get to know them principally through their attentions during pregnancy; they are proud of the babies they deliver and they watch their development with interest. The G.P.s themselves are the pædiatricians, and it would be very difficult to justify the development of pædiatrics as a specialty, as it is becoming in England and has already become in the United States. All this favours the patient even if it does not favour the future of potential and would-be specialists, and it also favours the national purse.

DIAGNOSIS, SURGERY, AND CHILDREN

The G.P. in New Zealand has open access to the diagnostic facilities of the hospital, both laboratory and radiological. In the bigger cities he is excluded from the larger hospitals as he is here, and accordingly the pattern is the same in that the standards of general care rise as one moves away from the large urban centres; but the differences between the various types of practice in New Zealand are less than in Britain. The urban G.P., never getting inside a hospital, can still do a very high level of diagnostic work. He can have his X-ray and laboratory tests done without referring his patient to an outpatient department or a consultant, and, if he is so minded, he can do a thorough job of investigation before making a referral. On the whole the New Zealand general practitioner screens his patients much more thoroughly than his counterpart in England, and those he sends to hospitals and consultants are much better selected.

Despite the better opportunity to do good work, and the wider range of work undertaken by the general practitioner, the problem of excessive surgery by the G.P. exists in New Zealand as here; and, if the reformers have their way, the patterns of medical care in New Zealand could well follow the English trends. The New Zealand situation should be studied before this happens.

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Special Articles

INCIDENCE OF TUBERCULOSIS IN NURSES IN A DUBLIN HOSPITAL AND THE STEPS TAKEN TO REDUCE THIS

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DURING the last twenty years a great and increasing interest has been taken in the incidence of tuberculosis in nurses and the methods to be used in an endeavour to reduce this. It is now clearly recognised that nurses, even in general hospitals where tuberculosis is rigidly excluded, run a far greater risk of developing this disease than do comparable members of the general population.

SOME COMPARISONS

It is surprising how different are the figures given by different authors for the incidence of tuberculosis in nurses (table I).

One reason for this difference is that some authors only include cases of tuberculosis which occur during the training period, whereas others follow up their nurses for years after they have completed their training. Heimbeck does this and includes in his numbers one nurse who developed phthisis 18 years after starting her training. I have done the same and include one nurse who developed tuberculosis 9 years after starting. Another reason for the difference in the incidence of the disease is that some surveys were started earlier than others and so show rather higher figures, since there has been a slow but steady decline in the incidence of tuberculosis in almost every country of the world during the last 50 years. A third reason is that some races are more prone to develop tuberculosis than others. This is well brought out in the Prophit survey (table II).

TABLE I—INCIDENCE OF TUBERCULOSIS IN NURSES

Country	Author	Nurses studied	Cases of tuber-culosis	Inci-dence %
U.S.A. ..	Ross (1930)	800	48	6·0
,, ..	Shipman and Davis (1933)	143	9	6·3
,, ..	Geer (1934)	934	42	4·5
,, ..	Ulmar et al. (1936) ..	1000	21	2·1
,, ..	Amberson (1941)	885	61	6·9
,, ..	Badger and Ritvo (1941)	510	21	4·1
,, ..	Brahdy (1941)	2230	40	1·8
,, ..	Dufault (1941)	174	16	9·2
,, ..	Israel et al. (1941)	637	68	10·7
,, ..	Hahn et al. (1941)	269	1	0·4
Canada ..	Bow (1937)	2281	29	1·3
,, ..	Wright (1941)	144	10	6·9
Norway ..	Heimbeck (1936)	1037	77	7·4
Sweden ..	[illegible] 1938)	434	23	5·3
Denmark ..	..	1108	33	3·0
France ..	..	280	7	2·5
New Zealand	..	152	12	7·9
England ..	..	5091	118	2·3
Ireland ..	Present survey (1949) ..	501	13	8·6

References taken from Prophit survey.

TABLE II—INCIDENCE OF TUBERCULOSIS IN DIFFERENT GROUPS

Group	No. examined	Cases of tuberculosis	Incidence %
Prophit Survey, 1931–43			
Group A hospitals ..	1241	24	1·9
,, B ,, ..	2692	47	1·8
Irish and Welsh nurses	937	41	4·4
Adelaide Hospital, Dublin, 1920–47			
Irish nurses	501	43	8·6

Group B hospitals had no tuberculosis wards and did not accept chronic or advanced cases, while Group A hospitals took in all classes of patients, including advanced cases of phthisis. The Irish and Welsh nurses worked in both groups of hospitals but their figures were separated from those of the English and Scottish nurses who worked in these hospitals and were given separately. The table shows clearly that the Irish and Welsh are more susceptible to tuberculosis than are the English. Similarly in America, and even more decidedly, the negro is more susceptible than the white.

MEASURES ADOPTED

Even allowing for increased susceptibility in our nurses the figure of 8·6% at the Adelaide Hospital is very high and is worth considering further. In 1920 no specific precautions were taken to prevent infection of nurses with tuberculosis. As the years went by it was realised that general measures were insufficient; and in 1932 it was decided to X ray all nurses before accepting them for training. In 1938, patients with open phthisis were excluded from the general wards and transferred to isolation wards. This does not mean that there is no danger of infection in the general wards, for unrecognised cases of phthisis are admitted from time to time into surgical or medical wards. Some of these are recognised later but not all. Cases of surgical tuberculosis with discharging wounds are also a source of danger. In 1939 we decided to do a tuberculin-test (Mantoux) on all probationers, to repeat it on negative reactors every 6 months, and to take further X-ray films of the lungs of those whose tuberculin-reaction changed from negative to positive. In 1948 we decided to X ray all nurses in the hospital every 6 months and to inoculate with B.C.G. all probationers who were Mantoux-negative on entry. In table III our nurses are grouped according to three time-periods; and I have put in some figures relating to medical students of the hospital for comparison. This table reflects, I think, the downward trend of the incidence of tuberculosis which has been observed in Ireland.

TABLE III—TUBERCULOSIS IN NURSING STAFF AND MEDICAL STUDENTS AT THE ADELAIDE HOSPITAL

Period	Total	Cases of tuberculosis	Died
Nurses			
1920–38	312	29 (*9·0%*)	4 (*1·25%*)
1939–47	189	13 (*6·87%*)	1 (*0·5%*)
1948–49	47	1	0
Medical student			
1920–38	350	11 (*3·2%*)	0
1939–47	147	5 (*3·4%*)	0

TABLE IV—MANTOUX-POSITIVE AND MANTOUX-NEGATIVE ENTRANTS COMPARED

Entrants	Total	Tuberculosis	Died
Nurses (1939–49)			
M –	93	6 (*6·4%*)	0
M + ...	143	8 (*5·6%*)	1
Medical students (1939–47)			
M –	27	1	0
M + ...	72	4	0

It is, however, of greater interest to consider the difference, in the incidence of tuberculosis, between those nurses who are Mantoux-positive on admission, and those who are Mantoux-negative (table IV). It is worth while comparing these figures with those of the Prophit survey (table V) and of Heimbeck (table VI.)

TABLE V—ENTRANTS IN THE PROPHIT SURVEY AND THE ADELAIDE HOSPITAL COMPARED

Entrants	Total	Tuberculosis
Prophit survey (1934–43)		
M – Group A hospitals ..	229	8 (*3·5%*)
M – Group B ,, ..	491	19 (*3·9%*)
M – Irish and Welsh ..	250	21 (*8·4%*)
M + Group A hospitals ..	1012	16 (*1·6%*)
M + Group B ,, ..	2201	28 (*1·3%*)
M + Irish and Welsh ..	687	20 (*2·9%*)
Adelaide Hospital (1939–49)		
M –	94	6 (*6·4%*)
M + ...	142	8 (*5·6%*)

It will be seen that our figures of tuberculosis in Mantoux-negative nurses are comparable with those of the Irish and Welsh nurses in the Prophit survey.

In table VI our figures for Mantoux-negative nurses again compare favourably with those of Heimbeck. The incidence of tuberculosis in nurses who were Mantoux-positive on entry is distinctly higher than is found in either of these tables but statistically this is of no significance, and is explained by the small numbers of nurses in my survey.

COURSE IN THE NURSES AFFECTED

The 14 nurses who developed tuberculosis may be considered more fully. The lesions in those who were Mantoux-negative on entry are shown in table VII.

TABLE VI—NURSES AT ULLEVAL HOSPITAL (HEIMBECK 1948) COMPARED WITH THOSE AT THE ADELAIDE HOSPITAL

Group of nurses	Total	Tuberculosis	Died
Ulleval			
Nurses in training			
M – entrants	284	97 (*34 2%*)	10 (*3·5%*)
Given B.C.G.	501	35 (*7·0%*)	2 (*0·4%*)
M + entrants	668	22 (*3·3%*)	0
Trained nurses			
M – entrants but became M + ...	178	8 (*4·5%*)	2 (*1·1%*)
Given B.C.G.	377	7 (*1·9%*)	2 (*0·5%*)
M + entrants	504	13 (*2·6%*)	1 (*0·2%*)
Adelaide Hospital			
All nurses			
M – entrants	94	6 (*6·4%*)	0
M + entrants	142	8 (*5·6%*)	1 (0·7%)

Of these six, five had their primary complex about 6 months after starting training.

One nurse, who had erythema nodosum, was sent home for 3 months' rest but foolishly took a job as companion and developed a pleural effusion forthwith. Two others developed effusions 6–8 months later but recovered and were fit for work within a year. Another two developed a slight infiltration into one lung after a longer interval, had 12 and 15 months' rest, and then returned to complete their training; all 5 have remained well since.

Nurse 6 had a cough fairly continuously from the start of her training but remained Mantoux-negative and radiologically normal for $2^1/_2$ years. She then became Mantoux-positive with an attack called "flu" and developed phthisis 6 months later. She was in Forster Green Sanatorium and had an artificial pneumothorax (A.P.) induced. She is still getting refills and is very well and married. It is now almost 9 years since she started her training.

TABLE VII—NURSES MANTOUX-NEGATIVE ON ENTRY

Nurse	Signs at time of primary complex	Months from start of training	Tuberculous infection	Months from start of training
1	Erythema nodosum	5	Effusion	5
2	Dry pleurisy ..	6	,,	14
3	Nothing	3–12	,,	16
4	"Flu"	7	Phthisis	31
5	Nothing	1–9	,,	41
6	"Flu"	30	,,	36

Of the eight Mantoux-positive nurses (table VIII) two developed phthisis after they had completed their training and had left the hospital.

Nurse 9 had nearly completed her training when she developed a cavity in one lung; an A.P. was induced and she went to Forster Green Sanatorium. There she did well and was discharged, keeping up her A.P. She then developed an empyema with a mixed infection and subsequently died.

Nurse 10 had a minimal infiltration which appeared after 14 months; she was away for 6 months and apparently got completely well; when she had almost finished her training she developed a tuberculous kidney and had a nephrectomy, but is now well.

Nurse 11 had a doubtful infection previously and should never have been accepted for training; after 9 months she had a recurrence but was so well 19 months later that we allowed her to start work in our convalescent home; she broke down again a year later and was in Forster Green Sanatorium.

TABLE VIII—NURSES MANTOUX-POSITIVE ON ENTRY

Nurse	Tuberculous infection	Mos. from start of training	Later history
7	Phthisis	72	Married
8	,,	57	Off work 12 mos.
9	,,	42	Sanatorium; A.P.; married; empyema; died
10	,,	14	Off work 6 mos.; completed training; tb. kidney, 48 mos. after start
11	,,	9	Doubtful earlier infection when at school; off work 19 mos.; recurrence 12 mos. later
12	Effusion	35	On sick leave
13	,,	5	Erythema nodosum 1 month after entry
14	Miliary	2	Streptomycin; sanatorium; to take up nursing again after 20 mos.

Nurse 12 was Mantoux-positive to 1/100 on entry. Almost three years later she had a feverish attack with severe headache and pleuritic pain in her chest; an X-ray examination showed slight effusions at her left base and right superior fissure, which cleared up in a few days. During this illness her Mantoux test became positive 1/10,000, and I believe that her pleurisy was tuberculous.

Nurse 13 was a very puzzling case. She was Mantoux-positive to 1/10,000 on arrival and one month later developed erythema nodosum. She had no evidence of streptococcal or other infection which could account for the erythema nodosum, and I believe that she was undergoing her primary infection at the time of starting. She developed a pleural effusion 4 months later.

TABLE IX—MANTOUX REACTIONS IN NURSES AND STUDENTS FROM DIFFERENT BACKGROUNDS

Subjects and their origins	Total	M +	M –
Adelaide Hospital		%	%
Nurses, Ireland	236	60·2	39·8
Medical students, Ireland	99	72·7	27·3
Prophit survey			
Nurses, England, Rural	310	80·0	20·0
Nurses, England, Urban	3025	82·0	18·0
Nurses, Wales, Rural	118	65·3	34·7
Nurses, Wales, Urban	176	80·7	19·3
Nurses, Ireland, Rural	330	65·2	34·8
Nurses, Ireland, Urban	215	81·4	18 6
Medical students, England, Rural	104	85·6	14·4
Medical students, England, Urban	1260	85·6	14·4

Nurse 14 was also very puzzling. She was not looking well 2 months after starting training although she felt perfectly well and was full of energy; a routine X-ray examination suggested a miliary infection of the upper parts of both lungs. She had no temperature at any time and after the first few days looked and felt perfectly well. She was treated with streptomycin and transferred to a sanatorium in Wales; she remained extremely well and her lungs cleared completely. She is coming back to us to complete her training.

From 1939 to 1949, 236 nurses have started training in the Adelaide Hospital and of these 142 were Mantoux-positive on entry and 94 Mantoux-negative. It is of interest to compare these figures with those of some of our medical students and of the Prophit survey (table IX).

I have not been able to divide our nurses into those who come from rural and urban districts, but the majority are rural in origin. If our figure for Mantoux-negative nurses is compared with that of the Prophit survey for Irish nurses, combining rural and urban nurses into one group, there is a significant difference—39·8% in this series as against 27·0% in the Prophit survey—for which I can offer no explanation.

TABLE X—TUBERCULIN REACTIONS ON JOINING THE ADELAIDE HOSPITAL AND SUBSEQUENTLY

Reaction as entrants and later	Nurses	Medical students
M + ...	142	72
M − became positive during training ..	50	15
M − no conversion ; training uncompleted ..	21	8
M −, and at end of training	1	4
M −, and given B.C.G...	22	..
	236	99

Of the 94 Mantoux-negative nurses 50 have become Mantoux-positive and only one nurse remained negative to the end of her 4 years' training period ; 21 are still in training or have left hospital before they were qualified, and 22 had B.C.G. (table X).

It is generally agreed that the first year after the conversion of the Mantoux-test from negative to positive is the period in which there is greatest likelihood of developing tuberculosis. We have tried to send our nurses home for 3–6 months' rest as soon as they develop their primary complex. In practice however many of our nurses have gone through this stage without any disturbance to their health whatsoever, and conversion has only been recognised by a subsequent routine Mantoux test (table XI).

TABLE XI—SYMPTOMS OF PRIMARY COMPLEX IN NURSES AND MEDICAL STUDENTS AT THE ADELAIDE HOSPITAL

Symptoms	Nurses	Medical students
Erythema nodosum	9	0
Feverish attack, " flu "	9	3
Pleurisy—dry	3	0
,, —with effusion	0	1
Phlyctenular conjunctivitis ..	1	0
No symptoms	28	11
Other symptoms	0	0
	50	15

It is of interest that we have had three cases of erythema nodosum amongst our nurses who were Mantoux-positive on entry. One whom I have already mentioned had this condition 1 month after arrival and developed a pleural effusion 4 months later. The other two had it 23 and 38 months after starting training and both had concomitant sore throats.

ROUTINE USE OF B.C.G.

Before candidates are called up we ask permission from their parent or guardian to give them B.C.G. if they are Mantoux-negative, and in no case has this been refused. Since the beginning of 1948 we have given the vaccine to all who were Mantoux-negative *on arrival*, and we have to thank Dr. Dorothy Price and her associates for enabling us to do this. They are Mantoux-tested as soon as they arrive in the hospital and if negative to 1/100, are given B.C.G. *immediately*. This takes a week, and since our nurses are in the preliminary training school and not on the wards for 8 weeks, they have 7 weeks after the inoculation before coming into contact with any case of tuberculosis. Six weeks after the inoculation we retest each nurse with a strength 1/100 and about half of them are then positive. By the end of 3 months most of the nurses have positive Mantoux reactions, but one nurse is still negative at the end of 1 year. *Results have been as follows :*

Inoculated with B.C.G.	22
Left hospital within 6 weeks	1
Conversion in 6 weeks	10
Conversion between 6 weeks and 3 months	6
Conversion in 3–6 months	3
Mantoux-negative after 1 year	1
Mantoux-negative after 3 months	1

The last nurse has only been in hospital for 3 months and I hope will be found to be positive at her next Mantoux test. The nurse who is still negative is an example of the cases where B.C.G. is given but fails to produce any primary complex. One of our medical students had a similar failure and had a second inoculation with B.C.G. but again there was no conversion of the Mantoux reaction.

We have tried for some time to keep Mantoux-negative nurses out of the wards where there are tuberculous cases, but this is very difficult to manage in a small hospital where patients are sometimes found to be suffering from phthisis as well as the condition for which they were admitted. The use of B.C.G. and the conversion of almost all Mantoux-negative nurses to positive overcomes this serious difficulty. Actually it is probably an advantage for nurses to have some contact with tuberculosis after they have had B.C.G. and become Mantoux-positive, since the encounter reinforces the degree of immunity produced by B.C.G. Half of these nurses have become Mantoux-positive to a dilution of 1/1000 tuberculin some months after they were positive to 1/100 only ; and this, I believe, is due to repeated absorption of small numbers of tubercle bacilli by all nurses working in hospitals, and indeed by most members of the general population. Occasionally nurses and others receive a larger dose of organisms, and, if Mantoux-negative, may easily develop symptoms.

One of our nurses on retesting 6 weeks after receiving B.C.G. gave a rather doubtful reaction to a strength of 1/100 Ten months after the inoculation she was very strongly positive to 1/1000, her area of infiltration being over 3 in. in diameter and her whole forearm swollen from elbow to wrist. At the same time her three B.C.G. nodules swelled up and became red. She felt ill and had to be kept in bed for a week and then given a period of sick leave.

It is far too soon to try and draw any conclusions about reduction in the incidence of tuberculosis among our nurses through the use of B.C.G. and the various other methods I have mentioned. But we feel that it is of the greatest importance and a matter of urgency to do everything within our power to lessen the danger of this infection to our nursing staff.

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"... Ninety-eight more millions are required for the Health Scheme, and one more youth is to be hanged for murder. ... Both suggest that the health, moral and physical, of this nation is not what it should be. ... In both cases the trouble may be due to too much cure and not enough prevention ; *hanging and flogging*, pricking and drugging—instead of enlightenment. It would be cheap for this country to spend fifty million a year in films to teach the people how not to need the doctor, and how not to put so much hope in the medicine bottle and the prick, by spreading better notions about cleanliness, the constitution and working of the human body, diet, and the rearing of children. It would be not only cheap but charitable as well to spend another fifty million to prevent youths from being flooded with crime images in cinema halls by giving them better films."—S. de MADARIAGA, *Manchester Guardian*, March 17, p. 6.

SOME CAUSES OF THE CARNAGE ON THE ROADS*

FROM A CORRESPONDENT

MANY remedies have been advocated for the carnage on the roads, but comparatively little has been written on the more basal question of ætiology. It is customary to blame the car-driver and to demand a more stringent driving test or heavier penalties against sinners. As doctors, we should look more closely at other removable causes such as bad lighting, lack of road signs, and the many hazards of the highway. Let us take two examples:

Lighting.—A man is driving his car westward from Shepherd's Bush to High Wycombe. From Westway until he reaches Horn Lane he glides along a safe well-lighted double track. At that spot, *without warning*, he is suddenly plunged into semi-darkness on a dangerous winding single track until he reaches Park Royal. The lighting then improves, but the single track threatens him as far as Greenford. This piece of highway treachery is unfair to the driver and dangerous to the public.

Road Signs.—Again, the driver who has only a bowing acquaintance with the main roads leading out of London gets little help from the authorities. From time to time he may be told the destination of roads that slink away to the right or left, but he is never by any chance given the name of the street along which he is actually travelling. Now and again, at great risk to himself and other road users, he must squint up at some building in the hope of deciphering a street name. In cities like New York the authorities tell him at every cross-roads (*a*) the name of the street on which he is driving and (*b*) the name (or number) of the cross street. He is thus able to keep his eye on the road and drive safely.

THE DRIVING TEST

We ought also to call for an impartial examination of the driving test itself. There is a deplorable lack of statistical information on the examiners' findings, though we are told that the rate of failures under test conditions is about 36%. The regulations were introduced in a praiseworthy attempt to improve standards of driving, and to increase the margin of safety on the roads. Are they achieving their object? Is the system helpful to applicants as an education, or is it merely becoming a tyranny of tricks and rules? In the car-driving test as it stands today the victim suffers many disadvantages. (1) He is seen by only one examiner, for a very short period, perhaps in a strange town. (2) He is probably nervous and ill at ease, and therefore liable to errors that he would not normally commit. (3) He has not previously had an opportunity of driving alone, and so lacks the confidence of personal experience. (4) If he fails he must either not drive at all or return to the leading-strings for a whole month—or risk a fine of 10*s.* and a month's imprisonment. And lastly (5), the examiner knows nothing about the candidate's background or training.

No doubt the Ministry of Transport has conducted operational research into these matters, and it would be useful to know something of the results. The following points would be instructive:

1. The proportion of applicants passed at each attempt, area by area.
2. A comparison of the results over several years.
3. An analysis of the results of first and subsequent tests with reference to the candidate's age, sex, and possibly occupation.
4. The main reasons for failure put forward by examiners.
5. The pass-rate at different times of the day and on different days of the week.
6. The difference, if any, between wet days and fine days.
7. The results of presenting the same candidate to various examiners.
8. A psychological study of the success or failure of applicants, in relation to simple personality features.

Psychology of the Driver

An investigation of the candidate's personality might be particularly interesting. Thus, broadly, one would expect the extrovert to make a good showing at his first test. He concerns himself primarily with objects, facts, and persons in his immediate environment, and he tends to be practical in affairs. On the other hand, he soon ignores the lessons learnt, because he is essentially opportunist. He shows no great concern for others. The introvert is more concerned with his own impulses than with direct response to varying outward sensations. He shows up badly, as a rule, in "snap" tests, but his discrimination and judgment are sounder than these would suggest.

A psychological study would be misleading without an exploration of the broad no-man's-land between normality and the neuroses. The obsessional may do splendidly in an examination, if he concentrates for the time being on the object of his desire; but in the long run he will be unreliable as a driver. The anxious type, on the contrary, almost invariably does badly under test conditions but is more likely to be conscientious and considerate on the road. Unfortunately the anxiety tends to be progressively exaggerated by repeated examinations, and the unhappy victim is deprived by the regulations of his one chance of success—an opportunity to gain confidence through practice by himself.

The Tenderfoot

A further question we should ask is simply this: what proportion of automobile accidents are associated with recently tested motor-car drivers? The figures might be further broken down and analysed.

LIGHT-FLASHERS

It is curious that apparently no-one has referred to the new nightmare of discourtesy—light flashing at cross-roads in the city. The other day we had to attend medically to a woman who had collided with a lamp-standard on the pavement. She had been temporarily blinded by a selfish driver who persisted in flashing his headlights on and off to save himself the trouble of slowing down. This cruel and dangerous malpractice is on the increase, and should be forbidden.

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[*] See Dr. C. A. Learoyd's article of Feb. 25 (p. 367).

Public Health

Mortality in Northern Ireland

IN Northern Ireland during 1949 the infant mortality (45 per 1000 live births), the maternal mortality (1·27 per 1000 live births), and the death-rate from tuberculosis (59 per 100,000) were the lowest ever recorded. The birth-rate, at 21·4 per 1000 population, showed a small decrease but was still above the average recorded for the ten years before the war. Last year 24 persons died of cancer for every 10 who died of tuberculosis; but there has been no increase in deaths from cancer in the past seven years.

Q Fever in Germany

The Office of the Surgeon-General, U.S. Army, has reported that 90 civilian cases of Q fever have occurred at Zusenhausen (population 1500), near Heidelberg. Most cases have been mild, although 1 death has been reported. The diagnosis has been confirmed by the Fourth Medical Laboratory, Heidelberg.

The source of the epidemic has not yet been ascertained by the German health agencies. Presumably Zusenhausen represents a new area in Germany for this disease.

In England Now

A Running Commentary by Peripatetic Correspondents

As a surgeon I'm finding life very hard these days, not because of the growing amount of work but because almost every day I have to operate on somebody who only a year or two ago would have been labelled inoperable and left to die in peace—cases of carcinoma of the pancreas or stomach, of bleeding peptic ulcer, and so on. Most of them are referred from other hospitals or departments. What with transfusions and penicillin quite a few do recover; but of course some still die. Nowadays we are expected to cure them all; and when one dies it's a severe blow to my reputation and to the department which referred him to me—this patient whom no-one would have dreamt of operating on a couple of years ago. The patients who do well just disappear and are more or less forgotten; but those who die are remembered, and whenever there is a death in my wards it takes me a couple of days to recover—to get back into full mental working order. I am in a state of constant anxiety; and I can see no end to it. I can't blame anyone but myself and my vanity in concentrating on the apparently hopeless cases. I wish now that I had specialised in pilonidal cysts or hammer toes.

* * *

At Olympia the Ideal Home Exhibition, which is open until April 1, offers something for almost every domestic taste. The furniture on view ranges from genuine and imitation antique to the most modern, which now includes a set of panels and fittings that can be joined up into different articles of furniture. There is a French exhibit showing a room prepared for a banquet—a rather too stimulating sight. There are many fascinating fireplaces, most with real fires burning. The mass of electrical household items is incredible; there seems to be nothing that cannot be done by electricity except setting the table and making the bed. The cooking stalls are reminiscent of displays of magic, now that pressure-cookers have reduced the time of cooking from hours to minutes and seconds. The W.V.S. have forceful lessons to teach about the safety of children in the home. Mr. Cube is there, complete with a model West Indian plantation. Cocoa is represented, and New Zealand has sent over a typical house. In the eighteen gardens spring flowers abound, flowering shrubs are everywhere blossoming, and the bulbs are magnificent; and how delicious it is to smell carnations and roses in March. With its demonstration of apprentices learning carpentry and other home-like occupations, even the Army does not disturb the idyllic atmosphere.

* * *

When I rang up one of the London teaching hospitals the other afternoon—it was a trivial errand, just to ask a friend of mine on the house to play golf at the week-end—I reflected that the reputation of a hospital mainly depends not on the senior surgeon or even the secretary of the management committee, but on the girl who answers the telephone.

After a minute or two's ringing a voice snapped "Golgotha Hospital." "I'm so terribly sorry to trouble you," I said in my most deprecating manner; "I wondered if I might speak to Mr. Forcep?" But the voice had vanished as unaccountably as Ariel's music. In a couple of minutes she returned and cut short my abashed request by barking, "You want surgery." I was wondering if she had discerned my deviated septum over the wire when a rough male voice announced, "Surgery 'ere. Wotcherwant?" "Could I please speak to Mr. Forcep?" "Oozat?" "Mr. Forcep." "Nevereardofim. Is 'e a stoodent 'ere?" I established the bona fides of my friend and was told to 'oldon. There followed the depressing sound of the receiver being abandoned on the desk, which I recognised as the death-rattle of constructive inquiry. When three or four silent minutes had passed I reached for THE LANCET and began reading the leader pages. I was well into the annotations when a fresh superior young male voice sounded in my ear. "Do you want the stools straight away?" he asked. "I'd better send them now. They'll be no use to you if they're not warm." I told the unknown I didn't want his stools. "Aren't you the path. lab.?" he demanded crossly. I explained I wasn't. "Oh damn!" he said. I had started on the original articles and was suffering severe ischæmic pain in my right arm when a sweet female voice told me abruptly, "Your wife is as well as can be expected and you may visit her tomorrow between the hours of two and four." "Thank you," I said humbly, being by now grateful for any attention, however irrelevant. Five minutes later the rough voice snarled, "'Is board's marked 'Out.' Bin marked 'Out' fer weeks," and he crashed down the receiver. Luckily it was only Wednesday, so I sent a post-card.

Hospital telephone girls have a lot to put up with, of course, what with irate surgeons and bare inquiries like "How's our Ada to-night?" But they could profitably study standing orders for telephonists at, say, a West End shop. It's as nice to hear a pleasant voice say immediately, "Selfishes, good morning," as it is to get an unexpected smile from a pretty girl on the bus. Why, even if you ring PAD 7000 a delightful young soprano exclaims "Paddington Station, may I help you?" Try it and see. But my favourite call is to a ladies' hairdressers round the corner which I discovered one day with a lucky wrong number. I'll spend tuppence any time just to hear that delicious voice say eagerly, sweetly, but with the inflection that infers she means business: "Madame Pompadour, at your service."

* * *

Shame on my friend of March 11 that he should write of Hornibrook's system of abdominal exercises in a spirit of ribaldry. He has only himself to blame if his abdomen is not less protuberant than before. A protuberant belly cannot be made to shrink, any more than Rome could be built, in a day. These exercises are unusual, grotesque, even suggestive; but their potency as a remedy for simple constipation or a corpulent abdomen (not generalised obesity) cannot be denied.

When I was a surgical dresser, my chief found in one of his beds a woman admitted for—among other things—surgical treatment for constipation. This surgeon seemed not to like the idea of such an operation and agreed with alacrity that we should try the effect of Hornibrook's exercises. The woman left the hospital ten days later having daily spontaneous bowel movements. She wrote to me for years afterwards that this happy state of affairs still obtained and that she still followed the ritual. She was the most grateful patient I have known. I recall a man with a corpulent abdomen who practised the exercises for a few minutes daily and after three weeks could insert his hand sideways between his abdominal wall and his formerly well-fitting trousers.

Most people get the result they want but in the end give up the exercises, preferring to spend the few minutes in bed and put up with their symptom. Those faithful ones who persevere do not "have nightmares featuring a fiend answering to the name Hornibrook."

* * *

The family were discussing that poor lad who could not stop sneezing. (By the way, what happened to him in the end? I hope, since we did not see anything more in the papers, we can assume that the general press rule holds: Bad news is news; good news is not.) Well, the children wanted to know what other things could go on more or less for ever. Hiccups was obviously the first, and then squinting and nose-bleeding. It is our custom to discuss all non-drawing-room subjects frankly but politely. Thus, the passage of flatus is known as "bottom-talking." We had previously been into the possibility of articulation per anum. So of course we were asked whether people are ever unable to stop their bottom talking. "But," said Jeremy, "how on earth would they write about it in the newspapers?" "Luckily," I replied, "there is one weekly newspaper which has a special column for such strange matters, called *In England Now.*" The children thought this over for some time. Then one of them asked, "What will they do if the first person whose bottom won't stop talking is a Frenchman?" "Let us," I suggested, "adopt the maxim of Mr. Asquith, and wait and see."

Letters to the Editor

VAGOTOMY FOR ULCERATIVE COLITIS

SIR,—Your annotation of Jan. 14 raises the question of the therapeutic effectiveness of vagotomy in ulcerative colitis. This is open to much debate and discussion. In the first place, there is no evidence at the present time that the vagus innervates the colon. Apparently vagal fibres stop at the ileocæcal valve. The impulses from the vagus nerve must be mediated through Auerbach's and Meisnner-Billroth's plexuses in the right half of the colon up to the ascending limb of the splenic flexure. These plexuses are continuous with those in the ileum. The vagus plays only an indirect rôle in ulcerative colitis. The emotions causing this disease are primarily transmitted over the sacropelvic nerves.

What vagotomy does do is to slow down peristalsis of the small intestine; and it prevents such a high titre of unattenuated or inactivated pancreatic enzyme, particularly trypsin, reaching the unprotected mucous membrane of the left half of the colon. For that reason, therapeutic results might be obtained by vagotomy. However, one can completely paralyse the vagus nerve by atropine and accomplish the same end-result as is seen in vagotomised patients.

Furthermore, no-one knows at the present time what the section of the vagus nerve does to the gastro-intestinal tract. It is not an innocuous operation. That some individuals are no better after vagotomy for treatment of their peptic ulcer is evidence in itself that a complete vagotomy cannot be done in every patient. The fibres decussate into the œsophagus and the impulse is carried down into the myenteric plexus higher than the site of section of the nerves. I refer you to Waltman Walters's observations on this particular aspect of vagotomy in the treatment of peptic ulcer. Finally, ulcerative colitis is a disease of the parasympathetic nervous system. No-one to my knowledge has reported this manifestation occurring in Hirschsprung's disease.

One added thought regarding the innervation of the colon. If you do an ileostomy, hypermotility of the small intestine continues, but the right half of the colon is at rest. Therefore vagal fibres in themselves apparently do not innervate this portion of the bowel. If they did, you would not abolish hypermotility of the right half of the colon. There is no evidence, now, that there is a high titre of lysozyme secreted in the colon at the right half and in the ileum as the result of vagal stimulation.

With these facts in mind, I would have to state that there is no indication for vagotomy in the treatment of ulcerative colitis at this time. Maybe future clinical observations might make me change my mind.

Chicago. SIDNEY A. PORTIS.

CONTINUOUS DRIP TREATMENT OF PEPTIC ULCER

SIR,—Dr. Clark (March 11) has done a useful service by his careful evaluation of technique and theoretical considerations in the continuous drip treatment of peptic ulcer. However, his attitude to the management of this disease and the conclusions he draws ought not to remain uncriticised.

I doubt whether many will agree with him that this method is less trouble than more conventional Hurst or Sippy régimes. It is unlikely that it would often be practicable to maintain a patient's enthusiasm for this treatment for more than a few days at home, and even if this could be done it would be no substitute for the enforced rest, sedation, restriction of tobacco, and change of environment that treatment in hospital involves. It is this latter factor that is most important. The temporary removal of the social and psychogenic causes of his ulcer is surely of far greater importance than the drugs and milk preparations the patient takes.

Little can be concluded from the cases described. The figures are not well presented and the manner in which they are broken down is ambiguous. However, allowing for this, they are in no way remarkable and present no evidence that the drip method is an advance in treatment. No controls are produced to show the difference of response in another similar group treated more conventionally. Controls in this series ought to have been considered essential, for the cases are highly selected, in that all the patients are in receipt of a disability pension. Further comment on this is unnecessary, except to remark that the social and psychogenic factors in the production and maintenance of these patients' ulcers do not seem to have been considered.

The follow-up, which falls within the natural periodicity of the disease, does not show any improvement on the more conventional methods of treatment. The assessment of healing by radiological and clinical methods may well have missed several cases of ulcer which could have been demonstrated gastroscopically as being still active.

These criticisms are made chiefly to underline the extraordinary degree of empiricism which has ruled the management of peptic ulcer since the days this disease became a major social and industrial problem. From the great mass of writing and knowledge obtained concerning this disease, it is surely time the most rational and effective approach to this problem was abstracted.

Our empiricism, our varying standards of treatment, and our different opinions concerning ætiology and prevention, do not offer an effective challenge to this social menace. It is true to say that this argument applies to most diseases we attempt to treat, but a great advance would be made if the medical profession could be presented with authoritative and proven guidance on this particular problem.

Chelmsford. C. A. HOULDER.

A SUBJECTIVE VIEW OF ACUTE POLIOMYELITIS

SIR,—The excellent article on p. 460 of your issue of March 11 prompts me, having recently suffered a milder attack of poliomyelitis, to offer some reflections on the state of mind of the patient during the acute stage.

The standard textbooks describe the patient as "apprehensive": my own mental state was, by contrast, one of surprising indifference. Though obviously ill, I was quite unconcerned by my condition, and made no serious attempt at diagnosis! In spite of severe headache and cervical pain lasting for three days, I was not distressed and required neither sedative nor analgesic. Intense vertigo, which persisted, gradually diminishing, for several days, was the only symptom which occupied my mind at all frequently, and though the subjective sense of rotation was so gross as to defeat all my attempts to sit up, it alarmed me not at all.

This lack of insight continued, to a lesser degree, for a fortnight or more after the acute phase, and was associated with a highly exaggerated sense of well-being, and a totally unaccustomed tendency to bouts of facile laughter. This was certainly an alteration of emotional tone, and not an attempt, conscious or unconscious, at adjustment to the situation. The mental state, in fact, must have resembled that seen typically in the patient suffering from disseminated sclerosis, and did not revert completely to normal until the fifth or sixth week.

As an inexperienced student, I have had little opportunity of observing (adult) patients during the acute stage of poliomyelitis; but conversation with, and inquiry among, convalescent patients and others who have recovered lead me to wonder whether (particularly by comparison with the mood of patients in the general wards) the "couldn't care less" attitude and the subsequent euphoria might not be found to be almost as common as the classical apprehensive state. Even allowing for some toxic confusion, the comparative unconcern in retrospect not infrequently shown even by the severely paralysed patient in acute poliomyelitis is quite astonishing, and, I would add, extremely fortunate. Surely there cannot be so many stoics among us ?

L. W.

HOME HELPS FOR THE TUBERCULOUS

SIR,—I should like to draw attention to the following case. Application was made, in London, for a home help for a patient awaiting admission to hospital. This patient, though tuberculous, is not suffering from active tuberculosis, but from a complication resulting from a failed extrapleural *pneumothorax*. No help was forthcoming for a week—and then a very limited amount—although there was no-one to look after the invalid except another tuberculous person in full-time employment. When asked why help could not be supplied, the authority concerned explained that, out of 38 home helps, only 2 would attend the tuberculous, the rest being afraid of contracting this disease. A form had been issued to these workers which stated "I have been informed that there is a tuberculous patient at . . ." Probably such a form is used to safeguard the council against claims for compensation. I appreciate that it would not be possible to determine whether a worker had been infected through acting as a home help or through some everyday contact ; but is not the solution to recognise the possible risk, and pay danger money to those willing to work for all patients suffering from some infectious or contagious disease, and to include them in the categories covered by the Industrial Injuries Act ? Owing to the great shortage of hospital beds tuberculous patients cannot readily gain admission, but on the other hand, unless they are very fortunate, they cannot have the services of a home help.

London, S.W.6. E. D. ANDREWS.

*** We comment on Miss Andrews's letter in an *annotation* this week.—ED.L.

POTASSIUM DEFICIENCY IN *p*-AMINOSALICYLIC ACID THERAPY

SIR,—In bringing to light the question of serum-potassium levels in P.A.S. therapy, Dr. Cayley (March 11) has done a service to those working on the chemotherapy of tuberculosis ; but I wonder whether the title of his paper should not have been "Potassium Deficiency in Prolonged Sodium Salt Administration," rather than imply that a depression of the blood-potassium level is associated with the *p*-aminosalicylic radicle.

In this connection it would be interesting to hear whether, in fact, it was the sodium salt of *p*-aminosalicylic acid that was used on the three cases which he cites. As you know, Sir, it is sodium P.A.S. which is predominantly used in this country in the treatment of pulmonary tuberculosis, and—whereas free acid granules and other salts are available—it is not unreasonable to suppose that the administration of a sodium salt over periods of ten weeks, five weeks, and four weeks (as in the 3 cases) in fairly high dosage might well so alter the sodium-potassium ratio as to cause depression of the serum-potassium level.

I am sure that it will be agreed that Dr. Cayley has not shown that "in patients with pulmonary tuberculosis under *treatment with* . . . P.A.S. the serum potassium may be dangerously lowered," since :

(1) this may be a "sodium effect" as suggested ;

(2) only 2 cases are described with a reduced serum-potassium level ; and

(3) in case 2, the reduction is not of a "dangerously low" order.

In the Scandinavian countries where free P.A.S. (as opposed to its sodium salt) has been in use for some six years now, no effect on potassium metabolism has been reported.

These criticisms are in no way intended to minimise the value of Dr. Cayley's findings, which are of some importance in view of the present-day trend towards prolonged administration of sodium *p*-aminosalicylate ; but I would point out that this depression of serum-potassium level is one of the factors which has prompted the clinical trial, at present proceeding, of calcium *p*-aminosalicylate, the initial results with which seem promising.

Grove Park Hospital, London, S.E.12. M. M. NAGLEY.

POSTOPERATIVE PARALYSIS IN THE UPPER EXTREMITY

SIR,—I read with great interest the articles by Mr. Ewing and Dr. Kiloh in your issue of Jan. 21. In the subsequent correspondence on the prevention of such lesions I have been rather surprised to find no reference to the simple apparatus illustrated here. This, I believe, was designed in the Western Infirmary, Glasgow.

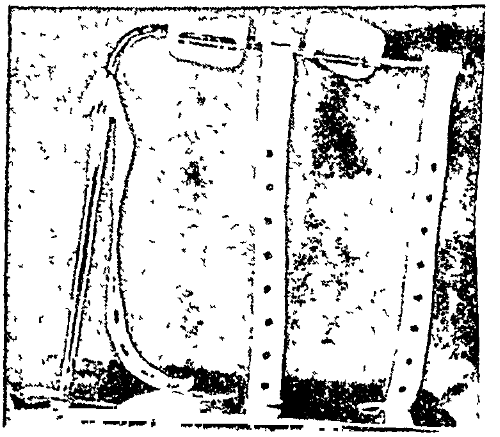

Fig. 1—The vicson arm-rest.

For abdominal surgery both upper limbs are placed in the slings, where they are out of the way of the surgical team and readily available to the anæsthetist. For operations on the breast or axilla, the forearm on the affected side is padded with cotton-wool and carefully

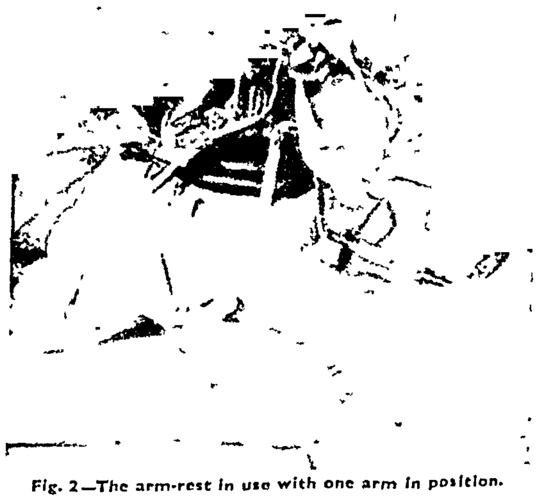

Fig. 2—The arm-rest in use with one arm in position.

bandaged to the vertical part of the bar. The angle of the arm can be adjusted to give the optimum exposure, traction on the plexus being minimised by the flexion and pronation of the forearm.

For intravenous injections with this apparatus the cephalic or radial veins are used. The veins on the dorsum of the hand are of course readily available, but the use of a needle with Gordh diaphragm adaptor in a cephalic vein avoids multiple punctures. The cephalic and radial veins are more suitable than the median basilic or median cephalic for infusions of blood or plasma.

The use of this or some similar support would appear to have some place in the prevention of lesions of the brachial plexus.

The 'Vicson' arm-rest is manufactured by Messrs. Vicarey, Davidson & Co., 162, Bath Street, Glasgow.

Royal Naval Hospital, Plymouth. A. D. SINCLAIR.

SOCIAL SIGNIFICANCE OF SYMPTOMS

SIR,—In his article of Feb. 11 Dr. Gooddy has done good service in bringing to light the manner in which the unrecognised neurotics are clogging the working of National Health Service and greatly adding to its cost by their repeated demands for medical attention, recognition of their symptoms, and special examinations. However, he seems to have failed to appreciate that in psychopathology the symptom is a very complex structure, that its roots extend deep into the personality, and that it is in many respects an anachronism. It plays an important part, for it strives to serve a dual purpose—that of attaining some measure of solution or expression of a deep unconscious conflict, or the partial gratification of an equally deep and unknown want, while at the same time it is used as a defence against the anxiety which may arise from the "wish" for gratification of primitive instinctual urges.

Often when listening to the neurotic's tale of woe I am reminded of the lines of Richard Lovelace (1618–58) which he wrote to Althea from prison :

> " Stone walls do not a prison make
> Nor iron bars a cage;
> Minds innocent and quiet take
> That for an hermitage ;
> If I have freedom in my love
> And in my soul am free ;
> Angels alone, that soar above,
> Enjoy such liberty "

I read these lines as a boy in my grammar book, but they were then rendered noxious to me by the addition of a single sentence—"Parse and analyse the above lines." Now isn't that in a sense exactly what happens when the neurotic is relating his symptoms ?—we make a critical analysis of his words instead of trying to understand the full meaning for him of the symptoms which he describes so vividly and often with so much emotion. If we listen attentively we shall appreciate that he is in a state of conflict ; he is a prisoner and yet his own gaoler ; he is yearning for that "something" which is portrayed in the above lines ; he feels frustrated because he cannot get understanding or help as to how to achieve his objective. "Broken glass in the stomach" is a very graphic way of describing a feeling of "pent up jangled emotions inside one," or again the act of smoking beneath a "No Smoking" notice is evidence of a deep rebellion against the world which doesn't attempt to understand and thwarts him at every turn.

I appreciate that it takes time, patience, and experience to listen to these people and unravel their difficulties, to lay bare their deeper wants and conflicts, and show them some real road by means of which they may at least try to reach the desired goal.

Undoubtedly several factors may be exacerbating the prevalence of neurosis today. The National Health Service Act has promised free treatment—whether of the body or psyche—and at the same time we have an elaboration of the social services and assurances of freedom from want ; so no wonder the neurotics, with their "unknown wants" come flocking for treatment and will not be easily put off. They will tend to produce new symptom complexes until they get what they want or give up in despair. Present trends in mechanised production are another factor, for many neurotics, who can adapt happily to a certain tempo, are unable to keep pace when this is increased. And in mass production the worker is often employed on uninteresting repetitive processes, instead of having the satisfaction of seeing "his job" finished.

Bishop's Stortford, Herts. D. N. HARDCASTLE.

AGAROL

SIR,—The Minister of Health mentioned 'Agarol' in the House of Commons on March 14, and asserted that it was "the subject of heavy advertising." Neither agarol compound nor any other William R. Warner product has ever been advertised to the public in this or any other country. Their sale results entirely from medical prescriptions and recommendations.

The Minister's comparisons were somewhat misleading :

1. The price difference between the prescription pack of agarol and the substitute emulsion is not as great as indicated ; and we understand that, with the N.H.S. system of averaging scripts under 5*s*., the 14 oz. agarol costs the Exchequer exactly the same as the *N.F.* substitute—usually between 2*s*. and 3*s*. If agarol happens to be in the list from which the average is computed, it will put the average up a trifle more than does the substitute.
2. Although the *N.F.* formula is offered as a substitute for agarol, it is not identical.
3. Agarol is manufactured to a standard of quality by a process which is not used by most, if any, manufacturers of the *N.F.* substitute.
4. The whole cost of evolution of the agarol formula and of its introduction to the medical profession was borne by this company.

William R. Warner & Co. Ltd.,
London, W.4. ELIOT WARBURTON.

VITAMIN B_{12} AND PERNICIOUS ANÆMIA

SIR,—Certain references to my work in your leading article last week require qualification.

> ". . . small doses, such as 10 µg., produced a reticulocytosis but no satisfactory subsequent rise in red cells or hæmoglobin."

The fact is that 10 µg. produced a mean rise of red blood-cells in 15 days about equal to the "average" standard of Della Vida and Dyke (1942) for response to liver extract. Such responses would normally be regarded as "satisfactory," but we found that larger doses produced even greater effects, roughly in proportion to the logarithm of the dose.[1] Fortnightly doses of 10 µg. of vitamin B_{12} were tried experimentally under closely controlled conditions, and found not to be adequate for all cases. For routine purposes in patients whose blood is examined only once in 6 months we usually give 30–60 µg. every three weeks. Reasons for giving larger doses to patients with subacute combined degeneration are discussed elsewhere.[2]

The preceding remarks refer to vitamin B_{12} itself. With respect to varieties of vitamin B_{12} derived by Lester Smith from *Streptomyces griseus*, sufficient time has not yet elapsed for a satisfactory determination of requirements either for maintenance or for patients with subacute combined degeneration.

The following sentence should be modified by inserting the words which I have put in italics :

> ". . . considers that a mixture of 5 µg. of vitamin B_{12} with 50 ml. of human gastric juice *given daily* has about the same hæmopoietic effect as a *single dose of* 10 µg. of vitamin B_{12} given parenterally."

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1. Ungley, C. C. *Brit. med. J.* 1949, ii, 1370.
2. Ungley, C. C. *Brain*, 1949, 72, 382.

Incidentally this applies to only 1 of the 3 cases which I reported at the meeting of the Royal Society of Medicine to which you refer; the ratio between the total dosage of vitamin B_{12} given orally with gastric juice and the dose which would probably be needed by injection to produce an equivalent response varies considerably from case to case.

The Royal Victoria Infirmary,
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C. C. UNGLEY.

SIR,—In view of last week's report by Dr. Dyke and his colleagues on the synthesis of vitamin B_{12} in the alimentary tract of a man at autopsy, it may be of interest to refer to work carried out at the University of Michigan in 1948 and 1949 during the tenure of a Rockefeller fellowship, and reported to the Scottish Society for Experimental Medicine in October, 1949. This was the preliminary part of an investigation of the extent to which remissions and relapses in patients with megaloblastic anæmia might be related to the production or destruction of pteroylglutamic acid or vitamin B_{12} by bacteria in the small intestine.

An intestinal tube was passed to the lower end of the ileum in three patients with pernicious anæmia in relapse and two controls. All these patients were fasting. The secretions of the alimentary tract were assayed for pteroylglutamic acid, and for growth factors for *Lactobacillus leichmanii* (chiefly vitamin B_{12}). In none of the subjects was there any significant amount of vitamin B_{12} or pteroylglutamic acid in the small intestine. In patients and controls the contents in a day's stools were about 5 µg. of vitamin B_{12} and 0·5 mg. of pteroylglutamic acid. In a patient with ulcerative colitis, each ml. of material obtained from the lower end of the ileum contained approximately 0·03 µg. of growth factors for *L. leichmannii* and 12 µg. of pteroylglutamic acid—much larger amounts than in the other patients, but not surprising in view of the fæcal nature of the aspirated material.

It was considered unlikely that relapses and remissions in pernicious anæmia could be associated with changes in the intestine flora of the small intestine. Further experiments are in progress.

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A few experiments with monkeys had shown that some degree of protection was afforded by inoculation with either a dead or living culture of *Brucella melitensis*, but no more animals were available. Wright backed his belief that immunisation would be effective (this was before the days of anti-typhoid inoculation) by injecting himself with a killed vaccine and afterwards with a living culture. Unfortunately the protectio if any, was not adequate, and he went down with very unpleasant attack of Malta fever which laste many weeks. He often told me of *the misery of tho* weeks, with their drenching sweats.

Was this, perhaps, the earliest instance of an attemp at preventive inoculation with a killed vaccine and "challenging dose" of living culture?

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SIR,—In view of the comparative rarity of epidemi myositis (*Diaphragmatic pleurisy*) the following smal outbreak in a passenger liner seems worth recording I have not been able to trace a previous epidemic in passenger ship, but Huss[1] described one in two Swedis warships that called at Marstrand. The crews wer healthy on arrival, but epidemic myositis was presen in the village. A few days after the ships had sailed som cases were seen in both ships, and within a month 34% of the men were affected.

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WAR

SIR,—Dr. Comfort has widened my thesis in an able and stimulating letter. War is a great destroying river to which many sources contribute. Much can be written about the part played by government—fanatical, corrupt, or complacent and indolent—by psychopaths in office and out of it, by social pressure and economic necessity and their psychological effects. In these articles I was concerned to emphasise and inquire into that vital contribution to war which does come from the minds of ordinary men. In my opinion too few of us have accustomed ourselves to looking into the glass and saying: "There goes a war-monger." It isn't easy to do!

It is very necessary to attach full weight to the peculiar horrors and madnesses of war, such as the pogroms and the bombings and their origins and release in the minds of clever men who lead us. But I am even more worried about the way the ordinary mind can be innocently fanned towards war (hot or cold) by leaders who, in a more healthy world, would have to relegate their energies to brisk journalistic invective.

In any study of periods of pre-war history I would pick out as a common factor the growing conviction on both sides that it is impossible to deal with the opposite side other than by force. Just before war breaks out this view seems to become so widespread as to be all but universal. I am fairly sure that this is in essence just that basic attitude to an enemy which has made the introduction of law a pragmatic necessity. Therefore, it is World Law that we now need.

As for government crimes, these are committed just in the very sphere in which the government has ceased to be the lawgiver to its people and has become the lawless and independent "sovereign State" for whose enchainment the ordinary man now awaits. I agree with Dr. Comfort that in this function governments are the enemies of mankind. Indeed it becomes reasonable to ask for a bloodless revolution against the "sovereign State" as such. But today evidence accumulates that some leading statesmen and publicists can see this dual rôle of the nation State—lawgiver at home, naughty-boy abroad—rather more clearly than can most ordinary men! When we belabour the psychopath in office do not let us forget that wisdom, courage, and idealism sometimes get into high places too.

We therefore ask national governments, as Hobbes once asked individuals, to "confer all their power and strength upon One Assembly" to "get themselves out of that miserable condition of Warre" which is consequent upon "the naturall Passions of men when there is no visible Power to keep them in awe." I for one do not see why governments and parliaments willing to abnegate their sovereignty should not be found sufficient in numbers and power to the task in hand—namely our collective peace and continuance.

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PERSONALITY AND NURSING

SIR,—All the objections which Dr. Hamilton raises in his letter of March 11 are considered and discussed in the detailed statistical report of the investigation which is to be published in the *Journal of Consulting Psychology*. As *The Lancet* did not feel that such a statistical report would be of interest to any but very specialised readers, these points were not discussed in the article published, on Feb. 25, in this journal.

It is almost certain that these considerations would reduce the size of the multiple correlation to some slight extent. Both Vernon[1] and Wagner,[2] however, report results in related fields which would lead to a very small reduction, if any, in the size of the correlation. Moreover, the reduction of the multiple correlation is not such a simple phenomenon as readers of the letter might be led to believe. It is frequently reduced, especially when the selection of tests is based on no theoretical rationale; but there are many cases, particularly that of the American Army Aviation Project, where no such reduction was observed. The results of using tests on all applicants, for which facilities are now provided, will answer some of the other questions raised.

It is difficult to discuss these rather complex statistical points in an article of this type. We hope that they have been fully covered in the detailed statistical report.

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Reports on the epidemiology of poliomyelitis provide evidence that flies can carry the virus, and it appears that in our future efforts to prevent the spread of infection strong efforts should be made to secure the coöperation of the public in protecting foodstuffs, fruit, vegetables, and liquids from contamination by flies.

As is well known, American investigators (Paul and Trask) have demonstrated that the virus can be recovered with ease from the stools of patients with the paralytic and with the common abortive types of the disease. One convalescent harboured the virus in his intestinal tract for 125 days. The same investigators succeeded in isolating the virus from the sewage of urban communities in which poliomyelitis was epidemic; nineteen specimens collected from sewers in the vicinity of isolation hospitals in which cases of poliomyelitis were being treated, yielded the virus.

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[1] Vernon, P. E., Parry, J. B. Personnel Selection in the British Forces. London, 1949.
[2] Wagner, R. *Personnel Psychology*, 1949, 2, no. 1.

Kessel et al.[1] were able to isolate the virus from the stools and colon contents of patients and at autopsies within three weeks of the onset. Of 35 patients under 15 years of age, 40% yielded the virus; 22% of stools from patients with paralysis and 19% of stools from patients without paralysis yielded virus.

Horstmann[2] writes:

> "The sudden burst of cases with the appearance of warm weather repeats itself again and again, and if summer comes early, so do epidemics. The first large epidemic in England in 1947 came in with unusually long and warm weather. Why does not the virus spread in winter as do other contact diseases? The virus is present in winter. Virus has been isolated from flies trapped during epidemics of poliomyelitis and from flies caught in clean surroundings where sanitary conditions have been excellent. . . . both flies and poliomyelitis flourish in summer; they may be an important link in the chain leading to poliomyelitis epidemics."

Francis et al.[3] proved that the virus from fæces of patients with poliomyelitis was actually taken up by flies and recovered by inoculation of rhesus monkeys. Kessel and his colleagues[1] isolated the virus from the stools of 20% of patients, but not once from 139 nasal washings. The virus has also been recovered from non-biting flies in the neighbourhood of infected persons.[4]

Thus the evidence indicates that the virus is probably present in the fæces of a large number of patients and abortive cases. To dispose of fæces in a primitive fashion along the permanent way is surely to court danger, especially during hot summer weather when flies are prevalent.

From the aspect of prevention I would emphasise the importance of measures to eradicate flies and remove their breeding-places. I would suggest that all public libraries should affix a small slip on the inside cover of each book, bearing the slogan in red capitals: "keep polio at bay—kill that fly." Other measures would include thorough washing of all fruit and vegetables before being eaten. The many excellent posters dealing with the anti-fly campaign issued by the Central Council for Health Education should also be prominently exhibited.

I am aware that I have covered old ground in this letter, but I feel that the obvious measures should not be neglected.

Health Department,
Worksop, Notts.

M. B. McCANN
Medical Officer of Health.

PNEUMOCONIOSIS AFTER EXPOSURE TO SULPHUR DIOXIDE FUMES AND DUST FROM COKE FIRES

SIR,—First, may I remind Dr. Fisher that our paper of Dec. 31 described our conclusion as tentative? Secondly, I would suggest that he has misapprehended the problem we dealt with: otherwise he would not speak, as in his letter of March 11, of pneumoconiosis caused by coke ash. The report concerned lesions appearing after exposure to both SO_2 fumes and dust from coke fires. Thirdly, I should like to add two other facts in favour of our findings: (*a*) Professor Pancheri (Milan) has found (see *Lancet*, Feb. 4, p. 226) that "in the sulphur industry workers are exposed to both dusts and fumes with ensuing dyspnœa, cyanosis, bronchitis, emphysema, and even bronchiectasis." (*b*) The case of a stoker was recently brought to my notice by his own doctor after perusal of our paper. This man's chest film showed definite pneumoconiosis.

Hull.

LASAR DUNNER.

Parliament

Health Service Costs

CHANCELLOR'S PROMISE OF LIMITATION

IN the House of Commons on March 14, replying to the Opposition's amendment which deplored the failure of the Chancellor of the Exchequer to enforce his own instructions to departments not to overspend extensively their estimates for the current year, Sir STAFFORD CRIPPS admitted that the supplementary estimate for the National Health Service was larger than all the others put together. But he justified the extra £98 million asked for on the ground that this was a very special case. The largest item, that for hospitals and specialists, was to supplement estimates which had been submitted by hospital management committees in August, 1948, when they had only recently been appointed and some had only skeleton staffs. Sufficient time had not elapsed for an adequate review of the hospitals, and in many cases no satisfactory accounts existed on which firm estimates could be based. With a view to making economies, or at least avoiding extravagances, the estimates were reduced by £12 million in the main estimates. But unfortunately it turned out that the management committees and regional boards had underestimated rather than overestimated their expenditure, and it became clear that the estimates could not be brought within the lower sum without closing hospital beds, which the Government were not prepared to do. The revised estimate produced on this basis gave rise to the increase of £50 million on the item hospital and specialist services. Some provision for the implementation of the Spens report on specialists had been made, but the sum to be paid in the current year exceeded this by £10 million. A further £7 million was needed to meet Whitley awards to nursing and other staff. The balance—about £20 million—was due partly to lack of material on which to make estimates and partly to increased prices.

The other three items of importance, Sir Stafford continued—pharmaceutical, dental, and supplementary ophthalmic services—showed between them an excess of about £45 million. Though there was an element in this of price change, by far the greatest factor was consumer demand, which had lasted much longer and at a much higher level than was expected. These were the special circumstances of the launching of this vast new service, and when these new factors were first encountered in the early summer of last year there were only two ways of dealing with the matter—either to shut down the beds and discontinue other services so as to keep within the estimates, or to maintain the services with the greatest possible economy. The Government unhesitatingly took the second alternative. He was quite sure that the Opposition leaders would have done the same thing. It would have been unthinkable for any responsible Government suddenly to discontinue these essential health services on the ground that a supplementary estimate was undesirable.

But everyone recognised that there was a limit to the speed of the development of the service, and he himself believed that it was now necessary to call a halt. The estimates for the forthcoming year must be regarded as a ceiling. Also, since such a large annual sum of money was at stake in the hospital services—about two-thirds of the total vote—some means must be found to associate the Ministry of Health more directly with the management committees and the regional boards to ensure that budgets were not exceeded once they were passed or savings on one subhead unnecessarily dissipated on another. How best this association could be achieved would be settled after the Minister had consulted the regional hospital boards and the management committees.

The Government would not be satisfied until the new service had been thoroughly examined in all its incidence, and so knitted together in its organisation as to ensure that there was no waste or extravagance. They wanted to provide the best health service the nation could afford, and a first-class service was not something which could be got on the cheap, but expenditure on health must be

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1. Kessel, J. F., Moore, F. J., Stimpert, F. D., Fisk, R. T. *J. exp. Med.* 1941, 74, 601.
2. Horstmann, D. M. *Lancet*, 1948, i, 273.
3. Francis, T. jun., Brown, G. C., Penner, L. R. *J. Amer. med. Ass.* 1948, 136, 1088.
4. Paul, J. R., Trask, J. D., Bishop, M. B., Melnick, J. L., Casey, A. E., *Science*, 1941, 94, 395.

brought into proper proportion with food subsidies, education, and other vital matters.

Mr. F. Messer held that the implication of the Opposition's amendment was that the Minister should have restricted the service, but those facing great tragedy because of disease could not listen with equanimity even to what the Chancellor had said. There was need for a great deal more to be done, especially in the tuberculosis services. No fewer than 10,000 people were waiting to get into sanatoria. He would like to persuade Parliament to spend even more money on the health services. Another grave matter was that since the introduction of the service there was greater difficulty in getting accommodation for old people in hospitals. The hospitals had been up-graded, but the tendency was to use them for acute cases, which meant less accommodation for chronic cases. Hospitals were unfitted to be dealt with under the Treasury system of finance which did not allow them to carry an unexpended balance from one year into the next. Thus hospitals had no incentive to make effective economies, and Treasury finance could prove an inducement to wasteful spending.

In his maiden speech, Dr. Charles Hill affirmed that whatever controversies had raged in the past as to the form the health service should take, the people of the country were now anxious that it should be a resounding success. The Minister's difficulty was to reconcile local budget preparing at the hospital management committee level with central financial control, and Dr. Hill welcomed the Minister's decision in future to make allocations of money, not earmarked for particular hospital management committee, to regional hospital boards for allocation. Even so, with all possible central economies effected, it was impossible not to expect a substantial increase in hospital expenditure when it was remembered that the proportion of expenditure for capital development was only 5%. Looking at the problem in isolation he could see the prospect of increased expenditure—justifiable in relation to hospital considerations—of £100 million or even £200 million in the next few years. But if there was a limit to what could properly be raised and if such expenditure was a reasonable possibility, then we faced the crucial issue of the priority of social services in relation to limited resources. We must choose between hospitals and houses, between clinics and schools.

The one way of strengthening the hand of the Minister of Health was the predetermination of the money available for the health service. In the hospital service this would mean an annual allocation of money to regional hospital boards, and in turn to hospital management committees. It might have the further advantage that the public, recognising the limit to which the Chancellor referred, would return once more to their old and friendly supporting attitude towards the hospitals.

The principle of allocation already existed within limits in the general-practitioner field, and was one of the reasons for the more modest supplementary estimate that field. If the allocation principle was applied to the dental service it would be possible to give expression at last to the Government's policy of priority—the dental care of mothers and children.

The increase in the cost of the pharmaceutical services, Dr. Hill pointed out, was only due in part to an increase in the number of items of service. It was also due to the cost of the newer drugs, but they contributed to the service elsewhere by shortening periods of illness. He admitted that one cause of the increased cost was the pressure of the middle-classes for the proprietary medicines to which they were accustomed. But he hoped that the tendency to regard a large number of the lesser items demanded of the service, and of the doctors in particular, as frivolous would cease. The whole object was to bring to the doctor the trivial to prevent it becoming a tragedy.

Dr. Barnett Stross found himself in agreement with all that Dr. Hill had said, including his gentle regret at the terms meted out to the general practitioner, who bore the brunt of the service. It was fascinating to know that his average salary was £1530 a year, while his prescriptions cost £1700 a year. On the whole Dr. Stross thought the dentists had done a good job, but why could not the Minister make it a condition of service for the dentist to take a percentage of children?

Mr. Iain MacLeod found it indefensible that the dentists should be paid so much more than the doctors. Relative to their training, qualifications, ability, the responsibility that they ceaselessly shouldered, and the hours they worked, doctors were by far the worst paid profession in the service. It would be unwise to presume too far on their infinite and most statesmanlike patience.

Dr. H. B. Morgan said the health service was a personal treatment scheme, and it was different from preventive medicine, social medicine, and industrial medicine. It was available to all on free and equal terms and therefore he disliked the system of priorities. He knew they were essential today for certain classes, such as mothers and children, but he wanted to see the day when there was no shortage of doctors or dentists, and no question of hospital accommodation not being available. He deprecated the introduction of parsimony into the question of the cost of the National Health Service.

Mr. Somerville Hastings said that in so far as the cost of the health service was new expenditure, that was surely an indictment of what had been done for the health of the nation in the past. What had been done was to transfer to a large extent individual expense and make it collective. Because of the value of our man-power, and the need to increase production, the country must spend on health all that was necessary, provided that it was done with care and economy. The fact that so much more could now be done for the welfare of patients and so many more recoveries were recorded, made expenditure on health today more worth while than it had ever been. He suggested that more should be done to keep hospital beds in constant occupation, for a staffed bed cost little more occupied than empty. Could not more use be made of the fever hospitals for convalescent cases? A bed bureau for a whole group of hospitals was essential and one doctor should have the duty of seeing that no beds were empty. If more full-time specialists were employed in hospitals there would be less travelling time to pay for. Some specialists at present were working in as many as 13 hospitals.

Mr. Aneurin Bevan, Minister of Health, caused some laughter by congratulating Dr. Hill on a maiden speech with which he was largely in agreement. The real point of the debate, he declared, was whether the Chancellor of the Exchequer and the Government were right in permitting the expansion of the health service to go on during the last year. We had to wait at least one year to see what the behaviour pattern of the people would be in respect of spectacles, dentistry, drugs, or doctors before it was possible to form the least estimate of what the expenditure would be. When hospital authorities were accused of maladministration members of all political parties who were serving on the management committees and regional boards were being indicted. He did not say there ought not to be a tightening of hospital administration; and there would be. There must be a closer identification of the central government with the local units of hospital administration. We had inherited a hospital system with no system of accountancy. Comparing costs in other countries he said that since 1946 hospital costs in the United States of America had gone up 40% and in Sweden 50%. The Royal Masonic Hospital and the King Edward VII Sanatorium were both outside the scheme, and their costs had risen 55·8% and 69·4%. In the N.H.S. costs rose by 40%.

But he agreed that economies ought to be made, and he believed savings could be made quickly in the cost of proprietary medicines, which had become part of the racket of civilised society. Take one preparation, 'Agarol' emulsion, six ounces of which cost 3s., on the N.H.S. list cost 10½d.; 'Genasprin,' 1s. 9½d., on the N.H.S. list 2½d.; 'Dexedrine' tablets 3s. 2d., on the N.H.S. list 9½d. All these preparations were widely advertised, and many doctors prescribed them. He hoped to get the coöperation of the profession, Parliament, and the public to cut out proprietary medicines which were unnecessarily expensive. They had had to get hospital glassware from Germany to break the monopoly in Great Britain. A large sum of money had been saved in this way, even after paying import duty. On X-ray apparatus, by cutting out the retailer, £150,000 a year had already been saved, and on X-ray films £280,000 a year. On hearing-aids and batteries they had saved £$1^1/_2$ million, and on streptomycin £240,000. In all, by cutting out retailers' costs they had saved over £$2^1/_2$ million, and as the N.H.S. and the supply organisation established themselves, many savings would be made in various directions. The Opposition amendment was not only an attack on the Government but a concealed and cowardly attack upon the N.H.S. by people who had not the honesty to make it openly. The amendment was negatived by 308 votes to 289.

Therapeutic Social Clubs

On the motion for the adjournment in the House of Commons on March 17, Mr. J. W. SNOW sought the Minister of Health's encouragement for the promotion of more therapeutic social clubs. Briefly reviewing their history he explained that shortly before the war a small group of psychiatrists decided that purely institutional treatment was not a complete answer for mental illness. They thought it might be beneficial if they could provide a method of social intercourse such as a club, which would impose self-responsibility upon mental patients. This was the origin of the so-called inpatient club. Mental treatment in this country, Mr. Snow suggested, had passed through three periods: the primitive period, the more enlightened scientific or philanthropic period, and the present participatory period. Thus these clubs were organised by the patients themselves who became partners in the operation of treatment. Then the psychiatrists who had started the inpatient club thought an outpatient club might be something better. Now there were a number of these clubs operating outside the hospitals. In London the L.C.C. had given valuable help and he hoped the idea would spread to Scotland, Wales, and the provinces. The underlying principles of the clubs were prevention and cure. By their membership many patients avoided inpatient treatment and relapses. An eminent psychiatrist believed membership to be helpful to the following types of patient:

> People who are abnormally reserved, solitary, and shy and who find it difficult to adapt themselves to a normal social life.
>
> People who have had treatment at a mental hospital, such as a leucotomy operation, and who may need about a year's rehabilitation before they are completely fit.
>
> People who are constitutionally unstable and who find it hard to fit into life but can be kept in their jobs with a minimum of psychiatric treatment and help.

Parents, as part of child guidance, might also join these clubs.

Mr. Snow urged the Minister of Health to make known the general principles underlying these clubs and their economic applications as a means of relieving congestion in the existing mental hospitals; and also to provide grants for research.

Mr. ARTHUR BLENKINSOP, parliamentary secretary to the Ministry of Health, said it was an encouraging fact that over 60% of the patients in our mental hospitals were voluntary patients. For some time mental hospitals had been developing the work of welfare clubs, both inside and, to a more limited extent, outside the hospital. The clubs could be of immense value, particularly on the welfare and aftercare side—and indeed to some extent on the preventive side—but it would, he thought, be a mistake to over-emphasise their possibilities as an alternative to hospital or outpatient clinics. There was clearly some difference of opinion on this question between the medical experts who took the view expressed by Mr. Snow and those who took the view that the actual treatment side should be concentrated in hospital and outpatient clinics. That did not necessarily detract from the value of the work done by the clubs, but suggested that we were not likely to reduce greatly pressure on hospitals and outpatient clinics by the development of more clubs. So far we had little experience of the working of these clubs outside the hospital perimeter. The health authorities and the regional hospital boards were studying this problem both in London and elsewhere, but at the moment it was not possible to commit the Ministry of Health to any expenditure on these projects, or to guarantee that they could exert pressure on the local authorities or hospital boards. They felt that clubs arising naturally from the local health authorities and the regional hospital boards were more likely to be successful than any proposals originating nationally from the Ministry. He was, however, much interested in the proposals which had been raised and he could assure Mr. Snow that they would be given sympathetic consideration.

QUESTION TIME

Sterilisation

Mr. W. L. WYATT asked the Home Secretary whether his attention had been drawn to the case of a Mrs. Kindred who was put on probation in Birmingham on Jan. 27 after the bench had been informed that she had agreed to be sterilised; and whether he would set up a committee to inquire into the desirability or otherwise of amending the law with regard to sterilisation.—Mr. CHUTER EDE replied: I am informed that the court in deciding to put Mrs. Kindred on probation were not influenced by the information given to them that she was willing to be sterilised and that they made no reference to it in pronouncing their decision. Certain aspects of this question of sterilisation have already been considered by a Departmental Committee appointed by the Board of Control which reported in 1934. The general question of birth-control was considered by the Royal Commission on Population. It would not appear that any useful purpose would be served by setting up a further committee. Mr. WYATT: As the committee to which the Home Secretary referred strongly recommended that sterilisation should be legalised in certain cases, and as it is important that this should be done urgently, is it not time to consider introducing legislation to this end?—Mr. EDE: No, Sir. The matter is highly controversial and involves, I think, very serious infringement of the liberty of the subject. I am not prepared to introduce legislation.

Young Offenders

Replying to a question Mr. EDE stated: Provisional figures for the year 1949 for England and Wales showed that 24,872 boys and girls under the age of 14, and 15,064 aged 14 to 17, were found guilty of indictable offences and dealt with in magistrates' courts. The corresponding figures for 1948 were 26,715 and 16,991, and for 1947, 21,152 and 13,861. The decreases in 1949 as compared with 1948 were 1843 and 1927, or 7% and 11%.

Political Meetings in Hospitals

Mr. J. A. BOYD-CARPENTER asked the Minister of Health whether it was with his knowledge and consent that the South West Metropolitan Hospital Board issued instructions that parliamentary candidates were not to be allowed to address gatherings on hospital premises.—Mr. BEVAN replied: Hospital boards had discretion on this matter and my consent was not required. It is not possible to make a general uniform arrangement in this matter because of the difference in accommodation at different hospitals, and of the different kinds of hospitals. I therefore thought it was wise to leave it to those in charge, who could vary the practice with the needs of the case.

N.H.S. *Prescription Charge*

Mr. M. C. HOLLIS asked the Minister whether it was still proposed to proceed with the plan for charging 1*s*. on prescriptions; and if he had now decided what was the definition of a prescription.—Mr. BEVAN replied: I am not in a position to add anything to previous announcements on this subject. Lieut.-Colonel WALTER ELLIOT: When will the Minister be able to make any announcement on this subject and let us know when the Prime Minister's instructions are to be fulfilled?—Mr. BEVAN: This is a matter which will be assimilated in the Budget statement.

Shortage of School Dentists

Mr. BARNET JANNER asked the Minister of Education whether he was satisfied that sufficient numbers of dentists would now be available for schools throughout the country.—Mr. GEORGE TOMLINSON replied: No, Sir; in January last the school dental service employed the equivalent of 738 full-time dentists by comparison with 921 in 1948, when the service had fully recovered from the effects of the war. Although last year the net loss was very serious, there were nevertheless over 100 new entrants and I hope that the negotiations for a Dental Whitley Council now proceeding will lead to a settlement of salaries and the restoration of the service to its former efficiency.

Hospital Accommodation for the Chronic Sick

In answer to a question Mr. BEVAN stated that according to the latest information, which relates to the summer of 1949, there were 6114 chronic sick patients awaiting admission to hospital in England and Wales. In October, 1949, 5508 chronic sick beds were unoccupied for lack of staff.

Contributors to National Insurance

In answer to a question Dr. EDITH SUMMERSKILL, Minister of National Insurance, stated that in July, 1949, about 24 million persons had registered under the National Insurance Act. The total population of Great Britain aged 15 and over was about 38 million, but this figure included a considerable number of married women, pensioners, and others who are under no obligation to contribute.

Obituary

CHARLES MONTAGUE CHADWICK

M.A., D.M. OXFD, F.R.C.P.

Dr. C. M. Chadwick, consulting physician to Leeds General Infirmary, died at Tunbridge Wells on March 11 at the age of 96. He was elected to the fellowship of the Royal College of Physicians in 1896 and he was the third most senior fellow.

The association of the Chadwick family with Leeds General Infirmary goes back unbroken for over a hundred years, for his father, another Charles Chadwick, was physician there from 1842 to 1871. A fine portrait of him still hangs in the medical school. The younger Charles was educated at the University of Oxford and the London Hospital. After graduating B.M. in 1883 he continued his studies at the schools of Leipzig and Vienna. In 1892 he was elected assistant physician to the Leeds General Infirmary, and two years later he became full physician. He was also on the staff of the Leeds Public Dispensary. From 1896 to 1897 he was joint lecturer in forensic medicine in Leeds, and the following year he was appointed professor of materia medica, pharmacology, and therapeutics in the Victoria University, the precursor of the University of Leeds. He is still remembered as an excellent clinical teacher. He retired from all his appointments in 1905.

FRANK CUNINGHAME COWTAN

C.B., C.B.E., M.R.C.S.

Air Vice-Marshal F. C. Cowtan, who died at his home at Farnham on March 5 at the age of 61, was one of the men who in the first difficult days of the service gave substance to the medical branch of the Royal Air Force.

Born in Kensington, he was educated at St. Paul's School and St. Thomas's Hospital. After qualifying in 1912 he joined the R.A.M.C. and for his services in France and later in Mesopotamia during the 1914–18 war he was four times mentioned in despatches. In 1916 he was appointed D.A.D.M.S. to Sir Matthew Fell, who writes: "It was in Basra in the summer of 1916 that I first saw Cowtan when he came to replace my D.A.D.M.S. who was sick. I knew nothing of him personally, but in a very few days found that I had struck a winner. Medical administrative affairs up and down the Tigris were in a rather hectic state that year but Cowtan settled down at once. He was not afraid of hard work and his natural gift for administration and orderly mind were of immense help to me. From the first, I found him a delightful companion, and chuckled when he sometimes firmly but politely drew my attention to what he called 'your irregular methods, Sir.' Later when he came and told me that he would like to transfer from the R.A.M.C. to the new medical service of the Royal Air Force I was glad to do what I could to help him, for I knew what he was worth to the new service in its infancy."

This led to Cowtan's appointment as medical training officer at Halton with the rank of squadron-leader.

In his new service he rose steadily. From 1926 to 1928 he was deputy P.M.O. in Iraq. A period of staff duty at the Air Ministry followed, till he was appointed to the command of Princess Mary's Hospital at Halton. While he was P.M.O. of Middle East command he was invalided home, and the beginning of the late war found him as P.M.O. Coastal Command. In 1943 he held the same appointment to Fighter Command, and he was appointed C.B. In 1944, as P.M.O. to SHAEF he took part in organising the medical arrangements for D-day. His last appointment was P.M.O. to Bomber Command and he retired in 1945 owing to ill health. He was appointed C.B.E. the following year. From 1941 to 1945 he was honorary surgeon to the King.

A colleague writes: "All who have had the happy experience of associating with Cowtan recall a man of steady purpose, of well-judged approach to all problems, deep loyalty, and love of country. His example in correctness of dress and bearing are clearly remembered."

In 1915 he married Miss Nora Kennedy. She survives him with a son and a daughter.

HAROLD FREIZE STEPHENS

M.R.C.S.

Dr. Freize Stephens, formerly medical superintendent of Coleshill Hall Institution for Mental Defectives, Birmingham, died on March 9 at his home at Coleshill.

He was born in 1885 in Madras, where his father, Daniel Freize Stephens, was on the staff of the Public Works Department, and his mother, Dr. Grace Stephens, was physician to the Maharanee of Gwalior.

After qualifying from Guy's Hospital in 1912, he joined the staff of the Royal Earlswood Institution. In 1916 he went abroad to serve in France, Iraq, and Persia as a regimental medical officer, later becoming consultant in mental diseases to the Northern Command, India. In 1922 he became deputy medical superintendent at the Manor Hospital, Epsom, and he spent the rest of his life working among mental defectives. His gifts for organisation received a wider scope when in 1929 he was appointed medical superintendent of the newly opened Coleshill Hall Institution for Mental Defectives, founded by the corporation of Birmingham.

During the next twenty years Coleshill Hall increased under his administration from an institution with 300 beds to one with over 1000. Many of the senior members of his staff remained with him through the whole of his superintendentship. In 1937 the converted and modernised public-assistance institution known as the Marston Green Homes was opened as a branch of Coleshill Hall, and later up-to-date workshops for the teaching of handicrafts and trades, and three modern pavilions for young children, were set up. The system of daily employment of men and women patients outside the institution was extended. J. C. R. writes: "In his scheme of training, Dr. Freize Stephens gave an important place to physical exercises, organised games, and Scout and Guide work, and the annual sports days and the holiday camps were outstanding examples of his cult of open-air training and his belief in the importance of the team spirit. Optimistic and progressive, he was inspired by the belief that his duty lay in restoring as many as possible of his patients to their places in the outside world, and to this end he increased the scope of parole and of licence. In every aspect of his work he continued to impress the stamp of a forceful personality. Despite his failing health he kept his enthusiasm and his unsparing energy to the last, and he was planning fresh advances, when his final illness forced him to retire."

A man of many interests and activities, he was often consulted when other colonies for mental defectives were being planned. At the time of his death, he was chairman of the Northern and Midland division of the Royal Medico-Psychological Association, and he had served on several of the subcommittees of the association. He also did much work for the Mental Health Association.

In the reports of the National Council on Mental Hygiene (1926–27) he wrote on the causes of mental disorder, and he had also contributed to our columns papers on the treatment of persistent offenders and on research in mental deficiency. His series of articles on the nursing of mental defectives is appearing at present in the *Nursing Mirror*.

Dr. Freize Stephens leaves a widow and three sons, of whom the eldest is a medical officer of the Colonial Medical Service in Northern Rhodesia, the second a medical student, and the third a lieutenant in the Royal Navy.

Notes and News

HOSTELS FOR COMMONWEALTH AND AMERICAN STUDENTS

Since 1940 our kinsmen and friends in the Commonwealth and in the United States have sent us £80 million worth of food gifts, including 75 million parcels sent as gifts to people in this country and 130 million lb. through the Commonwealth Gift Centre to schools, hospitals, almshouses, and so on. Now we are to be given a chance to show our gratitude for their kindness through the National Thanksgiving Fund which the Lord Mayor of London has opened. The proceeds of the fund are to be used chiefly to develop a centre in London for Commonwealth and American students. The plan is to erect an £800,000 building for married and women students on the opposite side of Mecklenburgh Square to London House, a residential hall for men students from the Commonwealth; this will be close to the main London University buildings, the Inns of Court, the British Museum, and the great teaching hospitals. It is also planned to reconstruct the Georgian houses on the east side of the square for men students from America at a cost of £250,000 and to set aside £600,000 for the upkeep and maintenance of these two buildings and of London House. A further £150,000 will go to the overseas students' hall in Scotland, at Edzell in Angus. If the fund proves big enough £200,000 will be shared between the Royal Empire Society, the Victoria League, the Overseas League, the Dominions' Fellowship Trust, and the English-Speaking Union to help them in their work for students and other visitors from overseas.

To carry out this plan, about £2 million in all will be needed. Donations should be sent direct to the Lord Mayor of London, The Mansion House, London, E.C.4, marking the envelope National Thanksgiving Fund, or handed in at any bank or post office.

FOOD IN THE EARLY YEARS

Good feeding is a pleasure at any age. Between the ages of 1 and 5 it is a duty as well. In 1942 the Ministry of Health published a pleasant booklet designed to help those in charge of groups of young children " to plan and prepare balanced, attractive and varied meals." A revised edition[1] has now been issued, in which the recipes make use of the greater variety of foodstuffs which have become available since the first appeared. The text gives general advice on the feeding of preschool children, and on their emotional as well as their nutritional needs. They dislike sloppy dishes, and they like food to look agreeable. They enjoy helping to get a meal ready, handing round the vegetables, and helping themselves with a spoon from the dish. They prosper when meals come regularly, when they have been active in the fresh air before meal times, when dining conditions—and the adults in charge—are peaceful and pleasant. Overtired and flustered adults do not encourage good digestion. This matters, for the alimentary tract is adept at forming habits, whether good or bad.

University of Oxford

The vice-chancellor has appointed Dr. Alice Stewart, deputy director of the Institute of Social Medicine, to carry on the duties of the professorship of social medicine for Trinity term, 1950.

Prof. H. E. Sigerist, formerly director of the Institute of the History of Medicine, Johns Hopkins University, will deliver the James Bryce lecture on Thursday, June 1, at Somerville College. He is to speak on the Latin Medical Literature of the Middle Ages.

University of London

The title of fellow of University College has been conferred on Dr. Charles Singer, professor emeritus of the history of medicine in the university.

Mr. H. J. Eysenck, PH.D., has been appointed to the readership in psychology, with special reference to psychiatry, tenable at the Institute of Psychiatry.

University of Sheffield

Dr. S. E. Dicker has been appointed lecturer in physiology.

University of Manchester

On May 17 the honorary degree of D.SC. is to be conferred on Mr. V. E. Negus, and on Lord Boyd-Orr, F.R.S.

University of Leeds

Dr. Georgiana Bonser and Dr. L. L. Dmochowski, who are at present lecturers in the department of experimental pathology and cancer research, have been appointed readers in cancer research.

University of Edinburgh

During the summer term Dr. Douglas Guthrie, lecturer on the history of medicine, will deliver a series of lectures entitled a Retrospect of Medicine and Science. The lectures will begin on April 18 and they will be held at the University New Buildings, Teviot Place.

Scottish Conjoint Board

On March 16 the following were admitted to the licentiateship of the Royal Colleges of Physicians and Surgeons of Edinburgh and the Royal Faculty of Physicians and Surgeons of Glasgow:

Audrey J. J. Abel, Maureen M. Aylmer, John Bonner, R. F. Caddell, Harry Coll, Maureen Coneghan, Phyllis Connor, J. H. A. Craig, B. K. A. Crawford, D. McD. Cruickshank, Margaret S. Curley, S. I. Davidson, G. S. Fiddler, J. A. Fleming, W. G. French, Emily A. Friel, R. A. Gelfer, Iona J. Godson, Philippa D. Harrison, D. M. Hesslegrave-Jackson, Robert Hogg, Leslie Huddlestone, R. A. Ingles, T. F. McC. Jackson, Mary W. A. Jamieson, R. G. Kibbey, A. W. Laing, Claude Langman, Charles Lipp, W. R. McKenzie, H. D. Malasky, Margaret McN. Montgomerie, D. G. Muldoon, Mary H. Murray, Wilma Nield-Faulkner, Charles Randall, Louis Robinson, H. L. Sandler, Sat Dev Sethi, Ellis Sopher, F. C. Van-Coller, John White, G. C. Wilson, Eileen M. Wolstenholme, Harold Woolfson.

Faculty of Anæsthetists

Dr. John Gillies will deliver the second Joseph Clover lecture at the Royal College of Surgeons, Lincoln's Inn Fields, London, W.C.2, on Wednesday, March 29, at 5 P.M. He is to speak on Anæsthetic Factors in the Causation and Prevention of Excessive Bleeding during Surgical Operations.

Society of Chemical Industry

The annual general meeting of the food group will be held on Wednesday, April 12, at 6 P.M., at Burlington House, London, W.1. At 6.30 P.M. Prof. S. Zuckerman, F.R.S., will give an address on Pounds, Dollars, and Calories.

Cardiology Congress

The first International Congress of Cardiology is to be held in Paris from Sept. 3 to 9. It is being organised by the Société Française de Cardiologie. The secretariat may be addressed at 19, rue Hautefeuille, Paris, VI.

International Congress of Dermatology

The tenth International Congress of Dermatology will be *held in London during the summer* of 1952, under the presidency of Sir Archibald Gray. Further information may be had from Dr. G. B. Mitchell-Heggs, Institute of Dermatology, St. John's Hospital for Diseases of the Skin, Lisle Street, Leicester Square, London, W.C.2.

Newsholme Lectures

Sir Henry Cohen will give the first Newsholme lectures at the London School of Hygiene, Keppel Street, W.C.1, on May 22, 23, and 24 at 6.15 P.M. He has chosen as his subject the Clinical Contribution to Public Welfare. The lectureship was created by the late Sir Arthur Newsholme, under a trust, and he laid down the following range of subjects: the application of anatomical and physiological teaching to the maintenance of health; the application of clinical teaching to the prevention of illness as it affects the hospital patient; and the effective curtailment of and recovery from illness.

Sheffield Regional Pædiatric Conference

The second regional pædiatric conference was held on Feb. 25 at the Children's Hospital in Sheffield. Dr. J. Lorber spoke on the Circulation of C.S.F. in Tuberculous Meningitis, and Dr. S. Doxiadis on Allergic Inflammations. Dr. C. Harvey, gave a survey of Congenital Heart Lesions in a School Health Service, and Dr. J. Emery illustrated the histological characteristics of the normal maturation of the pancreas in the child. At the end of the meeting Prof. R. S. Illingworth showed a film on the Development of Locomotion in Infancy.

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[1] The Feeding of Children from One to Five Years. London: H.M. Stationery Office. 1949. Pp. 16. 6*d*.

Institute of Sociology

At a meeting to be held at Burlington House, W.1, on Tuesday, March 28, at 5.30 P.M., Mr. Geoffrey C. Tyndale, K.C., will speak on Children in the Divorce Court.

Postgraduate Course in Rheumatism

The Empire Rheumatism Council are holding their spring weekend course at the Apothecaries' Hall, Black Friars Lane, London, E.C.4, from April 28 to 30. Further particulars may be had from the secretary of the council, Tavistock House (N), Tavistock Square, W.C.1.

Hunterian Society

The Hunterian prize for 1949 has been awarded to Dr. S. M. Rivlin for his essay on the Treatment of Varicose Veins and their Complications. The council have chosen as the subject for the 1950 essay the Diagnosis and Treatment of Irritating Rashes. The competition is open to all general practitioners. Further details may be had from the hon. secretary, Mr. Clement Francis, 75, Wimpole Street, London, W.1.

Fellowships in Cancer Research

The British Empire Cancer Campaign invites applications for senior fellowships, tenable for seven years with a salary of £2000 rising to £2600, and for junior fellowships, tenable for three years, with a salary of £1000 rising to £1200. Further particulars will be found in our advertisement columns.

Medal in Dermatology

The examination for the Chesterfield medal will be held at the Institute of Dermatology, St. John's Hospital for Diseases of the Skin, Lisle Street, London, W.C.2, on Monday, Tuesday, and Friday, April 17, 18, and 21. Further particulars may be had from the secretary of the institute.

Wessex Rahere Club

The spring dinner of this club, which is open to all Barts men living in the south-west of England, will be held at the County Hotel, Taunton, on Saturday, April 29. Mr. J. B. Hume will be the guest of honour. Further information may be had from the secretary, Mr. A. Daunt Bateman, 3, The Circus, Bath.

Association of Hospital Launderers

It is proposed to form an association for hospital laundry managers. Those interested are asked to get in touch with Mr. G. E. Beckett, laundry adviser to the South-Western Regional Hospital Board, who may be addressed at the laundry department of the Bristol Royal Hospital, Royal Infirmary Branch, Bristol, 2.

Course on B.C.G.

A course for doctors on Tuberculosis in Children and the Use of B.C.G. is being held at St. Thomas's Hospital Medical School, London, S.E.1, from April 18 to 21. Sir Robert Young will give the opening address, and other speakers will include Dr. B. G. Thompson, Dr. W. L. Yell, Dr. A. E. Brown, Dr. Marcia Hall, Prof. Frederick Heaf, Dr. K. Neville Irvine, Dr. Wilfrid Sheldon, Mr. J. A. Chomeley, and Dr. F. J. Bentley. Further information may be had from the secretary of the Tuberculosis Educational Institute, Tavistock House North, Tavistock Square, W.C.1.

N.A.P.T. Essay Prize

The National Association for the Prevention of Tuberculosis is offering a prize of 100 guineas for an essay on the improvement of the control of tuberculosis throughout Britain. The competition is open to doctors of ten years' standing who are working as tuberculosis officers, chest physicians, or sanatorium medical superintendents in the United Kingdom. The competition is open until March 1, 1951, and further details can be had from the Secretary-general, N.A.P.T., Tavistock House North, Tavistock Square, London, W.C.1.

Peckham Health Centre Appeal

The members of the centre, which closed a week ago, have formed themselves into an association and have issued an appeal for assistance in establishing the centre as an institute of human biology and so continuing the Peckham experiment. The association asks for money so that the centre may reopen before the specially trained staff find employment elsewhere. Donations should be sent to the appeals secretary, Mrs. E. Purser, 1, Belfort Road, London, S.E.15.

Medical Art Society

The annual exhibition of the society will be held at Walker's Galleries, 118, New Bond Street, London, W.1, from April 17 to 29. The annual dinner will be held at Kettner's Restaurant at 7 P.M. on April 17. Further particulars may be had from the hon. secretary, Dr. Henry Wilson, 142, Harley Street, W.1.

Hospitals Renamed in Liverpool Region

At a meeting on March 2, the Liverpool Regional Hospital Board agreed that the names of institutions should be changed as follows: City Hospital East, Liverpool, to Rathbone Hospital; Green Lane Isolation Hospital, Ormskirk, to Ormskirk Children's Hospital; Fazakerley Sanatorium to Aintree Hospital; and Barrowmore Sanatorium to Barrowmore Hospital.

International Cancer Congress

The fifth International Cancer Congress will be held in Paris from July 15 to 22, at the time of the commemoration of the 50th anniversary of the discovery of radium by Pierre and Marie Curie. The work of the congress will be divided into three main sections: biology and experimental work; pathological, clinical, and therapeutic aspects; and social medicine. Further information may be had from the secretariat, Union Internationale contre le Cancer, 6, Avenue Marceau, Paris, VIII.

Maternity Services in Northern Ireland

Dame Dehra Parker, the minister of health and local government, is to set up a health advisory committee on maternity services as she considers that maternity services in Northern Ireland should be reviewed by people with first-hand experience. This announcement followed a motion by the Opposition urging the minister to bring the law relating to midwives into line with the Midwives Act, 1936, in England. The minister said she had every sympathy with the terms of the motion, and had decided that steps must be taken to put the midwifery services on a full-time footing.

International Federation of EEG Societies

This federation was founded, in the form of an international committee, at the international meeting held in London in 1947. A tentative organisation was set up, with the international journal *Electro-encephalography and Clinical Neurophysiology* as its official organ, and two working committees were formed—one on technique and another on terminology. At the Paris meeting last year a more formal organisation was established with a legal constitution in close liaison with UNESCO. The official title of the new body is the International Federation of Electro-encephalography and Clinical Neurophysiology. The following officers were elected and will hold office until the third International Congress, to be held in the United States in 1952: honorary president, Prof. E. D. Adrian, O.M.; president, Dr. Herbert H. Jasper; vice-presidents, Dr. Robert S. Schwab, Mr. W. Grey Walter, D.SC.; Dr. Fritz Buchtal; treasurer, Dr. Antoine Rémond; and secretary, Dr. Henri Gastaut, 149, Prom. de la Corniche, Marseilles, France.

Royal Society

The list of those appointed to the fellowship includes: Prof. B. P. BABKIN, M.D., D.SC., physiologist, McGill University, Montreal, for his work on secretion by the digestive tract and conditioned reflexes; W. J. ELFORD, PH.D., biophysicist, National Institute for Medical Research, London, for his researches on viruses, particularly on methods of determining virus size; C. A. HOARE, D.SC., protozoologist, Wellcome Laboratories of Tropical Medicine, London, for his work on parasitic protozoa, especially the trypanosomes; A. J. P. MARTIN, M.A., PH.D., biochemist, National Institute for Medical Research, for his work on the development of liquid-liquid partition chromatographic methods of chemical analysis; R. A. MORTON, D.SC., professor of biochemistry, University of Liverpool, for his studies on the chemistry and biochemistry of the fat-soluble vitamins; R. J. PUMPHREY, PH.D., professor of zoology, University of Liverpool, for his researches on the sense organs and central nervous system of animals, particularly for his work on hearing in insects and man; Prof. H. E. SHORTT, C.I.E., M.D., D.SC., head of the department of parasitology, London School of Hygiene and Tropical Medicine, for his work on protozoal diseases; R. L. M. SYNGE, PH.D., biochemist, Rowett Research Institute, Aberdeenshire, for his application of the principle of partition chromatography to the separation of amino-acids and peptides.

Royal College of Physicians

Dr. B. T. Parsons-Smith, will deliver the Lumleian lectures on Tuesday and Thursday, April 11 and 13, at 5 P.M., at the college, Pall Mall East, S.W.1. His subject is to be Cardiac Failure.

London Cinchona Bureau

Sir Philip Manson-Bahr has been appointed director of the bureau at 10, Princes Street, London, S.W.1. The post was formerly held by the late Prof. C. A. Bentley.

London County Medical Society

A clinical meeting of this society will be held at St. Nicholas' Hospital, Tewson Road, Plumstead, S.E.18, on Monday, April 17, at 3 P.M. Inquiries should be sent to the hon. secretary, Mr. J. Gabe, F.R.C.S., St. Alfege's Hospital, S.E.10.

Infantile Paralysis Fellowship

The fellowship has bought the Lantern Hotel at Worthing. It is not to be used as a convalescent home but as a seaside hotel for people with infantile paralysis, and it is to be specially adapted to meet their needs.

Presentation to Mr. Mullally

Members of the staff of the Hospital of St. John and St. Elizabeth and colleagues of Mr. G. T. Mullally met on March 15 to present him with an illuminated address, a barometer, and a cheque. He is retiring after nearly 30 years' service on the staff of the hospital.

Jamieson Memorial Fund

At the suggestion of a group of his former colleagues in Leeds, a Jamieson Memorial Fund has been instituted in memory of John Kay Jamieson, for many years professor of anatomy and dean of the faculty of medicine in the University of Leeds. The fund is administered by a representative committee, and subscriptions have been invited from former students of the university who were taught by Professor Jamieson, as well as from old friends and colleagues. It is proposed to found a scholarship or prize with which Professor Jamieson's name will be associated. The fund will close on April 30.

Appointments

ALDRIDGE, J. S., M.R.C.S.: asst. county M.O., Devon.
BICKNELL, FRANKLIN, D.M. Oxfd, M.R.C.P.: physician to outpatients, French Hospital and Dispensary, London.
BORTHWICK, J. B., M.B.E., M.B. Edin., F.R.C.P.E.: asst. physician to Scottish Borders hospital group.
CRONIN, J. D., M.B. Lond., F.R.C.S.: orthopædic surgeon, French Hospital and Dispensary, London.
DICKSON, MARY, M.R.C.S., D.P.H.: asst. M.O. for maternity and child health services, County of Northampton.
DIMSDALE, HELEN, M.D. Camb., F.R.C.P.: consultant neurologist, Royal Free Hospital, London.
FRANK, J. R., M.B. Edin., F.R.C.S.E.: assistant surgeon to Scottish Borders hospital group.
GREENWOOD, J. M., M.D. Manc., D.P.H.: consultant physician in charge of chronic sick wards at, Newholme and Withington Hospitals, Manchester.
HOWARD, STANLEY, M.B. Lpool: senior asst. M.O.H. for City of Bradford in connection with the care and aftercare scheme.
KEITH, A. M., M.B. Aberd., F.R.F.P.S., F.R.C.S.E.: consultant orthopædic surgeon, Royal Alexandra Infirmary, Paisley.
LANCASTER, GEOFFREY, M.B. Manc.: appointed factory doctor for Ambleside district.
LAND, F. T., M.B. Glasg., F.R.F.P.S., D.L.O.: consultant surgeon in charge of E.N.T. Hospital, Glasgow.
MACALISTER, C. L. O., M.B. St.And., F.R.C.S.E.: consultant in genito-urinary surgery mainly at hospitals in No. 15 (Bradford A) hospital management committee group.
MCEWAN, TOM, M.D. Glasg., F.R.F.P.S.: consultant physician as *second asst. physician (physician to the outpatient dept.)*, Royal Infirmary, Glasgow.
MAYER, A. L. R., M.B. Glasg.: chief M.O., National Sanatorium, Benenden, Kent.
RAFTERY, J. D., D.PHIL. Oxfd, B.SC. Witw'srand, F.R.C.S.: asst. visiting orthopædic surgeon, Addington Hospital, Durban, S. Africa.
VALENTINE, A. A., M.B. St.And.: psychiatrist (S.H.M.O.), Royal Scottish National Institution, Larbert.
VALENTINE, G. H., M.B. Brist., M.R.C.P.: consultant pædiatrician, Peterborough area.

Liverpool Regional Hospital Board:

CONROY, P. B., M.R.C.S., D.A.: consultant anæsthetist, hospitals in North Liverpool and adjoining areas.
DAVIDSON, J., M.B., D.A.: whole-time consultant anæsthetist, hospitals in North Liverpool and adjoining areas.
EGAN, G. P., M.D. N.U.I., D.P.M.: consultant deputy superintendent, Rainhill Hospital.
LIPTON, SAMPSON, M.B. Lpool, D.A.: consultant anæsthetist, hospitals in North Liverpool and adjoining areas.

Diary of the Week

MARCH 26 TO APRIL 1

Monday, 27th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. R. T. Johnson: Carotid Ligation for Intracranial Aneurysms.

Tuesday, 28th

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Mr. A. K. Monro: Abnormalities of the Cutaneous Circulation in the Lower Limb.

Wednesday, 29th

ROYAL COLLEGE OF SURGEONS
5 P.M. Dr. John Gillies: Anæsthetic Factors in the Causation and Prevention of Excessive Bleeding during Surgical Operations. (Clover lecture.)
MEDICAL RESEARCH COUNCIL
10 A.M. (*London School of Hygiene, Keppel Street, W.C.1.*) Prof. A. Bradford Hill, D.SC. 2 P.M. Prof. J. R. Squire, Dr. Alice Stuart: Scientific Method in Field Surveys.
INSTITUTE OF PSYCHIATRY, Maudsley Hospital, S.E.5
4.30 P.M. Dr. E. Stengel: Postgraduate lecture-demonstration.
ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
3.30 P.M. Dr. C. A. Boucher: Accident Prevention in the Home.
UNIVERSITY OF GLASGOW
8 P.M. (Department of Ophthalmology.) Dr. T. Wilson: Modern Methods of Investigation.

Thursday, 30th

MEDICAL RESEARCH COUNCIL
9.30 A.M. Sir Frederic Bartlett, F.R.S., 2 P.M., Prof. W. E. Le Gros Clark, Mr. T. Bedford, D.SC.: Improvement of Human Performance by Laboratory Studies.
WESTMINSTER MEDICAL SCHOOL, S.W.1
5.30 P.M. (Meyerstein lecture-theatre.) Clinicopathological meeting on two cases of Hodgkin's Disease complicated by Tuberculosis.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. H. Gordon: Pitfalls in Treatment.

Friday, 31st

MEDICAL RESEARCH COUNCIL
9.30 A.M. Dr. Donald Hunter, Dr. J. M. Barnes. *2 P.M., Dr. C. M. Fletcher: Investigation of Health Hazards.*
MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES
8 P.M. (11, Chandos Street, W.1.) Dr. A. R. Martin: Principles of Penicillin Therapy.

Births, Marriages, and Deaths

BIRTHS

BARTLEY.—On March 17, at Poole, the wife of Dr. Christopher Bartley—a son.
BLAKELOCK.—On March 16, at Lincoln, the wife of Dr. L. H. Blakelock—a daughter.
CALDER.—On March 11, at Windsor, the wife of Dr. Alan Calder—a son.
CHANCE.—On March 12, in London, the wife of Dr. Ivor Chance—a daughter.
FOXELL.—On March 12, at Southampton, the wife of Dr. Alan Foxell—a son.
GRETTON-WATSON.—On March 9, in Chester, the wife of Dr. B. G. Gretton-Watson—a daughter.
HALE.—On March 13, in London, the wife of Dr. John Hale—a son.
HALL.—On March 14, at Northampton, the wife of Dr. R. N. Hall—a son.
LITTLE.—On March 14, at Bristol, the wife of Dr. Brian Little—a son.
MOONEY.—On March 14, in Manchester, the wife of Dr. Terence Mooney—a son.

MARRIAGES

BRACEWELL—YATES.—On March 11, in London, Graham Acton Bracewell, M.B., to Pamela Margaret Yates.
FORBES—GRUBERT.—*On March 15, in Berlin*, Duncan Forbes, M.B., captain, R.A.M.C., to Susanne Grubert.
MACKENZIE—ANDERSON.—On March 11, in Glasgow, Ian Carville Keith Mackenzie, M.B., to Anthea Mary Anderson.
SMITH—TURNER.—On March 18, at Bishop's Stortford, Irvine Smith, M.A., F.R.C.S., to Kathleen Turner, M.B.

DEATHS

CHADWICK.—On March 11, at Tunbridge Wells, Charles Montague Chadwick, M.A., D.M. Oxfd, F.R.C.P., aged 96.
CURWEN.—On March 15, at Hove, Eliot Curwen, M.A., M.B. Camb., F.S.A., aged 84.
DINGLEY.—On March 16, at Myddle, Salop, Lionel *Alfred* Dingley, M.D. Lond., F.R.C.S., aged 61.
FEARNHEAD.—On March 11, Thomas Fearnhead, M.R.C.S., of Lytham, aged 83.
KELLY.—On March 12, at Hanchurch, Stoke-on-Trent, Peter Kelly, M.B. Glasg.
LANE.—On March 16, at Eastbourne, Gordon Joseph Lane, M.D. Dubl.
SPRAGUE.—On March 11, Cecil Gordon Sprague, M.R.C.S., surgeon captain, R.N. retd.
STEVENSON.—On March 16, in Belfast, Howard Stevenson, B.A., M.B. R.U.I., F.R.C.S.I.
WARD.—On March 11, at Rochampton, Arthur Blackwood Ward, C.B.E., D.S.O., M.B. Camb., aged 79.

PAIN IN THE UPPER LIMB FROM MECHANISMS IN THE COSTOCLAVICULAR SPACE

F. A. R. Stammers
C.B.E., Ch.M. Birm., F.R.C.S.
PROFESSOR OF SURGERY, UNIVERSITY OF BIRMINGHAM

This paper is based on a personal series of 40 cases and began as a postgraduate lecture * on the costoclavicular syndrome. However, since my purpose was to examine and discuss all types of discomfort, from pain, paræsthesia, or sensory change in the precise distribution of a particular nerve, to something vaguer and more widespread, with or without motor or vascular phenomena, I think the present title is better.

Such conditions as osteo-arthritis and fibrositis of the cervical spine, osteo-arthritis of the shoulder and acromioclavicular joints, subacromial bursitis, brachial neuritis, retropulsed cervical disc (usually 5th or 6th), and even spinal-cord tumour or Pancoast's tumour, may account for very similar symptoms. Yet it should be possible, by careful examination and investigation, to differentiate all these from the group which I wish to consider now.

Twenty-five years ago it was accepted that the presence of a cervical rib or band might be the cause of discomfort confined precisely to the distribution of the ulnar nerve; but once the symptoms extended beyond this boundary the case was no longer understood, and it was often labelled as neuritis, fibrositis, or osteo-arthritis. Thanks to many observers it is now realised that many factors operating in the costoclavicular space may play a part in causing discomfort of much wider distribution than that of the ulnar nerve.

THE CERVICAL RIB

Cervical rib is mentioned in the writings of Galen and of Vesalius. Adson and Coffey (1927) stated that it was present in 0·056% of 500,413 cases X-rayed at the Mayo Clinic for various reasons; and Steiner (1943) found it in 0 05% of 38,105 patients. Gruber's (1869) classical paper grouped cervical rib into four kinds:

1. Short, with head, neck, and tubercle represented.
2. One that extends beyond the transverse process of the 7th cervical vertebra, possessing a body as well as a head, neck, and tubercle, but ending in a free tip.
3. Like (2) but with the tip attached to the 1st thoracic rib, either by a fibrous band or by an articulation.
4. A complete rib, attached in front to the costal cartilage of the 1st thoracic rib.

Halbertsma (1858) claimed that if the cervical rib was over 5·6 cm. long it supported the subclavian artery, but that if less than 5·1 cm. long it did not so support it. Gruber did not agree with this; and my own observations show that much depends on the height to which the arch of the artery rises in the neck.

Cervical rib may be unilateral or bilateral, and if the latter more often asymmetrical than symmetrical (fig. 1). Walshe et al. (1944) believe this asymmetry of the thoracic inlet to be a dominant fact in producing symptoms.

According to most textbooks the average age of onset of symptoms is about 20 years, but in my own cases the age tended to be around 30 years, the youngest case being 11 years old, and the oldest 63 years old. All agree that the majority are females.

Signs.—The rib may be large enough to present as an obvious and palpable supraclavicular swelling (figs. 2 and 3), and the subclavian artery may be pushed forward by it, its pulsations being visible and even simulating an aneurysm. In such a case a thrill can sometimes be felt by the examining finger and a bruit heard. In most cases the rib cannot be seen, though the supraclavicular fossa may look shallow. The rib can usually be palpated, either as a definite bony prominence or by the shallow and firm feeling it gives to the supraclavicular fossa. Pressure in the fossa may reproduce the discomfort of which the patient complains.

Symptoms

Symptoms are classically divided into sensory, motor, and vascular, and each and all are often worse when in bed, or during certain activities involving the arm.

Sensory.—The typical sensory symptoms are pain or paræsthesia within the ulnar area of the hand: examination may show sensation to be normal or it may reveal interference with one or more modalities of sensation. A less common form of sensory symptom in cervical rib (though more common when initiated by the other factors in the costoclavicular space) is a much more widespread discomfort involving hand, forearm, arm, especially the outer side, the shoulder, and occasionally the same side of the thorax and neck. Kinnier Wilson (1913) explained this by suggesting that when the inner cord of the brachial plexus is stretched over the cervical rib, the fibres destined to form the medial component of the median nerve may also be affected, so that the general threshold to pain of the whole plexus may thus be lowered. The fact that rest in bed with the affected arm in a sling relieves the pain favours this theory.

Motor.—The typical affection is weakness and wasting of the muscles of the hand supplied by the ulnar nerve. But here again, there is a less common manifestation of cervical rib—once more pointed out by Kinnier Wilson (1940)—namely, paralysis of two of the muscles of the thumb, the abductor and the opponens, sometimes accompanied by anæsthesia of the outer side of the base of the thumb.

Vascular.—*Vaso-spastic phenomena*, which are less common than sensory or motor symptoms, may present themselves in two ways—Raynaud-like attacks, and attacks of prolonged cyanosis and coldness of the hand, with an accompanying sensation described by the patient as "stiffness of the hand," during the course of which she appears to be able to achieve only "slow motion" movements of the fingers. As I shall show, the absence or presence of vascular symptoms, and the type of symptoms experienced, depend among other things on whether the arch of the subclavian artery is a high or low one.

Walshe et al. (1944) suggest that *aneurysm* should be not uncommon, but in my experience it is exceedingly rare. The third part of the subclavian artery is commonly somewhat wider than the second part, and this might be misinterpreted as an aneurysmal dilatation. On one

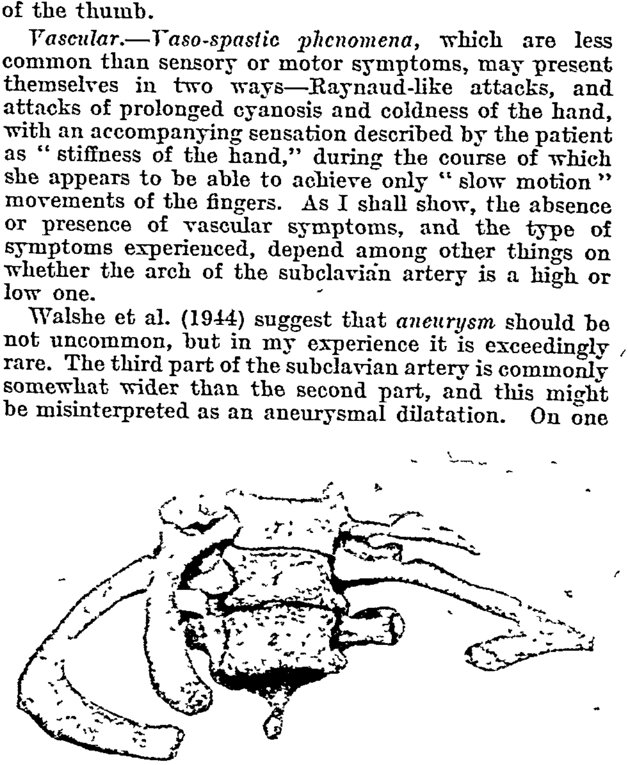

Fig. 1—Skeleton of bilateral cervical ribs. They are characteristically asymmetrical, which probably accounts for the asymmetry of the thoracic inlet (Schultze).

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* Given on Nov. 8, 1949, before the Edinburgh Post-Graduate Board for Medicine.

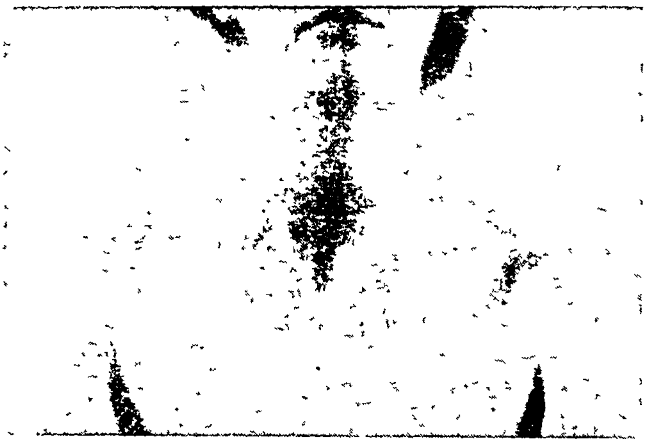


Fig. 2—A young woman with an easily visible cervical rib on the right side.

occasion I encountered a subclavian artery the substance of which had undergone change to such an extent that when, after attempting to control a fine spray of bleeding from the third part, I applied a pair of mosquito-forceps laterally, they bit a hole into the artery, and when, to control the consequent much worse hæmorrhage, I applied forceps across the artery, they cut through it as if through perished rubber, so that the open end of the second part now bled furiously. A forceps applied to the first part held normally, and a ligature controlled the situation satisfactorily. It is unfortunate that, in the excitement of the moment, no specimen for microscopy was taken; but that the wall was grossly abnormal, though not in the least dilated, was certain; and it must have represented the very earliest stage in the development of an aneurysm.

Cases of cervical rib developing finger-tip gangrene are said to owe this feature to emboli from small *thrombi* in the subclavian artery. One case within my experience showed much more dramatic vascular embarrassment than this.

A woman of 63, when snapping string while packing her Christmas parcels, felt a sudden pain in the shoulder region, and the arm became useless, benumbed, and cold. I first saw her three weeks later, when the arm was still cold, pulseless, cyanosed, slightly œdematous, anæsthetic, and almost completely paralysed, and on examination she presented the largest pair of cervical ribs I have yet seen. There seems no doubt that in the sudden movement of snapping string she caused trauma to her subclavian artery, perhaps at an atheromatous patch. There was no evidence of accompanying venous thrombosis.

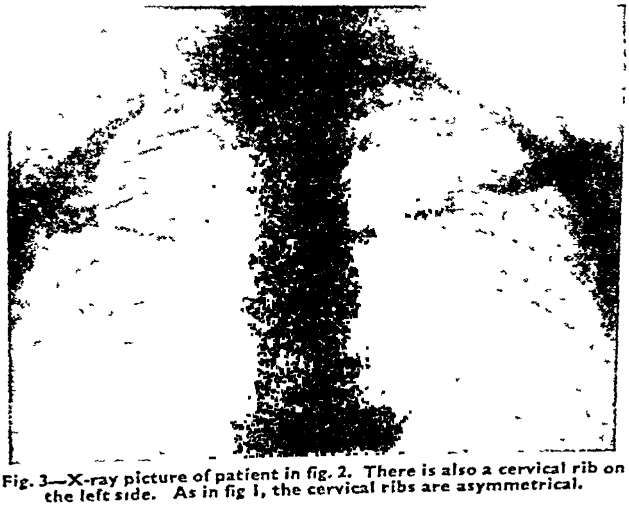


Fig. 3—X-ray picture of patient in fig. 2. There is also a cervical rib on the left side. As in fig 1, the cervical ribs are asymmetrical.

THEORIES OF VASCULAR INVOLVEMENT

Eden (1939) and Lewis and Pickering (1934) maintained that vascular symptoms were the result of direct pressure of rib or band on the artery; and D. M. Morrissey and I have observed that this certainly is true where a cervical rib articulates with the 1st thoracic rib just behind the scalene tubercle—when a highly arched subclavian artery is pressed against the prominence of the articulation by the action of the scalenus anticus (fig. 4).

Telford and Stopford (1931) have argued that in some people most of the sympathetic fibres destined to supply the arterial tree of the upper limb travel in the inner cord of the brachial plexus; and that if they have a cervical rib or band, these sympathetic fibres will be stimulated by pressure, thus inducing arterial spasm. In support of this hypothesis—which was based on the examination of the plexus of a patient suffering from cervical rib who died from some intercurrent disease—they point out that it explains why the spasm begins at the point where the axillary artery becomes the brachial. On the other hand, Blair et al. (1935) had a similar opportunity of examining a brachial plexus after death but found the sympathetic fibres widely distributed throughout the plexus. Walshe et al. (1944) believe that vascular symptoms are due to actual nipping of the artery between the clavicle and 1st rib or cervical rib. More recently, Telford and Mottershead (1947) suggest that the axillary artery is nipped by the two heads of the median nerve.

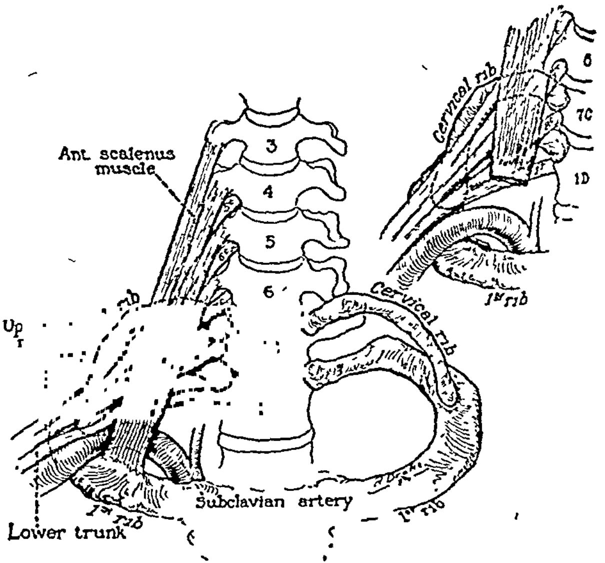


Fig. 4—When the subclavian artery arches higher above the clavicle than shown here, it lies against the prominence of the articulation of cervical and 1st dorsal ribs, and is pressed against it by the action of the scalenus anticus.—Taken from Adson's article in Christopher's Textbook of Surgery.

OTHER FACTORS

Postfixed Plexus

Minor variations certainly occur in the make-up of the brachial plexus; we have already seen that the distribution of the sympathetic fibres to the plexus varies from patient to patient. But, as I understand it, a postfixed plexus is one that is derived from cervical 6, 7, 8, and thoracic 1 and 2, instead of from one segment higher. I think it likely that less decided variations than this occur in its composition, and that some of the other anatomical variations to be mentioned distort or kink a normally constituted plexus.

Inner Border of Scalenus Medius

On a number of occasions I have encountered a tight, sharp, fibrous band in the inner border of the scalenus

Fig. 5—Radiograph of a "bottle necked" person.

medius, with the inner cord of the plexus or the highly arched subclavian artery kinked against it. The normal action of the scalenus anticus presses these structures against this band, and the action of carrying heavy parcels stretches them across it. It is a most striking thing, and must be cut or excised in order to leave the plexus and artery quite free from distortion due to it. Leriche has for many years advocated cutting the band. Strands of Sibson's fascia are also sometimes sufficiently prominent to present sharp edges against which the neurovascular bundle may be kinked.

Abnormal 1st Thoracic Rib

The rib may be bifid, or joined to the 2nd thoracic rib by a synchondrosis, or it may be thickened as the result of healing of a stress fracture; and this thickening may cause symptoms. White et al. (1945) maintain that it is impossible to differentiate an abnormal 1st rib from a cervical rib unless the so-called "moving jaw" technique of radiography is employed. In this technique the patient is instructed to open and close the mouth rapidly during exposure, and this makes it possible for all cervical vertebræ to be seen and counted on an anterior-posterior plate.

Enlarged 7th Cervical Transverse Process

Normally, the transverse process of the 7th cervical vertebra is shorter than that of the 1st thoracic, but it may be as long or even longer—when symptoms may result. Annersten (1947) believes that the important factor is compression of artery or cord between scalenus anticus and the enlarged 7th cervical transverse process; he refers to an "index," based on a comparison of lengths of the two processes. Where symptoms suggest some mechanical interference with the plexus or artery in the costoclavicular space, an enlarged 7th transverse process supports this diagnosis. It is usually accompanied by a fibrous band, often in the scalenus medius.

The Scalenus-anticus Syndrome

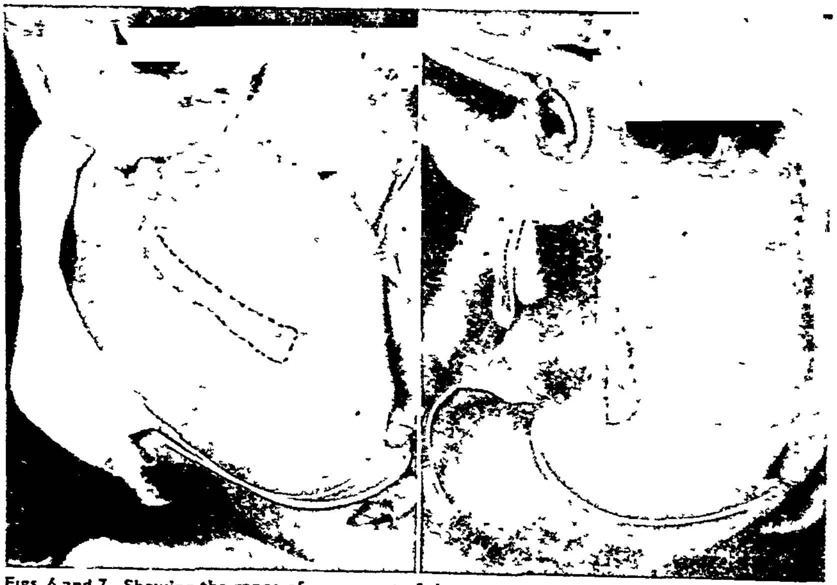
As Annersten says, "symptoms of brachial plexus compression used to be regarded as due to a cervical rib." Then Adson and Coffey suggested that the action of the scalenus anticus was all-important, and the expression "scalenous-anticus syndrome" was introduced. If this muscle is capable of producing the syndrome it is hardly surprising that symptoms should develop since—as Walshe et al. (1944) point out—being an extra-respiratory muscle, it contracts about 23,000 times in 24 hours. Other workers, too, attribute to the muscle a major rôle in symptoms of compression of the plexus: Ochsner et al. (1935) suggest that its overaction irritates the nerve supply, throwing the muscle into spasm and thus leading to further compression; they quote Naffziger as claiming that spasm of the muscle causes pressure on structures behind it; Donald and Morton (1940) state that in most of 40 cases of brachial plexus compression, they found the muscle to be sclerotic and hypertrophied; some authors declare the hypertrophy to be three to four times normal; Eden (1939) discovered fibrous bands in the region of the scalenus anticus. The occurrence of these latter I can myself confirm, but I regard the theory of hypertrophy, apart from general muscularity, as exaggerated.

All this may be true, but, whether the muscle is hypertrophied or normal, I cannot see why symptoms should be produced unless there is something abnormal behind the plexus or subclavian artery against which the extra-respiratory action of the scalenus anticus can compress these structures; such abnormalities are cervical rib, abnormal 1st thoracic rib, fibrous inner border of scalenus medius, or the normal dropping of the thoracic inlet almost constant in women after the menopause. For these reasons, scalenectomy is effective.

Costoclavicular Syndrome

There still remains a group of patients suffering a variety of symptoms which, in the absence of something more definite, have been ascribed to actual nipping of the plexus or artery, or both, between the clavicle and the 1st thoracic rib. The following are examples:

1. During the recent war it was not uncommon to find certain young recruits who could not wear the Army pack without gross discomfort in the arms. That the complaint was genuine was confirmed by the observation that the hands became congested, cyanosed, and benumbed, and the arms became useless, so that they had to be helped off with their pack, after which they quickly recovered. These men were usually slightly built, often of the weedy type, with sloping shoulders and what has been termed "bottle neck" (fig. 5). When one examined the supraclavicular space "things felt superficial" and one could almost palpate the 1st thoracic rib. I have no doubt that the broad straps of



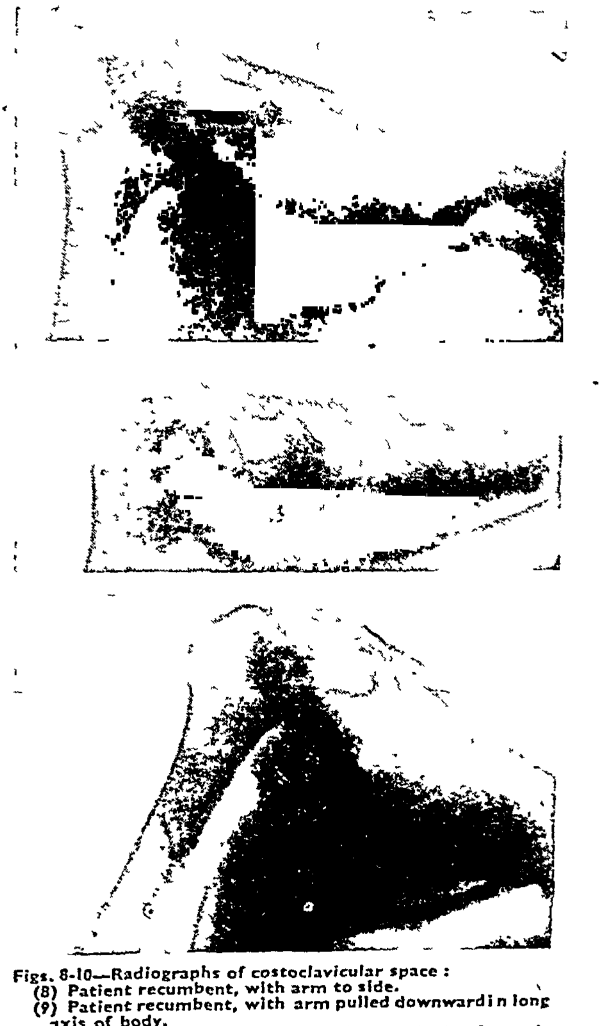
Figs. 6 and 7—Showing the range of movement of the outer end of the clavicle between forward and backward movements of the shoulder girdle.

the pack actually pressed the plexus against the rib, and the clavicle against the subclavian artery and vein. I saw two young men who developed anæsthesia of little and ring fingers and mild wasting of the interosseous muscles; and the condition became known in our unit as "pack palsy." After several weeks of Army food, outdoor life, and shoulder-muscle exercises, these cases were able to tolerate their packs.

2. Walshe (1945), during the war, called attention to the development of numbness, tingling, and uselessness of the fingers in women obliged to do their own housework and shopping. It was common enough in pre-war days among washerwomen and charwomen, and was often called neuritis. But during the war, some housewives, normally accustomed to domestic help and the services of errand boys, had to take on these labours themselves, often standing with heavy baskets in food queues after nights of fitful sleep interrupted by air-raids. He attributed the disorder to falling of the shoulders—*the result of fatigue and loss of muscle tone*—and a consequent nipping of structures between clavicle and rib; and he called it "acroparæsthesia."

3. Pommerenke and Risteen (1944) published 4 cases of pain and weakness of the hand resulting from patients being changed during operation from the flat to the Trendelenburg position, the shoulder-pieces being rather hurriedly applied; and 2 similar cases occurred in my own hospital.†

4. I know of a rowing man who has been troubled in recent years because he finds that he develops Raynaud-like phenomena in both hands after rowing about half a mile. There are no cervical ribs: may this from athletic hypertrophy of muscles?



Figs. 8-10—Radiographs of costoclavicular space:
(8) Patient recumbent, with arm to side.
(9) Patient recumbent, with arm pulled downward in long axis of body.
(10) Patient recumbent, with shoulder actively elevated.

There is no doubt that the general conformation the thoracic inlet, together with its relation to clavicle, determines whether certain circumstan e.g., change of occupation, decline in health, fatigue, an age-change—lead to pulling, kinking, or nipping of som part of the brachial plexus or subclavian vessels. In 1943 d'Abreu published a significant case of a girl, 29 years old, with an enlarged 7th cervical transverse process on the right side and a cervical rib on the left. These were symptomless, until a right-sided thoracoplasty was performed for phthisis of the right lung Three years later she developed vascular and nervous symptoms typical of those of cervical rib. d'Abreu *suggests that this was brought about by the artificial* falling of the shoulder after the thoracoplasty. The adoption by man of the upright position has inevitably been blamed by several authors, including Russell Hugo Patterson (1940), and recently Lambert Rogers (1949).

Telford and Mottershead (1947) have studied in students the effect on the radial pulse of various movements of the arm. Morrissey, of my department, has repeated these experiments, obtaining almost the same results:

(*a*) Almost any muscular man can obliterate his radial pulse by active adduction of the arm against the trunk.

(*b*) The action of retraction (bracing of the shoulders)—the same action as that used in rowing—obliterates the pulse in over 60% of normal men and women.

(*c*) Active abduction with extension diminishes or obliterates the pulse in about 50% of normal people.

(*d*) The important part of Adson's test is the deep inspiration after turning the extended head to the affected side, *thus causing the scalenus-anticus muscle to contract.* Indeed, the mere act of holding the breath in inspiration will, in some subjects, obliterate the pulse.

Figs. 8–10 show how the angle between the clavicle and the 1st thoracic rib or cervical rib varies with different movements: and figs. 6 and 7 show the wide range of movements of the outer end of the clavicle. We have also observed on the dissected cadaver the effect on the costoclavicular space of forceful downward pull of the arm—as happens when a heavy weight is carried with the arm by the side. The movement of the clavicle is more than a simple downward displacement, which would approximate clavicle and rib: the clavicle also rotates forwards, thus falling away from the rib and thereby widening the costoclavicular space. In retraction of the shoulder the clavicle not only moves backwards, radially on the sternoclavicular joint, but also rotates axially in a counter-clockwise direction, thus further approximating itself to the rib.

DIFFERENTIAL DIAGNOSES

In summary it can be said that pain or discomfort in the upper limb may be brought about by a number of factors operating in the costoclavicular space:

1. Cervical rib or band; and particularly the bony prominence produced by the type of rib which articulates with the scalene tubercle of 1st thoracic rib.
2. *Enlarged 7th cervical* transverse process.
3. Fibrous inner edge of scalenus medius.
4. Abnormal 1st thoracic rib.
5. The scalenus anticus muscle certainly plays a part, but it is the presence of some other abnormality behind it that enables it to do so.
6. (*a*) *The level to which* the subclavian artery rises in the neck; (*b*) the exact make-up of the brachial plexus; (*c*) the distribution of sympathetic fibres in the plexus; (*d*) the natural slope of the shoulders—the "bottle necked" folk.
7. Anatomical changes: (*a*) fatigue and general atonia of muscles; (*b*) unaccustomed exercise and weight-bearing, as in young recruits; (*c*) the natural falling of the thoracic inlet in women at about the age of 40.

Some other conditions which have to be considered when making the differential diagnosis can usually be ecognised by full clinical examination and investigation. They are:

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† Since this lecture was given, two more papers on this subject have appeared, by M. R. Ewing and by L. G. Kiloh (*Lancet*, Jan. 21). They suggest that the Trendelenberg position, abduction of the arm, and curare are especially responsible

(a) Osteo-arthritis of cervical spine.
(b) Fibrositis of neck muscles.
(c) Retropulsed cervical disc.
(d) Cervical spinal cord tumour, progressive muscular atrophy or syringomyelia.
(e) Osteo-arthritis or rheumatoid arthritis of shoulder or acromioclavicular joints.
(f) Subacromial bursitis.
(g) Raynaud's disease.
(h) Other peripheral vascular disease.
(i) Brachial neuritis.
(j) Tardy ulnar palsy.

Finally, it must be appreciated that a cervical rib may cause no symptoms at all; but, as a corollary, that in addition to a cervical rib, there may be present other lesions capable of producing discomfort in the arm. For instance, during the past year I have had one patient with cervical rib suffering from ulnar-nerve phenomena in the hand of the same side, yet at the same time having rheumatoid arthritis in the same shoulder; and a second case with cervical rib, osteo-arthritis of the cervical spine, and fibrositis of the neck muscles. Such cases must be particularly carefully assessed, and trials of the effect of treatment applied to such conditions as arthritis and fibrositis may succeed in deciding whether or not the abnormal rib plays any part.

TREATMENT

Where a cervical rib is associated with signs and symptoms of ulnar-nerve involvement in the hand, there is no doubt that in the absence of lesions outside the costoclavicular space, exposure of the subclavian artery, brachial plexus, and the rib should be undertaken. Operation should certainly be advised when the subclavian artery is pushed forward by the rib and seen as a large pulsating prominence just above the clavicle, since, though aneurysm is uncommon, it may develop. Much more important in these cases is the risk of vasospastic symptoms in the hand, and even of sudden thrombosis of the main artery.

In cases of clear-cut ulnar-nerve involvement without a true cervical rib but with an elongated transverse process of the 7th cervical vertebra, I think the region should be explored, since there is likely to be a tight edge-like band in the inner border of the scalenus-medius muscle against which the more anterior scalene is pressing some part of the plexus or, when it is highly arched, the subclavian artery. I am again supposing that investigation has failed to discover any of the extracostoclavicular-space lesions mentioned under differential diagnosis.

For all the remainder—that is to say, those patients complaining of vaguer and more widespread discomforts, whether associated with cervical rib or elongated 7th cervical transverse process or not—I believe the correct procedure is to prescribe shoulder-shrugging exercises and to support the affected arm in a sling so as to widen the angle between the clavicle and the thoracic inlet. It may be necessary for the really fatigued patient to commence treatment by complete bed rest for a week, and to build up her general health by tonics and diet. If no improvement follows in four to six weeks' time, I believe that it is justifiable to explore the costoclavicular space.

OPERATION

Details of operation are well described in all books on operative surgery. The important thing is to see that the inner cord and the artery both lie free from kinking or stretching by a sharp edge, be it cervical rib or inner border of scalenus medius. A necessary preliminary is to cut the anterior scalene muscle, after which the structures under review can be fully explored. In order to give the best exposure the patient's head is usually extended and turned to the opposite side, and the arm is drawn downwards in order to depress the clavicle. This position inevitably puts the anterior scalene on the stretch, and it may be this fact that has misled some into speaking of spasm of that muscle: at any rate, the position exaggerates the part played by it. Having severed the muscle, as much of the cervical rib is removed as is necessary to leave the cord or artery quite free; or, where there is a sharp edge to the scalenus medius, this is excised. Careful hæmostasis is essential, since hæmatoma is very liable to develop, and its subsequent organisation may result in adhesions in the space. For this reason, it is wise to employ a glove drain for the first 48 hours.

PROGNOSIS

Cases of cervical rib or band, or of scalenus-medius band, accompanied by pain and motor or sensory changes in the ulnar distribution in the hand, or of vascular phenomena, are usually relieved of their pain immediately. Paralysis and sensory change cease to progress, but recovery is incomplete. Vascular phenomena are also usually immediately relieved. The vague discomforts of the "costoclavicular" group are relieved by physiotherapy in about half the cases, and scalenectomy or severance of a band cures about half of the remainder.

I am grateful to Dr. O. Smith for the radiographs, and to Mr. Dee, of the photographic department, for the reproductions.

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COMPLICATIONS OF ULCERATIVE COLITIS

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Ulcerative colitis presents formidable problems in management to physician and surgeon alike. Its many and varied complications add further to these difficulties. These complications have been described by Bargen (1929) in 693 cases at the Mayo Clinic, and since then by Hurst (1935), Streicher (1938), Willard et al. (1938), Jackman et al. (1940), and Ricketts and Palmer (1946).

An account is given here of the complications encountered in 129 patients admitted to the Radcliffe Infirmary, Oxford, in the eleven years 1938–48. Though small compared with some of the American series, this seems to be the largest number of cases so far described from one hospital in England, and the disease seems to be commoner in the Oxford area than in many other regions.

The complications found were as follows:

Complication	*No. of cases*	*Incidence %*
Cutaneous lesions	12	9·3
Arthritis	7	5·4
Stricture	7	5·4
Fæcal fistulæ	5	3·9
Carcinoma of colon or rectum	4	3·1
Perforation	4	3·1
Stomal ulcers	4	3·1
Perirectal abscess	2	1·5
Conjunctivitis	2	1·5
Prolapsed rectum	1	0·8
Biliary cirrhosis	1	0·8
Suprarenal hæmorrhage	1	0·8

CUTANEOUS LESIONS AND ARTHRITIS

A striking feature of the present series is the high incidence of skin and joint lesions, often occurring together. Bargen (1929) reported skin lesions in 2·5% and arthritis in 4% of his 693 cases. Hurst (1935) reported an incidence of 2·5% for both types of lesion in his 40 cases, and in the series of Willard et al. (1938) there were no skin lesions but 5 of the 63 patients developed arthritis. Ricketts and Palmer (1946) reported an incidence of 10% for surface lesions of skin and mucosa in 206 cases, but further analysis shows that less than half of these lesions were definitely associated with the ulcerative colitis.

We think it worth while to draw attention to these complications, both because they were often troublesome and because in some cases they had obscured the diagnosis before admission.

The types of skin rash were as follows:

Lesion	*No. of cases*
Erythema nodosum (3 with arthritis)	4
Erythematous rashes	2
Pustular rashes (1 with arthritis)	3
Purpura (with arthritis)	1
Ulceration of legs (with arthritis)	1
Urticarial rash	1

In 5 cases they were minor, transient, and, since all coincided with exacerbations of colitis, were largely overshadowed by the diarrhœa. In the remaining 7 cases, on the other hand, they appeared as major episodes, being accompanied by arthritis in 5 cases which will be described in detail.

Erythema Nodosum

Case 1.—A girl, aged 16, was first admitted in May, 1940, with six months' history of diarrhœa with blood and mucus in the stools. On admission she was pale and looked ill. Hb 48%. A barium enema showed loss of haustration in the distal colon, and sigmoidoscopy revealed changes characteristic of ulcerative colitis. There was some improvement in the patient's condition during the next five months, but in October, 1940, her temperature went up again and the diarrhœa became worse. A few days later she developed erythema nodosum on both shins, with pain and swelling of the right elbow and wrist. These passed off in the next month, but after a further month she had a second crop of erythema nodosum. She was finally discharged, still passing blood and mucus in her stools, in January, 1941.

In April, 1947, she was readmitted in another exacerbation, which had started three weeks previously. She again developed erythema nodosum affecting the hands, forearms, and legs, with pain and swelling of both knee-joints. The rash faded during the next week, but the relapse continued for another six weeks.

Case 2.—A woman, aged 21, first admitted in August, 1943, had had seven weeks of diarrhœa with blood and mucus in the stools in 1940 and further attacks in 1941 and 1942. When admitted in 1943 she was in a severe relapse, and an ileostomy was performed. The immediate result was satisfactory, but she continued to have relapses, and colectomy was advised but refused. She was readmitted in March, 1945, and May, 1946.

Her fourth admission was in October, 1946. Three weeks before, she had noticed a small red tender nodule over the left tibial tubercle, after which first her right and then her left ankle became swollen and painful. Ten days later the joint swellings had begun to subside, but five days before admission her left knee had become involved. On admission she had a temperature of 102°F, and shortly afterwards tender erythem tous nodules appeared on the dorsal aspect of both feet an the left shin. In the next fortnight the fever settled and th joint swellings subsided. The nodules turned bluish, and th was scaling of the overlying epidermis.

The patient has had numerous relapses since but with any great constitutional disturbance, and there has been n recurrence of the arthritis or skin lesions.

Case 3.—A woman, aged 39, admitted in April, 1940, h had diarrhœa since 1922. In 1925 she had been admitted t hospital in France with the diarrhœa and a rash; typhoid fever was diagnosed and she was in bed many weeks. The diarrhœa had continued. Two months before admission red hard tender non-irritating lumps had appeared on both her legs and hands. The lesions came in three successive crops, each crop going away without breaking down or leaving any scars. Accompanying the rash she had pain and swelling in the ankles, knees, fingers, wrists, and elbows, and fever. Her doctor had diagnosed rheumatic erythema. Her stools had increased in frequency and become offensive. By the time of admission her skin lesions had almost completely cleared, but the diagnosis of ulcerative colitis was confirmed by barium enema and sigmoidoscopy.

Case 4.—A woman, aged 67, was first admitted in November, 1944. In 1931 and 1937 she had had two short attacks of diarrhœa, with blood and mucus in the stools, lasting two and four weeks. In August, 1944, she again developed diarrhœa with blood and mucus in the stools. The diarrhœa continued, and a week before admission she developed red shiny slightly raised painless nodules round the knees. On the day of admission she noticed two small similar nodules on her right upper arm and left wrist. Some of these nodules had a slightly purplish discoloration, and the largest ones were tender on palpation. During the next month her diarrhœa improved and the rash on her legs vanished.

In January, 1947, she had another relapse and developed similar lesions. This time she went rapidly downhill and died in a month.

Bargen (1929) has commented on the simultaneous appearance of erythema nodosum and arthritis in several of his cases. Brooke (1933) reported the case of a woman of 23, who, during a relapse of ulcerative colitis, developed on her shins and arms lesions resembling erythema nodosum which finally broke down; the lesions cleared as the diarrhœa improved but recurred during the next relapse. Elitzak and Widerman (1941) have described 3 cases of erythema nodosum in 23 children with ulcerative colitis. The lesions differed from the form ordinarily described in that they appeared in successive crops for several weeks. Jackman et al. (1940) have reported erythema nodosum in 9 out of 871 patients with ulcerative colitis (1%), including 95 children.

The 4 cases which we have described were all in females, and in 3 of them joint swellings accompanied the skin lesions. The lesions all tended to appear in crops, and in 2 cases bluish discoloration was observed as they faded. None of the lesions broke down, though in one case the overlying epidermis scaled. In case 3 a previous exacerbation of diarrhœa fifteen years earlier, accompanied by a rash, had been diagnosed as typhoid—it is not known whether this diagnosis was correct. The skin and joint lesions accompanying the exacerbation for which she was admitted had been diagnosed as rheumatic by her own doctor. Since similar skin lesions occur as toxic eruptions in sulphonamide therapy, particularly with sulphathiazole, it should be mentioned that the appearance of the lesions could not be related to sulphonamide therapy in any of these cases.

As regards ætiology, all the lesions developed during an exacerbation of ulcerative colitis and were accompanied by fever. They were evidently a manifestation of the toxæmia and may well have been an allergic response to toxins present in the bowel, comparable to the production of erythema nodosum in primary tuberculous and streptococcal infections. It would be interesting to try the effect of the anti-histamine drugs on the lesions, but an opportunity has not yet arisen.

Ulcers of Leg and Arthritis

Case 5.—A man, aged 29, was first admitted in May, 1944. Attacks of diarrhœa had started in 1931, when he was 15½. The first attack had lasted three months. In 1935, in the third attack, the patient had had severe pain and swelling in the knees and ankles, and the arthritis had recurred in subsequent relapses. Since 1942 the relapses had been accompanied by ulcers on the ankles and feet.

When he was examined in May, 1944, he had an ulcer 1½ × ¾ in. and about ⅛ in. deep on his right foot just above the internal malleolus, blisters on the inner border of his right foot and on the sole of his left foot, and an inflamed area along the inner border of his left foot. Ankle movements were painful, and the right knee was swollen. His diarrhœa was severe and he was at times incontinent. During the next two months his diarrhœa improved and the ulcers almost healed. In August, 1944, while still in hospital, he had another exacerbation of diarrhœa and then developed a deep reddish-purple blister, ½ in. in diameter, just above the left internal malleolus. During the next two months the diarrhœa again improved and the skin lesions healed.

In April, 1945, he had another relapse, with recurrence of arthritis and ulceration of the feet. He was readmitted in July, 1945, when the relapse was almost over. At that time there were healing areas of ulceration just below the right external malleolus and on the dorsum and plantar surface of the left foot.

Ulceration of the legs during exacerbations of chronic ulcerative colitis have been described by Leishman (1949) and Butler (1948) in this country and by Jankelson and Massell (1936) and Felson (1941) in America. It is interesting to note that in case 5 arthritis began to complicate exacerbations of the diarrhœa many years before the skin lesions appeared, and that afterwards they appeared concurrently. In contrast to the cases of erythema nodosum, since this man's skin lesions were all confined to the feet, it is probable that, in addition to toxæmia, lowered skin resistance, perhaps secondary to vitamin deficiency, and repeated trauma were partly responsible for their production. It is significant that the most indolent ulcer on his right foot was at the site of a scar of a "cut down" for blood-transfusion, where the skin would be devitalised and particularly susceptible to infection.

Case 6.—A woman, aged 42, was admitted in June, 1943. Diarrhœa with blood and mucus in the stools had started in November, 1939. After fourteen weeks in the Royal Berkshire Hospital she had improved considerably but had continued to have four or five stools daily. In May, 1941, she had noticed that her legs felt heavy and swollen, with lots of little "bruisy spots like pinpricks." These had disappeared after four days, but in July, 1941, they had recurred and spread to her arms and back. The purpuric eruption was accompanied by pain and swelling of the knees, ankles, and right elbow, and at the same time her diarrhœa was worse, her bowels being opened 6–7 times daily. She had again been admitted to the Royal Berkshire Hospital, and the skin and joint lesions had cleared. In May, 1942, she had had another recurrence of the purpura on her face and trunk and her face had become so swollen that for four days she could not open her eyes. Purpuric hæmorrhages had continued to appear during the next two months, and her diarrhœa had been worse.

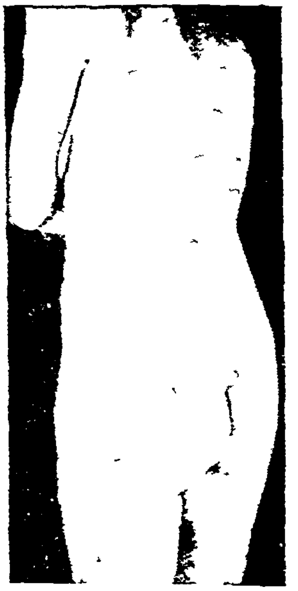

Fig. 1—Large ecchymosis on left chest and buttocks in a patient (case 6) with ulcerative colitis.

In June, 1943, her knees had become swollen and painful, and within twenty-four hours her shoulders and left elbow had also become involved. Two days later, bluish areas, at first the size of a shilling, had appeared on her trunk and limbs, and the joint swellings had subsided. The hæmorrhagic areas had become confluent, almost completely encircling her trunk and limbs. On her admission a few days later there were some recent purpuric spots on her forearms and hands, and brown stains of old outcrops were visible elsewhere on her body. On the back of her chest on the left side was a large ecchymosis 9 × 6 in., and there were similar ecchymoses over the buttocks and behind the left knee (fig. 1). The bleeding-time, coagulation-time, and platelet-count were all normal. A barium enema showed general loss of haustration, and proctoscopy a diffusely inflamed rectum. An atypical coliform organism was grown from her stools, and on injection into her arm this produced a profuse purpuric eruption. She was desensitised with a vaccine prepared from this organism, and her lesions cleared in the next three months.

In this case it will be noted that (1) the diarrhœa preceded the purpura by 1½ years; (2) the purpura and exacerbations of diarrhœa showed a seasonal incidence, beginning always in the early summer: and (3) the bleeding-time and platelet-count were normal, while the radiological and proctoscopic changes were those of ulcerative colitis. The purpura and arthritis were evidently an allergic reaction, and the question arises whether ulceration of the colon was another manifestation of this reaction or was the source of the antigen giving rise to it. It might be argued that the bowel changes producing bloody diarrhœa were due to purpura of the Henoch's type, and that a diagnosis of ulcerative colitis was unjustified. We feel, however, that the duration of the diarrhœa before the purpura appeared and the loss of haustration seen after the barium enema justify the diagnosis. Moreover, the fact that an organism isolated from the bowel could on injection produce a profuse purpuric eruption is evidence in favour of the colon being the source of the antigen sensitisation which gave rise to the purpura and arthritis. On the other hand, the seasonal incidence of the purpura and of the later exacerbations of the diarrhœa suggest rather that both symptoms were an allergic response to some separate antigen; those who believe that ulcerative colitis is an allergic disease will favour this view.

Generalised Exfoliative Erythema

Case 7.—A woman, aged 43, was admitted in February, 1944, with three months' history of severe diarrhœa with blood and mucus in the stools. Two weeks before admission she had developed a diffuse erythema on her trunk and limbs, most marked on the flexor surfaces. On admission the skin of her trunk was exfoliating, her general condition was poor, pulse-rate 106 per min., blood-pressure 80/60 mm. Hg, and she was mentally apathetic. Plasma-vitamin A and plasma-carotene levels were 54 I.U. and 27 I.U. per 100 ml.—both very low. The patient went rapidly downhill and died a week later. Necropsy showed gross ragged ulcerative colitis throughout the large intestine, and the sigmoid colon had ruptured in several places.

Unlike the other cases so far described, this woman's rash developed in the acute fulminating type of ulcerative colitis, and she died within three months of its onset. There was clear evidence of gross vitamin deficiency, and the rash was probably pellagrous.

OTHER COMPLICATIONS

Rectal Stricture

In all the 7 cases of rectal stricture this was severe and not just a narrowing of the colon such as is often seen after a barium enema in ulcerative colitis. In 4 cases the stricture was rectal, in 2 at the pelvirectal junction, and in 1 there were multiple strictures of the colon. In all 7 patients the colitis was of long standing, the average duration up to the discovery of the stricture being eleven years. In 4 cases the stricture was treated either by colostomy or ileostomy. In 2 cases it was found that a carcinoma had supervened on a chronic fibrous stricture. In 2 cases a stricture developed in

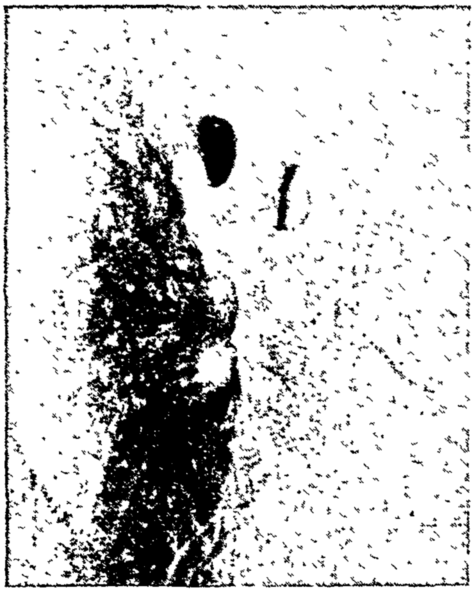

Fig. 2—Two fistulæ-in-ano in a patient with ulcerative colitis. Note absence of granulation tissue round the edges and of any tendency to heal.

the rectum after colostomy had been done for fæcal fistulæ.

Fæcal Fistulæ and Perirectal Abscess

Fistulæ proved a troublesome complication in 5 cases. There was a complete lack of any tendency to heal (fig. 2), and all required operation. In 4 cases the opening was perianal, and 2 of these had an ileostomy and 2 a colostomy; in 1 case colectomy was done later because discharge from the fistula continued after the first operation.

In the 5th case the fistula was abdominal in the vicinity of the left anterior superior iliac spine and communicated with the descending colon. Colectomy of the descending colon and splenic flexure was done and this fistula healed. Later the patient developed a rectovaginal fistula, and a colostomy was done in another hospital. When the patient was readmitted to the Radcliffe Infirmary two years later this fistula had also healed, but the rectal stricture already mentioned was found.

Ischiorectal abscesses developed without fistulæ in 2 further cases, both after ileostomy, done in one case as an emergency procedure in acute fulminating colitis, and in the other for rectal stricture. Both patients died.

Carcinoma of Colon and Rectum

Carcinoma is a recognised complication of ulcerative colitis, and the published reports have been reviewed by Lynn (1945), Johnson and Orr (1948), and THE LANCET (1950). The incidence in different series varies from 1·3 to 6·3%, the general incidence being about 2·5%, which is in close accord with our figure. Taking 40 cases of which there was a record, Johnson and Orr found that the ages of the patients developing carcinoma ranged from 18 to 69 years, with an average of 40·2 years, whereas the average age at which carcinoma of the colon of all kinds develops is 53. In our series the average age of the 4 cases was 37 years. The average duration of the disease before the development of carcinoma was estimated by Cattell and Sachs (1948) as nine years; in our series it was seven years.

Perforation

Perforation is a severe and generally fatal complication occurring in the most acute type of ulcerative colitis. It occurred in 3% of Bargen's (1929) cases, and 3·4% of those of Ricketts and Palmer (1946). In 3 of the 4 cases in our series it was a terminal event, but the 4th patient was saved by an ileostomy and suture of the perforation, and he is still alive. The duration of the disease before perforation was three months, four month and eighteen months in the fatal cases, and eighte months in the patient who survived. It is peculiarl difficult to diagnose, because it develops in a severel ill patient and is not accompanied by the dramat symptoms and signs which attend perforation at othe times.

Ulcers in the Mouth

Buccal ulceration was noted in 4 patients and caus great discomfort. In 2 cases the ulcers appeared durin relapses which were sufficiently severe for ileostomy t be carried out; in both cases the operation was successful and the ulcers healed soon afterwards. In the other 2 patients the ulcers also appeared during a bad relapse with fever and considerable constitutional disturbance In 1 of these cases, which occurred in the early days of penicillin, when it was still scarce, the stomal ulcer had been one of the most distressing features of the patient's illness for two months, but they cleared in a week after a course of systemic penicillin. In another relapse four years later the same patient developed an ulcer in her mouth while on penicillin, but it healed in two or three weeks. This seems to indicate that, though infection keeps these ulcers going once they have started, it is not the primary cause.

Conjunctivitis

Conjunctivitis occurred in 2 cases in several relapses, with skin lesions at the same time. Iritis or uveitis was noted in 5 of Bargen's (1929) cases, always with one or more other complications.

Rectal Prolapse

Prolapse occurred in 1 case in which ulcerative colitis had been present for more than ten years. It was associated with considerable spasm of the anal sphincter, and during relapses became sore and painful. The patient has had no further serious relapses since 1945 and, though he still has a slight prolapse, it does not trouble him and no operation has been necessary.

Biliary Cirrhosis

Hepatic cirrhosis was found in only 1 case—a patient of only 14 with no previous history of jaundice.

The patient was a boy of 14 in whom the colitis ran a particularly severe course, for he died seven weeks from its onset. For the last two weeks he was vomiting. Clinically the liver edge was palpable and hard, but there was no splenic enlargement.

At necropsy the liver was enlarged, weighing 1498 g., and of wooden consistence. There was well-marked fibrosis of the whole organ, with areas of hyperplastic liver tissue between the strands of connective tissue. The spleen showed an excess of fibrous tissue and weighed 294 g. Histologically the liver showed severe biliary cirrhosis, and the spleen a diffuse fibrosis throughout. The changes in the colon were those of severe ulcerative colitis, extending from the cæcum to the anus.

This single case may be considered a chance association, but cirrhosis as a complication of ulcerative colitis has been mentioned several times in published reports; in some of the cases, however, there were other possible causes for it. Thus Comfort et al. (1938) have reported 4 cases of long-standing ulcerative colitis associated with hepatic insufficiency, and Tumen et al. (1947) have described, in 151 cases of ulcerative colitis, 5 cases in which there was definite liver disease. In 4 of these the hepatitis was considered to be a complication of the colitis; in the 5th patient there was a previous history of alcoholism and dietary insufficiency in addition, which made it difficult to ascertain the prime cause. Two of these patients died within 16–22 months from the onset of the disease. In 2 other cases the disease was of the chronic continuous type, and in 1 other it was mild and intermittent. Ross and Swarts (1948) have observed 2 cases of jaundice and cirrhosis associated with ulcerative olitis. In one the patient became jaundiced two years fter the onset of diarrhœa and died five years later of iver failure, a nodular cirrhosis being found at necropsy. The other patient became jaundiced nine years after the nset of the ulcerative colitis and at laparotomy was ound to have cholecystitis and cholangitis, which may well have been responsible for the cirrhosis.

The importance of nutritional deficiency, especially protein deficiency, as a factor contributing towards liver disease is now fully realised. In ulcerative colitis loss of protein takes place in several ways. Large quantities of blood and mucus may be passed in the stools, and intestinal hurry may lead to impaired absorption. In severe cases there may be poor appetite and vomiting, as in the patient we have described, with the result that protein intake is reduced. Thus it is to be expected that the liver will become vulnerable; and in view of the severe toxæmia so often present it is surprising that liver damage is not a more common finding in ulcerative colitis.

Suprarenal Hæmorrhage

Hæmorrhage into the suprarenal gland developed in a particularly severe case, the patient dying in a month from the onset of the colitis.

At necropsy, ante-mortem thrombi were found in both suprarenal veins. Both suprarenal glands were moderately enlarged and very firm and tense, with bright-red blood on the external surface. On the cut surface there were numerous small triangular areas of hæmorrhage with their bases against the capsule, each measuring about 0·2–0·3 cm. in diameter. In the thicker part of the gland, where the pattern was more complicated, there appeared to have been a more generalised hæmorrhagic lesion.

This case suggests that suprarenal damage may be a factor contributing towards the dehydration and extremely rapid loss of weight often seen in the severe fulminating type of ulcerative colitis, and that cortical extract might be a useful adjunct to treatment.

Polyposis

The absence of a single case of polyposis in the colon presents a curious anomaly, for this almost invariably heads the list of complications in other series—e.g., Bargen (1929) 10%, Hurst (1935) 12·5%, and Jackman et al. (1940) 16·2%. The explanation may partly be that polyposis is primarily a sigmoidoscopic diagnosis and is present in long-standing cases. Though sigmoidoscopy was done at some time or other in almost all our cases, it was not done as a routine in the follow-up period. Nevertheless many patients were sigmoidoscoped at a stage when ulcerative colitis had been in progress for some years, and the absence of polypoidal changes must be regarded as unusual. Since closing this series we have personally observed 2 classical cases.

SUMMARY

The complications developing in 129 cases of ulcerative colitis are described.

Attention is drawn to the high incidence of skin and joint lesions, usually coincident. Seven of these cases are described in detail and the possible ætiological factors briefly discussed.

Four patients developed carcinoma of the colon or rectum, their average age being 37, compared with the average age of 53 at which carcinoma of the colon usually develops.

We wish to thank Prof. L. J. Witts and the physicians of the Radcliffe Infirmary, for permission to publish their cases, and Dr. F. G. Hobson for helpful criticism.

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CHLORAMPHENICOL IN TYPHOID FEVER

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IN the outbreak of typhoid fever at Crowthorne, Berkshire, in the spring of 1949, some of the cases were admitted to the Victoria Infectious Diseases Hospital, Winchester. Through the coöperation of Dr. W. H. Bradley, senior medical officer, Ministry of Health, a supply of chloramphenicol was provided for the treatment of these patients. This was the first opportunity in this country of giving chloramphenicol under controlled conditions in typhoid fever. This antibiotic, which was originally obtained from cultures of *Streptomyces venezuelæ*, is now also prepared synthetically. It was first used successfully in scrub-typhus, but a chance observation by Smadel (Woodward et al. 1948) showed that it also possessed a specific therapeutic action in typhoid fever.

A total of 13 patients were admitted to hospital in Winchester, all being confirmed cases of typhoid fever. At first only enough chloramphenicol was available for treating 6 cases, so on Dr. Bradley's advice (Bradley 1949) the patients were divided into two groups: 6 (A, D, G, H, I, and J) to receive chloramphenicol, and 7 (B, C, E, F, K, L, and M) to act as controls. In the selection of patients for treatment a strict alternate-case method was adopted, no consideration being given to age, sex, date of onset, history of previous immunisation, or severity of illness. Later, however, when the chloramphenicol had proved its usefulness and was more plentiful, 3 of the control patients (F, K, and L), who had relapsed and were causing anxiety, were given the drug. The nursing and management were similar for all 13 patients.

The patients were admitted to hospital between May 2 and 4, 1949, between the 8th and 14th days of their disease. Specimens of fæces and urine were cultured daily, and blood-cultures and agglutinin estimations were made at intervals. Before the start of treatment positive stool-cultures had been obtained from all 13 patients, and all belonged to Vi-phage type E.1. Routine blood-cultures were not taken until after treatment had begun. Administration of chloramphenicol to the 6 selected patients began on the evening of May 5, when they were on average at the 13th day of disease. Further details of these cases are given in table I.

DOSAGE

Treatment was given, on the lines suggested by Woodward et al. (1948), for eight days, 4 g. being given in the first hour and followed by 0·25 g. two-hourly

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TABLE I—DETAILS AND RESULTS IN 6 PATIENTS RECEIVING CHLORAMPHENICOL AND IN 7 CONTROLS. SIX REL (THREE IN EACH GROUP) WERE ALSO TREATED WITH CHLORAMPHENICOL

Case	Sex and age (yr.)	Admitted on: Date	Admitted on: Day of disease	Days of treatment*	Total dosage (g.)	Temp. normal*	Relapse*	Discharge*	Remarks
				TREATED CASES					
A	M 18	May 3	13th	15th–23rd	22·0	19th	Indefinite. 38th–43rd	73rd	Not immunised. Severe case. Strik clinical improvement. Recovery u eventful.
D	F 24	May 3	10th	12th–20th 61st–72nd†	19·25 26·25	14th	—	83rd	Immunised 1942. Mild case. Strik clinical improvement. Second cour ineffectual in clearing stools. † Chron carrier.
G	F 35	May 2	8th	11th–19th	19·25	13th	—	58th	Not immunised. Mild case. Striking clini improvement. Recovery uneventful.
H	M 14	May 2	11th	14th–22nd	22·0	18th	—	61st	Not immunised. Severe case. Striki clinical improvement.
I	M 15	May 2	11th	14th–22nd 38th–46th†	21·5 18·75	17th 39th	35th	64th	Not immunised. Severe case. Striki clinical improvement after first cours Full clinical relapse responded rapidly t *second course.*
J	M 53	May 2	12th	15th–23rd 34th–43rd†	20·5 21·5	17th 36th	33rd	65th	Not immunised. Severe case. Striking *clinical improvement followed by relapse* Excellent response to second course.
				CONTROL CASES					
B	M 40	May 3	14th	—	—	20th	—	69th	Not immunised. Severe case. Progress slow, *toxic effects very persistent.*
C	M 29	May 3	11th	—	—	18th	—	60th	Immunised 1939–45. Mild *case, few toxic symptoms.*
E	F 56	May 3	13th	—	—	21st	—	72nd	Not immunised. Mild case, few clinical symptoms.
F	F 40	May 2	8th	— 33rd–41st†	— 18·25	18th 36th	23rd	82nd	Not immunised. Severe case. Striking clinical improvement *followed treatment* for relapse.
K	M 40	May 2	8th	— 34th–42nd†	— 21·75	17th 37th	33rd	61st	Immunised 1939–45. Severe case. Excellent response to treatment of relapse.
L	M 56	May 2	10th	— 23rd–30th†	— 18·25	16th 28th	19th	63rd	Not immunised. Mild case. Treatment of relapse associated with sudden fall of temperature. Recovery later uneventful.
M	F 60	May 4	8th	—	—	—	—	66th	Not immunised. Ambulant case showing little evidence of active disease.

* Days of disease. † Relapse.

until the temperature was normal and thereafter four-hourly for the rest of the course. The total dosage thus differed in the various cases according to the time taken for the temperature to return to normal. The average total dosage in the 6 cases for the eight days was 20·75 g.

PROGRESS OF PATIENTS TREATED WITH CHLORAMPHENICOL

The response to chloramphenicol was similar in all cases and characteristic. Within seventy-two hours the temperature and pulse-rate had returned to normal and there was a well-marked improvement in the general condition. The toxæmia and headache were relieved, the mental outlook became brighter, appetite increased, and the patients asked for food, which they ate with obvious enjoyment. Abdominal discomfort was soon relieved, and reflexes returned where they had been absent. One or more bulky stools were passed, this being followed in most cases by formed motions as reported by Douglas (1949).

Stool-cultures.—Cultures from the stools tended to become negative during the eight-day course of chloramphenicol. This happened in 3 of 6 cases and lasted from three to six days. Stools from all these patients later became positive again. A corresponding negative period was not found in any of the 7 controls. The results of these stool-cultures are given in table II.

Urine-cultures.—Positive urine-cultures were obtained from 3 of the 6 patients just before treatment started. In each case urine-cultures became negative within forty-eight hours of the start of treatment and remained negative throughout the course. All 7 controls gave positive urinary cultures on one or more days during the same period.

Blood-cultures.—Before their admission to hospital Dr. Norman Wood, of Reading, had isolated *Salmonella typhi* from the blood of 2 of the patients who subsequently received chloramphenicol and from 1 of the controls. Further blood-cultures were made four days after the start of treatment, when all 6 patients treated with chloramphenicol were negative, as were 5 of the 7 controls. Later (see table II) 4 of the 6 treated cases and 4 of the 7 controls became positive.

Relapses.—In 3 cases (D, G, and H) clinical recovery proceeded uneventfully, but case D became a temporary excreter and may possibly become a permanent carrier. Details of her case are given below. Cases A, I, and J, whose temperatures had been within normal limits for 23, 18, and 16 days respectively, all relapsed. In cases I and J the symptoms were severe, and, since they were accompanied by a return of blood infection, it was decided to give a second course of chloramphenicol. In case A the symptoms of relapse were mild and unaccompanied by a return of blood infection; so a second course was not considered necessary.

The relapses of cases I and J on the 35th and 33rd days of disease respectively ran a similar course. There were the usual rise in temperature and pulse-rate, headache, loose stools, vomiting, and abdominal discomfort. Positive blood and stool cultures were obtained from both, and case J also had a positive urine. Treatment was on similar lines to those originally adopted, and this occasion an average dose of 20·125 g. of chlor- phenicol was given in nine and a half days. The mperatures returned to normal in about forty-two urs, compared with seventy-two hours in the original urse of treatment. One or two bulky stools were ssed, the general condition improved rapidly, and both tients made an uninterrupted clinical recovery. The ools of these patients became negative during this cond course of treatment and did not again become ositive while they remained under observation. Blood-ltures also became negative during treatment. Full etails of the progress of case I are given in the ccompanying figure, which illustrates the response to hloramphenicol of a treated case which relapsed.

PROGRESS OF CONTROLS

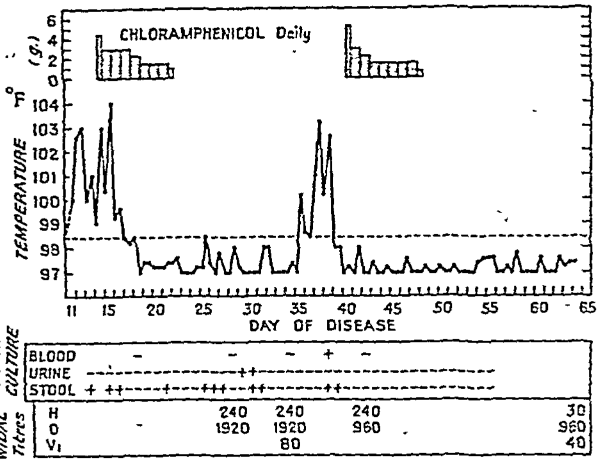
These 7 patients fall into three groups:

1. Three mild cases (C, E, and M) all of whom made an uninterrupted recovery.
2. One severe case (B).
3. Three cases (F, K, and L) who relapsed and later were given chloramphenicol. These will be referred to later.

Of the patients in group 1 little need be said, as their progress as mild cases of typhoid fever was uneventful.

The severe case in group 2, on the other hand, had the well-developed symptoms of enteric fever. When admitted on the 14th day of the disease he looked extremely ill, being toxic and feverish, with abdominal tenderness. Gradually, however, his condition improved and by the 20th day his temperature was normal. His progress was slower than had been noted in the treated cases, his headache persisted longer, his toxic state was not so quickly relieved, and his appetite and general feeling of well-being did not return so quickly. Eventually, however, he made a complete recovery.

Positive stools had been obtained from all untreated cases on their admission to hospital and these remained consistently positive throughout the whole period in which the treated group of patients were receiving chloramphenicol. This may be contrasted with the state of the treated patients, 3 out of 6 of whom, as has been mentioned, showed a temporary clearance during the time they were undergoing treatment.



Treatment, temperature, and laboratory findings in case I, showing relapse on 35th day successfully treated with a second course of chloramphenicol, begun on 38th day.

TABLE II—RESULTS OF FÆCAL AND BLOOD CULTURES

	Treated cases												Control cases													
	A		D		G		H		I		J		B		C		E		F		K		L		M	
	F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B
May 1								−		+												+				
4	+		+		+				+		−		+		+		−		+		+		+		+	
5	+		+		−		+				+		+		−		−		+		+		+		+	
6	+		+		−		−		+		+		+		+		+		−		−		+		+	
7	−		+		−		−		+		+		+		+		+		+		+		+		+	
8	−		+		−		+		−		+		+		+		−		+		+		+		+	
9	−	−	+	−	−	−	−	−	−	−	+	−	−	−	−	−	−	+	+	−	+	−	+	+	+	−
10	−		+		+		+		−		+		+		+		+		−		+		+		+	
11	+		+		−		−		−		+		+		+		+		−		+		+		+	
12	+		+		−		+		+		+		−		+		−		+		+		+		+	
13	+		+		−		−		−		+		−		+		−	+	+		+		+	−	+	
14	+		+		−		−		−		+		+		+		+		−		+	−	+	+	+	
15	+		+		−		−		−		−		+		+		+		+		−		+	+	+	
16	+		+		−		+		+		−		+		+		−		+		−		+		+	
17	−		+		+		−		−		+		+		+		−		−		+		+	+	+	
18	−		+		+		−		+		+		+		−		+		−		−		−		+	
19	+	+	−	+	+	−	+	−	−	−	+	−	+	−	+	−	−	−	−	+	+	−	+	−	+	−
20	+		+		−		+		−		+		+		−		+		−		+		+		+	
21	+		+		+		−		−		+		+		−		−		−		+		+		+	
22	+		+		+		−		−		+		+		−		−		+		+		−		−	
23	+		+		−		−		−		+		+		−		+		−		+		−		+	
24	−		+		−		−		−		+	+	+		−		+		+		+		+		−	
25	+	−	−	−	−	−	−	−	−	−	+		+	−	+	−	−	−	+	−	+	−	+	−	+	−
26	+		+		−		−		−		−		+		−		−		+		−		−		+	
27	−		+		−		−		−		−		+		−		−		+	+	+		−		+	
28	+		+		−		−		−		−		+		−		−		−		−	+	−		+	
29	−		+		−		−		−	+	+		+		−		−		+		−		+		+	
30	+		+		+		−		+		+		+		−		+		−		+		+		+	
31	+		+		−		−		−		+		+		−		−		+		−		−		+	
June 1	+		+		−		−		−		−		+		−		−		+		−		−		−	
2	+	−	+	−	−	−	−	−	−	−	+	−	+	−	−	−	−	−	+	−	−	−	−	−	−	−
3	+		+		−		−		−		−		+		−		−		+		−		−		+	
4	−		+		−		−		−		−		+		−		−		+		−		−		+	
5	+		+		−		−		−		−		−		−		−		−		−		+		−	
6	−		+		−		−		−		−		+		−		+		−		−		+		+	

Periods of treatment and retreatment are shown within brackets. F = fæcal; B = blood.

Relapses Treated.—The condition of 3 of the control cases (F, L, and K) deteriorated to such an extent that we did not feel justified in denying them the advantages of chloramphenicol treatment.

The first of these cases, L, who had a positive blood-culture on the 17th day of the disease, two days later showed the usual signs of a clinical relapse. Since he was in the control group, the administration of chloramphenicol was delayed for some days in the hope that his symptoms would subside. However, on the 23rd day, a further positive blood-culture having been obtained, and the patient's condition showing no signs of improvement, it was decided to give him a course of chloramphenicol, and a total of 18·25 g. was given in the next seven and a half days.

Within twelve hours of the start of treatment the temperature fell rapidly from 100° to 97°F and the patient developed some of the signs of shock, with cold clammy skin, collapse, &c., though his pulse remained satisfactory both in rate and volume. He then passed a large offensive loose stool, and shortly afterwards his temperature rose to 100·2°F ; it then gradually fell to normal by the 28th day, and his subsequent recovery was uneventful.

The worsening of this patient's condition soon after the start of treatment is very similar to that described by Murgatroyd (1949). This was the only one of our cases to show such a temporary deterioration.

Cases F and K, who had shown symptoms of relapse on the 20th and 33rd days, were both given a full course of chloramphenicol, the average total dose being 20 g. in eight days. Both responded well, and their further clinical progress was satisfactory.

PROGRESS OF "CARRIER" CASE D

In the original treated group was one patient, D, whose clinical response to chloramphenicol had been satisfactory but who had consistently produced positive stools during the whole time she was under treatment or observation. In view of the benefit we had noted in relapse cases with a second course of chloramphenicol, this patient was given a second course, starting on the 61st day of the disease, in the hope that it would render her stools negative.

Since she had quite recovered from the acute symptoms of the disease we felt we were justified in increasing the dose. She was therefore given a total of 26·25 g. spread over eleven and a half days. During this course she passed the only 2 stools that were negative out of the 72 cultured, and she was eventually discharged from hospital on the 83rd day of disease, still excreting *S. typhi* freely. On discharge, her Vi titre had risen to 1/80, and there seems to be every likelihood that she will become a chronic carrier.

It is worth noting that Rumball and Moore (1949), using even larger doses of chloramphenicol, failed to eliminate the typhoid bacillus from a chronic fæcal carrier, though they also reported a temporary clearing of the stools while the drug was being given.

SENSITIVITY OF *S. typhi* TO CHLORAMPHENICOL

The possibility that strains of *S. typhi* isolated from patients treated with chloramphenicol might show an increased resistance to the drug was investigated, through the kindness of Prof. Robert Cruickshank, in the Wright-Fleming Institute of Microbiology. Selected cultures obtained before, during, and after treatment were examined but no alteration was found in the susceptibility of the organisms to the drug.

TOXICITY

No toxic effects resulting from the drug were observed in any of the cases receiving chloramphenicol. Three patients reported "night terrors" during the course of treatment, but similar experiences occurred among some of the untreated cases. One patient said he had a constant noise in his ears "as if it were raining," while 2 others reported an indefinite rash, one on the ankle and the other on the thighs.

CLEARANCE TESTS

When this trial was originally planned, the numbe treated and untreated cases were to be about eq and if this arrangement had been maintained a r comparison between the rates of clearance in the groups might have been made. As the trial proceed however, changes were made because we did not justified in withholding the drug from the cont cases whose condition was deteriorating, or from treated cases which had relapsed. As a result th were now four groups instead of the two origin planned :

1. Original or early treated cases (A, D, G, H, I, and J).
2. Untreated cases (B, C, E, F, K, L, and M).
3. Late treated cases—i.e., treated only in relapse (F, and L).
4. Relapse cases receiving second course (I and J).

As the test of clearance we had decided to accep 6 consecutive negative stool and urine examination However, when the time came to assess the results thi arrangement proved unworkable, for several patient who had six or more consecutive negative stools an urines, and were therefore considered clear, later produce one or more positive specimens. In consequence, whe the patients eventually came to be discharged, we wer still in doubt regarding their state of clearance.

This uncertainty regarding clearance, together with the division of the original treated and untreated groups of patients into four small groups, three of which had received chloramphenicol at some time during their illness, made it inadvisable to try to assess the clearing action of the drug.

The general impression was that one course of the drug in the recommended dosage had no effect on the rate of clearance of the stools. On the other hand, the two cases I and J, which had relapsed and received a second course, responded by complete clearance of both stool and urine, and these remained negative for the remainder of the period of observation. This may indicate that a longer course of treatment, larger doses, or a routine second course might possibly accelerate the clearance.

Since their discharge from hospital all these patient have been under the observation of Dr. Norman Wood, of the Public Health Laboratory, Reading, who has kindly done further cultural examinations. The stools of "carrier" case D have been positive on each of the 21 occasions when they have been examined, but only one positive culture has been obtained from each of cases B (control) and H (treated). The stools of the remaining patients, both treated and controls, have been free from infection.

Agglutination Results

Several times during their illness, sera from all the patients were examined for H, O, and Vi agglutinins. No variation in these titres could be attributed to chloramphenicol treatment.

RELAPSES

Though the response of the treated patients to chloramphenicol was striking and clinically very satisfactory, it should be pointed out that 3 out of the 6 treated patients relapsed. against 3 of the 7 untreated controls. The relapses in the treated group developed later (average 35th day) than those in the controls (average 25th day). The frequency of relapses in cases treated with chloramphenicol has lately been commented on by others, notably by Smadel et al. (1949), who have shown that they seem to be prevented by giving larger doses and a longer course of treatment.

DISCUSSION

After studying the effect of chloramphenicol in 6 primary cases and 3 relapses in this outbreak we believe to be a most valuable drug, with properties in the atment of typhoid fever which are at present unique. Its beneficial effects in our cases were chiefly clinical. rhaps the most striking was its control over the tients' temperature, which fell to normal within venty-two hours in all the primary and relapsed ses treated. At the same time the drug relieved the rsistent headache, which is so distressing in the early ages of typhoid fever, and reduced the toxæmia; e patients felt better, their appetites returned, and eir abdominal discomfort was lessened. In fact, all e clinical symptoms noted in our patients were either duced or favourably influenced. Since neither hæmor-age nor perforation occurred in any of our cases we n offer no opinion on the efficacy of the drug in reventing these complications.

With regard to relapses, the effect of chloramphenicol as disappointing, since half of our treated cases eveloped relapse symptoms and in 2 of them these ere sufficiently serious to justify further treatment. lowever, the response to the second course proved so atisfactory that this may be an indication that longer ourses of treatment, larger doses, or a routine second ourse should be given to all primary cases. One course f chloramphenicol did not prevent the development of he carrier state, and a second larger and longer course vas ineffective in clearing this condition once it had leveloped.

Unfortunately from the bacteriological point of view hloramphenicol has not proved efficient, though there s evidence that it had some effect. This was seen in the learing of some of the stools and in the sterilisation of the blood-stream during the treatment period. The learing effect was only temporary; nevertheless, it gain holds out the hope that with some modification in dosage, in the light of further experience, wholly satisfactory results will be obtained.

SUMMARY AND CONCLUSIONS

A clinical trial in 13 cases of typhoid fever, alternate cases being given chloramphenicol, showed that this antibiotic has a specific clinical effect in the disease.

In the 6 treated cases, a total dosage of 19–22 g. of the drug, given in eight days, did not prevent relapses or the development of the carrier state.

The relapses in the treated cases occurred later than in the untreated controls.

In 3 of the treated cases fæcal excretion of *S. typhi* stopped temporarily during treatment but started again either before or at the end of the course.

There was no evidence that *S. typhi* developed an increased resistance to chloramphenicol.

No toxic effects of the drug were noted.

Our sincere thanks are due to Dr. W. H. Bradley and Dr. Ian Taylor, of the Ministry of Health, and to Dr. R. Lewthwaite and Dr. Stanley White, all of whom visited us several times and gave us freely of their experience and advice; and to Dr. A. Felix, F.R.S., for his kind help and guidance in the preparation of this paper. We would like to record our appreciation of the whole-hearted coöperation we received from the matron, Miss Stacey, and the staff of the Victoria Infectious Diseases Hospital. The laboratory investigations, entailing the examination of over 1000 specimens, were done by Mr. C. R. B. Frampton, senior technician, Public Health Laboratory, Winchester, whose careful work provided the foundation of this investigation. We are also grateful to Mr. E. Seymour, chief sanitary inspector for Winchester city, for his help with the chart.

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TREATMENT OF TYPHOID FEVER WITH CHLORAMPHENICOL

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LATE REGISTRAR AT THE HOSPITAL

CHLORAMPHENICOL, isolated by Ehrlich et al. (1947), was first reported as effective in typhoid fever by Woodward et al. (1948). Their observations have been confirmed by workers in various parts of the world (Murgatroyd 1949, 1 case: Douglas 1949, 2 cases: Vakil 1949, 14 cases; Lomax 1949, 1 case; Foster and Condon 1949, 1 case; Shah 1949, 33 cases; Patel et al. 1949, 6 cases; Cook and Marmion 1949, 14 cases; Kiledjian 1949, 3 cases; El Ramli 1949, 17 cases). Musotto (1949) has recorded some 500 cases in a waterborne outbreak, of which all the severe ones were treated with chloramphenicol, but he gives no definite figures. Smadel (1950) has reported on 45 cases treated with chloramphenicol, with 1 death.

The 18 cases reported here were seen between May, 1949, and January, 1950; 10 came from Crowthorne, Berks (see Bradley 1949), and 8 were seen later by one of us (A. L. K. R.). Of the 10 patients from Crowthorne 4 were treated with chloramphenicol on admission and 4 more received the drug during a relapse; of the 8 seen later, 5 were treated with chloramphenicol on admission; so altogether 9 cases were treated for the primary attack and 4 for a relapse. The 9 patients who received no chloramphenicol may be regarded as controls.

It was originally intended to carry out a controlled trial with chloramphenicol, but it seemed unjustifiable to withhold the drug from the more severe cases with continuous pyrexia and toxæmia with prostration and/or delirium.

METHODS

Diagnosis.—Salmonella typhi was isolated from the blood and/or fæces and urine in every case.

Dosage.—The dosage of chloramphenicol (P. D. & Co.) adopted was similar to that used by Woodward et al. (1948) in typhoid fever in Malaya. They gave an adult an initial dose of 50 mg. per kg. of body-weight, followed by 3 g. daily until the patient became afebrile, after which a slightly lower dose was given for five days: the average total dosage was 19·1 g. per patient over an average of 8·1 days.

Owing to the shortage of chloramphenicol in May, 1949, it was impossible to give the drug for more than nine days to the Crowthorne patients, but this was not thought to be a long enough course, and 4 patients, of the later series, who were admitted in the last three months of the trial when chloramphenicol was more plentiful, received it for eighteen to twenty days.

Adults received 4 g. as an initial dose, followed by 3 g. in divided doses daily until the temperature fell to normal (average three days), then 1·5 g. daily for a week, and finally 1 g. daily for a week. In 5 cases the chloramphenicol was given two-hourly while the patient was febrile and then four-hourly. In another 5 cases it was given four-hourly until the pyrexia subsided and then six-hourly. In 3 cases it was given twelve-hourly. The daily dosage was the same, whatever the interval between doses.

Children under 10 years were given either a half or a third of the adult dosage.

Two-hourly administration was recommended by Ley et al. (1948), who, in volunteers, obtained peak blood-levels half an hour after the dose was given by mouth, and showed that chloramphenicol was rapidly excreted. Woodward et al. (1948), with the dosage mentioned above, obtained peak blood-levels of 80 μg. per ml. in twenty-four hours, after which the levels fell to 20 μg. per ml. by the fourth day of treatment and remained at that figure or lower until the end of treatment. In-vitro investigations by Smith et al. (1948) showed that *S. typhi* was inactivated by chloramphenicol concentrations of 0·25 μg. per ml. In the present small series the blood-levels, estimated by microbiological assay, rose more slowly to peak values, and therapeutic levels were maintained whatever the spacing of the doses. The inactivation or excretion of chloramphenicol seemed to be moderately rapid.

BLOOD-LEVELS

The blood-chloramphenicol levels achieved in 4 illustrative cases were as follows:

Primary Attack.—Boy, aged 3 years. Dosage: 1·25 g. on admission, followed by 0·25 g. four-hourly, then six-hourly from fifth day.

	Blood-level (μg./ml.)
1st day, 1/4 hr. after dose	10
1 1/4 ,, ,, ,, ...	10
2 1/4 ,, ,, ,, ...	20
3 1/4 ,, ,, ,, ...	10
4th day, just before ,, ...	25
1/2 hr. after ,, ...	25
6th day 2 ,, ,, ,, ...	50
3 ,, ,, ,, ...	50
6 ,, ,, ,, ...	20

Primary Attack.—Woman, aged 29 years. Dosage: 4 g. on admission, followed by 1·5 g. twice daily, reduced to 1 g. twice daily from fifth day.

	Blood-level (μg./ml.)
1st day, 1/2 hr. after dose	0
1 ,, ,, ,, ...	5
1 1/2 ,, ,, ,, ...	10
2nd day, just before ,, ...	25
1/2 hr. after ,, ...	25
5 1/2 ,, ,, ,, ...	25
4th day, 5 1/2 ,, ,, ,, ...	25
6th day, 2 ,, ,, ,, ...	100
6 ,, ,, ,, ...	50
10 ,, ,, ,, ...	50

Relapse.—Man, aged 36 years. Dosage: 4 g., followed by 1·5 g. twice daily, reduced to 1 g. twice daily from fifth day.

	Blood-level (μg./ml.)
1st day, 2 hr. after dose	50
4 ,, ,, ,, ...	50
12 ,, ,, ,, ...	25
3rd day, just before ,, ...	100
6 hr. after ,, ...	50
12 ,, ,, ,, . ..	100
4th day, 6 ,, ,, ,, ..	50
5th day, 6 ,, ,, ,, ...	20
7th day, just before ,, ...	40
8th day, ,, ,, ,, .. .	0
9th day, 5 hr. after ,, ...	10

Recrudescence.—Woman, aged 59 years. Dosage: 3 g., followed by 0·5 g. four-hourly, reduced to six-hourly from about fifth day.

	Blood-level (μg./ml.)
1st day, 1/2 hr. after dose	20
1 ,, ,, ,, ...	25
1 1/2 ,, ,, ,, ...	50
2 1/2 ,, ,, ,, ...	50
2nd day, 2 ,, ,, ,, ...	25
3rd day, 2 ,, ,, ,, . ..	50
5th day, 2 ,, ,, ,, ...	20
4 ,, ,, ,, ...	20
8th day, 4 ,, ,, ,, ...	10

CLINICAL RESULTS

Crowthorne Patients (10)

Of the 4 patients treated with chloramphenicol on admission, a man of 77 died within seventy-two hours, and 2 of the others relapsed—a child of 3 years and a woman of 75. The remaining patient, a woman, aged 29, received 26 g. of chloramphenicol in nine days recovered uneventfully.

Fatal Case.—A man, aged 77, with advanced cardiovascu disease from which he had been expected to die for two three months before he contracted typhoid fever. On admis he was in an advanced typhoid state, with a dry, furred, fissured tongue, urinary and fæcal incontinence, tremor, continuous low muttering delirium, sub tendinum, carphology, and bronchopneumonia. He 10·5 g. of chloramphenicol in the seventy-two hours he died.

It was obviously expecting too much of the drug t cure this patient, whose death was undoubtedly due the intercurrent condition and hastened by toxæmi This was the only death in the series of 18 cases.

Relapses.—A boy, aged 3 years, relapsed on the thirty day of disease, eleven days after completing a course of 11·25 g. of chloramphenicol in eight days. This was the only case among the relapses in which attempts at blood-culture failed.

A woman, aged 75, on admission, according to her own doctor, was "moribund, with great prostration and physical signs of bronchopneumonia as well as typhoid fever." She relapsed eleven days after completing a course of 24 g. of chloramphenicol in nine days. The relapse occurred on the twenty-first day in hospital (day of disease on admission unknown). In the relapse she was extremely ill and had acute retention of urine, *Bact. coli* cystitis necessitating bladder washouts twice a day, myocarditis, and bronchopneumonia (lung puncture gave a pure culture of *S. typhi*).

Of the 6 patients not given chloramphenicol on admission 2 men, aged 36 and 58, and a woman of 62 relapsed; a woman of 59 had a recrudescence followed by a relapse; and the 2 remaining patients, children aged 2 and 4 years, recovered uneventfully. All 4 relapses and the 1 recrudescence were treated with chloramphenicol. Two cases are worthy of comment.

Relapse.—A woman, aged 62, became so ill with peripheral failure that she was given intravenous glucose. She also had acute retention of urine and myocarditis. She received 24·25 g. of chloramphenicol in nine days. Her pyrexia subsided within three days of the start of treatment, and she recovered without further incident.

Recrudescence and Relapse.—A woman, aged 59, was admitted on what was supposed to be the sixth day of disease Lysis began on the twelfth day, but a recrudescence started on the fifteenth day (blood-culture positive). She received 25·25 g. of chloramphenicol in eight days, and her pyrexia subsided in three days. On the nineteenth day of disease the patient had a small intestinal hæmorrhage. Her relapse began on the thirty-second day of disease, ten days after the end of her course of chloramphenicol. She also became so ill with signs of peripheral failure during her relapse that intravenous glucose was required. On the sixty-ninth day of disease she developed bronchopneumonia and, later, a *Bact. coli* urinary infection.

Second Series (8)

Five of these patients were treated with chloramphenicol, with much the same course as the Crowthorne cases but the remaining 4 with a longer course. All the 8 patients recovered, but in the treated group there was 1 relapse, in a nurse of 19, and 1 case developed cardiovascular complications.

Relapse after 29 Days' Apyrexia.—A nurse, aged 19, was admitted on Jan. 10, the thirteenth day of disease, and immediately put on a course of chloramphenicol. She relapsed on Feb. 11 after receiving 37·5 g. of chloramphenicol in twenty days. *On admission her temperature was* 102·6°F, but the pyrexia completely subsided by the third day of treatment (see figure). After an apyrexial period of twenty-nine days she had a typical relapse. This was quite outside our previous experience, so chloramphenicol was not started again for three days, but blood-cultures made on three successive days grew *S. typhi.* Another course of chloramphenicol was therefore begun, and her pyrexia subsided in four days. Thereafter she made a smooth recovery.

Complications.—A man, aged 72, was found on admission to have asymptomatic diabetes. He received no chloramnicol on admission but seven days later his condition eriorated and there were signs of myocarditis. Chloramnicol was started immediately and his general condition n improved. Apart from thrombosis in his left leg he had other complication and made an excellent recovery.

COMMENTS

ol and Urine Cultures

In the cases from Crowthorne treated with chlorphenicol for eight or nine days *S. typhi* was isolated m the fæces and/or the urine both during and after course of chloramphenicol. In the 5 cases of the ond series treated for at least eighteen days (except the nurse during her relapse), *S. typhi* was not lated from the fæces and/or urine after completion the course.

ration of Fever after Start of Chloramphenicol

In the 8 cases treated with chloramphenicol on mission and the 6 cases treated for relapses the average ration of fever after the start of chloramphenicol erapy was three days. In the 5 cases not treated with loramphenicol ("controls") the average duration of ver was fourteen and a half days. In 4 cases of paraphoid-B fever in the hospital at the same time, not eated with chloramphenicol, the average duration of ver was twenty-one and a half days.

fects of Chloramphenicol on Typhoid Fever

Except in the man of 77 who died of cardiovascular sease, the effects of chloramphenicol were exactly as scribed by Smadel (1950). The chief effects were on e temperature, which quickly fell to normal, and on e toxæmia, which was dispelled less rapidly but ually effectively. In no case did fever persist for more an four days after the start of chloramphenicol therapy. melioration in the patients' general condition was ually not noticeable for thirty-six to forty-eight hours, it between forty-eight and seventy-two hours the nprovement was very noticeable and in some cases amatic.

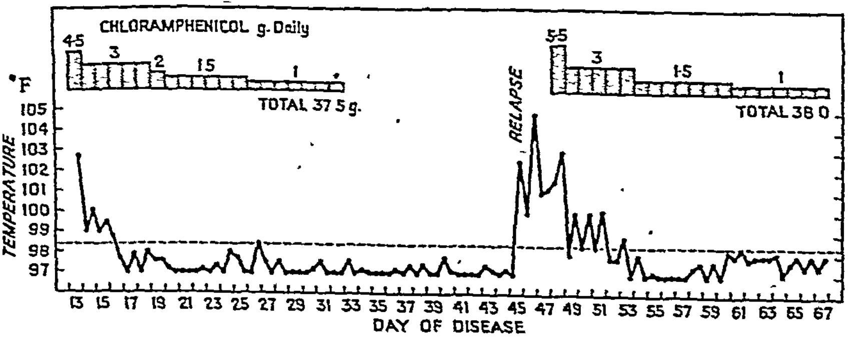
Chloramphenicol not only shortens the duration of the lness but also saves life. In this small series the woman 75 was undoubtedly saved by chloramphenicol, robably also the 2 women, aged 59 and 62, who had rdiovascular failure, and possibly the man of 72 who ad intercurrent diabetes and myocarditis.

oxic Reactions

No toxic or side-effects were observed in any of the atients who received chloramphenicol. The blood of ll the patients was examined at regular intervals. The lotting-time was reduced in the cases which were very l at the time of the estimation.

acterial Sensitivity

The chloramphenicol sensitivity of the strains of . *typhi* isolated before and after treatment, and after elapse and treatment, was investigated. No diminution n sensitivity of the organisms to chloramphenicol was bserved at any stage.



Dosage and temperature in a girl of 19, who relapsed after 29 days' apyrexia.

Complications

Woodward et al. (1948) showed that chloramphenicol does not prevent intestinal hæmorrhage and perforation, even when the patient becomes afebrile. The complications noted in this series were:

Sex	*Age*	*Acute retention of urine*	*Myocarditis*	*Bronchopneumonia*	*Cardiovascular failure*	*Intestinal hæmorrhage*	*Thrombosis of leg*	*B. coli urinary infection*
Female ..	75	+	+	+	0	0	0	+
Female ..	62	+	+	0	+	0	0	0
Female ..	59	0	0	+	+	+	0	+
Male (diabetic) ..	72	0	+	0	0	0	+	0
Male (died)	77	0	+	+	+	0	0	0

PROGNOSIS IN ELDERLY PATIENTS

It is generally agreed that as age advances the chances of recovery from typhoid become less. Goodall (1928) found that the case-fatality ranged from 7·2% in the younger patients to 31·7% in the older ones. Rolleston and Ronaldson (1940) noted that the lowest case-fatality is between 5 and 10 years of age; it then increases, with each quinquennium to 40% at the age of 60 and onwards. Of 11,509 patients with typhoid fever admitted to the Metropolitan Asylums Board hospitals in 1899–1913, there were 53 between the ages of 55 and 60, of whom 17 died, a fatality-rate of 32%, and 30 patients aged 60 years and upwards, of whom 12 died, a fatality-rate of 40%. Harries and Mitman (1947) say that the fatality-rate is highest in children under 3 years and in adults of 60 years and upwards; in these groups it may reach 50%. Banks (1949) agrees that in patients over 40 the prognosis is poor and that in those over 60 the fatality-rate may be 50%.

In the present, admittedly small, series of 18 cases, 6 patients were over 58. Apart from the one death, in the man of 77 who was admitted in a hopeless condition, all the patients recovered. In our view, chloramphenicol saved the lives of some if not all of these elderly patients.

RELAPSES

Relapses in typhoid fever treated with chloramphenicol have been mentioned by several observers. In this series of 17 cases (excluding the fatal case) there were 8 relapses (47%). Of the 9 cases treated with chloramphenicol, 4 relapsed (44%), whereas among the 8 cases not treated with the drug there were 4 relapses (50%). The incidences are therefore about the same with and without the drug.

Curschmann (1923) found that the frequency of relapses varied in different epidemics from 1·4 to 17%. Goodall (1928) reported 347 relapses in 2947 cases treated in the Metropolitan Asylums Board hospitals 1892–1914—an incidence of 11·7%. Rolleston and Ronaldson (1940) noted that, in the whole period 1900–09, 10·4% of the cases of enteric fever admitted to the Metropolitan Asylums Board hospitals developed relapses, the annual frequency ranging from 8·6% in 1906 to 12·4% in 1903. Ker (1920) reported an incidence of 5·5% in 1700 cases treated at the Edinburgh City Fever Hospital, but he observed that the tendency to relapse was higher in some outbreaks, and for one year the incidence was 13%. Banks (1949) states that relapses occur in about 12% of cases.

In the present series, with the exception of the boy of 3 years in whom no positive blood-cultures were obtained, the nurse of 19 who relapsed after twenty-nine days' apyrexia, and a girl aged 5, the relapses occurred in the older patients.

Smadel et al. (1949) analysed their results in 44 cases treated with chloramphenicol and noted a striking relation between the duration of the course and the incidence of relapse. Relapses occurred in 7 out of 13 patients whose initial course of drug was given for eight days or less (average 6·9 days) and the total dose of chloramphenicol averaged 20 g. There were no relapses in a second group of 19 patients in whom the chloramphenicol was continued for nine to fourteen days (average 11·2 days) and the total dose averaged 25·7 g. A third group of 12 patients treated for fourteen to twenty-three days (average 18), the average total dose being 32·8 g., also had no relapses. All the relapses in their patients responded satisfactorily to chloramphenicol. They recommend a course of more than eight days for patients actually ill with typhoid fever, if relapses are to be avoided, but in their opinion little advantage is gained by continuing the treatment for more than fourteen days.

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CONCLUSIONS

No firm conclusions can be drawn from this small series, but the results suggest that chloramphenicol will be effective if given in adequate dosage over a minimum period of eighteen to twenty days, an initial dose of 4 g. being followed by 3 g. daily until the patient is apyrexial, then 1·5 g. daily for a week, and 1 g. daily for the final week. Chloramphenicol has undoubtedly eased the heavy strain that typhoid fever imposes on the nurses—an important factor these days, especially in infectious diseases hospitals, where the nursing shortage is still unsolved. Nevertheless, in typhoid fever, the success of any treatment still largely depends on the nurses' proficiency, devotion, and vigilance.

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CHLORAMPHENICOL IN TYPHOID FEVER

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Since Woodward et al. (1948) demonstrated the favourable response of typhoid fever to chloramphenicol, their findings have been confirmed in reports from the U.S.A. and France, and in a few cases in the United Kingdom (Bradley 1949, Murgatroyd 1949, Cook 1949).

The results in 200 cases of typhoid fever treated with chloramphenicol at the Abbassia Fever Hospital are analysed here. The patients studied were those admitted to the hospital between May and December, 1949, in which the clinical diagnosis of typhoid fever was proved by the isolation of *Salmonella typhi* from the blood. It was not considered justifiable to leave some cases without chloramphenicol as controls, especially since in a previous series all of 20 uncomplicated cases had responded quickly and favourably to chloramphenicol. All the patients were kept in bed for at least fourteen days after their temperature had returned to normal, and most of them were kept in hospital for three weeks or more after the fall of temperature to see whether a relapse would occur.

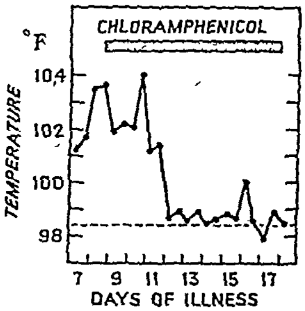

Fig. 1—Fall of temperature by crisis in a girl of 10 years.

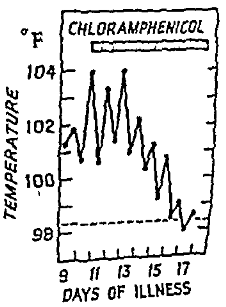

Fig. 2—Fall of temperature by lysis in a boy of 5 years.

The effect of chloramphenicol was assessed on (1) the behaviour of the temperature; (2) the incidence of relapses; (3) the occurrence of serious complications (hæmorrhage, perforation, &c.); and (4) the mortality. The response to chloramphenicol was studied in relation to: (1) the severity of the disease; (2) its duration

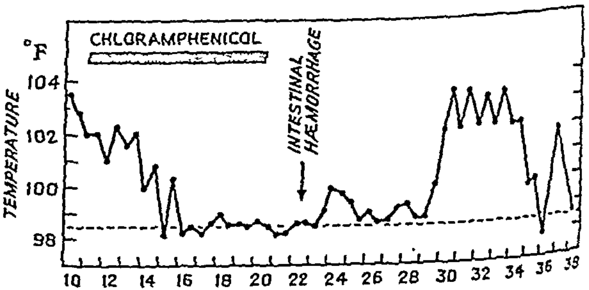

Fig. 3—Intestinal hæmorrhage in convalescence, followed by relapse, in a man of 25.

DR. RANKIN, DR. GRIMBLE: REFERENCES—*continued*

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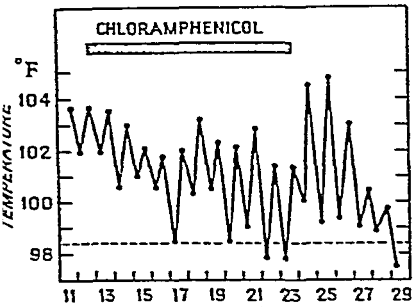
efore treatment: (3) the frequency of administration the drug; and (4) the patient's age and sex.

As regards dosage, the chloramphenicol was dispensed capsules containing 0·25 g. The dose given was about mg. per kg. of body-weight by month. This amount as then given daily until the temperature was normal; me patients received the same or a smaller dose for a ariable period up to fifteen days.

At the beginning of the study, chloramphenicol was iven two-hourly: later some of the patients had four-hourly, and the others twelve-hourly, doses. The responses to treatment of the different groups were then compared.



ig. 4—Resistance to chloramphenicol in a boy of 5 years.

RESULTS

Pyrexia

The temperature chart is our main objective guide to the patient's response to treatment. In nearly all cases defervescence occurred rapidly, and the temperature became normal after an average of 3·5 (S.E. 0·03) days (table I). In 7 very severe cases (3·5%), however, the temperature did not settle so quickly but remained high for 8–27 days. In most cases the temperature started to fall within the first day or two of the start of treatment, with corresponding symptomatic improvement. Figs. 1–5 show some of the ways in which defervescence took place after the administration of chloramphenicol.

Tables I and II show that there was no significant difference in the average duration of fever after treatment started, whether the patient was in the first, second, or third week of his illness or even later; whatever the severity of his condition; and whether he was given the drug two-hourly, four-hourly, or twelve-hourly. There was also no significant difference in the response of the fever in the two sexes.

TABLE I—EFFECT OF SEVERITY OF ILLNESS AND DURATION OF SYMPTOMS BEFORE TREATMENT ON RESPONSE

Days of symptoms before treatment	Severity of illness	No. of cases	Av. days of pyrexia after start of treatment	No. relapsed (% of cases followed for 3 weeks)	No. died
1–7	Moderate	5	2·6	..	..
	Severe	6	4·2	1	..
	Very severe	6	3·7	1	..
	All cases	17	3·5	2 (*16·7%*)	Nil
8–14	Moderate	28	3·0	2	..
	Severe	28	3·0	6	..
	Very severe	55	3·6	14	5
	All cases	112	3·3	22 (*25·5%*)	5 (*4·5%*)
15–21	Moderate	6	3·5	..	..
	Severe	7	3·6	..	..
	Very severe	31	3·9	11	4
	All cases	44	3·6	11 (*31·4%*)	4 (*9%*)
More than 21	Moderate	..	..	..	..
	Severe	3	4·3	1	..
	Very severe	24	3·8	5	4
	All cases	27	3·8	6 (*37·5%*)	4 (*15%*)
Grand total		200	3·5	41 (*27·5%*)	13 (*6·5%*)

Percentages are of cases observed for at least 3 weeks.

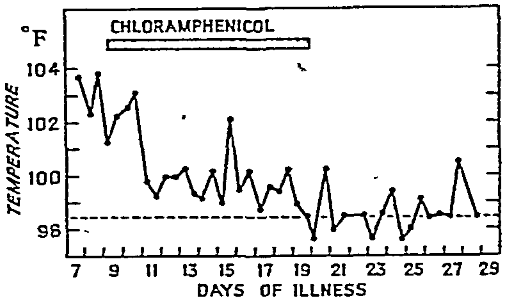


Fig. 5—Irregular temperature in convalescence in a man of 25.

Relapses

The relapse-rate was studied in the cases observed in hospital for three weeks or more after the temperature became normal. Some interesting conclusions can be drawn from the data in tables I–IV.

Table I shows that 27·5% of these cases relapsed. The relapse occurred after an average apyrexial period of 15·5 (S.E. 1·2) days, with a range of 6–31 days. It will be seen that the relapse-rates in cases treated during the first, second, or third week of their illness or later were 16·7, 25·5, 31·4, and 37·5% respectively. The difference between these rates is not statistically significant.

TABLE II—EFFECT OF FREQUENCY OF DOSES ON DURATION OF PYREXIA AND NUMBER OF RELAPSES

Frequency of doses	No. of cases treated	Av. days of pyrexia* after start of treatment	Severity	Relapses in cases observed for 3 weeks
Two-hourly	109	3·5	Moderate	0
			Severe	7 (*39·4%*)
			Very severe	19
Four-hourly	52	3·1	Moderate	0
			Severe	3 (*22·7%*)
			Very severe	7
Twelve-hourly	39	3·9	Moderate	0
			Severe	0 (*13·8%*)
			Very severe	4

* This was found to be independent of the severity of the illness.

Table II shows that when the same daily dose was given two-hourly, four-hourly, or twelve-hourly, the relapse-rates were 39·4, 22·7, and 13·8% respectively—i.e., the less often chloramphenical was given, the less was the probability of a relapse. The differences between 13·8% and each of 22·7% and 39·4% are statistically significant.

Table III shows that the relapse-rates were 26·7, 33·3, and 7·7% in groups of cases in which the drug was continued for up to five, ten, and fifteen days respectively into convalescence. The differences between 7·7% and each of 26·7% and 33·3% are statistically significant.

Table IV gives the relapse-rates in age-groups; there is no significant difference between these rates.

If the temperature in convalescence is irregular (this occurs in 21·5% of the cases), it does not follow that a relapse is more likely than if the temperature is normal and regular. Of the relapsed cases in the present series, 77% had a normal and regular temperature in convalescence and only 23% had intermittent pyrexia.

Serious Complications

Intestinal hæmorrhage occurred in 6 cases. In 3 of these it occurred on the second, fourth, and seventh days of treatment, and they all recovered. The other 3 patients had severe and repeated bleeding before and during treatment and all died of the hæmorrhage plus other complications (toxæmia, heart-failure, &c.).

twenty-nine days' apyrexia, and a girl aged 5, the relapses occurred in the older patients.

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CONCLUSIONS

No firm conclusions can be drawn from this small series, but the results suggest that chloramphenicol will be effective if given in adequate dosage over a minimum period of eighteen to twenty days, an initial dose of 4 g. being followed by 3 g. daily until the patient is apyrexial, then 1·5 g. daily for a week, and 1 g. daily for the final week. Chloramphenicol has undoubtedly eased the heavy strain that typhoid fever imposes on the nurses—an important factor these days, especially in infectious diseases hospitals, where the nursing shortage is still unsolved. Nevertheless, in typhoid fever, the success of any treatment still largely depends on the nurses' proficiency, devotion, and vigilance.

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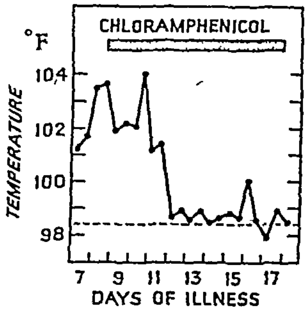

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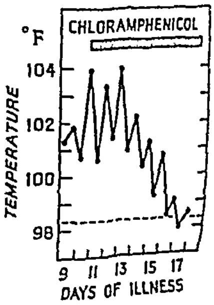

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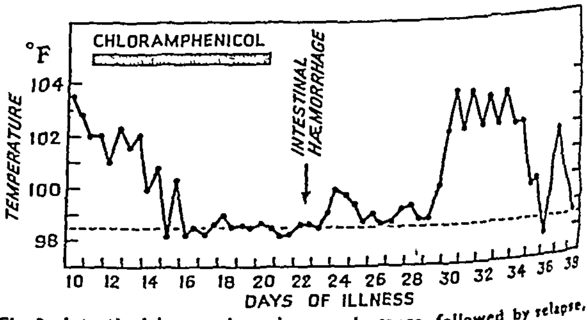

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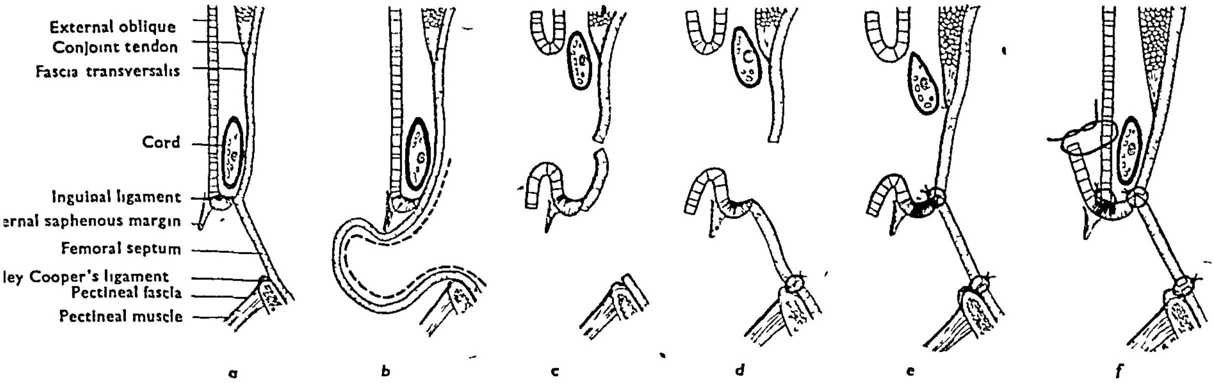

. I—Diagrammatic representation of the principle of the repair: *a*, the normal arrangement, with the femoral ring closed by the emoral septum, a specialised part of the fascia transversalis; *b*, the femoral peritoneal sac is covered by the femoral septum; *c*, the ernial sac, with all its coverings, including the femoral septum, is reduced and excised; *d*, the lower leaf of the divided fascia transversalis s sutured to Astley Cooper's ligament; *e*, the posterior wall of the inguinal canal is reconstructed; *f*, the external oblique aponeurosis s overlapped, and the normal anatomical arrangement largely restored.

The new septum is as strong as the original and ossesses its elasticity. None of the structures forming e femoral canal or ring are displaced under tension, hich would impair their function and those of intimately lated structures. The posterior wall of the inguinal nal is restored to its normal strength and can be rengthened if need be, so preventing a direct inguinal ernia, a complication admittedly less serious than a moral recurrence, but one equally as annoying to the atient.

TECHNIQUE

A linear incision 10 cm. long is made starting just edial to the pubic tubercle and extending laterally 1 cm. oove and parallel to the inguinal ligament. The external blique aponeurosis is exposed. The deep layer of the perficial fascia is incised along its attachment to the edial portion of the inguinal ligament and fascia lata, nd the hernial sac is displayed. This is separated from he neighbouring structures, and the neck of the sac is lentified as it lies etween the inguinal igament anteriorly, the ectineus fascia posteriorly, Gimbernat's igament medially, and he femoral vein laterilly.

In the absence of trangulation the neck of the sac is detached rom the boundaries of the femoral ring by blunt dissection. Since this manœuvre often leads to reduction of a loop of bowel into the peritoneal cavity it is inadvisable when strangulation is present; in such circumstances the sac is opened and the bowel inspected before the neck of the sac is freed.

The aponeurosis of the external oblique is incised in the direction of its fibres; the cord is separated from the posterior wall of the inguinal canal, and the fascia transversalis displayed. An incision is made in the fascia transversalis at the junction of its upper two-thirds and lower third and carried laterally towards, but not so far as, the inferior epigastric artery. The hernial sac is withdrawn through the femoral ring, opened, ligatured, and excised. A swab is inserted into the extraperitoneal tissues, and the peritoneum is retracted medially to display the femoral ring from above.

Three silk sutures, no. 2, threaded on a no. 5 Ogilvie needle, are passed through Astley Cooper's ligament and the edge of the lower flap of the fascia transversalis, which in this part is reinforced by the deep femoral arch and iliopubic band (fig. 2). When these sutures are tied, the fascial flap rotates and, without tension, completely closes the femoral ring.

The posterior wall of the inguinal canal is reconstructed by suturing the upper flap of the fascia transversalis to the inguinal ligament at its junction with the lower flap of the fascia transversalis.

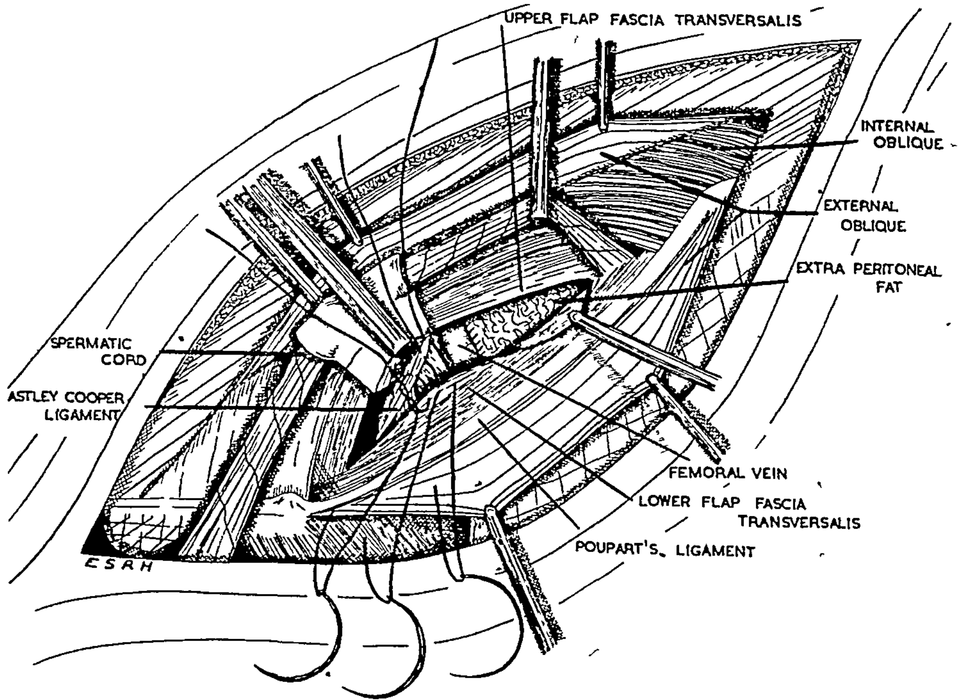

Fig. 2—No. 2 silk sutures threaded on no. 5 Ogilvie needles are passed through Astley Cooper's ligament and the edge of the lower flap of the fascia transversalis.

TABLE III—EFFECT OF DURATION OF TREATMENT IN CONVALESCENCE ON INCIDENCE OF RELAPSE

Days of treatment in convalescence	No. of cases	No. relapsed
0–5	75	20 (*26·7%*)
6–10	45	15 (*33·3%*)
11–15	26	2 (*7·7%*)

TABLE IV—RELAPSE-RATE IN AGE-GROUPS

Age (yr.)	0–5	6–10	11–20	21–30	Over 30
No. of cases ..	57	27	40	19	9
Relapses (%) ..	26·3	33·3	20	31·6	22·6

Perforation occurred in 7 cases (3·5%) and 2 of the patients died, including one who perforated three days after the start of chloramphenicol. Of the 5 who recovered, 3 were operated on not later than twelve hours after the perforation had been diagnosed; the other 2 recovered without operation. All the 5 cases had intensive chemotherapy with chloramphenicol, penicillin, and streptomycin.

Encephalitis developed in 4 cases, of which 1 was fatal.

Hæmorrhagic Type.—The series included 6 cases of the hæmorrhagic type; 5 of these patients died during chloramphenicol therapy, and one, a boy, recovered after 27 days' treatment with chloramphenicol.

Mortality

Of the 200 patients in this series, 13 died (6·5%), whereas the *mortality-rate* over the past ten years in our hospital was 9–12%. It should be noted, however, that 4 of the perforated cases, all the 6 with the hæmorrhagic type of disease, and 3 of those who had intestinal hæmorrhages were referred to me for chloramphenicol treatment and would not otherwise have come to the hospital. This accounts for the rather high mortality.

Toxic Effects

Contrary to the reports of other workers, I believe that the chloramphenicol was responsible for the following symptoms, because they were observed only in patients receiving this drug: anorexia, nausea and vomiting, stomatitis with glazed and sore tongue, rash (especially where sweating was severe), and mental apathy, was severe in some cases.

COMMENTS

Dosage

For the present it seems that the best scheme of dosage is 50 mg. per kg. of body-weight over the first two hours, and then 25 mg. per kg. every twelve hours until the temperature becomes normal and half that dose for fourteen days in convalescence. Rest in bed and symptomatic treatment should continue, as before chloramphenicol therapy, for at least another week.

Future Investigations

From the results in this series and a previous one, I am convinced that chloramphenicol provides the most efficient specific treatment for typhoid fever so far devised. I must emphasise the importance of nursing, symptomatic treatment, and rest in bed for at least three weeks after the subsidence of fever, for the toxic effects of the infection last longer than the pyrexia.

Work is now proceeding along two main lines:

(1) To find out the smallest effective dose of chloramphenicol, since there is evidence that half the dose used in this series—i.e., 25 instead of 50 mg. per kg. of body-weight daily—may give the same therapeutic response. Also it is important to estimate how long chloramphenicol therapy should be maintained after defervescence.

(2) In another series of cases the combined effect of chloramphenicol and sulphadiazine is being studied according to the recommendation of El Borolossy and Buttle (1949).

SUMMARY

A series of 200 cases of typhoid fever have been treated with chloramphenicol and the results analysed.

The average duration of fever after treatment started was 3·5 days, the relapse-rate in patients followed up for at least three weeks was 27·5%, and the mortality was 6·5%. Relapses were fewest on twelve-hourly doses.

The response to chloramphenicol was little affected by the severity of the condition or duration of symptoms before treatment.

Mild toxic effects, ascribed to chloramphenicol, were observed, including anorexia and gastric upsets, stomatitis and glossitis, rash, and apathy.

I am very grateful to my colleagues, Dr. A. Hamid Omar and Dr. A. W. El Borolossy, for their enthusiastic efforts in this work and in the preparation of this paper.

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FEMORAL HERNIORRAPHY

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AN aim in the repair of any structural defect is a restoration to normal, but this can *only* be ideal if, at the same time, it prevents the recurrence of that defect.

The femoral ring seems to be composed of relatively immovable structures: Poupart's ligament anteriorly, Astley Cooper's ligament posteriorly, Gimbernat's ligament medially, and the femoral vein laterally. This potential defect is closed by the femoral septum, a specialised portion of the fascia transversalis, which does not form a rigid barrier, as can be proved at laparotomy by placing a finger on the abdominal aspect of the femoral canal.

In the repair described here the place of the femoral septum is taken not by rigid scar tissue but by the fascia transversalis which forms the inferior part of the posterior wall of the inguinal canal (fig. 1). The fascia transversalis is composed of two layers and is strengthened by certain bands. The superficial layer is continuous with the conjoint tendon and may be regarded as a continuation of the sheath covering the anterior and posterior surfaces of the conjoint muscles. The deep layer is the true fascia transversalis. The deep femoral arch is a strong band which blends below with the inguinal ligament and strengthens the lower third of the posterior wall of the inguinal canal; medially it is attached to the *ilio-inguinal* line, and laterally it disappears under the internal oblique muscle. The cremaster muscle arises from its anterior surface, and the transversalis fascia passes deep to its posterior surface to fuse with the femoral septum medially and the anterior wall of the femoral sheath laterally. The iliopubic band lies directly behind the deep femoral arch and stretches between the iliopectineal line and the anterior superior iliac spine. Henle's ligament and the interfoveolar ligament strengthen the medial and lateral portions of the fascia transversalis.

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Prof. RAYMOND BOURG (Brussels) described his laboratory experiments on the effects of administering œstrogen to rats. In general the size of the dose determined the extent of ovarian secretion; but with larger doses the secretion of follicular hormone became relatively larger than that of luteal hormone. Clinically he had found that large doses gave the best results. Large doses injected over a short time had not yet been used clinically, but in amenorrhœa this method might sometimes prove very useful. Finally, Professor Bourg emphasised the importance, as an aid to clinical treatment, of experiments of the kind he had undertaken.

Dr. ARTHUR SUTHERLAND discussed functional uterine bleeding or, as some preferred to call it, dysfunctional uterine bleeding—a term usually applied to abnormal uterine bleeding without any obvious lesion.

Analysing 1000 cases of abnormal uterine bleeding occurring in the absence of gross pelvic abnormalities, Dr. Sutherland said that organic pathological lesions of the endometrium were present in 139 (chronic endometritis in 110, uterine polypi in 11, tuberculosis in 10, and malignant disease in 8). Among the remaining 861 patients endometrial hyperplasia was present in 265: irregular ripening of the endometrium in 26: and irregular shedding in 13; and endometrial atrophy in 10. In 547 the endometrium appeared normal. Although these 861 cases could be regarded as functional, in some instances this might not be so. The possibility of a pelvic cause not apparent on clinical examination must not be forgotten.

Œstrogen therapy was of relatively recent origin. From the present and other series it was evident that the incidence of endometrial hyperplasia was less than had been supposed, and that abnormal bleeding occurred from any type of endometrium. Œstrogen therapy was becoming increasingly popular. Karnaky used several œstrogens in varying doses; many of his cases were also given thyroid and Lugol's iodine, and it was not possible to state how far these contributed to the results. Some used a combination of one of the œstrogens and either progesterone or pregneninolone, administered cyclically. No conservative treatment of functional uterine bleeding produced better results than those obtained with œstrogen therapy.

Dr. Sutherland suggested that all cases of presumed functional bleeding should have a diagnostic curettage performed to eliminate unsuspected organic conditions; this should be done even for adolescent patients. A number were cured by the curettage, although the reason for this was not known. Patients who were not cured or greatly improved needed further treatment. For the large group of those at or near the menopause, hysterectomy or radiotherapy was preferable to endocrine treatment; and some severe cases in the late thirties occasionally required hysterectomy. Abnormal uterine bleeding in girls under 20 years of age was not common, and it could usually be cured by giving the antihæmorrhagic factor orally. In very young patients, where this failed, cyclic oral œstrogen therapy could be given. The efficacy of the antihæmorrhagic factor diminished with age, and Dr. Sutherland had almost abandoned using it for patients over 25. Other cases were usually treated with œstrogens.

Attention should be paid to the endometrial histology, and the alternative of androgen treatment should be considered in cases showing marked endometrial hyperplasia. Very occasionally patients showed no improvement and needed a further examination, including blood examination, estimation of prothrombin-time, urinary vitamin C, basal metabolic rate, and Wassermann reaction, and a further curettage. The possibility of emotional difficulties as a cause must be kept in mind, and when these were suspected the patient should be seen by a psychiatrist.

Mr. T. N. MACGREGOR said that abnormal uterine bleeding might be present in the first or second half of the menstrual cycle, or during the whole cycle. He described 38 cases of dysmenorrhœa, which had been under observation for from three months up to two years. The patients were aged 14–28, with an average age of 20, the average age of menarche being 13 years 4 months. Œstrogen was given during the first 20 days of the cycle. Sometimes the initial daily dose was not effective, and it had to be increased in subsequent cycles until ovulation was inhibited. When it was clear that ovulation had been suppressed, œstrogen was given daily from the 14th to the 24th day of each cycle. Œstrogen was not continued longer than 3 months if alleviation was not obtained. The drug relieved all cases where the dose was sufficient to suppress ovulation, but pain recurred at the next ovulation except in 14 cases which were apparently cured. In this series 55% were cured or relieved, 24% relapsed, and 22% derived no benefit.

Mr. MacGregor remarked that it was significant that no evidence of hyperplasia had been found. Probably the series included one or more patients with neurotic tendencies, yet œstrogen suppressed ovulation in all. This suggested that the pain was not psychosomatic but was due primarily to another cause, the psychological effect supervening as a result of recent pain.

The majority of women ovulated without pain, because the œstrogen and progesterone were in equilibrium. Imbalance was probably caused by over-production of progesterone rather than of œstrogen. Menstrual pain was due to hyperactivity of the uterine musculature, which could not be due to œstrogen; therefore, progesterone or an associated substance was probably the activating factor in uterine pain. It might be said that the activity of an organ, such as the uterus, which was under the control of the autonomic nervous system depended on a balance between the parasympathetic and the sympathetic systems. In this connection it was interesting that in the rabbit the administration of œstrogen had been shown to lead to the production of acetylcholine. It was possible, therefore, that œstrogens were parasympathetic stimulants. If this was correct, progesterone might have the opposite effect and act as a sympathetic stimulus. Œstrogen could only be of limited value, but sometimes it did help, and it should be considered before surgical treatment was decided on.

Prof. T. N. A. JEFFCOATE, dealing with the place of œstrogen therapy in pregnancy, remarked that early hopes in this regard had not been fulfilled. He believed that its value had been established beyond doubt only in the inhibition of lactation. It was less valuable in suppressing established lactation than in preventing its establishment. It was well known that in some animals all œstrogens caused abortion. In women they did not disturb a normal pregnancy or bring on early labour. It was not known whether they induced labour at term, yet women were regularly being given œstrogens in the hope of inducing labour. Professor Jeffcoate emphasised that it was no good giving œstrogen and expecting to see the result in a few hours; it took 12 hours to see the initial result, 24 hours to produce a reasonable

The operation is completed by overlapping the external oblique muscle anterior or posterior to the cord. If the sac is large, its removal leaves a space at the saphenous ring, which may be partially obliterated by approximating the superficial fascia to the fascia lata.

RESULTS

The method has been used in 31 cases; each patient has been followed for not less than two years. There have been no recurrences; and in no patient has an inguinal hernia developed.

SUMMARY

A repair which has been used in a series of femoral herniorraphies is described. The inferior portion of the fascia transversalis is turned downwards as a flap to form a new femoral septum.

AQUEOUS SUSPENSION OF PROCAINE PENICILLIN

Robert I. Cohen
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SENIOR SURGICAL REGISTRAR, LIVERPOOL ROYAL INFIRMARY

A stable suspension of crystalline procaine penicillin in water should have the [illegible]eous solutions of penicillin with the [illegible] of procaine penicillin in oil. A short investigation has therefore been made with a new preparation of this type, 'Distaquaine.' There is no doubt about the clinical efficacy of penicillin in oil, but it is *troublesome to* administer because of its high viscosity, which necessitates a fairly large-bore needle, and a minor disadvantage is the difficulty experienced in cleaning the syringe after use. Moreover, some doctors do not look favourably on the intramuscular injection of an oily base.

The aqueous suspension supplied by the makers for this inquiry contains the stable crystalline procaine salt of penicillin G with less than 1·5 % of suspending agents. The suspended particles in the preparation are nearly all less than 40 μ in diameter; only an occasional particle reaches 60 μ. The potency is 1000 units per mg., which is the potency of pure procaine penicillin G.

METHOD OF ADMINISTRATION

Into a "single-dose" vial of aqueous suspension containing 330,000 units of penicillin 1·2 ml. of sterile water was injected and the vial was shaken. Next, as much as possible was withdrawn into the syringe. This amounted to about 1·5 ml., the increase being due to the solid crystals in suspension and also to some tiny air bubbles trapped in shaking the vial. No difficulty was encountered in giving the injection. Though 1·2 ml. of diluent makes a rather thick suspension, this was found to be much easier to give than the oily preparations previously tried. The suspension was made still easier to handle if 2 instead of 1·2 ml. of diluent was added, and this has since been the method of choice.

The injection was made into the triceps muscle at ordinary speed through a no. 14 needle. There is no need to hurry between mixing the diluent and injecting it, since even the diluted suspension is reasonably stable. A 2 ml. hypodermic syringe may be used. The syringe should be washed thoroughly after use, in water in the ordinary way.

FINDINGS

Thirty-two volunteers, chosen at random, were injected, 16 being kept in bed whereas the 16 others were ambulatory during the day of observation. No pain of any sort was complained of either early or *late*; several of the volunteers *did not know* they had had their injections. There was no swelling or redness, and no volunteer complained of stiffness.

Only *two* febrile reactions were noted, one of 99·2° and the *other* 99·8°F. Both settled within two hours.

The technique of assay was a modification of the serial-dilution method described by Randall et al.[2] *B. subtilis* was used, instead of *Staph. aureus*, as the test organism because of its greater sensitivity to a concentration of 0·012 unit per ml. But an end-point showing a level below 0·1 unit per ml. is difficult to interpret because of the natural inhibition of normal serum.

From the thirty-two volunteers given an intramuscular *injection of the* aqueous suspension of procaine penicillin, blood was taken at fixed intervals. Twenty-eight of the volunteers received 300,000 units, two received 600,000 units, and two were given 300,000 units repeated after twelve hours. The blood-penicillin levels are shown in the accompanying table. These figures compare with those published elsewhere[1] and for penicillin in oil[2]; further, except for three cases where the end-point of the assay was doubtful, the blood-level in all the volunteers was above the accepted effective minimum[3] of 0·03 unit per ml. up to 24 hours.

AVERAGE AND MAXIMUM AND MINIMUM BLOOD-PENICILLIN LEVELS 1–24 HR. AFTER INJECTION OF PENICILLIN G IN AQUEOUS SUSPENSION

No. of subjects	Dose (units)		Blood-penicillin levels (units per ml.)						
			1 hr.	2 hr.	4 hr.	8 hr.	12 hr.	18 hr.	24 hr.
12 (Amb.)	300,000	Av.	0·77	1·09	0·96	0·65	0·25	0·163	0·08
		Max.	1	2	2	1	0·5	0·25	0·125
		Min.	0·25	0·5	0·5	0·25	0·125	0·06	0·06
16 (Bed)	300,000	Av.	1·42	1·88	1·7	0·56	0·25	0·24	0·08
		Max.	2	4	4	1	0·5	0·25	0·125
		Min.	0·25	1	1	0·25	0·08	0·4	0·04
2 (Amb.)	600,000 (in two doses)	Av.	1	1	1	0·5	0·125	0·75	0·25
		Max.	1	1	1	0·5	0·125	1	0·25
		Min.	1	1	1	0·5	0·125	0·5	0·25
2 (Amb.)	600,000	Av.	2	2	2	1	0·5	0·18	0·1
		Max.	2	2	2	1	0·5	0·25	0·125
		Min.	2	2	2	*	0·5	0·125	0·08

* Contaminated. Amb. = ambulatory.

SUMMARY

In a trial of an aqueous suspension of penicillin G in adult volunteers intramuscular injection caused no difficulty or dilemma. A dilution to 2 ml. was easier to use than the recommended one to 1·2 ml.

No pain or discomfort was felt after the injections, but two subjects had a transient febrile reaction *without general upset.*

An effective blood-penicillin level of over 0·03 unit per ml. was maintained for twenty-four hours in 27 *out of 30 volunteers after a single intramuscular injection of 300,000 units.*

I am indebted to the Distillers Co. (Biochemicals) Ltd., for the hospitality of their laboratories and the help of their staff, particularly Mr. G. A. Glister. The aqueous suspension of procaine penicillin was supplied by that company.

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"... *as knowledge increases, concepts of disease become more complex rather than simpler.* Every diagnostic test and every therapeutic measure exhibits both in its technical complexity and in its field of application the property not of expansion merely but of expansion with perpetual acceleration towards infinity. ... It is abundantly clear that we are rapidly approaching the time when humanitarian demands can be satisfied only by inroads upon our resources in money and man-power prejudicial to our standard of living, when the claims of physical health will conflict with the claims of economic health, when 'cost of living' will acquire a new and ominous meaning."—Dr. Ffrangcon Roberts, *The Spectator*, March 10, p. 298.

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On inertia, Professor Jeffcoate said that this had never been shown to be due to low œstrogen level in the blood. When inertia was the result of mechanical failure, œstrogen therapy rarely had any effect; nor did it help hypertonic inertia; but it seemed to have some effect on hypotonic inertia. The time was not ripe to deny that œstrogen therapy had any place in inertia.

The wheel had moved through a full circle; and œstrogen, which had been feared as the cause of abortion, was now used as a preventive. It stimulated expulsion where the fœtus was dead, and if given for 5–8 days would produce abortion in 80% of these cases. But Professor Jeffcoate sometimes wondered in how many of these cases the uterus would have evacuated itself in any event. It seemed important that someone should do a controlled experiment.

What of the use of œstrogens in pregnancy in diabetic women "and as a prophylactic against all the ills that may affect a woman in pregnancy"? There was a tendency to regard œstrogen therapy as acting not on the muscle so much as on the placenta and on the nutrition of the fœtus. This theory appeared a little too good to be true, but it might have something important to offer. It was important that large-scale controlled clinical experiments should be carried out on this. Some workers in Britain had failed to confirm the findings on which the theory was based.

Finally, Professor Jeffcoate posed the question: Why do synthetic or natural œstrogens, which in large doses produce vomiting or nausea in normal women, never cause this in the pregnant woman?

The Diagnosis of Diabetes Insipidus

At a meeting of the section of endocrinology on March 22, with Mr. L. R. BROSTER in the chair, a discussion on the diagnosis of diabetes insipidus was opened by Prof. J. H. BURN.

Professor Burn gave a short historical account of the use of nicotine as a stimulant of the antidiuretic function of the posterior pituitary. He cited the discovery of this action as a rare example of successful logical conjecture in pharmacology. Pickford had shown in 1939 that acetylcholine could inhibit diuresis in atropinised dogs. Thus the effect was attributed to the nicotine-like rather than the muscarine-like effect of acetylcholine, since the latter was neutralised by atropine. Therefore, nicotine itself was tried; and it also was found to inhibit diuresis in dogs, though it had no effect on hypophysectomised dogs. Further careful work, which involved injecting as little as 2 µg. of acetylcholine through the eye and following the path of such injections by indian ink, showed that the drug acted on the supraoptic nuclei.

Professor Burn then referred to his own work, which revealed close similarity in antidiuretic effect between nicotine or the smoking of one or two cigarettes on the one hand, and the injection of 50–100 milli-units of posterior pituitary extract on the other. He thought that the pressor and antidiuretic principles of the posterior pituitary were probably the same substance: and it was interesting that the same order of dose of posterior-pituitary extract which produced antidiuresis in dogs also caused a definite decrease in the coronary blood-flow of the dog heart-lung preparation. There was here a suggestion of the mechanism by which smoking might impair physical training.

Prof. R. KOURILSKY (Paris) reported the results of much work on a group of patients presenting with polyuria or polydipsia. He used a water-restriction test, sometimes with an additional salt load, and studied the urinary and blood changes. He classified his cases in three groups. Group I suffered progressive dehydration on water restriction. At necropsy these cases had complete destruction of the posterior lobe of the pituitary, but not of the anterior lobe or of the supraoptic nuclei. Group II first lost weight quickly on water deprivation, but then reached a stable state in which fluid intake and output balanced. The histological picture in one such case was of only partial destruction of the posterior pituitary—by a metastatic neoplasm in this instance. Group III presented with polydipsia, but without polyuria of parallel severity, the discrepancy in fluid balance being due to excessive fluid lost in sweating. These cases could concentrate the urine up to a specific gravity of 1·030 or more, whereas the maximum achieved by true diabetes-insipidus cases of group I was 1·010. In these cases added salt produced a greater increase of thirst than in normal subjects, and Professor Kourilsky attributed the defect in this third group to a specific lesion of the thirst-controlling mechanism rather than of the antidiuretic mechanism. Furthermore, his pathological studies had shown hypothalamic destruction without involvement of the posterior pituitary. In one case, in which a subarachnoid cyst was exerting pressure on the hypothalamus, puncture of the cyst produced immediate, dramatic relief of the abnormal thirst and polydipsia, and only later relief of the polyuria. These cases were resistant to the antidiuretic action of posterior-pituitary extracts.

Further evidence of a separate causation of true diabetes insipidus was derived from the observation that in cases of groups I and II, antidiuretic hormone started to relieve the polyuria before the polydipsia. The only experimental support for the presence of a separate thirst centre in the hypothalamus was produced by Hess, who could stimulate polydipsia in a cat by an electrode situated in the hypothalamus. This had not been confirmed. In man procaine block of the stellate ganglion might induce thirst, presumably by the effect on the salivary glands; and Professor Kourilsky suggested that such an autonomic block might prevent inhibition of thirst normally constantly maintained by a hypothalamic centre.

Professor Kourilsky said that normal men drinking excessive amounts of water up to 15 litres a day eventually developed a habit of thirst, which maintained their water intake at a high level. The polydipsia was usually associated with drowsiness and fatigue, which had been attributed to excessive flushing of sodium chloride out of the body. If the water intake was suddenly cut to normal, there was great thirst, anorexia, tiredness, and fretting, reminiscent of untreated diabetes insipidus. He concluded that thirst could be a habit which outlived its cause, whether this was originally organic or merely a voluntary polydipsia. The immediate response to both water load and deprivation tests might be masked by the body's water-reserve capacity, which varied from 500 to 3000 ml.; this reserve, which tended to be larger in women, was under hormonal control.

Dr. O. GARROD described his use, with Dr. J. E. CATES, of nicotine as a differential test for cases of polydipsia and polyuria. Their clinical material included 8 cases of diabetes insipidus and 2 of functional polydipsia, and 2 heavy smokers. Apart from the clinical characteristics of the cases, the diagnosis was based on the results of the following investigations:

1. Water deprivation for 20–24 hours, which caused the loss of up to 4 lb. in weight and a concentration of the urine to a specific gravity of up to only 1·014 in the diabetes-insipidus cases, but of over 1·020 in the functional ones.

2. A hypertonic-saline injection test for antidiuretic effect.

3. A test dose of 0·1 unit pitressin intravenously for antidiuretic effect.

4. A nicotine test. This started with six hours' water deprivation followed by large amounts of water orally to produce a good diuresis. At the height of the diuresis nicotine was given in a dose of 3 mg. (expressed as nicotine base) to smokers, and of 1 mg. to non-smokers, who were more susceptible. The urine was collected every 15 minutes from an indwelling catheter. The volume and chloride concentration were measured, as also was the creatinine output and blood-pressure in a number of cases.

These doses of nicotine failed to inhibit diuresis in 4 of the 6 patients with diabetes insipidus who smoked, and in the other 2 produced a transient antidiuretic effect and some increase in urinary sodium-chloride concentration. Of the 2 patients with diabetes insipidus who did not smoke, 1 gave an antidiuretic response to the 1 mg. dose of nicotine. When these doses of nicotine were doubled, there was a definitely greater antidiuretic response in the same subjects, but also a high incidence of side-effects such as dizziness, paræsthesiæ, hyperpnœa, palpitations, sense of constriction in the chest, blurring of vision, and occasional nausea and vomiting. In fact it was clear that cases of diabetes insipidus might have nicotine side-effects without an antidiuretic response, whereas in normals the antidiuretic effect was the one most easily produced. The blood-pressure and creatinine-clearance tests were used to assess the possible rôle of decreased glomerular filtration rate (G.F.R.) in producing an antidiuretic effect. In 1 case the G.F.R. did fall, but this could not be held to account for more than a small fraction of the total antidiuretic effect. Dr. Garrod concluded that in diabetes insipidus a sufficiently powerful nicotine stimulus could activate the supraoptico-hypophyseal pathway, showing that the lesions could only have been partial.

Dr. A. A. G. LEWIS, together with Dr. T. M. CHALMERS, described the employment of the nicotine test for diabetes insipidus. Preliminary work had confirmed the hypothesis of Burn and others that nicotine acted through the release of antidiuretic hormone from the posterior pituitary. By matching diuresis curves produced by nicotine with those obtained by graded doses of posterior-pituitary extract, it proved possible to calibrate the response to nicotine administered intravenously. The sodium-chloride concentration of the urine was also measured; although this increased during both types of diuresis, the total output changed very little, or sometimes decreased slightly after pitressin. The nicotine test was performed during diuresis produced by drinking 1 litre of water. The urine was then collected every 10 minutes. In each case the response was expressed in equivalent milli-units of pitressin by doing at least two tests with different doses of pitressin on each subject and constructing a dose-response curve. The logarithm of the dose of pitressin was found to bear a linear relation to the duration of inhibition of diuresis. The slope of the line indicated that doubling the dose produced about 10 minutes' longer antidiuretic effect. Calibrated diuretic curves were also constructed for the effect of smoking 1–3 cigarettes. Smoking one cigarette with full inhalation was found to be equivalent in effect to about 1·5 mg. of nicotine base; and after inhaling the smoke of three cigarettes in succession there was a much impaired antidiuretic response to pitressin injections.

Nicotine given intravenously was shown to be able to cause a pronounced drop in blood-pressure, associated in one case with syncope; and thus in such experiments the decreased G.F.R. must complicate the interpretation. On the basis of this nicotine test, Dr. Lewis divided his cases into two groups: in one the supraoptico-hypophyseal mechanism was destroyed, and in the other it could still be stimulated.

Reviews of Books

Annual Review of Microbiology

Vol. III. Editor: CHARLES E. CLIFTON. Stanford, California: Annual Reviews. 1949. Pp. 476. $6.00.

The Nature of the Bacterial Surface

Editors: A. A. MILES and N. W. PIRIE. Oxford: Blackwell Scientific Publications. 1949. Pp. 179. 15s.

IT is said that a condition of tenure of certain academic posts in the United States is the annual publication of one or more "papers." If this were true (which we doubt) it would explain those numerous essays on such subjects as the Blood Beryllium in 100 Cases of Hallux Rigidus which so often hinder the search for what we wish to read. Excessive publication is a worry affecting every branch of learning; and though nobody doubts that the preparation of minor original investigations for the press is invaluable training for the young, the practical results have been much weariness for all. Hence the development of some new forms of publication to allow "what matters" to receive attention.

Though the idea is by no means novel, the review of new knowledge published as an annual volume seems to be gaining fresh popularity. Typical of these is the *Annual Review of Microbiology*, and its third volume illustrates both the strength and weakness of this medium. The subject of microbiology is already divided into sections—of interest to the agronomist, the brewster, and the physician, among many others—and each section is by now barely comprehensible to students of the others. Thus a microbiological review, if it is to live up to its name, must include much matter which is of interest to only a minority of those who call themselves microbiologists. It would be foolish, also, to imagine that volumes of this kind are a substitute for hours spent in the library. Nevertheless they offer, at worst, a classified series of signposts which may save many fruitless hours; and when the reviewer has done his work properly he provides not a compilation but a synthesis, intelligible to those of us whose mild curiosity extends into fields outside our own. While no contributor to this volume exhibits the contemplative authority of a Burnet or an Andrewes, the level of contributions is high. Taliaferro on the cellular basis of immunity and Erikson on the actinomycetes seem outstanding, but it would be fair to say that to the average microbiologist, if such exists, half the book will be interesting and three-quarters understandable. The indices, both of authors quoted and of subjects, are excellent.

A second type of publication now making headway is the report of a conference. Those who were present at the symposium on the Nature of the Bacterial Surface, held by the Society for General Microbiology last April, are not likely to forget the feast of ideas set before what could accurately be called a delighted audience. In the account of the proceedings, those who spoke, not only as principals but in secondary parts and as interlocutors, have been given space and illustrations on a lavish scale, and praise is due not only to Dr. Miles and Mr. Pirie, who edit this volume, but to the anonymous stenographer whose record reads like *Hansard*. Most of the few hundred who do not regard such subjects as mere scientific trifling heard the disputations, and most will want this book; they will be surprised how vividly their memories are stirred.

We should add, perhaps, that success in this genre is not as easy as might be thought. The symposium-conference is expensive; the all-star cast is apt to be elusive; and the range of subjects which lend themselves to this form of discussion is limited. It is the essence of a symposium that those who take part must differ, not only in their conclusions but in their lines of approach; yet neither must be so diverse that understanding, and even some fusion of ideas, is impossible. (A colloquy between a flat-earthist and the Astronomer Royal might be entertaining, but it would not be a symposium.) At the same time, communications to scientific meetings so rarely evoke a constructive discussion at the time that committees of learned societies might well consider whether some of their time would not be better spent in planned debate. And if their results are as good as those of the microbiologists, they will be wise to publish them for the benefit of all.

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The choice of leading symptoms may seem a little arbitrary. It includes epistaxis, but not vertigo or any sensory or motor paresis; so diseases of the central nervous system receive scanty attention. Save that pain is rightly given precedence, the ordering of the chapters follows no very obvious plan, and it seems somewhat illogical to place the chapter on anæmia—a pathological state—between those on such unqualified symptoms as lateral abdominal pain and nose-bleeding. But these are small points. All the chapters are good in themselves and calculated to encourage careful history-taking and the use of eyes, ears, hands, the "scopes," and such tests as a competent doctor can and should make for himself. A sense of proportion pervades the book. Common disorders and those in which a wise patient would most desire early and accurate diagnosis are emphasised and put first; the more erudite investigations and tests are not forgotten but are never exalted above their worth. Simple and convincing clinical statistics and an occasional aphorism, judiciously chosen quotation, or personal experience reinforce the argument. The book should give a fresh slant on medicine to students reading for their finals, stimulate the imagination of young doctors beginning practice, or older ones who have got into grooves, and prove a useful consultant to anyone perplexed by a diagnostic problem.

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THE LANCET

LONDON: SATURDAY, APRIL 1, 1950

The New Medical Bill

In 1942 the Medical Planning Commission, appointed by the British Medical Association, said that "it would be an advantage to both the community and the practitioner if, when the medical student has passed his final examination, he could spend some time in practice under supervision before he embarked in practice on his own account." This opinion was endorsed by the General Medical Council in 1943, and elaborated by the Goodenough Committee, which in 1944 recommended that "every student, after he has passed his final qualifying examination and before he is admitted to the Medical Register and allowed to enter independent medical practice, should be required to serve as a junior house-officer for a period of twelve months in one or more approved hospitals." The Goodenough Committee considered the proposal that part of the twelve months should be spent outside hospital, in some other form of approved practice—e.g., as assistant in a laboratory or a health centre, or as apprentice to a general practitioner—but felt that in present circumstances the student would benefit most by spending the whole time in hospital, preferably devoting six months to a medical post and six months to a surgical one. The responsibility for finding him suitable posts was to rest on his teaching school, and, though the duties he would perform would approximate to those assigned in teaching hospitals to newly qualified house-officers, his status as a student still needing guidance and supervision was to be marked by giving him the care of fewer beds, with correspondingly more time for thought and study. The committee had in mind a maximum of 20 beds in teaching hospitals, and 30 beds in others, but thought that at first, in order to provide enough appointments, the figures might have to be 15 and 25.

Before the war only about half the doctors qualifying in this country took house-appointments before leaving hospital work; and, though the proportion became far higher during the war, the requirement that everyone shall spend at least a year in such an appointment represents a major change in our educational system. It is brought within sight by the Bill to amend the Medical Acts which was introduced in the House of Lords last week. Under this Bill the student on qualification will be entitled only to provisional registration by the General Medical Council, which will demand evidence of twelve months' satisfactory resident (or virtually resident) work in an approved hospital or institution, including prescribed periods for medicine and for surgery, before full registration is granted. The hospital or institution is to be approved by one of the bodies empowered to grant a qualifying diploma or degree, and the Bill (unlike the Goodenough Committee) does not exclude recognition of a midwifery post for this purpose. A note by the Ministry of Health, which is responsible for the Bill, explains that much preliminary organisation will be needed before all this can be brought into effect. The Act will not operate until a day to be appointed by the Privy Council, and different days may be appointed for different parts of the British Isles. Under another clause of the Bill the General Medical Council will acquire for the first time the right to send visitors to report on the sufficiency of the courses of instruction given to medical students. At present its visitors do no more than inspect examinations.

So much for the educational aspects of the Bill. The remainder, which deals mainly with the constitution and disciplinary procedure of the council, has gained both positively and negatively by the modifications made in the four years since it was drafted for the consideration of the bodies chiefly concerned. It goes a very long way to satisfy the demands for reform which at one time became strong but have latterly faded through preoccupation with the National Health Service. While few have doubted that the council, with its 39 members, of whom 5 are appointed by the Crown, 27 by the universities and medical corporations, and only 7 are directly elected by the profession, is well fitted to perform its functions in respect of registrable qualifications and the issue of the *British Pharmacopœia*, it has been widely, and at times keenly, felt that such a body is not ideally constituted for judging errors of professional conduct. Under the Bill the members of the council are to be increased to 45, of whom 5 doctors and 3 laymen will be appointed by the Crown on the advice of the Privy Council. The number of members elected directly by the profession is increased only by 2—making 6 for England, 2 for Scotland, and 1 for Ireland—but at least 6 of them are to be members of the new Medical Disciplinary Committee on which the disciplinary functions of the council will now devolve. This committee, consisting of the president and 18 other members of the council (1 or more of whom must be non-medical) will work with a quorum of 9. Thus the elected members, who are generally in active practice, are formally granted a larger share in the judicial proceedings, and there will be less justification for the gibe that "even a medical practitioner is entitled to be tried by his peers, not by his professors."[1] We would respectfully ask the British Medical Association to consider whether, in these circumstances, it is desirable to continue the practice whereby the elected members of the General Medical Council are to all intents and purposes appointed by the council of the B.M.A. As things stand, an independent candidate would have to have quite exceptional claims before he could succeed against the B.M.A.'s official nominees, and we suggest that the elections would be given more reality and usefulness if the B.M.A., instead of asking voters to keep rigidly to an official list, were to present them with a choice of a dozen or more candidates all of whom would be acceptable to the association. If this incidentally improved the chances of an occasional outsider, so much the better both for the G.M.C. and the B.M.A.; for unreal elections are seldom quite healthy.

In the disciplinary procedure of the council—or rather of the Medical Disciplinary Committee—various important changes are made. Subject to the approval be better spent in planned debate. And if their results are as good as those of the microbiologists, they will be wise to publish them for the benefit of all.

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[1] *Economist*, 1946, 151, 284.

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his is the most that endocrine therapy can offer n dysmenorrhœa. At the meeting Mr. T. N. MacGregor claimed to have produced painless periods in 38 patients with spasmodic dysmenorrhœa by giving them œstrogen in the second half of the cycle. It is less easy to understand the underlying rationale of this method, especially as it is generally agreed that œstrogens given after the tenth day of the cycle have no demonstrable effect on the remaining events of the cycle and will not prevent menstruation from taking place at the expected time. It is probable that in the presence of progesterone exogenous œstrogens are in some way "inactivated," as they may be, and for the same reason, in pregnancy.

Prof. T. N. A. Jeffcoate made some sobering remarks on the use of œstrogens in pregnancy. He had reached the conclusion that they are fully effective only in preventing lactation and are less reliable in the suppression of established lactation. He doubted whether breast engorgement will respond to an occasional dose. If one was prepared to give them for up to seven days, he thought that œstrogens might assist in evacuating a missed abortion. He was convinced that œstrogen therapy has no part to play in the induction of labour; as much as 500 mg of œstradiol intravenously had been ineffective in a case of inertia. However, considerable interest has been taken in the work of the Smiths [4] on the œstrogen treatment of threatened and repeated abortions, toxæmia, and pre-eclampsia, and in Priscilla White's [5] report of a 90% fœtal survival-rate in 300 deliveries where the diabetic mothers had been treated with œstrogen during pregnancy. Olive Smith [6] claims success-rates of 72% in 219 cases of threatened abortion treated with œstrogen; 78% in 272 cases where the œstrogen was given prophylactically, on the basis of previous history, to prevent abortion: and 75% where it was given prophylactically again, on the previous history, to prevent complications of late pregnancy. For prophylaxis the Smiths insist on a rigid, gradually increasing, dosage schedule reaching 125 mg. of stilbœstrol daily by the 35th week. This is a very different schedule from that proposed by Christie Brown [7]—0·6 mg. of dienœstrol and 10 mg. of ethisterone daily up to the 18th week, after which the embryo should "plough its own furrow." Since 0·6 mg. of dienœstrol is equivalent to about 0·15 mg. of stilbœstrol the discrepancy is very wide. Christie Brown suggests that larger doses or a longer course of œstrogen may give rise to abnormality in the fœtus. He gives similar doses during the second half of the menstrual cycle in all cases of infertility showing no gross disease, to "secure firm implantation of the ovum," and 34% of 111 patients so treated became pregnant within six months. Here again is a method of treatment whose rationale is difficult to reconcile with the accepted physiology of the reproductive cycle, especially in relation to the behaviour of exogenous œstrogens and progestogens in the second half of the cycle. Yet it has yielded such surprisingly good results that one wishes the series had been statistically treated, for instance by giving alternate cases the active material and the placebo.

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4. Smith, O. W., Smith, G. van S., Hurwitz, D. *Amer. J. Obstet. Gynec.* 1946, 51, 411.
5. White, P. *Penn. med. J.* 1947, 50, 705.
6. Smith, O. W. *Amer. J. Obstet. Gynec.* 1948, 56, 821.
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New Uses for Streptococcal Enzymes

The liquefying enzymes elaborated by some streptococci may well find increasingly wide applications in surgery and medicine, by aiding the removal of thick pus or other exudates from body cavities and surface wounds. Their uses have lately been reviewed by Tillett and his colleagues,[1] with striking colour photographs. Tillett and Garner[2] first described the fibrinolytic action of broth cultures of hæmolytic streptococci in 1933. Further studies of the liquefying process have shown [3] that the streptococcal fibrinolysin, which has been named streptokinase or SK, combines or reacts with a globulin factor present in serum or exudate, variously called plasminogen, serum protease, or activatable fibrin-lysing system, to form the active fibrin-lysing system or plasmin. Two years ago, Sherry, Tillett, and Christensen,[4] demonstrated that the physical characters of thick pus that make it difficult to aspirate are due not so much to fibrin as to desoxyribose nucleoprotein, which forms 30–70% of its total solids. They also showed [5] that the organisms producing streptokinase, such as the group A hæmolytic streptococci, can also produce desoxyribonuclease—now known as streptodornase or SD—which readily liquefies thick pus or viscous solutions of the nucleoprotein itself. Christensen [6] has since described an improved method for purifying these two enzymes: alcoholic precipitation is followed after solution by precipitation with protamine, and a further precipitation with 20% alcohol then brings down streptokinase and leaves desoxyribonuclease in solution. He also describes the somewhat formidable technique for estimating not only the two enzymes and plasminogen but also antistreptokinase, a normal constituent of blood-serum which inhibits streptokinase. The level of antistreptokinase in the blood is normally higher in adults than in infants, it is raised in rheumatic fever, and it reaches very high titres after the intrapleural injection of streptokinase.

Tillett and Sherry [3] have injected the purified enzymes into the pleural cavity in patients with different types of effusions, and the only toxic effects noted were some transient fever and malaise. In fibrinous pleurisy the aspirated fluid showed a fall in fibrinogen and a rise in non-protein nitrogen, sometimes accompanied by a leucocytic reaction. In most cases of empyema the enzymes rapidly reduced the amount of sediment in the pus and its viscosity, so that it could readily be aspirated; but in two cases the pus was sufficiently acid to inactivate the enzymes and no benefit was obtained. In postoperative hæmothorax the injection of streptokinase made it possible next day to aspirate much of the effusion as a thin brownish fluid. In the latest paper, Tillett et al.[1] mention two further cases of hæmothorax in which loculation or blood-clot hindered aspiration,

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1. Tillett, W. S., Sherry, S., Christensen, L. R., Johnson, A. J., Hazlehurst, G. *Ann. Surg.* 1950, 131, 12.
2. Tillett, W. S., Garner, R. L. *J. exp. Med.* 1933, 58, 485.
3. Tillett, W. S., Sherry, S. *J. clin. Invest.*, 1949, 28, 173.
4. Sherry, S., Tillett, W. S., Christensen, L. R. *Proc. Soc. exp. Biol. N.Y.*, 1948, 68, 179.
5. Tillett, W. S., Sherry, S., Christensen, L. R. *Ibid*, p. 184.
6. Christensen, L. R. *J. clin. Invest.* 1949, 28, 163.

of the Privy Council. it is to make its own rules, deciding for example what rules of evidence should be observed. Unlike the present council, it may oblige witnesses to testify on oath, and command their presence by subpœna. It will, like the present council, be advised by a legal assessor, who will be a barrister, advocate, or solicitor of not less than ten years' standing, working under rules made by the Lord Chancellor. When the assessor advises the committee on any question of law he is to do so in the presence of all the parties to the proceedings (or their representatives); if the advice is given in camera, the parties shall be told what it was; and if the committee does not accept his advice the parties must again be informed. After so many years in which it has been advocated, a right of appeal from the council's decisions is at last granted; for within 28 days of hearing that his name is to be erased from the Register the practitioner may appeal to the Privy Council. These are large and welcome changes even if they do not at all points fulfil the suggestions put forward jointly by the defence societies.[2] Possibly the rules the committee will make will cover some of these—for example the need to ensure that (apart perhaps from the president) the members forming the tribunal shall not have previously considered the evidence as members of a penal-cases committee. The defence societies thought it advisable that in all cases the initial complaint should be supported by an affidavit or affidavits, and that "all evidence before the disciplinary tribunal be given orally on oath, save for good and sufficient reason, except evidence as to character which may be given in writing." More material was their recommendation that the tribunal should be able to administer other penalties short of erasure (namely, suspension for varying periods or censure of varying degrees); and we cannot help regretting that the Bill retains the phrase "infamous conduct in a professional respect" with its flavour of hanging, drawing, and quartering, instead of adopting the societies' term "professional misconduct." But with so much to approve there is no need to emphasise relatively minor points of disagreement.

Œstrogen Therapy in Menstrual and Pregnancy Disorders

THE limitations of œstrogen treatment in gynæcology and obstetrics are at last being more clearly defined. On the whole, the views expressed at the Royal Society of Medicine on March 17 were commendably cautious.

Dr. A. M. SUTHERLAND, discussing the 1000 cases of abnormal uterine bleeding in which he has examined the endometrium, emphasised the need for diagnostic curettage before endocrine therapy is decided on, for in 14% of the cases organic pathological lesions were found. On the other hand, of the remainder, nearly two-thirds showed no histological abnormality, and less than a third had any evidence of endometrial hyperplasia. These findings suggest that it is hardly justifiable to claim that some form of treatment has "cured" functional non-ovulatory uterine bleeding on the basis of normal endometrial or biphasic temperature pattern after treatment unless the non-ovulatory nature of the cycles was established before treatment. Where curettage reveals endometrial hyperplasia—the "metropathic" group—SWYER[1] has lately been advocating œstrogen therapy. The efficacy of high doses of œstrogen and progesterone in producing immediate hæmostasis during the bleeding phase—KARNAKY[2] originally advocated 10–25 mg. of stilbœstrol every 15 minutes until bleeding ceased within 4–6 hours—has been generally accepted. Such heroic dosage is seldom necessary, though it will often have to be a good deal higher than the 2–5 mg. daily recommended by SWYER to produce "obvious amelioration of the bleeding within 48 hours."

Most English gynæcologists would not expect more from endocrine therapy in menstrual disorders than the ability of œstrogen to check bleeding immediately, and the ability of progesterone, given in a non-bleeding phase and repeated at regular monthly intervals, to cause progesterone-withdrawal bleedings, thereby forestalling the onset of another metropathic bleeding phase. But SWYER has reintroduced the "Hamblen technique," consisting in œstrogen hæmostasis, "cycle development" by the production of œstrogen-withdrawal bleedings, and "pituitary regulation" with œstrogen followed by the combined administration of œstrogen and progesterone. HAMBLEN[3] claimed that this technique gives a 45% "salvage" rate in young women with functional uterine hæmorrhage, and that about half of those who do not react to the œstrogen-progesterone scheme will respond satisfactorily to his "one-two cyclic gonadotrophin therapy." SWYER has slightly modified HAMBLEN's technique, and he of course gives the œstrogens and progestogens by mouth, by which route they have for some time been proved effective in adequate doses. He has found secretory endometrium in all of his 8 cases in which initial biopsy showed a proliferative endometrium or cystic glandular hyperplasia. Unfortunately he does not tell us the interval between the two biopsies or the ages of the 8 patients. A claim of 100% success for any treatment is so impressive that it would have been interesting to know the details of each case. The basis of the cyclical progesterone-withdrawal treatment is the production of artificial "periods," as a substitute for irregular metropathic bleeding, until the metropathic condition undergoes spontaneous remission. Puberty bleeding is especially prone to such remissions; indeed, there are many cases in which only one prolonged and excessive bout of bleeding has ever occurred. Fortunately the metropathic type of maturity bleeding is also likely to undergo spontaneous remission. The possibility of these remissions must be borne in mind in evaluating the results of any form of treatment, and statistical analysis might sometimes be admissible.

Much has been written about the endocrine treatment of dysmenorrhœa. It seems clear that spasmodic dysmenorrhœa occurs only in ovulatory cycles, and that if ovulation is inhibited by giving œstrogen in the first half of the cycle the resulting withdrawal bleeding will be painless. (This simple fact has been amply proved by endometrial biopsy and by basal temperature records.) Many workers believe that

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2. See *Lancet*. 1946, i, 936.

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1. Swyer, G. I. M. *Brit. med J.* 1950, i, 626.
2. Karnaky, K J *Sth. med. J.* 1940, 33, 1285.
3. Hamblen, E C. Endocrinology of Woman. Springfield, Ill., 1945.

Whatever the explanation, it seems wise not to give pertussis vaccine if there is a past history of convulsions, if the child is suffering from or has recently had a respiratory or other infection, or he has lately been in contact with an infection to which he is susceptible.

DAY HOSPITALS

One out of every thirty-five people born in Great Britain (Dr. E. B. Strauss says[1]) is at some time or another a certified patient in a mental hospital. This is a dramatic way of putting the fact that the incidence of certifiable mental illness in the community is nearly 3%, and it certainly helps the imagination to grasp the problem in terms of people and families. Certified patients of course represent only a proportion of the mentally ill in the country: there are just as many people seeking voluntary treatment in our mental hospitals, and there are many more who do not need full hospital treatment but who badly need help of some kind. For some years now the mental service has been trying to find ways of helping these people. Outpatient clinics at mental and general hospitals do something, social clubs for discharged mental-hospital patients perhaps do more. Community care given by psychiatric social workers to patients in their own homes has already proved its worth[2]; and the day hospital started by the Institute of Social Psychiatry has benefited many who feel themselves to be in some sense outcasts from society—discharged patients, neurotics, psychopaths, and delinquents among them.

The institute opened its first social clubs for patients over ten years ago, and is now responsible for some 11 of them. The idea of a day hospital came to Dr. Joshua Bierer, the director of the institute, through his growing conviction that some of these patients needed more help than they gained from an hour or two a week, or even an hour or two a day, of social intercourse. The day hospital offers them fully occupied days: it provides group and individual treatment, occupational therapy throughout the day, art, music, and drama, and the opportunity to adapt themselves to a society which is, indeed, selected and experienced under safeguarded conditions, but which is nevertheless real—demanding appropriate behaviour and the acceptance of responsibility, and offering treatment at the level of actual personal experience. Every patient has his effect on the group: even withdrawal, as Dr. Strauss pointed out, has its effect, attracting some and repelling others. The day hospital thus differs from the mental hospital in providing an opportunity for emotional development. The inpatient can go his own way without affecting the group because he has no responsibility. The patient in a day hospital is one of a group in action: he gets the rewards or buffets which his own behaviour excites and he is directly affected by the behaviour of others.

It might be thought that society as a whole could provide him with this experience. It always had to do it in the past, and sometimes no doubt the results were good. The current unsociability of our race is responsible for a good deal of ostracism, and no doubt of expense. We have to make artificial opportunities for social intercourse for various groups of people—the aged, the residents of new housing estates, the mentally sick, the deaf, the blind, the troublesome, the lonely. In more genial days the general zest of society must have carried all these people along, and no-one seems to have been the worse. Now we withdraw our garments, and fear to be bored or distressed.

This has some bearing on the question raised by a probation officer at last week's conference: she asked whether there was no danger of "contamination": whether one neurotic would not confirm another in his symptoms—whether, in short, the day hospital was not brewing up an explosive mixture. Dr. Bierer was able to reply that they had not found it to be so, either in the clubs or the day hospital: but then they take their precautions, diluting the more explosive elements by getting their wives and families to join the clubs with them. In one experimental club where discharged criminals are members, psychiatric social worker students make the leaven. This particular club was actually started because discharged criminals can find no company but their own kind: nobody else will accept them, and this in itself predisposes them to offend again. The really antisocial person, Dr. Bierer said, cannot help fighting against society, because he feels like a cornered rat: "You will never remove his sense of being cornered by cornering him further." Our police, he reminded the meeting, carry no firearms: and fewer of them get killed than in any other country. Our criminals, he said, feel less cornered.

SOCIAL HISTORY OF THE WAR

Mr. Titmuss's *Problems of Social Policy*[1] is one of the United Kingdom Civil Series of the History of the Second World War. The basic data of his themes are simply stated:

> "One metric ton of high-explosive, dropped in night raids by piloted aircraft on large cities in Britain, killed about four to five people and injured between ten to fifteen. . . . When the raids came, the size and character of the problem of homelessness took the authorities by surprise. In general terms one ton of high-explosive delivered on the built-up area of London and other large cities destroyed or damaged beyond repair ten houses. Another twenty-five were rendered temporarily uninhabitable and eighty were slightly damaged. On the average, therefore, one ton affected 115 houses, made eighty people temporarily homeless and caused another thirty-five to lose their homes permanently. For every civilian killed, thirty-five were bombed out of their homes."

In sum, 60,000 civilians were killed, 86,000 were seriously and 149,000 slightly injured. 175,000 houses were destroyed, 201,000 were damaged and rendered uninhabitable for a period, and 3,034,000 had minor damage. Millions of citizens—expectant and nursing mothers and children—were evacuated from the danger areas under official schemes or privately. So strong was the pull of family life (and often so uncomfortable was the strain of living with strangers) that as the incidence of bombing dropped, so the evacuees tended to return, and as it waxed anew, so the evacuation process had to be repeated. But each time fewer went, and more effort was needed to persuade them to go.

So we have the three main themes of this book—the problems of evacuation, of the homeless, and of casualties—and in their unfolding Mr. Titmuss leads us both wide and deep. He divides his history into four parts: Expected War, The Invisible War, The Battles, and The Long Years. The pre-war plans, their shortcomings in face of the actual event, the effect on one another of evacuee and (often unwilling) host Treasury, parsimony, local-authority reluctance to incur expenditure, the poor-law traditions of "chargeability," the comparative blind spot on problems arising from housing damage, the transformation in outlook produced by the first week's blitz on London and the subsequent rapid development of post-raid services, the national nutrition policy, the excessive curtailment of some of and within 24 hours of the injection of streptokinase large volumes of blood were easily removed. In a patient with a postoperative effusion infected with *Ps. pyocyanea* more than a litre of bloodstained fluid was evacuated after the injection of streptokinase, but the remaining infection resisted all forms of treatment until streptodornase was injected on alternate days; after the third injection of this the pleura was sterile. It is thought that the removal of the exudate and debris allowed the natural antibacterial factors, cellular and humoral, to make better contact with the bacilli and to destroy them. Photomicrographs of pus from a maxillary sinus show how 20 minutes after the injection of streptodornase the whole background of debris in the film had disappeared, only living leucocytes being left. The enzymes were also useful in chronic osteomyelitis with sinus formation and spreading ulceration of the skin.

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[1] Speaking on March 22, at a conference on Day Hospitals arranged by the Institute for Social Psychiatry.

[2] See *Lancet*, [illegible] p. 216.

[1] Problems of Social Policy. By RICHARD M. TITMUSS. London: H.M. Stationery Office and Longmans, Green. 1950. Pp. 596. 25s.

"Streptococcal enzymatic debridement," as TILLETT and his colleagues call their new technique for the removal of blood-clot and the cleansing of infected surfaces, is likely to be of great value as a supplement to antibiotic therapy in suitable cases, if only in shortening the patient's illness and lessening the formation of fibrous tissue. But it is clearly not a simple matter to arrange for the supply of the enzymes in adequate concentration, purity, and volume. This practical difficulty may be illustrated from the work of CATHIE [7] in this country. He has apparently had considerable success in the treatment of tuberculous meningitis by adding streptokinase to intrathecal injections of streptomycin. The enzyme was prepared by a modification of the method described by GARNER and TILLETT in 1934 [8]; the filtrate of the broth culture is adsorbed on to aluminium hydroxide and eluted with phosphate solution, and the product is standardised against clots formed in dilute plasma by the addition of thrombin. Even with this simpler method the routine supply of streptokinase is a considerable addition to the work of a hospital laboratory. Production by CHRISTENSEN's method of the presumably purer and more potent preparations, which are probably essential for the treatment of large pleural effusions, would be impracticable. The American workers say that much of their material was supplied by Messrs. Lederle and Co. and it is satisfactory to know that an active preparation of streptokinase can be obtained in England.*

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[7] Cathie, I. A. B. *J. clin. Path.* 1949, 2, 73; *Lancet*, 1949, i, 441.

[8] Garner, R. L., Tillett, W. S. *J. exp. Med.*, 1934, 60, 239.

* The makers [illegible] Wellcome, do not state the concentration [illegible] in [illegible] titration a[illegible] bere[illegible] vitro by moderate dilutions of th[illegible] supplied in the dry form to be di[illegible] use.

Annotations

ENCEPHALOPATHY AND PERTUSSIS VACCINATION

CONVULSIONS are common in infants and young children, though they no longer appear among the major causes of child deaths. It has been estimated that 4–7% of apparently normal children have a convulsion before they are 5 years old. Most of these attacks are associated with pyrexial illnesses, particularly respiratory infections lasting only a day or two. Some 5–10% are followed by epilepsy in later life. Violent and focal convulsions often leave cerebral sequelæ, especially if they occur before the child is a year old, and Lennox,[1] who followed up 240 cases of febrile convulsions, found nervous instability of some kind in 10–15% of the children: she emphasised that fever with convulsions can produce brain damage detectable in an electro-encephalogram. A convulsion or coma is the most usual first symptom of the ill-defined group of cerebral disturbances called encephalopathies, and there seems to be no sharp dividing line between these and the postconvulsive state. In some of them there is a definite cause of cerebral irritation, such as lead-poisoning or uræmia, but in most cases the reason for the cerebral symptoms is obscure. Clinically it is difficult if not impossible to distinguish the encephalopathies associated with infections from postinfective encephalitis, and even the pathological differentiation is uncertain. Grouping these manifestations together it may be said that temporary, permanent, or even fatal cerebral disturbances occur in scarlet fever (Rolleston [2] collected records of 75 cases with hemiplegia), smallpox, measles, mumps, herpes zoster, typhoid fever, and pertussis. The cerebral symptoms usually appear with or after the rash, but Holliday [3] has lately published examples of "encephalitis" arising in the pre-eruptive stage of rubella, measles, and chickenpox, and this condition should be borne in mind whenever a child develops obscure neurological symptoms after being in contact with infection.

The most puzzling of the "encephalopathies" are those which follow prophylactic inoculations. Sometimes this is a chance association (there has been at least one instance of a child having a severe convulsion a quarter of an hour *before* a dose of vaccine), but smallpox vaccination and rabies or T.A.B. inoculations are undoubtedly, though very rarely, the cause of encephalitic symptoms. In the U.S.A. there have been reports of encephalopathy ascribed to pertussis vaccine, though again the incidence is very low in relation to the $2^1/_2$–3 million inoculations done every year. There have been no similar cases after diphtheria immunisation alone, which suggests that in the two recent cases in England following combined diphtheria-pertussis inoculation the pertussis vaccine was the cause. In both cases, oddly enough, the children had twin brothers who were immunised at the same time without ill effects. In both the injection was their first dose. The first case[4] was in a boy of 8 months who started a convulsion about eight hours after his injection and died in hospital seven or eight hours later. Autopsy showed only intense congestion and some œdema of the whole brain. In the case reported by Dr. Anderson and Dr. Morris last week (p. 537) the boy was older (2 years 7 months) and had had a convulsion with transient hemiplegia three months before, when other children in the house had mumps; his convulsions did not start until thirty-six hours after his immunisation. Fortunately this child recovered, though with a right hemiparesis; the encephalograms showed dilatation of the left lateral ventricle. The mechanism of these mishaps is unknown. *H. pertussis* does contain an endotoxin which, when injected into rabbits will cause death in convulsions: but this does not happen if the vaccine has been treated with heat or formalin, and presumably its action can be ruled out here. The possible explanations seem to be: "some sensitisation phenomenon"; a latent encephalopathic tendency, made manifest by the vaccine; a latent virus infection similarly activated; or a cerebral vascular accident, such as thrombosis of small cerebral vessels, which is supported by the rapidity of onset of the symptoms.

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[1] Lennox, M. A. *J. Pediat.* 1949, 35, 427; *Amer. J. Dis. Child.* 1949, 78, 868.

[2] Rolleston, J. D. *Proc. R. Soc. Med.* 1927, 21, 213.

Holliday, P. B. *J. Pediat.* 1950, 36, 185.

[4] *Brit. med. J.* 1949, ii, 1478.

Reconstruction

WHAT MAKES A GOOD HOSPITAL?

(FROM A CORRESPONDENT)

WHAT makes a good hospital? It is strange to reflect that although we are now going forward with the creation of a national hospital service very few of those concerned with supervision of it could give a reasoned reply to the question. We are scarcely conscious of what we are trying to do when we speak of building up a good hospital service.

In common usage the word hospital signifies primarily the building. Many do not really get beyond this idea. A good hospital is, let us say, a clean bright modern building, typified for many by the much-publicised examples of new construction in Scandinavia, or the relatively few new modern units constructed in the '20s and '30s here in Great Britain. There is of course a measure of truth here: good work is hampered by obsolete premises suffering from the handicap of much improvisation. But it is only a short step from this to the idea that it is possible by voting a sufficient sum of money to plant a hospital here or there wherever the public need may require. This is, once stated, plainly a fallacy. It leads straight to an emphasis on construction, regardless of the need first to ensure that men and women are going to be available to staff the hospital. A better appreciation of the things that go to make a good hospital may save much heart-burning later.

FIVE ELEMENTS

It is probably fair to say that, apart altogether from physical premises, there are five main elements on which the merit of a hospital depends. Three of them have been recognised as essential to the conception of a hospital in this country ever since the refoundation of the Royal hospitals in the 16th century—namely:

(1) A medical staff.
(2) A nursing staff, together with the necessary complement of cooks, domestic workers, and so forth.
(3) An administrative authority.

To these there have been added since the latter years of the 19th century two still only half-understood essentials:

(4) Diagnostic facilities, and the staff to operate them.
(5) A social welfare service.

No-one is properly qualified to take a share in the supervision of hospital services who has not at least some understanding of what constitutes excellence in each of these five respects. And how many of those recently appointed to act on regional boards and hospital management committees have more than a dim idea of what is needed? To be able to detect an occasional human failing here and there in an existing organisation is not enough; the old half-conscious methods of the past will surely fail in this new era unless we have a clear concept of what is needed.

What then constitutes excellence in these five directions? It is impossible without writing a book to do more than offer a few observations under each heading and to hope that they may prove suggestive.

THE FIRST THREE

Excellence in the Medical Staff

The medical staff must comprise the best men available and they must work happily as a team. As to the ways of ensuring this, the tradition of our best hospitals has been clear and forthright now for many generations. The staff have been elected by their colleagues, acting together as the medical committee of the hospital, and there should be the least possible interference with this procedure. The method admittedly carries with it the danger of inbreeding—and the arrangements now devised to enable the regional boards to have control of the medical appointments may be a necessary safeguard; but if they destroy the sense of comradeship among the medical staff the gain will have been dearly bought, and the arrangements must be revised before it is too late. (This, in all its ramifications, is a large and difficult subject; one wonders whether the experimental character of the new arrangements has been explained to the members of the regional boards who have been invited to operate it.)

With the highest standards of professional skill must go one other thing of the utmost importance to a hospital—an absolute integrity towards every patient. We like to think that the tradition enshrined in the charge to the physicians at St. Bartholomew's—enjoining them to set aside "all favoure, affection, gayne or lucre"—needs no repetition today. Is the record spotless? The excellence of a hospital depends in no small measure on a refusal to allow this great British tradition to be compromised by the arrival within the walls of the hospital of the pay-bed patient. Publicity is here perhaps the best safeguard. Let *all* paying patients' fees (to the medical staff as well as to the hospital) be collected through the hospital office, and let a statement of all payments made be laid regularly before the board of governors or a small subcommittee chosen for the purpose.

Excellence in the Nursing Staff

Here there is to hand a simple test. With certain exceptions it is true to say that a good hospital is one that is not short of nurses—that is to say, one to which women of the right kind are attracted in sufficient numbers. Nurses come and go, and they know their hospitals with an intimacy impossible to the outsider. If the nursing staff is up to complement, then the nursing in that hospital is pretty sure to conform to our British standards of excellence. The converse is not equally true, for there are exceptions—and the hospitals for tuberculosis are a case in point—where it would be wrong to judge the quality of the nursing by this test. Generally speaking, a hospital which is periodically short of nurses—and more especially if other hospitals of apparently similar character are not equally short—should leave no stone unturned to discover why, even if inquiry leads to difficult and awkward conclusions.

In no department is the hospital more dependent on the human factor than in its matron and her nurses. A good nursing staff is one that is happy: and there is no doubt whatever that women differ immensely in their capacity as matrons (and as ward sisters) to achieve this sense of harmony. Not every appointment is a success. It is a weakness in our system that it is not always easy financially for a matron or a ward sister to retire upon pension, and something can often be done to make this a little easier.

I must not here embark on a discussion of the wider nursing questions—whether the centralised examination system and other trends of the times obscure the essence of hospital nursing as the relief of distress and the comforting of the patient, or write on the danger of *diverting* the emphasis to ward routines and semimedical technicalities. But it may be permissible to observe that one short cut now increasingly adopted—the employment of young girls to look after the aged and chronic sick—is certainly no sign of excellence in a hospital. Of all our present practices, this employment of child labour is surely the most certain to be condemned by the opinion of the future.

Excellence in Administration

He who would understand what constitutes good hospital administration *must* know something of the change which has come over the scene within the last thirty or the social services in the danger areas and their inadequate and tardy development in the reception areas —these are a few of the topics which Mr. Titmuss, as social historian, illuminates as he pursues his main themes.

The story of the Emergency Medical Service and the Casualty Service naturally occupies a significant though not a preponderating part of the book. The natural anxiety to be ready at all times to deal with war casualties, whether Service or civilian, led to severe curtailment of resources available to the sick civilian. This shortage was encouraged by the financial arrangements inevitably made by the Ministry of Health to reserve beds for war victims. The strain fell particularly heavily on sick children, on the old, on the mentally sick, and on a large proportion of the tuberculous, who were discharged home to help create a reserve of beds. In due time these emergency arrangements had to be modified, but the main burden of caring for the civilian sick was borne by the then "municipal" hospitals. This is well shown by the figures Mr. Titmuss gives of vacant to occupied beds in February, 1941, which was 1 : 0 9 in the voluntary hospitals as against 1 : 8·0 in the municipal. But the experience gained led as early as 1942 to a Government promise of a post-war national hospital service, and the now historic hospital surveys were begun. And so with other social services. Designed in a hurry to meet the emergencies of war, they have now passed into the fabric of the national life.

Mr. Titmuss gives some interesting illustrations of the indirect price of war in terms of human life. Deaths of babies in 1940–41 showed an excess of 6500 over those of 1938–39; 130 children, indulging their natural play instincts, were accidentally drowned in emergency water tanks in 1940–43; in elderly people between 1940 and 1943 there was an excess mortality of 2300 from "falling downstairs, out of bed, elsewhere in the home, out of doors, or from unknown circumstances." But out of suffering came wisdom. Perhaps the most striking proof of that in the field of social policy was the arrest of the downward trend in vital statistics which marked 1940 and 1941, and the subsequent achievement, while the war was still in progress, of records which would have appeared impossible in 1938. The author quotes René Sand: "We can buy human life. Every country within certain limits decides its own death rate."

Mr. Titmuss has already put social medicine in his debt by his statistical analyses of infant mortality and by his social studies, with Prof. Fred Grundy, of Luton. His present lucid and well-written book is a really important work of social history. As such, it adds incidentally but profoundly to the raw material of social medicine and substantially increases our indebtedness.

ADOLF MEYER

THE development of psychiatry in the United States and Canada, and in this country, during the present century probably owes more to Adolf Meyer than to any other single man. Many forces, historical and contemporary, unifying and disruptive, have given it the diverse shapes it wears today, but none has exerted the steady formative central pressure upon its theory and practice which Adolf Meyer's teaching in the Henry Phipps Clinic afforded the generations of men and women who in their turn passed on to their students the broad conceptions and detailed practice which they had learnt from Meyer at Johns Hopkins. Among them were most of the abler psychiatrists of America, and many from Great Britain and the Commonwealth who hold prominent teaching positions. Adolf Meyer's death on March 16, therefore, has historical as well as personal significance. Psycho-analysis now plays a larger part in psychiatric training and theory than he conceded it, and the short-cut physical methods of treatment are often at odds with his insistence on paying full attention in therapy to the whole man and all the circumstances that could have caused or could maintain a mental illness. But the main stream still runs in the channel he cut. Our rapidly growing knowledge of cerebral physiology and its bearing on mental disease moreover is in no sense alien to his way of regarding the relationship of bodily to mental happenings.

Strangers often found it hard to understand why Adolf Meyer was the undisputed leader of American psychiatry for decades. He wrote little himself and never produced a comprehensive textbook or statement of his teaching; his exact researches were chiefly concerned with cerebral anatomy and pathology; his pupils published comparatively little from his wards and laboratories; he was difficult to follow because of his ungrateful and laboured style; and no outstanding advance in nosology, therapy, or psychopathology was linked with his name. Yet the paradox was immediately explained when one came under his personal influence. He was a psychiatrist who might well have been taken as the ideal type of what such a specialist should be—humane, alert, warm-hearted, shrewd and sensible, medically and scientifically in the great tradition; a teacher at once exacting and stimulating; a man with a social conscience and a wise humility. To causes such as the furtherance of mental hygiene he gave farsighted support, while remaining critical of unbalanced enthusiasms. In so far as psychiatry in the English-speaking countries is now a respected and indispensable part of medical training and practice, it is the work in considerable measure of Adolf Meyer, through his teaching and example.

IODINE IN SALT

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Reconstruction

WHAT MAKES A GOOD HOSPITAL?

(FROM A CORRESPONDENT)

WHAT makes a good hospital? It is strange to reflect that although we are now going forward with the creation of a national hospital service very few of those concerned with supervision of it could give a reasoned reply to the question. We are scarcely conscious of what we are trying to do when we speak of building up a good hospital service.

In common usage the word hospital signifies primarily the building. Many do not really get beyond this idea. A good hospital is, let us say, a clean bright modern building, typified for many by the much-publicised examples of new construction in Scandinavia, or the relatively few new modern units constructed in the '20s and '30s here in Great Britain. There is of course a measure of truth here: good work is hampered by obsolete premises suffering from the handicap of much improvisation. But it is only a short step from this to the idea that it is possible by voting a sufficient sum of money to plant a hospital here or there wherever the public need may require. This is, once stated, plainly a fallacy. It leads straight to an emphasis on construction, regardless of the need first to ensure that men and women are going to be available to staff the hospital. A better appreciation of the things that go to make a good hospital may save much heart-burning later.

FIVE ELEMENTS

It is probably fair to say that, apart altogether from physical premises, there are five main elements on which the merit of a hospital depends. Three of them have been recognised as essential to the conception of a hospital in this country ever since the refoundation of the Royal hospitals in the 16th century—namely:

(1) A medical staff.
(2) A nursing staff, together with the necessary complement of cooks, domestic workers, and so forth.
(3) An administrative authority.

To these there have been added since the latter years of the 19th century two still only half-understood essentials:

(4) Diagnostic facilities, and the staff to operate them.
(5) A social welfare service.

No-one is properly qualified to take a share in the supervision of hospital services who has not at least some understanding of what constitutes excellence in each of these five respects. And how many of those recently appointed to act on regional boards and hospital management committees have more than a dim idea of what is needed? To be able to detect an occasional human failing here and there in an existing organisation is not enough; the old half-conscious methods of the past will surely fail in this new era unless we have a clear concept of what is needed.

What then constitutes excellence in these five directions? It is impossible without writing a book to do more than offer a few observations under each heading and to hope that they may prove suggestive.

THE FIRST THREE

Excellence in the Medical Staff

The medical staff must comprise the best men available and they must work happily as a team. As to the ways of ensuring this, the tradition of our best hospitals has been clear and forthright now for many generations. The staff have been elected by their colleagues, acting together as the medical committee of the hospital, and there should be the least possible interference with this procedure. The method admittedly carries with it the danger of inbreeding—and the arrangements now devised to enable the regional boards to have control of the medical appointments may be a necessary safeguard; but if they destroy the sense of comradeship among the medical staff the gain will have been dearly bought, and the arrangements must be revised before it is too late. (This, in all its ramifications, is a large and difficult subject: one wonders whether the experimental character of the new arrangements has been explained to the members of the regional boards who have been invited to operate it.)

With the highest standards of professional skill must go one other thing of the utmost importance to a hospital —an absolute integrity towards every patient. We like to think that the tradition enshrined in the charge to the physicians at St. Bartholomew's—enjoining them to set aside "all favoure, affection, gayne or lucre"—needs no repetition today. Is the record spotless? The excellence of a hospital depends in no small measure on a refusal to allow this great British tradition to be compromised by the arrival within the walls of the hospital of the pay-bed patient. Publicity is here perhaps the best safeguard. Let *all* paying patients' fees (to the medical staff as well as to the hospital) be collected through the hospital office, and let a statement of all payments made be laid regularly before the board of governors or a small subcommittee chosen for the purpose.

Excellence in the Nursing Staff

Here there is to hand a simple test. With certain exceptions it is true to say that a good hospital is one that is not short of nurses—that is to say, one to which women of the right kind are attracted in sufficient numbers. Nurses come and go, and they know their hospitals with an intimacy impossible to the outsider. If the nursing staff is up to complement, then the nursing in that hospital is pretty sure to conform to our British standards of excellence. The converse is not equally true, for there are exceptions—and the hospitals for tuberculosis are a case in point—where it would be wrong to judge the quality of the nursing by this test. Generally speaking, a hospital which is periodically short of nurses—and more especially if other hospitals of apparently similar character are not equally short—should leave no stone unturned to discover why, even if inquiry leads to difficult and awkward conclusions.

In no department is the hospital more dependent on the human factor than in its matron and her nurses. A good nursing staff is one that is happy: and there is no doubt whatever that women differ immensely in their capacity as matrons (and as ward sisters) to achieve this sense of harmony. Not every appointment is a success. It is a weakness in our system that it is not always easy financially for a matron or a ward sister to retire upon pension, and something can often be done to make this a little easier.

I must not here embark on a discussion of the wider nursing questions—whether the centralised examination system and other trends of the times obscure the essence of hospital nursing as the relief of distress and the comforting of the patient, or write on the danger of diverting the emphasis to ward routines and semimedical technicalities. But it may be permissible to observe that one short cut now increasingly adopted—the employment of young girls to look after the aged and chronic sick—is certainly no sign of excellence in a hospital. Of all our present practices, this employment of child labour is surely the most certain to be condemned by the opinion of the future.

Excellence in Administration

He who would understand what constitutes good hospital administration *must* know something of the change which has come over the scene within the last thirty or the social services in the danger areas and their inadequate and tardy development in the reception areas —these are a few of the topics which Mr. Titmuss, as social historian, illuminates as he pursues his main themes.

The story of the Emergency Medical Service and the Casualty Service naturally occupies a significant though not a preponderating part of the book. The natural anxiety to be ready at all times to deal with war casualties, whether Service or civilian, led to severe curtailment of resources available to the sick civilian. This shortage was encouraged by the financial arrangements inevitably made by the Ministry of Health to reserve beds for war victims. The strain fell particularly heavily on sick children, on the old, on the mentally sick, and on a large proportion of the tuberculous, who were discharged home to help create a reserve of beds. In due time these emergency arrangements had to be modified, but the main burden of caring for the civilian sick was borne by the then "municipal" hospitals. This is well shown by the figures Mr. Titmuss gives of vacant to occupied beds in February, 1941, which was 1 : 0·9 in the voluntary hospitals as against 1 : 8·0 in the municipal. But the experience gained led as early as 1942 to a Government promise of a post-war national hospital service, and the now historic hospital surveys were begun. And so with other social services. Designed in a hurry to meet the emergencies of war, they have now passed into the fabric of the national life.

Mr. Titmuss gives some interesting illustrations of the indirect price of war in terms of human life. Deaths of babies in 1940–41 showed an excess of 6500 over those of 1938–39; 130 children, indulging their natural play instincts, were accidentally drowned in emergency water tanks in 1940–43; in elderly people between 1940 and 1943 there was an excess mortality of 2300 from "falling downstairs, out of bed, elsewhere in the home, out of doors, or from unknown circumstances." But out of suffering came wisdom. Perhaps the most striking proof of that in the field of social policy was the arrest of the downward trend in vital statistics which marked 1940 and 1941, and the subsequent achievement, while the war was still in progress, of records which would have appeared impossible in 1938. The author quotes René Sand: "We can buy human life. Every country within certain limits decides its own death rate."

Mr. Titmuss has already put social medicine in his debt by his statistical analyses of infant mortality and by his social studies, with Prof. Fred Grundy, of Luton. His present lucid and well-written book is a really important work of social history. As such, it adds incidentally but profoundly to the raw material of social medicine and substantially increases our indebtedness.

ADOLF MEYER

THE development of psychiatry in the United States and Canada, and in this country, during the present century probably owes more to Adolf Meyer than to any other single man. Many forces, historical and contemporary, unifying and disruptive, have given it the diverse shapes it wears today, but none has exerted the steady formative central pressure upon its theory and practice which Adolf Meyer's teaching in the Henry Phipps Clinic afforded the generations of men and women who in their turn passed on to their students the broad conceptions and detailed practice which they had learnt from Meyer at Johns Hopkins. Among them were most of the abler psychiatrists of America, and many from Great Britain and the Commonwealth who hold prominent teaching positions. Adolf Meyer's death on March 16, therefore, has historical as well as personal significance. Psycho-analysis now plays a larger part in psychiatric training and theory than he conceded it, and the short-cut physical methods of treatment are often at odds with his insistence on paying full attention in therapy to the whole man and all the circumstances that could have caused or could maintain a mental illness. But the main stream still runs in the channel he cut. Our rapidly growing knowledge of cerebral physiology and its bearing on mental disease moreover is in no sense alien to his way of regarding the relationship of bodily to mental happenings.

Strangers often found it hard to understand why Adolf Meyer was the undisputed leader of American psychiatry for decades. He wrote little himself and never produced a comprehensive textbook or statement of his teaching; his exact researches were chiefly concerned with cerebral anatomy and pathology; his pupils published comparatively little from his wards and laboratories; he was difficult to follow because of his ungrateful and laboured style; and no outstanding advance in nosology, therapy, or psychopathology was linked with his name. Yet the paradox was immediately explained when one came under his personal influence. He was a psychiatrist who might well have been taken as the ideal type of what such a specialist should be—humane, alert, warm-hearted, shrewd and sensible, medically and scientifically in the great tradition; a teacher at once exacting and stimulating; a man with a social conscience and a wise humility. To causes such as the furtherance of mental hygiene he gave farsighted support, while remaining critical of unbalanced enthusiasms. In so far as psychiatry in the English-speaking countries is now a respected and indispensable part of medical training and practice, it is the work in considerable measure of Adolf Meyer, through his teaching and example.

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Disabilities

48. THE MENTALLY HANDICAPPED CHILD

THE knowledge that one's child is not developing normally usually comes very slowly, beginning with a nagging fear and growing like a dark cloud as the months go by. Because of this the natural tendency is to break away from the menace and refuse to face the situation. In these days the child-welfare clinics are a great help to the young mother: but there are many who avoid the clinic, as well as friends, from the time when they first realise that their baby is not doing the things that a normal child does at his age. This is a great pity because every moment is valuable and if the situation is there to be faced, and the task to be done, the sooner one begins on it the better.

When my baby was a year old she had cut no teeth and made no attempt to sit up: she just lay and smiled placidly, and sucked all her food. She had had a very prolonged birth, and although I did not realise it at the time, had had pressure on the brain which would partially disable her for the rest of her life.

By the time she was two we had found a doctor who put us in touch with expert advice and we learned that we were faced with an uphill task, but one that we were assured had promise of achievement. Those were the darkest days of all because they were so full of uncertainty. It was difficult to believe in a promise that the child would eventually walk and talk. She was two-and-a-half before she walked at all, and then awkwardly and with a dragging movement. By the time she was four, when my next baby was born, I was still—in spite of persistent attempts at training—washing nappies, and coping with dirty beds. She had teeth now, but no desire to use them for purposes of mastication. I am afraid I laughed somewhat bitterly when the specialist said that she would one day be a 75% good citizen: but his words encouraged me, and I kept on with that queer doggedness that is nature's gift to mothers.

We tackled the problem of clean habits by a vigilance that must have irritated the child as much as it did us, for at last the miracle happened. At night we tried every method that anyone suggested and at last found our own particular answer to the trouble. For a period we lifted her every 2 hours, then every 3, working on to 4, and so on, until finally she went from 10 P.M. until 6 A.M., and the battle was as good as won. We found in this, as in other things, that rhythm and routine are the only substitutes for an active brain.

Feeding was a difficulty that was to concern us for many years. First of all because we had to teach the child to chew by means of games, constant facial contortions, and exaggerated movement of our jaws. Even after the first essential was grasped, this was a thing we had to watch for years. Then she had to be taught to feed herself. Her hands were spastic, and she found it difficult to hold a spoon—impossible to find her mouth. Our method here was to play with a spoon at times other than meal times—to have a bowl of lentils or peas, and try to ladle them from one dish to another. Then, when the art of holding the spoon was achieved, the next move was to put honey on the spoon, and guide it to her mouth. After we had tried a few goes at this, she made a rough (very rough) attempt at finding her mouth for herself: and the washing of face, head, and garments that this entailed was well worth while. By the age of seven an onlooker at a party had no idea that there was anything wrong. A party with cream cakes and jelly is a pretty good test!

The first walking was, as I have said, very awkward. Here I owe a big debt to a series of dancing teachers who have given exercises and remedial drill which have done wonders. These exercises have not been merely for feet and legs, but for hands and arms, and general harmony of movement. I believe that the coordination of bodily movement has done much to help her with speech. The use of the hands is very important too. We did not start with a pencil, but with a long paintbrush which was easy to hold, and required the movement of the whole arm. From this we went on to coloured pencils, and when the child was able to hold a pencil properly we went on to form. My method may seem strange but it worked. We put two dots on a piece of paper, and, imitating train-noises, we travelled from one to the other. Sometimes the line made some extraordinary journeys in between, but eventually we travelled the shortest distance. Then we used four dots and at last we got the shape of a primitive house. The curl of smoke that we added to the chimney was Mother's exclamation mark of triumph! We have now travelled through many stages—through crude woolwork, raffia-work, felt-work—up to the ultimate triumph of making Mother a frock at the local L.C.C. dressmaking class: and it is wearable! More than that: this year another miracle happened when a kind friend taught the art of toy-making, and by the sale of soft-toys actual money has been earned towards the summer holidays. This was something I had never contemplated. What if it *has* taken twenty-one years?

Speech meant a long journey, too. Here again I owe much to a speech specialist who helped not only my child but me as well to tackle this big problem. My advice to parents of children with retarded speech is talk to your child: talk, and keep on talking. Point out things, even if he doesn't seem to respond. Talk clearly and in simple words. At one time I was afraid people would think I was a foreigner—because I mouthed my words and I spoke so deliberately and distinctly. Lip-control is usually poor with retarded children, and there are many useful exercises for this which can be turned into games: blowing a ping-pong ball across a polished table is one, and another is to make a miniature clothes-line and pin paper clothes on it which must be blown dry by a strong wind. At 4½ my child could only say "Daddy." At her twenty-first birthday party she replied (in a memorised speech, it is true) to her toast. Speech may never become perfect, but so long as it frees the child to express himself it is worth waiting for.

One essential is to let the child lead as normal a life as possible. Perhaps there is a tendency to keep him in the background and confine him to the home. One has to fight one's pride and make a bid for normal contacts; and I have always found other children kind—anyhow up to the age of adolescence, when they become too much occupied with their own affairs. Then one has to depend on the friendship of older people. If it is possible for the child to have at least some corporate lessons in whatever kind of school is possible, that is a good thing; but I found that the actual teaching must be done individually. We had a teacher for some years whose methods were worth noting. For example, she told the story of Dick Whittington, then my little girl read the story in a very simplified form. Next, since we are fortunate enough to live in London, they went up to see the Mansion House and the Royal Exchange. After that they went down to the river and watched a ship unload its cargo. The story had become visual and alive. The next day they talked about it, trying to remember what they had seen. Then they read the story again, and the words in the book were shapes of something real, and therefore remembered.

The development of independence is a subject in itself. The beginning is difficult because the backward child lacks initiative, and has to be persuaded, cajoled, and led. It would be so much easier to do up his shoes, wash his hands, and comb his hair one's self; and it is forty years. Until the end of the 19th century, administration of a hospital was relatively simple: it was quite possible for a more or less uninstructed committee of lay folk to raise funds for a hospital, meet and appoint and dismiss the subordinate staff, and make sure that the cost of provisions was not excessive. The guardians managed the poor-law hospitals on similar but more economical lines, though they usually leaned more heavily upon the medical superintendent and sometimes took too much for granted. But with the increase in the complications of hospital management, it has become no more possible for a committee to administer a hospital successfully without a knowledgeable administrator than it is possible for such a body to manage an ordinary money-making business employing an equivalent number of staff. The committee must choose an executive officer and give him their confidence. It is his business to advise them on the whole economy of the hospital understood in its widest sense. The experience of the best hospitals in Great Britain and America over the last generation is decisive in this matter: but we have still many hospitals where the older tradition prevails and the executive officer is regarded as a mere clerk, whose duty is believed to be to place every matter that calls for a decision before the management committee.

A good administration implies that the just degree of delegation to the executive officer and his staff is established and maintained. It must vary according to circumstances, and the human factor cannot be left out of account. If the executive officer does not "carry the guns" needed for the task, it may be necessary for the chairman and other members of the committee to come to the rescue and help him out. If his personality is too marked, it may be necessary to exert some restraint and see that he does not unduly dominate the matron and other officers of the hospital. But the management of the hospital must not be taken out of his hands, for no hospital can be well administered if the committee continually overrules the policies of its executive officer.

Medical staff, nursing staff, and administrative officers—these three constitute the nucleus of any hospital. They must work happily together as a team, and to enable them to do so within the limits prescribed by the budget is the primary function of the committee. The three elements do not automatically achieve this sense of unity; for each—if it is alive and active as it should be—must be regarded as a potential source of pressure on the organisation as a whole. In periods when medicine is changing as it is changing today, the medical staff are constantly making fresh demands upon the nursing staff, and on the administration. The shifting stresses and strains must be accepted and welcomed as signs of life, and not regarded as something to be resisted or resented.

TWO OTHERS

There remain however, as noted above, at least two other components which cannot in these days be left out of account in assessing the quality of a hospital—its diagnostic facilities and its social-welfare services. Neither are entirely new developments, for both came into being during the latter years of the 19th century: but neither are so well established as essential parts of a hospital worthy of the name that their quality—or even their existence—can be taken for granted.

Excellence of Diagnostic Facilities

"Do not show me your wards and your kitchens: show me your laboratories!" said Sir William Osler to a hospital conference of 1910. It is a fair guess that if he were with us today he would still find much to criticise. The development of diagnostic facilities (by which I mean the X-ray departments and the various pathological and other laboratories) has been rapid but spasmodic, and the quality of the services provided by different hospitals is hard to assess. Experts in these fields tend to get on with their own job in their own hospital and do not make a habit of going round inspecting the deficiencies in other hospitals. And yet the efficiency of its diagnostic facilities and the professional quality of the personnel in charge of them is a sure guide to the capacity of a hospital to keep in step with progress. In no other field would the disparities between the different hospitals, if they were faithfully tabulated, prove so staggering.

Probably one of the most useful things that any regional board could do would be to arrange for a periodical inspection of the diagnostic facilities provided by the hospitals within its province. In this field there is no known means of ensuring that the personnel of any particular hospital can determine for themselves whether or not they are abreast of progress or stagnating in a backwater.

Excellence of Social-welfare Services

The choice of a social-welfare service as a sine qua non of a good hospital may seem a little strange when so much else of importance is omitted. What of the physiotherapy and other therapeutic services? What of the standard of catering, and so on? But the choice is deliberate. There is nowadays no reasonable room for doubt but that a hospital which takes patients and sends them out again without almoners to see that the patient is, as far as may be, free from worry while in hospital and helped along on the right road after departure, is just not doing its job. Nor is there any reasonable doubt but that this work amounts to a major department of the hospital, guided by its own criteria, requiring its own specialised staff, and—although not everyone would agree with this—properly responsible through the administrative officer to the governing body of the hospital. (Others would say that the department is a mere appanage of the medical staff, to whom it owes its allegiance; but the weakness of this approach is surely that it would limit the work of the almoner to the case referred by the doctor, whereby much that is important would inevitably be missed.)

What is at stake is not merely the existence of an almoner's department; it is a conception of the function of the hospital. For too long the hospital has been regarded as little more than the workshop of the surgeon and the physician, and the nurse has had to circumscribe her station to keep in line: the appearance on the scene of the almoner reintroduces an element of solicitude for the hospital's guests without which the modern hospital cannot discharge its duty to the community.

"... A doctor is, by definition, a man who doesn't have time. One of the things the average doctor doesn't have time to do is catch up with the things he didn't learn in school, and one of the things he didn't learn in school is the nature of human society, its purpose, its history, and its needs.... If medicine is necessarily a mystery to the average layman, nearly everything else is necessarily a mystery to the average doctor. Medical education is uniquely narrow, intense, and protracted. The doctor is the specialist *par excellence.* And his specialization doesn't end with his entrance into practice. The developments in medicine come so fast that the conscientious practitioner has no time to interest himself in the common concerns of citizens.... The doctor—the average doctor—is a nice fellow to have around the house or the hospital. His self-sacrifice for his patients is proverbial and proverbially true. But he sometimes breaks down in the larger areas of social intercourse because his training and his calling break down there. And the medical calling, like others that deal with bodies *qua* bodies, has a peculiar attraction to the socially circumscribed personality."
—MILTON MAYER, *Harper's Magazine*, December, 1949.

With the object of drawing attention to the desirability of securing national and international agreement on the colouring and marking of cylinders and the use of non-interchangeable regulating valves, the Association of Anæsthetists convened a meeting at the Royal College of Surgeons on Jan. 25, which was attended by representatives of the Ministry of Health, the Royal College of Surgeons, the Royal College of Obstetricians and Gynæcologists, the Association of Anæsthetists, the British Standards Institution, the Faculty of Anæsthetists, the British Medical Association, the British Dental Association, the Medical Defence Union, and the World Medical Association. Dr. John Gillies was in the chair. The following resolutions were passed unanimously:

1. That this meeting, in view of the number of deaths resulting from incorrect coupling of medical gas cylinders, strongly recommends that non-interchangeable couplings for medical gas cylinders as described in the draft code of practice agreed by the technical committee (CHE/20) of the British Standards Institution, be introduced at the earliest possible moment.
2. That representations be made to the Ministry of Health and that a copy of the decision of this meeting with regard to the adoption of the non-interchangeable coupling be sent to the Ministry for information and action.
3. That this meeting endorses the British Standards Institution's request that the Ministry of Health should approach the American Bureau of Standards.
4. That those present at this meeting should approach their opposite numbers in the United States of America.
5. That those present should meet again in four months time to receive reports on the progress of the steps taken.
6. That the above resolutions should be published in the medical and dental press and communicated to the medical departments of the Services, who should be asked to approach their opposite numbers in the United States and the Dominions.

Parliament

Midwives (Amendment) Bill

In the House of Lords on March 21 Lord SHEPHERD moved the second reading of this Bill. Only a small proportion of the 63 recommendations of the Working Party on Midwives[1] necessitated new legislation, and by far the greater number were being put into effect administratively. At present there were 70,000 midwives in England and Wales on the roll, but under 18,000 were practising. Of these, 5800 were employed by hospital authorities and 8200 by local authorities.

Turning to the Bill itself Lord Shepherd said that the first two clauses dealt mainly with the reconstruction of the Central Midwives Boards for England and Scotland. Hitherto they had been appointed by Order in Council but the Government had now decided to ask Parliament to allow changes in the boards to be made by statutory instrument. Any changes which might be made in the constitution of the boards would not imply a reflection on their efficiency, but would be designed to strengthen them, possibly by the inclusion of a higher percentage of qualified midwives, who were now limited to 5 out of a membership of 14 in England and Wales. Clauses 3 and 4 concerned the reciprocal recognition between the English and Scottish boards, clause 5 the recognition of women trained outside the United Kingdom. Where their training was not regarded as sufficient the Central Midwives Board would be able to authorise further training to justify the issue of a British certificate. Clause 6 dealt with the provision of an official uniform which would not, however, be compulsory. But the penalty for wearing a uniform without authority would be severe. Clause 7 dealt with the roll of midwives. Since so few of the women inscribed were actually in practice it was considered a waste of money to continue to publish it every five years. But the roll would be kept at C.M.B. headquarters, and local authorities would supply the central boards with the names of practising midwives and it would be their duty to publish these lists every year—17,000 names instead of 70,000. Clause 8 enabled the local supervising bodies to provide residential accommodation for pupil midwives.

Appointments to Hospital Management Committees

In the House of Commons on March 21 Mr. J. A. BOYD-CARPENTER raised on the adjournment what he described as "certain rather odd happenings in the South West Metropolitan Regional Hospital Board," which gave rise to interesting reflections on what was happening generally on the hospital side of the National Health Service. He thought that the general policy of the Ministry of Health not to intervene in the actions of the regional boards was right, but in the case he was about to describe non-intervention by the Minister would amount to connivance of a grave abuse in the regional hospital board's powers. The dispute had arisen in connection with the appointments to the Kingston group management committee: and in the background there was another dispute between the group management committee and the regional board on whether the Kingston Victoria Hospital should continue as a small hospital where general practitioners might treat their patients or whether it should be turned into a maternity unit attached to a larger hospital.

The question had now arisen of the renewal of appointments to the management committee; the chairman and three of the members had not been reappointed. They were all people who had strongly supported the views of their own management committee against the views of the regional board. Mr. Boyd-Carpenter suggested that the board had used their powers of appointment to force their views upon the management committee. It was laid down by the National Health Service Act that before filling vacancies the board should consult the committee. He understood that consultation had not taken place.

At the same time, he continued, the local advisory committee had been asked for recommendations for appointments to the group committee. They nominated four medical men in order of preference. The regional board appointed the last two and it was perhaps significant that the doctor whose name appeared first shared the views of the group management committee on the future of the Victoria Hospital. It was equally interesting to note that there remained on the group management committee a doctor who was not only a member of the regional board but also an employee of the group management committee.

Mr. FRED MESSER hoped, that the Minister would not give in to this appeal. The boards could not possibly do their job if they always had to be looking behind their shoulders to see whether what they were doing met with the Minister's approval. If the Minister permitted an inquiry into this case every regional board would be faced with this prospect when it declined to renew an appointment.

Mr. BLENKINSOP, parliamentary secretary to the Ministry of Health, was sorry that Mr. Boyd-Carpenter had indulged in what he could only describe as special pleading. The Minister had no power to deal with the appointment of hospital management committees; that was the statutory job of the regional hospital boards. The Ministry were satisfied that the regional hospital board here had carried out its duties to the letter and there was no basis at all for the Minister to intervene in any way. They wanted to encourage the regional boards to bring new personnel into the management committees.

Medical Bill

On March 22 Lord Shepherd introduced a Bill to amend the Medical Acts, and for purposes connected therewith. The Bill was read a first time.

QUESTION TIME

Iodised Salt

Mr. SOMERVILLE HASTINGS asked the Minister of Food whether the Food Standards Committee had yet completed their inquiry into the measures necessary to give effect to the Medical Research Council's recommendation that all domestic salt supplies in Great Britain should be iodised as a measure of protection against goitre.—Mr. MAURICE WEBB so very difficult to refrain from doing it again when it has been clumsily and badly done.

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[1] See *Lancet*, 1949, i, 190.

The most difficult stage in the struggle to give him independence is when the child has to be trained to do things outside the home by himself. The first day (and for many days afterwards) that a small figure walked to school alone, I walked, heavily disguised, on the other side of the road. There are certain risks you must take if your child is going to have a life worth living.

Later on, when my little girl was trained in road sense, she learned to shop—at first with someone, and later alone. This is a great joy to her. If the name of anything is difficult we write it down, and since she is not too clever about money she always has more than enough in her purse, and in coins of large denomination.

Lethargy is an enemy that has to be watched, especially during the years when the accomplishments are few. We have always tried to keep her active and interested without unduly tiring her; and as the things that she could do mounted up this vigilance became less necessary.

During the difficult years the child may feel frustrated. I found that attempts to counteract this by praising her for accomplishment had to be very judicious. It is, however, important to let the child feel that, at least in the home, she is a person of significance. There are many simple jobs and responsibilities that will give this sense of mattering which every human being needs. Never mind if the cups get broken or the milk spilt. The aim is not to achieve perfection, but to give the child a chance of growing up into a person able to do some service, not only for himself, but for the community.

Special Articles

HEALTH SERVICE ESTIMATES

The gross cost of the National Health Service in Great Britain during 1950–51 is estimated at £464,514,400. This figure is given in the Civil Estimates[1] published last week.

For England and Wales the gross cost is estimated at £413,260,400 (compared with £400,183,432 in 1949–50); and the net cost, allowing for appropriations-in-aid at £351,541,000 (compared with £317,873,250 in 1949–50). For Scotland the figures are: gross cost £51,254,000 (compared with £49,988,300 in 1949–50); and net cost £41,394,000 (compared with £40,636,300 in 1949–50). Thus the net increase is £33,667,750 for England and Wales; and £757,700 for Scotland.

For England and Wales the following estimates of gross cost are given:

	1950–51 £	*1949–50* £	*Increase* £	*Decrease* £
Central Council, &c.—	5000	2500	2500	—
Hospital, specialist, and ancillary services—	237,980,100	221,994,600	15,985,500	—
Services provided by local health authorities—	17,180,000	14,320,000	2,860,000	—
General medical and dental services, pharmaceutical services, and supplementary ophthalmic services—	140,394,000	141,487,400	—	1,093,400
Training services, &c.—	63,600	56,250	7350	—
Other services—	*17,637,700*	*22,322,682*	—	*4,684,982*
Total ..	413,260,400	400,183,432	18,855,350	5,778,382

The allotment to the hospital, specialist, and ancillary services in England and Wales is distributed as follows:

	1950–51 £	*1949–50* £	*Increase* £
Advances to regional hospital boards—	193,415,000	184,375,000	9,040,000
Advances to boards of governors of teaching hospitals—	34,470,000	31,565,000	2,905,000
Capital expenditure by the Minister in the acquisition of land, hospitals, and equipment—	3,300,100	2,016,200	1,283,900
Payments to the Minister of Pensions—	4,020,000	2,222,000	1,798,000
Payments to the Minister of Works—	1,594,000	*993,000*	*601,000*
Expenses of the Minister in connection with research—	31,000	30,800	200
Bacteriological service, &c.	1,150,000	792,600	357,400
Total	237,980,100	221,994,600	15,985,500

Under the heading of general medical and dental services, pharmaceutical services, and supplementary ophthalmic services, the distribution in England and Wales is as follows:

	1950–51 £	*1949–50* £	*Increase* £	*Decrease* £
Administration—	1,929,500	1,858,000	71,500	—
General medical services—	42,734,000	41,745,000	989,000	—
Pharmaceutical services—	28,003,000	31,700,000	—	3,697,000
General dental services—	41,565,000	43,048,000	—	1,483,000
Supplementary ophthalmic services—	*25,665,000*	*22,725,000*	*2,940,000*	—
Medical Practices Committee—	9000	8000	1000	—
Dental Estimates Board—	487,000	402,000	*85,000*	—
Tribunal under section 42 of the 1946 Act—	*1500*	*300*	1200	—
Transferred liabilities—	—	1100	—	1100
Total ..	140,394,000	141,487,400	4,087,700	5,181,100

Among other services in England and Wales, the cost of compensation for loss of the right to sell medical practices is estimated at £5,315,000, compared with £7,165,000 in 1949–50.

MEDICAL GAS CYLINDERS

The Association of Anæsthetists of Great Britain and Ireland and the Medical Defence Union have interested themselves for some time in safety measures to eliminate, as far as possible, avoidable anæsthetic deaths. With this object in view, these two bodies have collaborated with the British Standards Institution in preparing a code of practice for anæsthetists, and in addition have approved certain recommendations concerning the colouring and marking of cylinders containing gaseous anæsthetics. Most of the changes suggested are immediately practicable, and together they form a short-term policy.

As a long-term policy, there have been prepared, with the assistance of the manufacturers of anæsthetic gases and apparatus, specifications for standardised non-interchangeable couplings and coloured leads; and it is hoped that when these come into general use, wrong connections between gas cylinders and anæsthetic or inhalational apparatus will be virtually impossible and deaths from such accidents avoided.

It is eminently desirable, however, that these couplings should be adopted by international agreement which has not yet been obtained. There is also disagreement internationally as to the colouring and marking of cylinders. This is a matter of great significance in wartime: lack of inter-Allied uniformity led to many unfortunate occurrences during the late war.

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[1] Civil Estimates for the Year ending March 31, 1951. *Class V*: Health, Housing, Town Planning, Labour, National Insurance, and Contributions to Local Revenues. H.M. Stationery Office. Pp. 154. 3s. 6*d*.

With the object of drawing attention to the desirability of securing national and international agreement on the colouring and marking of cylinders and the use of non-interchangeable regulating valves, the Association of Anæsthetists convened a meeting at the Royal College of Surgeons on Jan. 25, which was attended by representatives of the Ministry of Health, the Royal College of Surgeons, the Royal College of Obstetricians and Gynæcologists, the Association of Anæsthetists, the British Standards Institution, the Faculty of Anæsthetists, the British Medical Association, the British Dental Association, the Medical Defence Union, and the World Medical Association. Dr. John Gillies was in the chair. The following resolutions were passed unanimously:

1. That this meeting, in view of the number of deaths resulting from incorrect coupling of medical gas cylinders, strongly recommends that non-interchangeable couplings for medical gas cylinders as described in the draft code of practice agreed by the technical committee (CHE/20) of the British Standards Institution, be introduced at the earliest possible moment.
2. That representations be made to the Ministry of Health and that a copy of the decision of this meeting with regard to the adoption of the non-interchangeable coupling be sent to the Ministry for information and action.
3. That this meeting endorses the British Standards Institution's request that the Ministry of Health should approach the American Bureau of Standards.
4. That those present at this meeting should approach their opposite numbers in the United States of America.
5. That those present should meet again in four months time to receive reports on the progress of the steps taken.
6. That the above resolutions should be published in the medical and dental press and communicated to the medical departments of the Services, who should be asked to approach their opposite numbers in the United States and the Dominions.

Parliament

Midwives (Amendment) Bill

IN the House of Lords on March 21 Lord SHEPHERD moved the second reading of this Bill. Only a small proportion of the 63 recommendations of the Working Party on Midwives[1] necessitated new legislation, and by far the greater number were being put into effect administratively. At present there were 70,000 midwives in England and Wales on the roll, but under 18,000 were practising. Of these, 5800 were employed by hospital authorities and 8200 by local authorities.

Turning to the Bill itself Lord Shepherd said that the first two clauses dealt mainly with the reconstruction of the Central Midwives Boards for England and Scotland. Hitherto they had been appointed by Order in Council but the Government had now decided to ask Parliament to allow changes in the boards to be made by statutory instrument. Any changes which might be made in the constitution of the boards would not imply a reflection on their efficiency, but would be designed to strengthen them, possibly by the inclusion of a higher percentage of qualified midwives, who were now limited to 5 out of a membership of 14 in England and Wales. Clauses 3 and 4 concerned the reciprocal recognition between the English and Scottish boards, clause 5 the recognition of women trained outside the United Kingdom. Where their training was not regarded as sufficient the Central Midwives Board would be able to authorise further training to justify the issue of a British certificate. Clause 6 dealt with the provision of an official uniform which would not, however, be compulsory. But the penalty for wearing a uniform without authority would be severe. Clause 7 dealt with the roll of midwives. Since so few of the women inscribed were actually in practice it was considered a waste of money to continue to publish it every five years. But the roll would be kept at C.M.B. headquarters, and local authorities would supply the central boards with the names of practising midwives and it would be their duty to publish these lists every year—17,000 names instead of 70,000. Clause 8 enabled the local supervising bodies to provide residential accommodation for pupil midwives.

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At the same time, he continued, the local advisory committee had been asked for recommendations for appointments to the group committee. They nominated four medical men in order of preference. The regional board appointed the last two and it was perhaps significant that the doctor whose name appeared first shared the views of the group management committee on the future of the Victoria Hospital. It was equally interesting to note that there remained on the group management committee a doctor who was not only a member of the regional board but also an employee of the group management committee.

Mr. FRED MESSER hoped that the Minister would not give in to this appeal. The boards could not possibly do their job if they always had to be looking behind their shoulders to see whether what they were doing met with the Minister's approval. If the Minister permitted an inquiry into this case every regional board would be faced with this prospect when it declined to renew an appointment.

Mr. BLENKINSOP, parliamentary secretary to the Ministry of Health, was sorry that Mr. Boyd-Carpenter had indulged in what he could only describe as special pleading. The Minister had no power to deal with the appointment of hospital management committees; that was the statutory job of the regional hospital boards. The Ministry were satisfied that the regional hospital board here had carried out its duties to the letter and there was no basis at all for the Minister to intervene in any way. They wanted to encourage the regional boards to bring new personnel into the management committees.

Medical Bill

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QUESTION TIME

Iodised Salt

Mr. SOMERVILLE HASTINGS asked the Minister of Food whether the Food Standards Committee had yet completed their inquiry into the measures necessary to give effect to the Medical Research Council's recommendation that all domestic salt supplies in Great Britain should be iodised as a measure of protection against goitre.—Mr. MAURICE WEBB replied: The Medical Research Council after extensive examination have recommended that all table and cooking salt should be iodised for the prevention of goitre and thyroid enlargement. This recommendation has been endorsed by the Ministry of Health Standing Committee on Medical and Nutritional Problems, and it has the full approval of the Secretary of State for Scotland and the Minister of Health.

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[1] See *Lancet*, 1949, i, 190.

The Food Standards Committee were asked to advise on what measures would be necessary to give effect to the medical recommendation. They have recently completed their inquiries and have recommended a standard of composition for iodised salt which can be enforced by chemical analysis. The committee received evidence from representatives of the salt industry, who have concurred in the recommendation as a permanent measure, and from other expert witnesses, and have advised that within one year from the date of an order all pre-packed free-running salt should be treated with small traces of iodide and that within two years all other pre-packed salt should be similarly treated. I understand that this would mean that the production of cut-lump salt would have to be discontinued. I am advised that if salt production as between pre-packed free-running salt and other salt used in the home remains substantially in the same proportion as in 1948 slightly more than half the population of Great Britain would benefit within the first year from the Medical Research Council's recommendation and that the entire population would benefit by the end of two years. Steps will not be taken to give effect to the Committee's recommendations until all concerned (the trade and technical interests, the medical profession and, indeed, the public) have had full opportunity to make any representations they wish. The Food Standards Committee will be open to receive representations until June 30, 1950.

Hospital Management Committees

Mr. DONALD KABERRY asked the Minister of Health whether, in view of the experience now gained as to the working of the hospital management committees and the filling of casual vacancies, he was prepared to review the rules governing the constitution of these committees, with a view to securing more adequate public representation.—Mr. ANEURIN BEVAN replied: The appointments are a matter for the regional hospital boards, who are required by statute to ensure that each committee includes members appointed after consultation with certain specified local public bodies. They are not, however, required by statute to undertake such consultations on the occurrence of every casual vacancy.

Motor-cars for Disabled Miners

Mr. EMRYS HUGHES asked the Minister what steps he was taking to provide motor-cars to disabled miners similar to those provided for disabled soldiers.—Mr. ARTHUR BLENKINSOP replied: Motor propelled tricycles are provided for severely disabled civilians under the National Health Service, but I cannot undertake to provide motor-cars.

Foods for Diabetics

Wing-Commander E. E. BULLUS asked the Minister if he would arrange that special foods prepared for diabetic people should be supplied as medical necessities under the National Health Scheme.—Mr. BEVAN replied: I am afraid this is not possible. The Act of 1946 authorises the provision of all proper or sufficient drugs and medicines but does not cover the provision of foods.

Health Centres

Mr. SOMERVILLE HASTINGS asked the Minister of Health what arrangements he had made for practitioners who are willing to undertake full-time service in health centres in any part of the country to secure an opportunity to practise their profession in this way, and what steps he took to ensure agreement by suitable practitioners of a district to undertake service in a health centre before he sanctioned the provision of such a centre by new construction or adaptation.—Mr. ANEURIN BEVAN replied: Before approving a health centre I obtain an assurance from the executive council, after consulting the local medical committee, either that enough local doctors want to practise there or that the need for more doctors in the area would justify advertising vacancies. Mr. HASTINGS: Does not the Minister think that if he agreed to the arrangement suggested in the first question, it would greatly improve the distribution of doctors, which is most unequal at present?—Mr. BEVAN: A special committee of the Central Health Services Council is exploring the whole question of the lines on which health centres should be developed.

In answer to a further question, Mr. BEVAN stated that one new building for a health centre was under construction, one other new building and one adaptation had been approved, and other schemes were under consideration. He had no information as to the numbers of doctors willing to transfer their practices to health centres. The present building situation would in any case make it impossible to provide health centres for all doctors who would like it.

Number of Nurses

Replying to a question, Mr. BEVAN said that the total nursing and midwifery staff employed whole-time or part-time in the National Health Service in England and Wales on Dec. 31, 1949, was 174,000. This was 12,000 more than on Dec. 31, 1948.

Hospital Boards and Committees

Mr. BOYD-CARPENTER asked the Minister whether it was with his approval that paid servants of regional hospital boards or group hospital management committees are appointed members of the particular boards or committees by whom they are employed.—Mr. BEVAN *replied*: As a general principle, I am not in favour of these officers serving as members of the bodies with which they are immediately connected. The requirements of the Acts make it inevitable, however, that a limited number of the senior medical and dental staffs should be so appointed, and I recognise that there may be other exceptional cases where it is desirable so to appoint officers.

Unemployed Doctors

Replying to a question, Mr. GEORGE ISAACS stated that there were at present 74 unemployed medical practitioners on the Appointments Register. This number included 36 foreign doctors, most of whom are Polish.

Poliomyelitis and Inoculation

Mr. S. P. VIANT asked the Minister of Health whether in view of the admitted risk of postvaccinal encephalitis he would consider making an investigation with the object of ascertaining if the numerous inoculation operations now being performed are playing any part in causing poliomyelitis.—Mr. BEVAN replied: I will consider the suggestion.

Fat Content of Ice-cream

Mr. SOMERVILLE HASTINGS asked the Minister of Food whether he would make regulations designating two or more qualities of ice-cream according to fat content, so that the public might have knowledge of the food value of the article purchased.—Mr. MAURICE WEBB replied: I am afraid that shortage of ingredients still make it impossible to introduce a satisfactory single standard for ice-cream without seriously reducing supplies to the public. The Food Standards Committee has considered fixing two standards; but after consulting the trade and the local-authority associations they felt that the lower standard, to which most of the manufacturers would have had to conform, would not have a good enough food value. In the circumstances, the committee recommended that the introduction of standards should be deferred until an improvement in the supply of rationed ingredients made it possible to prescribe a satisfactory minimum standard.

Public Health

Smallpox

A NURSE in a Glasgow hospital sickened on March 23, developed a rash on March 25, and has now been diagnosed as having semiconfluent smallpox. By last Monday the diagnosis of smallpox had been confirmed in two other cases, both modified by previous vaccination. In addition. two adults and a baby were under observation.

The source is probably a Goanese seaman who landed from R.M.S. *Chitral* at Tilbury on March 5 and travelled to Glasgow. He felt unwell on March 7 and developed a rash soon after admission to hospital on March 10. Chickenpox was diagnosed by competent physicians. This man was probably infected on the *Chitral* and there may be another missed case or cases amongst the passengers and crew who disembarked in London on March 5.

Smallpox should be suspected in any passengers or contacts who report fever or rashes to their doctors.

In England Now

A Running Commentary by Peripatetic Correspondents

THIS tension in the air about the atom bomb and worse takes us in different ways. Many avoid mentioning it at all; most rational people say soberly what they think, but do not dwell on it. Some optimists maintain that the danger is greatly exaggerated. The reaction which surprised me most came from a retired senior civil servant. He and my husband were at Oxford together and are renewing their old friendship. In the course of a long, scholarly, and intimate talk together the international situation naturally came up. Like many others the learned man evidently thought (erroneously) that the husband of a doctor knows more about drugs than other men do. "Do you know of a strong narcotic poison?" he asked, for he thought such a thing might be useful. My husband, having resigned to me the hyoscine preparation with which he flew back from America, said truthfully that he did not. "I believe one can be prepared from the roots of runner beans," said his friend wistfully. True, the ancients disliked beans and thought them unlucky, but Yeats spoke for us moderns in prizing his nine rows. Yet now the world has grown so sinister that a sane and quiet householder can turn his thoughts from scarlet and white flowers with bees murmuring among them, and from succulent green slices accompanying roast meat and gravy, to the poison underground which may deliver him from unknown horrors.

* * *

A character in *South Wind* remarks: "Mothers at present can bring children into the world, but this performance is apt to mark the end of their capacities . . . It is quite surprising how many survive in spite of their mothers. Ask any doctor." Norman Douglas might have known our hamlet. Regardless of the fact that I am not a G.P., they come blithely along hoping I will provide treatment and reassurance and so save them a visit to the village or town, for their own doctors will not come out without good cause. There were three of these mothers in one week not long ago.

The first came one morning to say that Barbara was being very sick and could I suggest anything? I gave her an alkali for an immediate stomach washout, and, as soon as I had arranged that the lunch would go on cooking in my absence (for it was a day when I had no help), I walked round. Barbara might have eaten something outré, for she is a schoolfellow of that would-be Sophie Tuckshop of ITMA who has figured before in these pages, or she might have some more serious ailment which would mean sending for their own doctor. The little girl was in the living-room wrapped in her mother's fur coat—a curious covering for a vomiting child, I thought. She was very limp, but her eyes were bright and her tongue clean; she complained of pain "here," comprehensively over the epigastrium, and there was no tenderness or rigidity; then she obligingly vomited into the kitchen sink, so I could see there was only clear fluid and a grape or two, duly skinned and stoned. She denied having eaten anything unusual. Then the mother volunteered that Barbara had felt sick after school treacle pudding the day before, and she had therefore given her two aspirins at bedtime and another that morning at breakfast. So the unfortunate child of 9 had had gr. 15 in about twelve hours and it seemed her tummy had revolted. I was discoursing on the use and abuse of aspirin when the father came in from outside and heard me. "Aspirin?" he said. "It always makes me sick, and I daren't touch it now." This seemed to clinch the diagnosis, especially since I had myself seen and spoken to the little girl the previous evening, not long before bedtime and the administration of the gr. 10 of aspirin; she had then been cavorting about the road on a borrowed bicycle outside my garden and seemed to be in perfect health. I thought to myself that a woman who has been married for eleven years should know something by now of the idiosyncrasies of both husband and child, and that aspirin is not a panacea.

A few days later a baby of fifteen months arrived in the arms of anxious parents. Toddling about the sitting-room, the floor strewn with toys, her three elder sisters, and the feet of three adults, she had sat down suddenly and let out a yell. She was wearing neither knickers nor napkin, and something sharp had made a gash of about half an inch on one labium. She was picked up bleeding and brought by car the hundred yards to my house, such was the agitation of the parents. It was not a deep cut and nothing was necessary but bathing and something to keep the labia from sticking, and I applied penicillin ointment. We never found out what she had sat on; opinions differed between the sharp corner of the fender and the tag of a shoe lace. The place healed rapidly and the mother, a doctor's daughter, promised meekly not to let baby run about in future naked from the waist down. It seems to me to be a very bad habit among what one may call the less fastidious mothers to dispense with protection for a child's nether regions as soon as sphincter control is gained. No doubt it saves washing knickers, but it is not hygienic, it may lead to infection, and the tender skins and genitals of toddlers are easily hurt when they sit down Bump, as they are apt to do.

The third little girl, aged three, came weeping in her mother's arms and accompanied by the grandmother. She wanted to pass water and couldn't, as they said in their soft country burr—and as she called out piteously in baby language. There was nothing to see, they were sure, but when I pulled down her knickers and looked, she was red and sore. She had these attacks after eating apples and tomatoes, they said, and she had been eating apples. "Well, why let her eat them?" I asked. Their broad, kind, subthyroid faces looked at me perplexed. For the same reason, I knew but again did not say, that a certain mother of a diabetic boy in pre-insulin days gave him chocolates; the child wanted them.

The question for all these and many other mothers is "Why?" But there will be no reply.

* * *

The other day I ran across this advertisement in a back number of one of the American journals:

> "SCRUB NURSE desires position with surgeon. Boston or vicinity. Postgraduate course and scrubbing experience in neuro-, thoracic and general surgery."

My little dictionary defines "scrub" (verb) as "to rub hard with something coarse or bristly"; and "scrub" (noun) as "brushwood, stunted trees, insignificant person, stunted animal or plant." One would scarcely expect that a nurse would advertise that she was an insignificant person, or that she could tell the forest from the trees because the latter were stunted. Nor would she be useful in surgery because she could rub hard with something coarse, unless a hog was to be operated on; her talents would scarcely be employed on exposed nerves or cerebrum. Actually a "scrub nurse" is an operating-theatre sister privately employed by a surgeon to assist him in institutions where the services of regularly employed sisters cannot be furnished, or in instances where the surgeon prefers to have his own "scrub nurse."

* * *

The doctor's telephone seems to have been forgotten when the National Health Service Act was being put together. It lays down (I suppose) that the doctor shall see his N.H.S. patients at the surgery at stated hours and visit them when they are too unwell to get to the surgery; but it says nothing about answering their futile questions on the phone. Many ci-devant private patients still ring me up at all hours just to chat about my latest prescription or ask me to get them some of the new drug they have read about in the *Daily Whatnot*. When my brain was picked in this way before the Act I could, if sufficiently irritated, add a bit to the bill: now I can only say: "I'll be in my surgery at such and such a time" and hang up. Of course, these patients don't like that. I suppose they are the same thoughtless types who buttonhole doctors at cocktail parties and tell them about their illnesses in the Far East or Mother's Terrible Operation. Can't we have another Amending Act to deal with them?

Letters to the Editor

GENERAL PRACTICE TODAY

AN APPRECIATION

SIR,—It is a good military principle that after a reconnaisance has been made but before action is taken an appreciation shall be made of the situation. So although it is true that Dr. Collings, in concluding his illuminating report, does summarise his findings and gives his own individual recommendations for action, he will doubtless not begrudge one of that group whom he calls "the people most concerned—namely 'ordinary' general practitioners" the right to make an independent appreciation of his report and to suggest the action it might or should provoke.

My own first impression, which I find is shared by others, was that Dr. Collings's method of sampling must have thrown up a greater proportion of the bad than of the good in general practice in England, so that the picture it gave him was distorted. Then I realised that this was really unimportant. What mattered was that Dr. Collings had found practices existing in England of the bad types he describes; and had been able to observe the bad effect that working under such conditions had had on men who had come from their hospitals well trained, well qualified, and with good clinical disciplines. "The conditions and conduct of general practice in industrial areas make a mockery of our modern medical education and the disciplines and practices taught in our great hospitals." It is true that these practices Dr. Collings condemns existed before the coming of the National Health Service; it is equally true that the service has done nothing to abolish them and much to perpetuate and even to multiply their incidence.

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SIR,—Your very reasonable review (March 18) of my new book *The Common Infectious Diseases* is appreciated; but when you take me to task for what you call a claim to "priority" in the "intensive" intravenous antitoxin treatment of diphtheria, I feel that some reply is desirable in the interests of historical accuracy.

In the preface I sought to explain the emphasis laid on certain subjects in my book by stating that in the last twenty years I had myself "advanced" certain new ideas, methods, and modifications of established practice. While the phraseology might have been more explicit I cannot see how this has become interpreted into a foolish claim for "priority."

Your review mentions as an instance the "intensive" intravenous antitoxin treatment of diphtheria, and rightly names W. H. Park and V. Bie as pioneers. In the paper in *The Lancet* of July 7, 1928, in which, with a colleague, I "advanced" the idea of modifying existing practice in the treatment of hypertoxic diphtheria—namely, by employing large intravenous doses of antitoxin—I quoted freely from the work of Park and Bie. This paper was considered at the time to be so subversive of established practice that it formed the subject of leading articles in both *The Lancet* and the *British Medical Journal*. Thus, referring to my own as well as Bie's results, *The Lancet* stated (1928, ii, 22): "these results are so remarkable that they must lead to reconsideration of the current view that it is useless to give antidiphtheritic serum in doses of more than 30,000 to 50,000 units." And the *British Medical Journal* (1928, ii, 453) stated: "this experience of the value of intravenous administration of antitoxin in large doses is, however, contrary to general opinion in this country as held by E. W. Goodall and others, and in America by W. H. Park, who have asserted that doses in excess of 30,000 and 50,000 units are useless." Again, Dr. E. H. R. Harries, then of Birmingham, wrote in *The Lancet* of July 21, 1928, congratulating my colleague and myself upon our results and stating that, in comparable hypertoxic cases, our case-mortality was less than that in his series where large *intramuscular* doses of antitoxin had been mainly used.

However, not even W. H. Park in 1910, had "priority" in the treatment of diphtheria by intravenous antitoxin. One of my predecessors in Belvidere Hospital, Glasgow, Dr. D. L. Cairns, described in full 20 such cases in *The Lancet* of Dec. 20, 1902. But, as in many such instances, and owing perhaps to technical difficulties, the idea failed to gain acceptance then and on later occasions. Certainly in 1928, when my paper was published, the routine practice in the treatment of hypertoxic cases, except in Copenhagen, was to give antitoxin intramuscularly in doses which nowadays would be considered relatively small, and with results which, in my experience at Leicester at least, I recall with horror.

Park Hospital, London, S.E.13. H. STANLEY BANKS.

PUBLICITY

SIR,—A year ago a letter of mine, which you had published, was used by a national newspaper, without acknowledgment to *The Lancet*, in a way that made it seem that I had granted an interview. No redress was obtainable and no apology forthcoming.

Yesterday I attended, by invitation, a meeting of the Manchester Marriage Guidance Council, under the chairmanship of Dr. J. L. Burn, medical officer of health for Salford, of which the audience consisted of invited social and welfare workers. The meeting was addressed by Mr. A. J. Brayshaw, secretary of the National Marriage Guidance Council, on the subject of marriage guidance as a basic service to the community. I was not on the platform, but took part in the discussion, in which some 10 or 12 other speakers joined.

Today a national newspaper published an article in which I am wrongly described as a specialist in gynæcology. The names of the speaker and chairman, and the nature of the meeting, are not stated, and the impression is given that I gave a lecture on sex to this body. Some incorrect statements, and others which are distorted out of their context, are improperly attributed to me.

The risk of such publicity and distortion must inevitably prevent medical men from playing their part as citizens in this and many other spheres. I feel that the profession should be made aware of the dangers that modern journalism presents to free discussion.

Manchester. BERNARD SANDLER.

APPROACH TO THE UPPER THORACIC SYMPATHETIC GANGLIA

SIR,—In his letter of March 4 Mr. Haxton generously agrees that honour should be given where it is due; but, although he criticises Mr. Hedley Atkins's advice on the peraxillary route to the upper thoracic sympathetic ganglia, he does not seem to have read Mr. Atkins's description of the operation.[1] Mr. Haxton mentioned "painful convalescence inevitable to resection of rib": but Mr. Atkins never mentioned resection of any rib in his description of the operation.

Until surgeons have decided whether sympathetic denervation of the hands is more thorough and more permanent after removing the stellate ganglion as well as the upper thoracic ganglia, or after prestellate ganglionectomy alone, the best method of approach seems difficult to decide. For it would appear that the anterior approach, as described by Gask and Paterson Ross[2] is the most satisfactory for stellate ganglionectomy, whilst the per-axillary route would appear to be the more direct approach if the second and third ganglia are to be removed without removal of the stellate ganglion.

The clear exposure of the third thoracic ganglion through the anterior approach on every occasion is [illegible] claim which I, like Mr. Atkins, think many surg[illegible] would find difficult to substantiate. I agree that [illegible]oval of the stellate ganglion through the axillary *approach is apt to be a rather blind, and therefore a more dangerous,* procedure than the removal of *this ganglion through the* anterior approach.

If stellate ganglionectomy is *required for sympathetic* denervation of the upper *limb, then the anterior approach*

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1. *Lancet*, 1949, ii, 1152.
2. Gask, G. E., Ross, J. [illegible] mpathetic Nervous System. London, 1

would seem to be the better of the two. If the stellate ganglion need not be removed, I believe that the second and third thoracic ganglia can be reached more easily, and seen more clearly, through the axillary approach than through the anterior one.

Leeds. MICHAEL C. OLDFIELD.

RELIEF OF PAIN IN RHEUMATOID ARTHRITIS WITH TETRAETHYLAMMONIUM BROMIDE

SIR,—In confirmation of Dr. Howell's experience with tetraethylammonium bromide in rheumatoid arthritis, described in your issue of Feb. 4 (p. 204), we should like you to publish this preliminary report.

Since November, 1949, we have tried tetraethylammonium bromide (T.E.A.B.) in chronic polyarthritis. Our reasoning has been as follows. Among the signs of rheumatoid arthritis there are some characteristic general reactions—for example, cold clammy hands and feet, atrophy of skin and muscles, decalcification of bones, and diffuse swelling of subcutaneous tissues. These reactions have much in common with the so-called functional vascular disorders and reflex dystrophies. The common feature of all seems to be vasomotor changes. Our working hypothesis is that these changes cause ischæmia, mainly in the joints and adjoining tissues, the ischæmia causes pain, and the pain immobilises the joints. This is a vicious circle, which vasodilatation should break; hence the temporary relief of pain by heat. The astoundingly quick relief that follows injections of deoxycortone combined with vitamin C may probably be explained in a similar way.

It seems an obvious step to try other vasodilator drugs, starting with T.E.A.B., which has already been tried in various vascular disorders.[1] This drug causes vasodilatation by blocking autonomic impulses.[2] Thus its effect may be compared with sympathectomy, which has been used in rheumatoid arthritis with a certain amount of success.[3]

Our material so far only amounts to seven thoroughly investigated cases, all with severe pain and reduced mobility in one or several joints. After 1–3 weeks' observation in hospital, to note any spontaneous improvement, we have started with a dose of about 5 ml. (0·5 g.) of T.E.A.B. ('Etamonin Astra') slowly injected, the blood-pressure being checked continuously. After this we have waited until the effect, if any, has disappeared. Then we have made a control injection of sterile water in the same way, to detect any possible effect of suggestion—in our experience a pitfall of the utmost importance. In some cases we have revised the doses, starting with a control injection and then continuing with T.E.A.B. When we have learnt the duration of the effect of the drug we have proceeded with a series of injections once or twice a day.

It is far too early to express an opinion on the eventual results of T.E.A.B. as treatment. In view of the theoretical considerations mentioned above, we first wanted to find out whether T.E.A.B. has any immediate effects such as we observed after combined injections of deoxycortone and vitamin C. Such effects have been observed in five of the seven cases, and three examples are given here.

CASE 1.—A female shop-assistant, aged 42, who has had chronic polyarthritis since the age of 13, leading to severe deformity of the right hip-joint and considerable deformity of the left knee and of the fingers. When trying to clench her right fist she could only get her finger-tips to 0·5–1 cm. from her palm. Two months ago she developed pain with reduced mobility in her right shoulder. After the injection of 7·5 ml. of T.E.A.B. relief began in 15 min. After 30 min. she had no pain, movements of the right shoulder were free, she could clench her right fist completely, and her formerly cold clammy hands were definitely warmer. After 4 hours she walked surprisingly easily and painlessly. Next morning she felt slight pain in her shoulder but no stiffness, and the stiffness has not reappeared during the following 3 months' observation.

CASE 2.—A sailor, aged 44, who has had several attacks of rheumatoid arthritis since the age of 30, but has no deformities. The present attack began in December, 1949, the main symptoms being swelling and stiffness of the left wrist. After the injection of 6 ml. of T.E.A.B. relief of pain began in 15 min. An hour afterwards the wrist was freely mobile with no pain. Compared with its condition before the injection, the mobility of the wrist had increased by 50°. The improvement slowly disappeared in the next 6 days. A further injection brought relief lasting about 10 days and a reduction in the swelling.

CASE 3.—A male clerk, aged 62, who has had rheumatoid arthritis since 1947, gradually getting worse but without deformities. His main symptoms were considerable pain, slight stiffness and swelling in all his fingers, and tenderness over the metatarsophalangeal joints. An hour after the injection of 5 ml. T.E.A.B. he had no pain, there was free mobility of the fingers, and walking was much easier. The duration of the relief was about 3 days. The same result followed a further injection, and the swelling then decreased.

To sum up, tetraethylammonium bromide has been tried in 7 cases of chronic polyarthritis. In 2 there was no effect, but in 5 there has been relief of pain and increased mobility, starting 15–30 minutes after the injection. This may be compared with the effect we have seen after combined injections of deoxycortone and vitamin C. We presume that the effect is caused by changes in vasomotor tone in the joints and adjoining tissues. We have as yet no opinion on the question whether T.E.A.B. can be used for treatment.

F. HEYMAN
E. LEWIN
E. WASSÉN.

Second Department of Internal Medicine,
Sahlgren's Hospital, Gothenburg, Sweden.

THE CARNAGE ON THE ROADS

SIR,—Dr. Learoyd's excellent article of Feb. 25 does not mention some important points, of which perhaps the strangest is the apparent lack of interest shown by the medical profession. Beyond occasional complaints from the provinces that hospitals are filled with road-accident cases, or from West End consultants that their progress has been hindered by foolish pedestrians, the medical press has carried little comment. Perhaps, like the magistrates, the doctors are often keen motorists.

Another inexplicable feature is that as a rule no proper inquiry is held into causes—in striking contrast to the long and searching investigation into rail and air accidents.

Finally, road-safety measures have had to compete for many years with what can only be described as an "anti-safety" campaign carried out by the motoring interests, who have preached the dangerous doctrine that "speed is not a cause of accidents." Whatever grain of truth there may be in this statement when applied to experts driving high-class machines, it is surely, to put it mildly, a little rash to proclaim it to all and sundry on roads that have to carry mixed traffic of all descriptions. As well as opposing tests for drivers, the motoring interests have strenuously resisted restrictions, such as speed limits and pedestrian crossings, and they have cultivated the legend of "police persecution" while fostering resentment of any discipline or control. So many excuses and justifications, apart from bad driving, have been put forward, that accident production may have been actively encouraged.

Dr. Learoyd mentioned the Royal Society for the Prevention of Accidents. May I suggest that medical men may make a positive contribution at trivial cost by joining the Pedestrians Association?

London, N.W.8. R. J. CLAUSEN.

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1. Campbell, K. N., et al. *Alexander Blain Hosp. Bull.* 1946, 5, 108.
2. Acheson, G. H., Moe, G. K. *J. Pharmacol.* 1945, 84, 149.
3. Hench, P. S., Craig, W. McK. *Sth. med. J.* 1931, 24, 636. Moore, J. R. *J. Amer. med. Ass.* 1931, 97, 172. Rowntree, L. G., Adson, A. W. *Ibid*, 1929, 93, 179.

RESEARCH ON ARTHRITIS TREATMENT

SIR,—The concentration in your journal of the lively liscussion about Lewin and Wassén's results with heumatoid arthritis[1] encourages me to record a case vhich might help to prolong the salutary confusion which eigns at present on the question of the action of ascorbic acid in arthritis.

An unmarried woman, aged 43, somewhat obese but in good health, who, although she has had occasional "rheumatic" twinges, does not suffer from any definite joint affection, slipped early in June, 1948, and twisted her left ankle. There was considerable swelling and pain below the external malleolus, and as the swelling had not subsided after ten days she consulted a surgical outpatient department. On examination, movement was found to be free and painless except on extreme inversion. There was swelling over the lateral malleolus and pain on pressure over the lateral ligament. X-ray examination of the ankle did not show any bony injury. A tear of the lateral ligament was diagnosed and adhesive strapping applied; two weeks later the ankle had returned to normal and remained so for the ensuing two years.

On Sept. 21, 1949, in the course of an investigation into the action of high doses of vitamin C, she started to take 300 mg. of ascorbic acid (Crookes) daily. After twenty-three days, having taken 16 such daily doses (4·8 g.), she stopped taking the drug because she had developed a slight swelling of the right ankle and considerable swelling and stiffness of the left ankle with prominence of the superficial veins over the left external malleolus. Within a few days of the cessation of treatment both pain and swelling had disappeared and the ankle had returned to normal. Six weeks later, in November, 1949, she resumed the same daily dose of ascorbic acid. After five days, some stiffness was felt in the left ankle but treatment was continued. After fifteen days, swelling, discomfort, and venous engorgement of the left ankle again developed to such a degree that the drug had to be stopped. The right ankle was not affected on this occasion. The total amount administered was 4·35 g. Seven days after cessation of vitamin-C intake, the ankle had again returned to normal.

On Feb. 3, 1950, she resumed once more the consumption of 300 mg. of ascorbic acid daily. Five days later some twinges were felt in the left ankle but she continued treatment. On the 16th day the ankle felt stiff and there was pronounced puffiness under the left external malleolus. On the 20th day, some pain was added to these complaints. The ankle continued in this condition until the 24th day, when treatment was stopped. The total amount of drug until the development of œdema was 4·2 g. The total amount until the cessation of the experiment was 6·6 g. The ankle continued puffy and stiff for another week and then returned to normal.

It is important to note that recovery from the original accident had been so complete that the patient was quite unable to remember which side had been involved, so that it was necessary to consult the hospital records to ascertain that it had been the left side. Apart from her moderate obesity there are no grounds for suspecting any upset of steroid metabolism. Her blood-pressure is 145/70 mm. Hg.

The first point—worthy of record because not previously recorded—is that vitamin C in high dosage may awaken a dormant periarthritis. None of the other seven volunteers in this investigation have so far shown this effect although most of them have received similar doses for a much longer time; but this is a small series and reports of prolonged administration of vitamin C in such high dosage are very scanty. The next point exciting attention is the extraordinary memory displayed by the patient's left ankle. It is an example of the fact that complete structural, and even functional, restoration is not always synonymous with a restitutio ad integrum of local metabolism. This also serves as a timely reminder that a morbid alteration of local reactivity is probably as important and integral a part of connective-tissue disease as the possible upsets in systemic factors which has recently received so much well-merited attention.

It was shown by Selye[2] that deoxycortone acetate can aggravate experimental arthritis, and it would seem that the beneficial effect demonstrated by Lewin and Wassén is produced by the synergistic action of two substances, each of which can aggravate arthritis, under certain conditions, when acting singly. This case also tends to throw some slight doubt on the belief that oxydation of adrenal steroids is a complete explanation of the effect of ascorbic acid in rheumatic disorders.[3]

Two further apparent paradoxes in this field may be mentioned. One is the case of Zierler and Lilienthal,[4] who found that administration of deoxycortone acetate in a subject with myotonic dystrophy led to increased sodium and water excretion. The other comes from Walter's[5] description of scurvy in its severest forms:

> "But a most extraordinary circumstance, and what would be scarcely credible upon any single evidence, is, that the scars of wounds which had been for many years healed were forced open again by this virulent distemper. Of this there was a remarkable instance in one of the invalids on board the Centurion, who had been wounded above fifty years before at the battle of the Boyne, for though he was cured soon after, and had continued well for a great number of years past, yet on his being attacked by the scurvy, his wounds, in the progress of his disease, broke out afresh, and appeared as if they had never been healed."

As a student of vitamin-C action, I have no hesitation in accepting this account as accurate, and it would therefore seem that an extreme lack of vitamin C, as well as an excess of this substance, can, under certain conditions, reactivate old injuries.

It would be easy, Sir, to discount all these contradictions (to which we might add the divergent findings of those who have repeated Lewin and Wassén's therapeutic trials) by supposing the periarthritis in my case to be due to coincidence, by disallowing the findings of Zierler and Lilienthal as not being adequately controlled, and by refusing to accept the testimony of an 18th-century lay observer. I prefer to see in these paradoxical phenomena the tantalising evidence of some elusive truth which we shall only capture if we do not allow our views to become prematurely settled.

I should like to conclude this letter by expressing my gratitude to the patient mentioned here, who, although a keen dancer, has allowed herself three times to be the subject of an unpleasant and somewhat frightening disability.

Gerontological Research Unit,
Usher Institute, Edinburgh.

ERICH GEIRINGER.

SIR,—In my letter of Jan. 21, I mentioned my experiences of the method of Lewin and Wassén[6] with deoxycortone acetate and ascorbic acid in rheumatoid arthritis. Instead of deoxycortone I have used with similar success testosterone (25 mg.), progesterone (4 mg.), and also œstrone (5 mg.).

Presuming that the action on the sterones is due to the redox power of ascorbic acid, I have tested other redox substances, such as methylene-blue and sodium thiosulphate. Following an intramuscular injection of a sterone I injected intramuscularly or intravenously 10 ml. of a 10% solution of methylene-blue. In cases which had responded well to the technique of Lewin and Wassén, the injection of a sterone (intramuscularly) with subsequent injection of methylene-blue intravenously or intramuscularly produced similar good results, though perhaps not so promptly as with ascorbic acid. However, 10 ml. of a 10% solution of sodium thiosulphate, injected intravenously 3–5 minutes after intramuscular injection of a sterone, acts better than, and also as promptly as, ascorbic acid. Sodium thiosulphate is cheaper, and is free from the side-effects caused by methylene-blue.

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1. Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.
2. Selye, H. *Brit. med. J.* 1949, ii, 1129.
3. Hallberg, L. *Lancet*, Feb. 25, p. 351.
4. Zierler, K. L., Lilienthal, J. L. jun. *Amer. J. Med.* 1948, 4, 186.
5. Anson's Voyage Round the World. London, 1947.
6. Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.

I believe that this mysterious alteration of deoxycortone and other sterones into a "cortisone-like" substance is caused, not by simple oxidation,[7] but by the redox action of such substances as thiosulphate and methylene-blue.

In further investigations I have also tried combined intravenous injections of 10 ml. of a 10% solution of sodium salicylate together with 10 ml. of a 10% solution of sodium thiosulphate. With this injection *without* a sterone I have obtained better analgesic results than by injection of sodium salicylate alone (without thiosulphate).

It seems possible that the well-known antirheumatic action of sulphur compounds may be connected with their redox power.

Lodz, Poland. MARCELI LANDSBERG.

SIR,—In a search for steroids which do not have the untoward effects of deoxycortone, it seemed justifiable to assess the value of 21-acetoxypregnenolone, which is structurally related to deoxycortone acetate and has a very slight mineral-corticoid activity.

We gave 21-acetoxypregnenolone intramuscularly in doses of 5–20 mg., followed by 1 g. of ascorbic acid intravenously, in 15 cases of chronic joint disease, including some of rheumatoid arthritis. The therapeutic effect was comparable to that obtained with deoxycortone acetate and ascorbic acid.

When we used deoxycortone and acetoxypregnenolone in 40 cases of osteoarthritis, we obtained a more satisfactory improvement than in strictly inflammatory processes; in fact, in a series of 12 cases of rheumatoid arthritis, all in the active phase, some advanced and some early, we did not obtain results as definite as did Lewin and Wassén.

21-acetoxypregnenolone, though no more effective than deoxycortone, allows more prolonged treatment and avoids the hazards of deoxycortone.

B. C. BALLABIO
G. SALA.

Medical Clinic, University of Milan.

FLUID STANDARDS

SIR,—Your note of March 18 (p. 522) on Standardising Spoons implies that the American ounce is $^1/_{16}$ of an Imperial pint. This may be true for cookery, but in infant feeding and measuring petrol for cars, surely the essential point is that there are only 16 ounces (each roughly similar to our ounce) in the American pint. Mitchell-Nelson [8] gives:

1 fl. oz. = 29·5737 c.cm.; 16 fl. oz. = 1 pint = 473·179 c.cm.

This may be contrasted with Hutchison and Hunter [9]:

1 fl. oz. = 28·39 c.cm.; 20 fl. oz. = 1 pint = 567·9 c.cm.

or the L.C.C. *Pharmacopœia* (1936):

1 fl. oz. = 28·41 c.cm.; 1 pint = 568·25 c.cm.

or the Great Ormond Street *Pharmacopœia* (1933):

1 fl. oz. = 28·42 c.cm.; 1 pint = 568·24 c.cm.

Black's Medical Dictionary (1941) also gives:

1 fl. oz. = 28·42 c.cm.

Would you please, Sir, tell us the number of millilitres (to four places of decimals) in our ounce?

Guy's Hospital,
London, S.E.1. RONALD MAC KEITH.

*** According to the *B.P.*, 1 pint = 568·25 ml. So the fluid ounce = 28·4125 ml. In future it is proposed that the medicine tablespoon should contain $^1/_{40}$ of a pint—i.e., 14·2062 ml.—whereas the cookery tablespoon will contain $^1/_{32}$ of a pint, or 17·75 ml.—ED. L.

STERILISATION OF SYRINGES

SIR,—The satisfactory sterilisation of syringes which are in constant use by the anæsthetist during a busy operating-theatre session has been a source of worry to me for many years, especially since the appearance of a fresh hazard in intravenous work—the hepatitis virus.

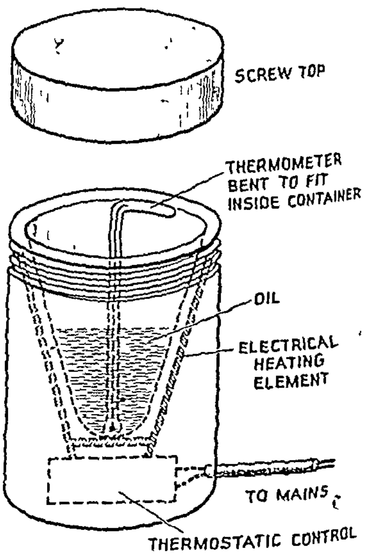
In many hospitals it is still customary for the syringes used for thiopentone, curare, &c., simply to be rinsed in doubtfully sterile water after use and put back into definitely non-sterile spirit. The sediment at the bottom of the spirit-containing vessel is sometimes so thick as to bring to mind the Ancient Mariner's "ribbed sea sand," and the variety of organisms that can often be cultured from this deposit is truly astonishing. Hitherto there have been only two satisfactory alternatives to this uncleanly method. (1) The use of a large number of syringes boiled or, better, autoclaved for each session; this is both cumbersome and, in the case of 'Record' syringes, destructive. (2) Boiling up a lesser number of syringes in relays during the session; this method involves frequent delays while waiting for a fresh syringe and the syringe mortality is apt to be high.

For many years I have used oil sterilisation, at home, of the syringes for my private equipment, and this has led me to try to design a portable, easily worked, electric oil-sterilising unit. This method of sterilising does not seem to be sufficiently well known or its merits appreciated. It is well described in M.R.C. *War Memo. no. 6*, 1942: "To sterilise a record type of syringe . . . oil at a temperature of 120–130°C is rapidly drawn into the syringe . . . the syringe should be removed from the oil and inverted so that the oil reaches every part of the inside of the syringe. The oil is then expelled and the process repeated two or three times. . . . The syringe is now ready for use."

Needles are easily sterilised by placing them in the oil-bath for $^1/_2$–1 minute and removing them with forceps. It must of course be appreciated that, though the needle is entirely sterilised, the syringe is only sterile on the inside. This is of little consequence, since only the needle (which is affixed with forceps) penetrates the patient's tissues.

It is well to rinse the syringe with water before sterilising, not only to wash out any blood but also because presumably the layer of superheated steam that forms between the oil and the inside of the syringe is the most effective sterilising factor.

The apparatus described here is small and easily portable and can be set up in a moment on a convenient corner of the trolley. It takes only 2 or 3 minutes to reach the necessary temperature and is thermostatically controlled to maintain the required temperature range. After a syringe has been sterilised, the temperature may drop below 120°C for a few seconds, but it almost immediately rises again and the apparatus is ready for the next syringe. A thermometer is incorporated to check the operating temperatures and thus ensure that the apparatus is working properly.


SCREW TOP
THERMOMETER BENT TO FIT INSIDE CONTAINER
OIL
ELECTRICAL HEATING ELEMENT
TO MAINS
THERMOSTATIC CONTROL

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[7] Hallberg, L. *Ibid*, Feb. 25, p. 351.
[8] Mitchell-Nelson's Textbook of Pediatrics. Philadelphia, 1946.
[9] Hutchison, R., Hunter, D. Clinical Methods. London, 1949.

I have made a series of tests with this method, which show its high degree of efficiency. Two syringes (marked A and B) were used for each test to provide a double check. The results were as follows:

Nature of test	*Temperature of apparatus* (°C)	*Syringe A*	*Syringe B*
After sterilisation of clean syringe	120	Sterile	Sterile
After contamination with 1/50 concentration of 4 hr. living broth culture of *Staph. aureus*	130	Sterile	Sterile
After contamination with 1/1000 week-old sporing culture of *B. subtilis*	120	Sterile	Sterile
After massive contamination with *B. subtilis* spores	130	Slight growth only after a week	Sterile

Boiling for 20 minutes is required to kill non-sporing pathogenic organisms. Viruses are killed by 5 minutes' boiling. It thus seems safe to assume that the oil method is certain to eliminate the latter. Sporing organisms need 90 minutes' boiling, 15 minutes' autoclaving at 15 lb. pressure, or 1 hour of dry heat at 160°C. Thus for practical theatre purposes, in my opinion, the advantages of the oil method of sterilisation are unquestioned.

My thanks are cordially extended to Mr. S. N. Bowden, senior technician at the Memorial Hospital, Woolwich, for his help. The apparatus was made for me by Medical Industrial Equipment Ltd., and I am grateful to Mr. E. P. Childerhouse, their director, for his advice on the execution of the design.

Woldingham, Surrey. F. BARNETT MALLINSON.

CORTISONE AND A.C.T.H.

SIR,—May I point out that the statement, in your annotation of March 18, that the article by Dr. Long and Dr. Miles, in the same issue, is "notable for containing the first report on work carried out in Britain with cortisone," is not correct.

As long ago as February, 1947, a paper on the effect of 'Cortisone' on lactation in adrenalectomised rats was published from this institute.[1]

The National Institute for Research in Dairying,
Shinfield, near Reading.
S. J. FOLLEY.

DANGER FROM THE NEWER INSECTICIDES

SIR,—Having read your annotation of March 4, I am concerned in particular at the statement you make, "but in the field the difficulties in ensuring adequate protection for individual workmen are almost insurmountable." All the evidence to date, both in this country and in the U.S.A., shows this statement to be incorrect.

I enclose a copy of a leaflet we are sending out to all people on our circularising lists, and which will also be attached, together with the instruction label, to all containers of 'Parathion' preparations which we send out. I would also draw your attention to an article in the *Grower* (March 11, p. 470) depicting the protective clothing which should be worn.

Intelligently used, parathion is a remarkably effective insecticide, and if the manufacturer's instructions are carried out, it can be used with safety. It is very regrettable that there has been so much loose writing in the daily press. This has caused great concern amongst fruit-growers.

I would point out also that, in this country, wettable powders containing parathion are not used at all. The two firms handling most of the parathion in this country are ourselves and Messrs. Plant Protection: one or two other firms are handling it, but to a very much smaller extent. Our material is being sold as a miscible-type preparation containing 20% of parathion (I believe there is only one preparation with a higher content), and there is therefore no need whatsoever to wear respirators in the field.

G. L. HEY
Wheathampstead, St. Albans, Herts.
Senior Entomologist, The Murphy Chemical Co. Ltd.

⁂ The accidents in the United States among men handling parathion in the factory and in the field make us believe that this insecticide is far more dangerous than any used in the past (e.g., nicotine or lead arsenate). The mode of action of the organic phosphorus compounds is entirely different; the onset of symptoms is insidious, and deaths have occurred despite care in handling. We understand that at least six firms are distributing parathion and similar substances in Great Britain, and that farmers complain of the unsuitable containers in which parathion is sometimes supplied. Effective protection of the worker is cumbersome and costly, and we fear that the proper clothing and appliances will not always be used when necessary.—ED. L.

ADMISSIONS TO HOSPITAL

SIR,—I was interested to read (March 18, p. 518) that Bradford (B) hospital group have a doctor undertaking home visits to assess the comparative medical urgency of chronic sick cases on the waiting-list for admission.

In York this work is undertaken by the medical officer of health and welfare officer. This arrangement provides a valuable link with the hospital management committee; it also enables the local authority to arrange for domiciliary services without delay, and helps this authority to assess the extent of the need for "Part III" accommodation. May I recommend this for consideration as an alternative to the Bradford procedure?

C. B. CRANE
York. Medical Officer of Health.

PENICILLIN

SIR,—As a parent who has just seen, once again, the effect of penicillin on a sick child, may I put on record the immense gratitude that one feels to all those known and unknown chemists who have made this miracle possible? And not only to these but to the whole medical profession who, directly and indirectly, do so much in guarding our happiness.

It seems such a long way from the nursery to the medical school and the laboratory that gratitude tends to become inarticulate; but nevertheless it is very deeply felt by a great number of people, including myself.

Bridport, Dorset. ELIZABETH LISTER.

ERGONOMICS RESEARCH SOCIETY

SIR,—In July, 1949, a group of people decided to form a new society for which the name the "Ergonomics Research Society" has now been adopted. Ergonomics by definition is to mean "the study of the relation between man and his working environment," particularly the application of anatomical, physiological, and psychological knowledge to the problems arising therefrom. This covers the field which has variously been described as "fitting the machine to the man," human engineering, that part of industrial psychology not concerned with vocational guidance, &c.

The society is intended to bring together workers in the fields of applied psychology, physiology and anatomy, and movement study. Two scientific meetings have already been held, at the second of which the rules for the society were adopted. They lay down that ordinary members shall be research-workers in the above fields and that others interested may become associate members. Meetings will be held three or four times a year,

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1. Cowie, A. T., Folley, S. J. *J. Endocrinol.* 1947, 5, 24.

at which papers will be read, demonstrations given, and business transacted. It is hoped to publish papers presented to the society.

Anyone interested in the activities of the society is invited to write for further information to the secretaries, at Sussex House, 34, Palace Road, East Molesey, Surrey.

R. C. BROWNE	H. D. DARCUS	Members of Council.
C. G. ROBERTS	R. CONRAD	
O. G. EDHOLM	W. E. HICK	
W. F. FLOYD	G. M. MORANT	
	H. MOUND	Treasurer.
	K. F. H. MURRELL	Secretaries.
	T. P. RANDLE	

Obituary

ALFRED HENRY PROCTOR

M.D., M.S. DURH., F.R.C.S.E.

Colonel A. H. Proctor, emeritus dean of the British Postgraduate Medical School, died at Hexham, Northumberland, on March 23.

Alfred Henry Proctor was educated at Rutherford College and the University of Durham. He interrupted his studies to serve in the South African war, and this delayed until 1902 his qualification as M.B. In 1904 he graduated M.S., and in 1905 M.D. with gold medal.

In 1904 he entered the Indian Medical Service. In the first world war he served in France, Egypt, and Mesopotamia; he was twice mentioned in despatches and in 1917 was appointed D.S.O. In India he was successively surgeon at the Medical College Hospital, Calcutta, and surgeon and (from 1923 to 1933) surgeon-superintendent of the Presidency General Hospital, Calcutta. In 1933 he was appointed surgeon-general to the government of Bengal; and from 1933 to 1935 he served as inspector-general of civil hospitals, United Provinces. He was honorary surgeon to the Viceroy.

On returning to this country in 1935, Colonel Proctor became dean of the British Postgraduate Medical School (now the Postgraduate Medical School of London); and he served in this capacity until 1944, when he retired at the age of 65. Thereafter he was medical superintendent of the Southport E.M.S. Hospital until 1948 when he went to live in his native Northumberland.

G. G. T. writes: "Proctor was always a good student and an outstanding man whom all respected and admired for his absolute integrity and stern sense of duty. Although a great many important administrative posts fell to his lot he was always a clinician and a very competent surgeon. When on leave from the I.M.S. he spent quite a lot of time visiting his old hospital at Newcastle-upon-Tyne, and in one of these interludes he did some postgraduate work in Edinburgh and became a fellow of that college. That was in 1923.

"As surgeon-superintendent of the Presidency Hospital in Calcutta he did quite a lot of surgery and acquired a high reputation for his work among the community. He was also inclinable to research and was very fond of the microscope.

"As dean of the Postgraduate Medical School he was a notable success. His calm deliberate manner, his obvious sincerity, his helpfulness to juniors, and his powers of conciliation were all assets of great value in the early stages of that venture. His subordinate staff and the technicians were devoted to him and recognised his absolute fairness. Proctor was also a soldier and understood what discipline meant, but he never tried to impose conditions on others that he would not himself observe. He was good at finance and very rigid about the use of public funds, of which he took as much or more care than if it had been his own money.

"He had great ideas about postgraduate education. He recognised the need for education of specialists but never forgot the claims of general practitioners and always stood out for their interests. Before the war he went to Germany to investigate the conditions of postgraduate education and to explain the objects and efforts of the Postgraduate School. When the war came along he lived in the hospital for a good part of that time, and he took a hand in the clinical work as well as in Home Guard duties.

"At the B.M.A. he did good work on the naval and military committee, which later became the Armed Forces committee; and almost to the time of his death he was a member of the Central Medical War Committee.

"His principal recreation was fishing, and he loved to steal away to some of the streams in Northumberland or to throw a line among the salmon in Aberdeenshire. He was the most loyal and truest of friends."

O. E. N. writes: "Colonel Proctor came to the Postgraduate School after a distinguished career in the I.M.S.—so distinguished that it only just missed the very highest level. The school had hardly started, and there was the whole of the administration to be organised; the qualities which Colonel Proctor brought were just what the school needed. He had a wonderful experience on which to draw: he had run hospitals himself, and had inspected the running of hospitals by others; he had been a professor of surgery, commanded in the field, held the responsibility for providing harassed ministers with the answers to questions, engaged in private practice. People found it difficult to accept that he had had so much experience; it was easier to imagine that he was just a soldier, who did not understand academic and medical matters.

"Coming to the first medical school to be associated with a L.C.C. hospital, he appreciated the difficulties and problems of both sides, and the trust he inspired in municipal administrators helped greatly the cooperation of two bodies which might have been mutually suspicious. He had no difficulty in building up the administrative organisation of the school; it came easily to him. He had to put up with a good deal of needless interference from the bright little notions of bright little people, who did not understand that he had faced those particular problems thirty years before, and had not only worked out the answers long ago but had had almost a life-time of experience of the practical effects of different systems. Fortunately for himself, Colonel Proctor was not one of those who dismiss from their minds all the details of a solved problem; he had no difficulty in marshalling the arguments all over again. He had, in any case, a habit of preparing for anything that might crop up in a discussion with great care and elaboration. He had all the facts collected, but he was so careful never to make the least slip that he would often refrain from producing the appropriate argument in debate, but would hunt among his papers for what he knew was there and would fail to find it in time. He was, himself, deliberate and slow-moving, and he refused to be hurried, either by the quick and superficial or by the quick and brilliant.

"He had been brought up in a very rigid puritanical sect, and the training left a stamp on him for life. To him the supreme authority was the 'stern daughter of the voice of God,' and the highest power an equally stern fate. Life to him was a hard thing and in his outlook he was essentially a stoic. (His face would have done well for a Roman philosopher.) But underneath a firm exterior he was much more 'tender' than 'tough' in James's sense. Indeed, it was one of his difficulties that he, one of the tender, was always in positions which would have been easy for the tough. He never blamed: he pitied. He was inwardly shocked by such things as the willingness of a doctor to accept a contract in the E.M.S. which involved liability to be sent elsewhere, so long as he was left where he was, knowing that as soon as he was asked to fulfil his part of the contract he could (and would) resign. But Colonel Proctor had seen so much of that sort of thing that he accepted it as a most unfortunate fact, and the calmness which accompanied his acceptance was mistaken by those who knew him least as cynicism.

"He demanded an almost impossibly high standard from himself, and wished he could expect the same of others. He was by nature very gentle and conscious of the susceptibilities of others; duty often prevented his showing it. Very high moral standards are not popular; we tend to be made to feel inferior in their presence; it may have been this which contributed to make Colonel Proctor 'unlucky.' Schemes dear to his heart tended not to come off; persons were liable to be antagonised;

he seemed just not to achieve the highest posts for which he was eligible. Life was never just 'fun' to him, as it was to others less worthy. But it is to be suspected that he did better than succeed.

"He was a gentleman if ever there was one; there was no better chief to work for; he had many very sincere friends. And he could, if he had let himself, look back on a large life, with many things done, no man injured, and many things seen and endured."

Colonel Proctor is survived by his wife and two sons.

ARTHUR HENRY EVANS

O.B.E., M.D., M.S. LOND., F.R.C.S.

Mr. Arthur Evans, consulting surgeon to Westminster Hospital, died on March 20 in his 79th year.

His long and distinguished association with the hospital extended over 60 years; for he entered as a student with a scholarship in 1890 when, as he recalled with amusement, the premedical and preclinical subjects were taught by any members of the staff who claimed or were saddled with authority and responsibility. This teaching was supplemented by outside help, and Evans learnt biology for the London University preliminary scientific examination from the future celebrity H. G. Wells. He qualified in 1895, and after holding all the resident appointments then available he passed the M.B. Lond. with honours in 1897. The same year he took the F.R.C.S., and the following year he proceeded to the M.D.

Thus experienced and equipped, his future career was not easily decided. "I never had, and never wish to have, a better house-surgeon," said Charles Stonham, a man of rare discrimination and rarer praise, an opinion which determined his choice when in 1900 at the beginning of the South African War he asked Evans, who was already established in Liverpool, to join him as his assistant in the Imperial Yeomanry Hospital. For his services abroad Evans was mentioned in despatches.

On his return to England in 1901, he passed the M.S. Lond. and the following year he was elected to the staff of Westminster Hospital—the first Westminster student to gain that distinction. At the same time he held the appointment of demonstrator of anatomy and physiology and later of pathology, teacher of surgical anatomy, operative surgery, and general surgery, and of surgeon to the Seamen's Hospital. He was also senior surgeon to the London Temperance, to Bethlem Royal, and to the Royal Masonic Hospitals.

Evans was so versatile that it is difficult to identify not one branch upon which he has left his mark, but one in which he has not been conspicuous. At first the influence of Robert Jones in Liverpool attracted him towards orthopædics. Later, circumstances drew him to the specialty of otology and laryngology and he established an intimate contact with the leading performers on the concert platform and in opera. In this sphere his reputation and popularity were outstanding; for, apart from his professional skill, his personality, his musical ability, and his knowledge of dramatic technicalities, all combined to a sympathetic understanding of the doubts and difficulties of the artistic temperament. But to a man of his attainments the comparative superficiality of such a career, however attractive, became distasteful, and he turned to what he regarded as the more serious business of life. He was a pioneer in thoracic surgery at the Royal Chest Hospital, his work on the gall-bladder and thyroid laid foundations the value of which have been gratefully acknowledged by his pupils who have acquired distinction in these departments: and that the taught should have eclipsed the teacher was to him a supreme satisfaction.

In the 1914–18 war he looked after the wounded at Westminster, the Royal Masonic, the Royal Chest, and the 4th London General Hospitals and at Aldford House Park Lane Hospital for Officers. He also acted in an advisory capacity at the War Office as inspector of surgical instruments. For this work he was later appointed O.B.E. After a term of office as senior surgeon to Westminster Hospital, in 1937 he was appointed consulting surgeon.

Evans contributed little to medical literature. Writing he found laborious. As a clinical teacher he was brilliant. Knowledge and wisdom were accompanied by pertinent anecdote, and a lecture or ward round was both entertainment and instruction. His Hunterian lecture on the Surgery of the Gall-bladder (1929) was enriched by the demonstration of a magnificent collection of specimens from his own operations. With Sir James Purves-Stewart, his corresponding senior physician at Westminster, he wrote *Nerve Injuries and Their Treatment* (1916), and his article on A Rubber Œsophagus in the *British Journal of Surgery* (1933) is a classical exposition of surgical enterprise and skill.

It is easier to enumerate the milestones in a man's career than to write of the traveller himself. But something must be said of a man with an unforgettable personality. Arthur Evans had an irrepressible joie-de-vivre which triumphed over all vicissitudes and compelled a like optimism in all with whom he came in contact. He was a brilliant natural comedian. An after-dinner speech delivered without premeditation was an inexhaustible stream of wit and ready repartee. Even his casual conversation scintillated. Yet when occasion demanded he could be serious enough but never solemn. He had a capacity, amounting to genius, for imparting bad news with a gentleness which softened the hardest blow. He could answer the question "is it cancer?" with no evasion of the truth yet with an interpretation that sent the inquirer away comforted. His faults were the defects of his qualities. In expressing his opinion of somebody's worth or suitability, innate kindliness and Celtic exuberance led to over-generous assessment, while any depreciation was almost absurdly attenuated. His praise was always without qualification; his dispraise never. And so with his one foible. Early in life he was so impressed with the evils of intemperance that he was unable to entertain anything but an inflexible insistence upon total abstinence. But all other human weaknesses he accepted not only with forbearance but with compassion and sympathy.

His last years were clouded by progressive parkinsonism. Yet crippled and handicapped in all activities he remained cheerful and uncomplaining, retaining to the end his mental vigour, his affection in his old medical school, and interest in all its doings.

He is survived by a widow, a daughter, and three sons, two of whom are surgeons, one on the staff of Westminster Hospital.

A. A.

SIDNEY VERE PEARSON

M.A., M.D. CAMB., M.R.C.P.

Dr. S. Vere Pearson, for many years physician to Mundesley Sanatorium in Norfolk, was an outstanding example of a doctor who had graduated into his specialty through personal experience of disease. One of the recognised authorities on the sanatorium treatment of tuberculosis, he was himself an example of cure by rest, fresh air, and graduated exercise.

He came from a large Nonconformist family. His father, the Rev. S. Pearson, had married Miss Bertha Crosfield of Liverpool, and their large and able family achieved distinction in many ways. One of Pearson's brothers became a missionary in India and was a close friend of Rabindranath Tagore, another became headmaster of Tettenhall College, and a third is a member of the well-known firm of hospital architects who built Midhurst and much of Mundesley Sanatorium.

From Manchester Grammar School Pearson went to Emmanuel College, Cambridge, where he took his B.A. in 1896. He continued his medical studies at St. George's Hospital, but he returned to Cambridge for a short period in his first year at the hospital to row in his university boat. He always kept his enthusiasm for rowing and for some years after the 1914–18 war he went up to Emmanuel each year to help coach the college crews.

Shortly after qualifying in 1900 he held resident appointments at the East London Hospital for Children at Shadwell in the East End. He had just completed this appointment when, as he himself described it, "a house-physician at St. George's with five months of his term of office to run contracted typhoid, and I stepped into his shoes." Six months as house-officer at the Brompton followed. Encouraged by his appointment as senior medical registrar at St. George's, he decided to settle in consultant practice in London: He was appointed to the staff at Shadwell, and everyone thought he would get the next staff appointment at St. George's, when an unexpected hæmoptysis changed all his plans. Within a few weeks he had set out for Nordrach in the Black Forest, where he was one of Walther's earliest patients. After six months abroad a hurried visit to London confirmed his decision not to return to consulting practice there, and he decided to become a sanatorium physician; for though at that time there were few such posts in England, he felt "their day was dawning." Accordingly he went back to Nordrach to complete his cure and his education. In 1905 he was offered the post of medical superintendent at Mundesley in succession to Dr. Noel Bardswell. When he started work he was still a sick man and liable to bouts of fever and hæmoptysis. Those who only knew him in later life as a man of exceptional vigour found it hard to realise that the inconvenient closeness of the doctors' houses to the sanatorium was due to his inability in his early years there to rely on being able to walk more than 100 yards.

When Pearson went to Mundesley it was a sanatorium built on the conventional chalet plan of the late 19th century. Under his management it grew into a modern sanatorium-hospital with all essential requisites. In the treatment of pulmonary tuberculosis in this country his name will always be linked with the introduction of artificial pneumothorax, an innovation he carried out in 1910 in association with Claude Lillingston and A. de W. Snowden. Although without X-ray control, the new method steadily overcame opposition, eventually proving to be one of the major therapeutic advances of the century. Throughout his life he was receptive of new ideas, and in the daily medical conferences at Mundesley it was the rule for the youngest to speak first on each case even if he were fresh from his first house-appointment. This practice proved valuable in keeping the sanatorium staff abreast of current medical thought. Although a man of strong personality, he neither claimed nor assumed the rôle of superintendent, and in summing up a discussion on the treatment of a difficult case he would usually agree with his juniors' views while adding valuable comments derived from his long experience. To the end of his life he remained youthful in mind, and his habit of talking on the level with people a generation or more his junior made him a number of happy and lasting friendships. One of these younger colleagues recalls how "an early and unfortunate encounter with the local sanitary inspector, on account of pollution of the brook by the sewage from the growing sanatorium, turned his mind to rural hygiene. His advocacy of Vivian Poore's views on the superiority of the well-kept earth-closet assumed almost religious fervour, and he derived considerable satisfaction in giving his patients, however wealthy or well-born they might be, no option but to contribute to the rich humus which helped the sanatorium garden to win prizes for lovely flowers and delicious fruit and vegetables. When the opposition to his beloved system became irresistible Vere Pearson yielded with the graciousness of Queen Elizabeth in similar circumstances, and set himself, with his usual thoroughness, to the study of the latest and most efficient models of Sir John Harington's new-fangled invention."

Pearson had presided over the Society of Superintendents of Tuberculous Institutions and was a former chairman of the Joint Tuberculosis Council. His published works reflect the trend of his interests: the *State Provision of Sanatoriums* appeared in 1913, the *Growth and Distribution of Population* in 1934, *London's Overgrowth* in 1939, while four years ago in *Men, Medicine, and Myself*, he summed up what he had experienced and thought.

S. R. G. writes: "My own friendship with Pearson began with the foundation of *Tubercle*. Shortly after it started he joined the editorial board on the introduction of his friend Lillingston. The other members in those early days after the first world war were Egbert Morland, Rosslyn Earp, Edgar Collis, Noel Bardswell, and Marguerite Kettle. We forgathered in a room up many flights of stairs at the top of John Bale's printing works, and there was little in the world of tuberculosis we did not discuss with great vigour—from the working out of the Astor report to graduated labour and the new village settlements—while we tried to pick up the threads of the pre-war world of international tuberculosis we had known, and corresponded with Brauer, Sauerbruch, Calmette, and the rest. In all this Pearson with his Fabian background was in his element. His interests in life seemed endless, and his views forthright, whether the subject was his management of the sanatorium farm, or engravings, on which he was an expert judge, or water-colours which he painted well, or Henry George and the single tax. He would turn up at my flat for breakfast at some unearthly hour, or we would meet for dinner in the evening, and the discussions went on fast and furious; but they were always good-tempered and kindly. For years he was a keen follower of Labour and chairman of his county Labour group; but I have an idea that he became discouraged by what he thought to be its wrong-headedness in his later years. He was really an individualist at heart—one of that rapidly disappearing Victorian generation who believed firmly and confidently in getting on with the job oneself. Altogether a most likeable man of great character and a staunch friend and ally."

After he retired Pearson went on a visit to the West Indies, for the scenery of these islands appealed to the artist in him. He died in Jamaica on March 18 at the age of 75. His wife, formerly Miss M. E. Earl of Norwich, whom he married in 1916, survives him with a son and a daughter.

HOWARD STEVENSON

M.A., M.B. R.U.I., F.R.C.S.I.

Mr. Howard Stevenson's death on March 16 breaks another link with the early days of the Belfast medical school.

A son of the late Alexander Stevenson, of Lisburn, he was educated at Methodist College, Belfast, and the Queen's College of the old Royal University of Ireland. He took the B.A. in 1897 and the M.B. in 1900, and the fellowship of the Royal College of Surgeons of Ireland in 1904. After working in the old Royal Hospital in Frederick Street he served on the staff of the Ulster Hospital for Children and Women, and later he became senior surgeon to the Royal Victoria Hospital. In 1938 he was elected M.P. for Queen's University at Stormont, and he was chairman of the Select Committee on Health Services in 1943 and 1944. He served a term as president of the Ulster Medical Society. During the war he returned from retirement to help the Royal Victoria Hospital.

W. S. B. writes: "Stevenson had a great experience of all abdominal surgery, where his sureness of touch and economy of manœuvre gave him a phenomenal operating speed without any suggestion of haste. He will long be gratefully remembered, by all who worked with him, for his unfailing courtesy and consideration to staff and patients alike."

FREDERICK WILLIAM TWORT

M.R.C.S., F.R.S.

Prof. F. W. Twort, who died on March 20 at the age of 72, was superintendent of the Brown Institution of the University of London from 1909 until its destruction by bombing in 1944. An outstanding representative of the independent research-worker, he had made valuable contributions to bacteriology, but he felt himself increasingly uneasy in the closer relationship of research and the State.

He was born at Camberley in 1877, the son of Dr. H. W. Twort, and he qualified from St. Thomas's Hospital in 1900. The following year he was appointed assistant superintendent of the clinical laboratory at St. Thomas's, and in 1902 assistant bacteriologist to the London Hospital, a post which he held till he took charge of the Brown Institution in 1909. He served in the 1914–18 war with the Royal Army Medical Corps in charge of the base laboratory at Salonika and as bacteriologist to the Northern Ireland command.

His earliest work at the Brown Institution was on the cultivation of the lepra bacillus. It extended to the causative organism of Johne's disease of cattle, and tween 1910 and 1913, with G. L. Y. Ingram, he ltivated the bacillus, reproduced the disease from ltures, and made the first attempts to prepare a ecific diagnostic agent analogous to tuberculin. Their servations were summarised in their *Johne's Disease* ondon 1913), and Twort afterwards maintained that he "essential substance" which they recognised was itamin K. In 1913 he began to study the conditions overning the growth of infective agents, and in 1915 e described in our columns some experiments with taphylococci which are now generally accepted as the rst demonstration of bacteriophage action. Unfortun-tely their significance was not recognised, and Twort ater said that lack of support and funds had prevented him from continuing them. Meanwhile, d'Herelle, who had independently made similar observations with dysentery bacilli, carried the investigation further, and his name is now associated eponymously with Twort's in the Twort-d'Herelle phenomenon. Subsequently the University of London supplied Twort with essential equipment for his scheme of research for the cultivation of viruses, and it was a source of distress to him in the last years of his life that he had no opportunity to resume his virus work with such of this equipment as had been salvaged from the institution when it was bombed. He regarded his own experiences as an illustration of the risk to science which may arise from control of research through State grants: but they also illustrated the not uncommon combination of unusual ability with a combative personality.

Dr. Twort's notable contributions were recognised by his election as F.R.S. in 1929 and by his receiving the title of professor from London University. He is survived by his widow, one son, and three daughters.

Prof. JOHN RYLE

Dr. Percy Stocks writes: "Advancing age brings nothing so devastating as the falling by the wayside of tried and valued friends, and for myself the crossing of the threshold of the seventh decade has been accompanied by a double loss of this kind. On arriving home from America a few months ago I was shocked to learn that I should not again see Major Greenwood; and now this experience has been repeated by reading on my return from Paris of the death of John Ryle.

"My first meeting with Ryle was at a Medical Research Council Committee on Hospital Morbidity Statistics in 1942, a remarkable group of clinicians, pathologists, and medical statisticians who came very near to understanding one another's aims and points of view, and who produced, after many meetings, the well-known Provisional Classification of Diseases and Injuries, preparing the way for the International Statistical Classification (1948). In those meetings, and to an increasing extent on other working parties which had to deal later with the beginnings of hospital and other kinds of morbidity statistics, Ryle impressed me by his understanding, not too common in a professor of medicine, of what the medical statisticians were driving at. My associations with him after his appointment at Oxford became closer, and one of the pleasures of going to the new Institute of Social Medicine was the warmth of welcome which always met me when I entered his room. He was not demonstrative, but quiet friendliness radiated from him.

"His small book on *Changing Disciplines*, which embodies in a few lectures the ideas which were taking shape in his mind during those all-too-brief years, is a classic: and at several places in the U.S.A. where Ryle had lectured on his last visit, I found he was held in very high esteem, despite a good deal of theoretical opposition to the idea of social medicine as an entity. They had met the man, and it made a difference.

"Ryle was well aware that a social medicine department must depend for much of its food-supply on the General Register Office, and he always appreciated the work done by the official medical statisticians, and was ever ready to help where he could. The General Register Office is not unmindful of what it owes to such men as Greenwood and Ryle, so different and yet so much alike, and these few sentences are a poor attempt to express this gratitude at the same time as my own feelings of personal loss."

Notes and News

HOT WATER IN THE HOME

In practice hygiene often boils down to hot water, and health education is most effective where there is an adequate supply at those strategic points of a household—the kitchen sink, the bath, and the hand-basin. A survey[1] of the hot-water supplies in 6000 representative households, undertaken for the Ministry of Works in March, 1947, suggests that the housewife still has a good deal to contend with. In 44% of the households there was no piped hot-water supply, and only 36% had a piped supply to sink, bath, and basin. Only 54% of the families had access to a bathroom—this proportion varied from 46% in Scotland to 60% in England —and only 43% had a bathroom of their own. Some 12% (35% in Scotland) did not even claim the doubtful luxury of a portable bath, which was available to 31%. There were hand-basins in only 75% of the bathrooms.

Turning to the question of how the water was heated, the survey found that 15% of the households had no means of heating water and 43% had only a copper. This meant that in 43% housewives had to heat a good deal, if not all, of the water, for such jobs as washing up, in kettles and pans. Between them the hydraulically backward areas of Scotland and London accounted for almost half of these households. Apart from the not very convenient copper, the commonest method of heating water was by a fire with a boiler behind it. This method was used in about a third of the households. As was to be expected, independent boilers and gas and electric appliances were commoner in the higher than the lower income groups, and 6% of the households had a gas or electric appliance as well as a solid fuel appliance.

University of Cambridge

On March 18 the following degrees were conferred:

M.D.—A. G. Freeman, D. N. Lawson, B. E. Miles.

University of London

Sir Ernest Graham-Little is not seeking re-election to the senate, to which he has been re-elected 10 times in succession. Sir Alexander Fleming F.R.S., has been nominated for the vacancy.

University of Dublin

At a recent examination the following were awarded the diploma in gynæcology and obstetrics:

Ahmed Abdel-Fattah Atallah, D. C. G. Bracken, C. A. Cussen, P. B. Guastalla, Shamim Aon Jafarey, J. H. Kühn, Henry Messawer, Max Miller, Nirmal Kumar Mitra, Nina C. Muir, Sunil Kumar Nag, Hyman Neifeld, D. P. J. O'Shea, Peter Pau, Jeffrey Walsh, F. E. Welch.

Dalhousie University

Dr. N. G. B. McLetchie, director of pathological laboratories at Regina, Saskatchewan, has been appointed to the chair of pathology at Dalhousie University, Halifax, Nova Scotia, in succession to Prof. R. P. Smith. Dr. McLetchie is a graduate of the University of Glasgow.

Royal College of Physicians

A course of lectures in general medicine will be given at the college, Pall Mall East, London, S.W.1, from May 1 to June 19. Further particulars will be found in our advertisement columns.

Association of Surgeons of Great Britain and Ireland

The association has decided to award annually, in place of the Moynihan fellowship, a Moynihan prize (£100), and a medal for an essay. For 1951, the subject chosen is Pathology, Prevention, and Treatment of Thrombophlebitis (including Phlebothrombosis); and for 1952, Pathology of the Formation of Calculi. Further particulars will be found in our advertisement columns.

Welsh National School of Medicine

Dr. A. G. Watkins, has been appointed to the newly established professorship of child health. He has been lecturer in pædiatrics at the school since 1932 and he is pædiatrician to the Cardiff Royal Infirmary, the Llandough Hospital, and the Tuberculosis Service in South Wales. He is also adviser in pædiatrics to the Welsh Regional hospital board.

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[1] National Building Studies No. 8. H.M.S.O. 1950. Pp. 50. 1s.

Brussels Treaty Organisation

The fifth session of the public-health committee was held at the Hague on March 9–11. The next session will be in Edinburgh on Sept. 7–9.

British Health Resorts Association

A meeting of this association will be held on Friday, March 31, at 4.30 P.M. at 11, Chandos Street, London, W.1. Dr. A. P. Cawadias, the acting honorary secretary, may be addressed at 6A, Bourdon Street, W.1.

More Spectacles

Before the start of the National Health Service, spectacle manufacturers were supplying spectacles at the rate of about 4,250,000 pairs a year. In December, 1948, the rate of demand reached 12 million a year, but it fell substantially and steadily during 1949, and the present rate is about 5 million a year. Production could not at once keep pace with this sudden acceleration of demand, but the rate has been increased to 7,500,000 pairs a year. It passed current demand early last autumn, and it has steadily risen since, while demand has fallen. About 500,000 have been wiped off the waiting-list since last September, and arrears are now being reduced at the rate of 250,000 a month. In a parliamentary answer on March 23 the Minister said the greater part of the arrears should be overtaken before the end of the year.

Anti-histamine Drugs in the Common Cold

In view of the conflicting reports on the value of anti-histamine drugs in the treatment of the common cold, the Medical Research Council have agreed to arrange an investigation. Trials are being carried out in factories, Civil Service establishments, and other institutions where large numbers of subjects can be studied. Volunteers are requested to report when they have a cold; they are then given tablets to take *and the progress of the cold is assessed during the next week.* Some of the volunteers are given tablets containing the anti-histamine drug under trial; others get tablets containing another compound. In order to obtain results which are *scientifically sound, neither the volunteer nor the doctor* conducting the test knows which type of treatment is being given. The results of the tests will not be known for several months.

Administration of the Hospital Service

The National Federation of Hospital Officers has set up a working party "to consider the administrative structure of the new hospital service and to make recommendations." Brigadier G. Hardy-Roberts (Middlesex Hospital) has accepted the chairmanship, and the following have agreed to serve with him: Captain H. Brierley (London Hospital), S. Clayton Fryers (Royal Infirmary, Leeds), P. H. Constable (St. George's Hospital), P. Essex-Lopresti, F.R.C.S. (Accident Hospital, Birmingham), G. W. Beckwith (Darlington H.M.C.), R. A. Mickelwright (Ealing H.M.C.), J. Rowlandson (chairman, Standing Committee of Finance Officers), L. T. Feldon (Darenth & Stone H.M.C.), and C. C. Carus-Wilson (St. Bartholomew's Hospital). The hon. secretary will be Miss J. Crawford, of the Middlesex Hospital.

Travelling Fellowships in Medicine and Tuberculosis

The Medical Research Council invite applications for the following travelling fellowships for 1950–51:

Rockefeller Medical Fellowships.—These fellowships are intended for graduates resident in this country who have had some training in research work in clinical medicine or surgery, or in some other branch of medical science, and who are likely to profit by a period of work at a centre in the United States or elsewhere abroad, before taking up positions for higher teaching or research in the United Kingdom. The stipend of fellowships tenable in the United States will ordinarily be at the rate of $2600 per annum for a single fellow, and of $3600 per annum for a married fellow. Travelling expenses and some [illegible] paid in addition.

Dorothy Temple C [illegible] *in Tuberculosis.*—The object of these fello [illegible] opportunities for study or research to suit [illegible] subjects of either sex "intending to devo [illegible] ancement by teaching or research of curat [illegible] ment of tuberculosis in all or any of its forn [illegible], as a rule, be awarded to candidates who v [illegible] or inquiries elsewhere than in the United [illegible] inarily be awarded for one academic year. [illegible] rily be at the rate of *£650 per annum fo* [illegible] £900 per annum for a married fellow, sub [illegible] stment in the case of fellowships tenable at centres outside the sterling area, with an allowance for travelling and incidental expenses.

Applications should reach the secretary of the council, 38, Old Queen Street, London, S.W.1, not later than June 1, 1950.

Diary of the Week

APRIL 2 TO 8

Monday, 3rd

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Dr. T. L. Hardy, Mr. Michael Smyth: Ulcerative Colitis.

Wednesday, 5th

NATIONAL HOSPITAL, Queen Square, W.C.1
5 P.M. (Institute of Neurology.) Prof. J. Morelle (Louvain): Neurofibromatosis of the Central Nervous System.

Appointments

ASTLEY, C. E., M.D. Leeds, M.R.C.P.: cons. physician, Teesside group of hospitals.

CHARRETT, M. A., M.R.C.S., D.P.H.: M.O.H., borough of Weston-super-Mare and area M.O. to Somerset county council.

CHIN, E. F., M.B. Sydney, F.R.C.S.: part-time asst. thoracic surgeon (cons.) to Godalming, Milford, and Liphook (Surrey) group of sanatoria.

DEWAR, D. C., M.D. Glasg., D.P.M.: cons. psychiatrist, Brookwood Hospital, Knaphill, Woking.

FOULKES, S. H., M.D. Frankfurt, L.R.C.P.E.: part-time physician (cons.), Bethlem Royal Hospital and Maudsley Hospital, London.

FREW, J. M., M.B. Glasg., D.P.M.: cons. psychiatrist, Brookwood Hospital, Knaphill, Woking.

HARLEY, H. R. S., M.S. Lond., F.R.C.S.: part-time asst. thoracic surgeon (cons.), Godalming, Milford, and Liphook (Surrey) group of sanatoria.

MACDONALD, RODERICK, M.B. Edin., D.P.M.: physician-superintendent and cons. psychiatrist, Banstead Hospital, Surrey.

ROSS, H. L., M.B. Durh., M.R. Lpool, D.M.R.D.: cons. radiologist, *Coventry group of hospitals, mainly at* Hospital of St. Cross, Rugby.

SLOAN, W. R., M.D. Belf., F.R.C.S.E., M.R.C.O.G.: cons. in obstetrics and gynæcology, Samaritan Hospital, Belfast.

TAYLOR, W. K., B.SC. Lond., M.R.C.P., D.C.P., F.R.I.C.: cons. pathologist, Godalming, Milford, and Liphook (Surrey) group of sanatoria.

Births, Marriages, and Deaths

BIRTHS

BECTOR.—On March 14, in London, the wife of Dr. N. P. Bector—a daughter.

BENNETT.—On March 19, at Liverpool, the wife of Dr. N. O. Bennett—a son.

BRAND.—On March 21, the wife of Dr. Terence A. Brand—a daughter.

BUCHAN.—On March 21, in London, the wife of Dr. Ian Buchan—a daughter.

GENT.—On March 20, in Malta, the wife of Surgeon Lieutenant N. S. C. Gent, of Frampton, Dorset—a son.

HIRD.—On March 22, at Carshalton, to Dr. Mary Sharpe, wife of Dr. G. F. Hird—a daughter.

KEATING.—On March 23, at Birkenhead, the wife of Dr. R. J Keating—a daughter.

LUNDIE.—On March 17, at Wantage, the wife of Major A. R. T. Lundie, M.C., R.A.M.C.—a daughter.

PHILLIPS.—On March 23, in London, the wife of Dr. E. H. P. Phillips—a daughter.

WOODALL.—On March 22, in London, the wife of Dr. John Woodall—a daughter.

MARRIAGES

WATERS—KOHLER.—On March 21, in London, Harry Waters, M.B., to Irene Kohler.

DEATHS

BROWNE.—On March 20, at *Great Missenden*, Robley Browne, O.B.E., L.R.C.P., surgeon captain, R.N. retd, aged 86.

DAVIES.—On March 25, at Winchester, Henrietta Frances Davies, M.B. Lond., aged 70.

EVANS.—On March 20, at Forest Green, Surrey, Arthur Henry Evans, O.B.E., M.D., M.S. Lond., F.R.C.S.

MILROY.—On March 20, at North Berwick, Thomas Hugh Milroy, M.D., LL.D. Edin., D.SC. N.U.I. and Belf., F.R.S.E.

PEARSON.—On March 18, in Jamaica, Sidney Vere Pearson, M.D. Camb., M.R.C.P., of Mundesley, Norfolk, aged 75.

PROCTOR.—On March 23, at Hexham, Northumberland, Alfred Henry Proctor, D.S.O., M.D., M.S. Durh., F.R.C.S.E., colonel, I.M.S. retd.

SUFFERN.—On March 21, at Hill Head, Fareham, Hants, Alexander Canning Suffern, O.B.E., M.D. R.U.I., lieut-colonel, R.A.M.C. retd, aged 92.

TWORT.—On March 20, at Camberley, Frederick William Twort, M.R.C.S., F.R.S., aged 72.

Dr. Stephen Taylor has been appointed a member of the Beveridge Committee to inquire into the organisation of British broadcasting.

Mr. Rainsford Mowlem and Dr. H. W. Davies left this country on March 21 for a visit, under the auspices of the British Council, to Yugoslavia. There they are lecturing and demonstrating the techniques of plastic surgery and *anæsthesia.*

SYMPATHECTOMY IN HYPERTENSION

ROBERT PLATT
M.Sc. Manc., M.D. Sheff., F.R.C.P.
PROFESSOR OF MEDICINE, UNIVERSITY OF MANCHESTER

S. W. STANBURY
M.B. Manc., M.R.C.P.
BEIT MEMORIAL RESEARCH FELLOW AND PART-TIME RESEARCH ASSISTANT, DEPARTMENT OF MEDICINE, UNIVERSITY OF MANCHESTER

A PRELIMINARY and tentative account of our early experience with sympathectomy in the treatment of hypertension has already been published (Platt 1948). The present paper is concerned with the results of operation in 80 patients, some of whom have been followed for two to three years. The series is small and some of the cases have been followed for a relatively short time; the results in many of them, however, are so clearly unsatisfactory that a more prolonged follow-up is not necessary to confirm the frequency with which the procedure fails to relieve high blood-pressure.

The fact that our results are on the whole considerably worse than in many published series we do not ascribe to inadequate medical or surgical treatment. On the contrary, we believe that many, if not most, of the good results reported by other authors are due to three factors: (1) insufficient control, with failure to observe the blood-pressure for a long enough time before operation is performed; (2) failure to appreciate the great variability of blood-pressure in benign hypertension; and (3) ignorance of the natural history of benign essential hypertension, with lack of appreciation of its relatively good prognosis in most of the milder cases.

We believe that the majority of cases of essential hypertension can, from the point of view of sympathectomy, be divided into two classes—namely, those which are too mild to warrant the use of this serious operation, and those which are too severe, too old, or too arteriosclerotic to benefit from it. Despite this general condemnation we have to admit that there is a small middle group in which sympathectomy has, even judged by the strictest of standards, produced real, apparently lasting, and significant benefit. We shall, so far as possible, attempt a clinical definition of this group. For the rest, the results of operation will speak for themselves.

THE PROGNOSIS OF HYPERTENSIVE DISEASE

The commonest cause of death from hypertensive disease is heart-failure, and this is most liable to occur between the ages of 55 and 65. Since this is not an age-group for which sympathectomy is seriously contemplated by any of its advocates, this group need not concern us further. All physicians with much experience of hypertension realise that, when discovered accidentally in a comparatively young person, it is often compatible with many years of life, and commonly gives rise to no symptoms unless an anxiety state is superimposed by the discovery of the disorder and too frequent estimation of the blood-pressure. It is well known that the prognosis throughout is better in women than in men. Bechgaard (1946) and Burgess (1948) have made important observations on the natural history of untreated hypertension, and their mortality figures must be taken into account in assessing survival after sympathectomy. It is apparent from their studies that moderate hypertension may be associated with no significant increase in mortality; and that patients with diastolic pressures of over 120 mm. Hg on first estimation may survive for more than fifteen years.

Hypertension is a clinical phenomenon and not a disease. The height of the blood-pressure is not necessarily an accurate index of the severity of the basic disease processes, nor is it an infallible guide to prognosis. Clinical experience teaches that the more serious case is usually associated with the higher blood-pressure; but sometimes cerebral thrombosis or cardiac failure will occur unexpectedly in patients with a diastolic blood-pressure of no more than 120 mm. Hg. The individual response to the establishment of permanent hypertension, and thus the individual prognosis, cannot therefore be forecast. It is, however, a firm clinical fact that when the diastolic blood-pressure becomes permanently raised to very high levels (130–140 mm. Hg or more) serious complications such as retinopathy, heart-failure, and renal failure are probable and the hypertension tends to enter its "malignant phase." This may happen irrespective of the cause of the hypertension, and is particularly likely when inordinately high pressures develop in young people. Despite the dissent of Goldblatt (1947), clinical experience suggests that it is the severe hypertension itself which brings about the "malignant deterioration"; and we believe that the experimental work of Wilson and Byrom (1941) and Byrom and Dodson (1948) offers strong support for this concept. Accepting this premise, sympathectomy producing significant and permanent reduction of blood-pressure would be of prophylactic value in such cases. The operation would not cure the disease, and there is little to suggest that it in any way alters or reverses the basic disease processes of which hypertension is but one effect.

OTHER REPORTS

We do not intend to review the extensive literature on sympathectomy in hypertension. Too often, reports fail to give adequate clinical information about the patients submitted to operation, and the reader has no opportunity of judging to what extent the inclusion of mild cases predetermines favourable operation statistics. Even the careful and critical account of Hammarström (1947), which records details of every case, includes many with diastolic pressures of less than 100 mm. Hg—cases which in our view would be likely to survive without operation and without disability for very many years. The series of so-called malignant hypertension reported by Peet and Isberg (1948) includes several cases in which the preoperative diastolic pressure was less than 120 mm. Hg—a level at which, in our experience, the changes of true malignant hypertension are not found. It will thus be seen that our series is difficult or impossible to compare with that of any so far published; our comparatively bad results are to be judged only after acceptance of the premise that mild cases of hypertension do not justify this serious operation, and that there is no evidence that their lives are prolonged by it.

SELECTION OF CASES

Cases selected for sympathectomy had usually presented with diastolic pressures of 130 mm. Hg or more when the patient was ambulant, and which tended to be 120 mm. or more with the patient at rest in bed. As bed rest was prolonged, the diastolic pressure sometimes fell below 120 mm. (see figs. 3, 4, 5, and 7 and table II). All were free from serious cardiac insufficiency and had renal function that was "reasonably good." (In this context "reasonably good" implies a urea-clearance of not less than 50–60% of the average normal, and, with a few exceptions, the ability to produce urine with a specific gravity of at least 1·016.)

The age and sex distribution is shown in fig. 1. Definite papillœdema was present in 24 cases, which are thus classified as "malignant type of hypertension"; in 51 the diagnosis was believed to be "essential" hypertension; in 16 there appeared to be a primary renal cause; and in 12 no diagnosis could be made. There was 1 case of phæochromocytoma.

METHOD OF ASSESSMENT

All cases had routine electrocardiograms and six-foot skiagrams of the chest before operation. No systematic study was made of the changes induced in these by operation; this aspect has been surveyed by Canabel et al. (1945). Unpublished observations by one of us (S. W. S.) have shown that renal function in hypertensive disease, whether measured by urea-clearance, concentrating capacity (specific gravity), or even inulin and *p*-aminohippurate clearances, shows very wide spontaneous variability. It was therefore difficult to assess the effect of the operation on renal function. The retinal appearances before operation have been carefully recorded, with particular attention to the presence of papillœdema, retinal hæmorrhages, and exudates. We feel convinced that not all observers recording the effects of sympathectomy in hypertension make the distinction between true papillœdema and œdema of the peripapillary retina. Adequate assessment of serial changes in retinal vessels is practically impossible without the help of photography and the detailed recording of every stretch of blood-vessel. We are unimpressed by reports which grade retinal appearances by a series of "pluses" and attempt a pseudostatistical assessment of the results of operation in terms of these highly subjective gradings.

The only available objective measure of the effects of operation is the blood-pressure, and in the first instance we shall define the success or failure of operation purely in terms of blood-pressure. Symptomatic relief will be discussed later. The difficulties involved in the assessment of blood-pressure changes have been emphasised by Evelyn et al. (1949), whose methods represent the best approach to the problem. In some of our cases we have records, as had Evelyn and his colleagues, of blood-pressures for some years before operation, taken when the patients were up and about as outpatients. In most we have one or two outpatient readings, the pressure on admission to hospital, and measurements throughout a period of some weeks at rest in a medical ward; during this last period blood-pressure was measured daily and the patient often did not know that surgery was contemplated. After operation the patient was seen as an outpatient at a special clinic where recumbent and standing blood-pressures were measured after about 15 minutes' rest. There are thus available for comparison with the postoperative readings, preoperative values representing probable maximal psychic pressor effects (initial attendance at the outpatient department and the first day in hospital) and readings representing the therapeutic effect of bed rest. The way in which we assess such a comparison will be described when we discuss our "failures" and "successes."

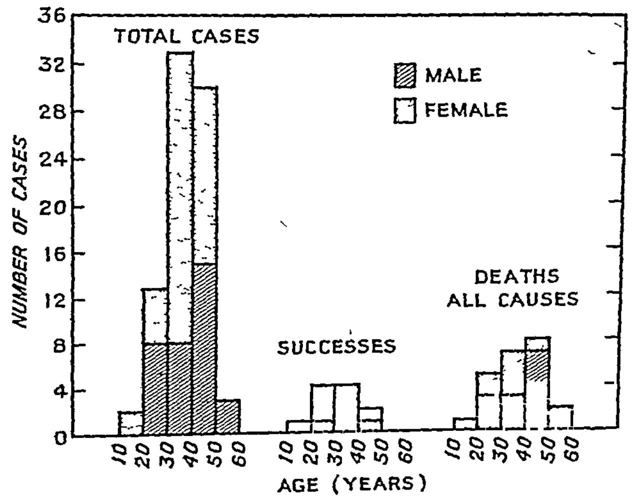

Fig. 1—Distribution by age and sex of total cases, "successes," and deaths from all causes.

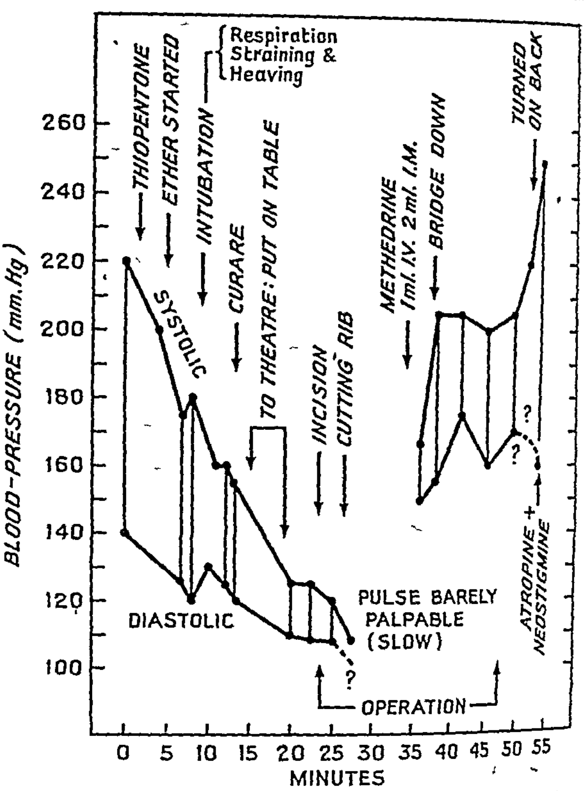

Fig. 2—The effects of anæsthesia, positioning, operation, and methedrine on the blood-pressure in a case of malignant hypertension (man, aged 49 years).

Operations and Results

The cases fall into six groups according to the operation performed:

1. The *Smithwick dorsolumbar operation* with ganglionectomy from D9 to L3 (19 cases).
2. The *Adson subdiaphragmatic splanchnic resection* with removal of ganglia L1, 2, and 3 (3 cases).
3. The *Boyd operation* (30 cases). This operation, which produces a sympathectomy extending from D4 to L5, involves a transthoracic approach, and it has been found desirable to carry it out in three or four stages.
4. "*Adson +*."—For various reasons the physician members of the team have sometimes thought it undesirable to proceed with the final transthoracic operation. This has given rise to a fourth group (14 cases), which we shall call Adson +, in which bilateral subdiaphragmatic splanchnic section and lumbar ganglionectomy has been performed, together with a thoracic sympathectomy from D4 to D12, on one side only.
5. "*Total*" *sympathectomy* (1 case).
6. *Uncompleted operations.*—In addition, 12 patients have died after the first stage of a sympathectomy (not necessarily as a result of the operation) and thus cannot be included in any of the above categories.

A few of the cases were operated on by Prof. Geoffrey Jefferson and by Mr. H. T. Simmons, but by far the greater part of the surgical work has been done by Prof. A. M. Boyd, who has coöperated throughout in this investigation. He will publish separately an account of the surgical procedures.

Of the 80 patients submitted to operation, only 11 (14%) subsequently had a significant and maintained reduction in the recumbent blood-pressure (see fig. 1) 11 patients have died after discharge from hospital and 1 defaulted, refusing further operation after unilateral thoracic sympathectomy. Table I presents the results obtained by the different techniques.

THE DEATHS

Of the 80 patients reviewed 23 are dead—i.e., 44·1% of all the males and 17·4% of all the females, submitted to operation. These figures are for the most part a measure of the severity of the cases selected by the physicians—a selection which precludes "good" operation statistics.

In 4 female cases, death must be regarded as accidental; the causes were subarachnoid hæmorrhage from congenital cerebral aneurysm, accident involving anæsthetic apparatus, adrenaline intoxication from extra-adrenal phæochromocytoma (not discovered at operation), and sudden death following intravenous administration of 1% procaine. Omitting these, the female death-rate is reduced to 8·7%. The remaining 4 female deaths are accounted for as follows:

Age	*Diagnosis*	*Operation*	*Mode and time of death*
17	Hypoplastic kidney; pyelonephritis	D4–12, one side	Congestive cardiac failure, 16 months after operation
37	Essential hypertension	Boyd complete	Acute pulmonary œdema, after second thoracic operation
44	Malignant essential hypertension	Subdiaphragmatic, one side	Postoperative collapse
44	Malignant essential hypertension	Smithwick complete	Uræmia, about one year after operation

One male died after intravenous procaine. It could fairly be said that two others were submitted to operation in desperation: one, a man aged 25 years, with type-2 nephritis and hypertension in the malignant phase, died of uræmia eight months after a unilateral Smithwick operation; the other, a physician, aged 35, with recurrent heart-failure, died a few days after completion of the Boyd operation. The remaining 12 male deaths are accounted for as follows:

TABLE I—RESULTS OF VARIOUS SURGICAL PROCEDURES IN 80 CASES OF HYPERTENSION

Type of operation	No. of operations completed	No. successful	Deaths since completion of operation
Boyd	30	4	4
Smithwick	19	4	4
"Adson +" ..	14	Nil	2
Adson	3	2	1
"Total"	1	1	Nil
Total ..	67	11	11

None of the "successes" is included in "died since completion." 12 patients died and 1 defaulted, before completion of the operation.

Of 6 cases of malignant essential hypertension 1 (aged 43) died of cardiac failure after a unilateral Smithwick operation; 3 (aged 48, 50, and 53) died at home of cardiac failure before completion of their operations; and 2 (aged 38 and 45) died of uræmia approximately two years and one year after completion of the Smithwick operation.

Of 3 cases of severe essential hypertension with well-marked arteriosclerosis, 1 (aged 42) passed into coma following the unilateral Smithwick operation, and autopsy revealed cerebral œdema; 1 (aged 52) died two days after completion of the Boyd operation from cardiac failure; and the third (aged 45) died at home, probably from coronary occlusion, three years after completion of the Smithwick operation.

The remaining 3 were cases of chronic type-1 nephritis or pyelonephritis with hypertension of malignant type. Of these, 1 (aged 28) completed the Adson operation and died of heart-failure a few months later; 2 completed the Boyd operation, 1 dying of uræmia 6 months later (aged 24), and the other of uncertain cause 3 months later (aged 31).

Perhaps the most interesting point that emerges from consideration of these mortality figures relates to the presence of papillœdema. Of the 24 patients with papillœdema (14 males and 10 females) submitted to operation, 8 (57%) of the males and 3 (30%) of the females have died, either at or after operation. Of the males with papillœdema, 4 of the 7 below 40 years of age, and 2 of the 4 below 30 years of age, have died.

We were alarmed by the occurrence, in some of our earlier cases of severe benign or malignant hypertension, of fatal postoperative collapse and acute cardiac failure following even short and relatively mild operations; so an attempt was made to follow blood-pressure changes throughout the operation. Fig. 2 is constructed from data obtained by one of us (S. W. S.) before and during a transthoracic operation on a male, aged 49, with malignant hypertension. Preoperative thiopentone and tetraethylammonium depressor tests had reduced the diastolic pressure by no more than 10–15 mm. Hg from the usual level of 140 mm. Hg. At operation the blood-pressure fell to 125/105 before surgery actually commenced, and

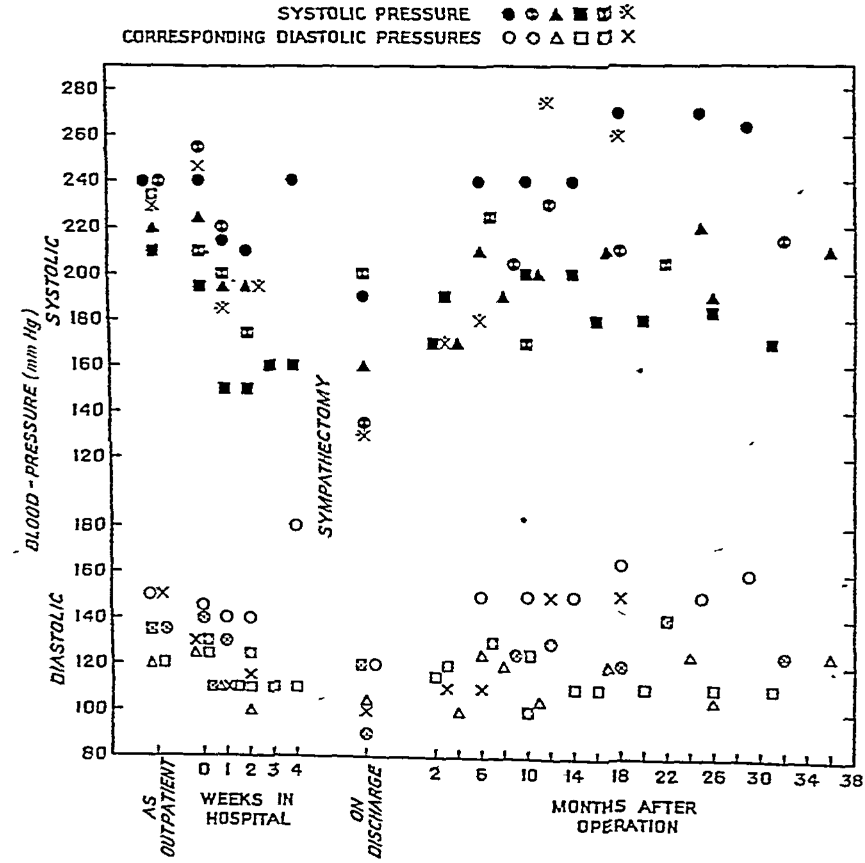

Fig. 3—Scatter diagram of blood-pressure readings obtained in six patients submitted to the Smithwick operation. Comparison is made of pressures before operation, both as ambulant outpatient and at rest in bed; on completion of operation; and ambulatory after operation.

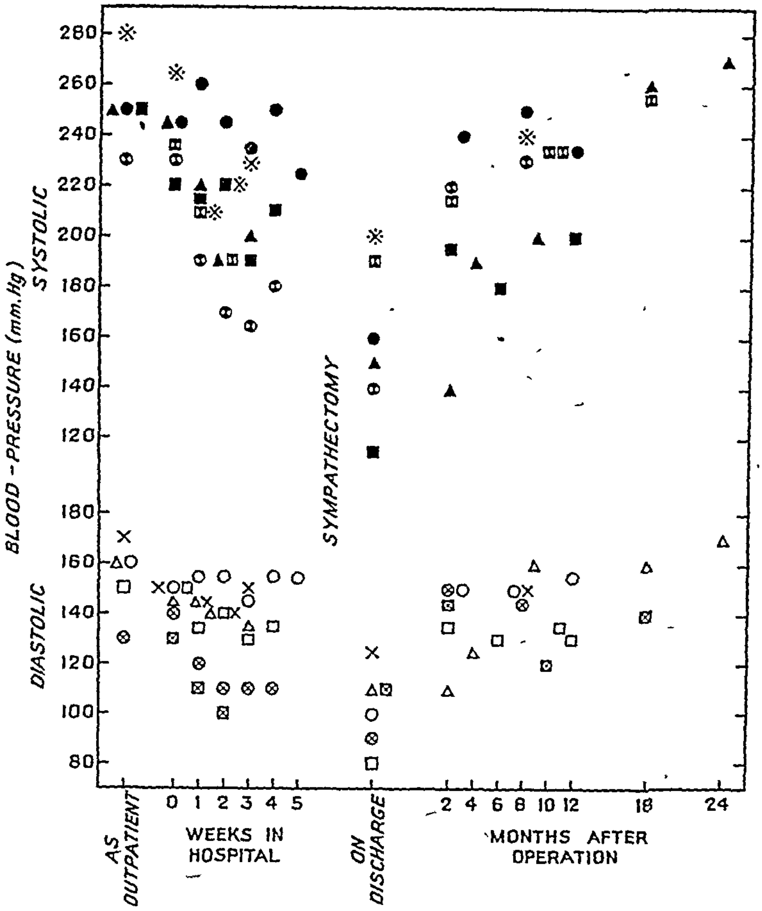

Fig. 4—Scatter diagram of blood-pressure readings obtained in six patients submitted to the Boyd operation. Key as for fig. 3.

during the operation no readings could be obtained by palpation or auscultation until 'Methedrine' was given. Such a profound hypotension could produce severe cardiac or cerebral ischæmia and might easily lead to arterial thromboses in diseased vessels. It seems likely that the hypotension is produced by the combination of loss of venomotor control due to anæsthesia and, perhaps, to interference with venous return through moving and positioning the patient. Methedrine appears to control this hypotensive state, and an attempt is now made to maintain the blood-pressure at its initial level with the aid of this drug. There have been no further inexplicable early postoperative deaths since this procedure was instituted.

THE FAILURES

Considerable difficulty is met in assessing the significance of minor differences between preoperative and postoperative blood-pressures. If all recumbent diastolic pressures measured in the ambulant outpatient after operation remain equal to, or higher than, the highest recorded before operation, the treatment has undoubtedly been ineffective; and this happened in a proportion of the cases classified as "failures."

In other cases the diastolic pressure after operation has appeared to be reduced by 20 mm. Hg or less, compared with the high levels when the patient first attended the outpatient department. We cannot maintain that this represents a "successful" result of operation, for several reasons: (1) the postoperative levels were almost always well above the levels achieved with bed rest before operation; (2) changes of 20 mm. Hg are well within the range of spontaneous variation in even the most "fixed" states of hypertension (Hammarström 1947); (3) isolated readings about as high as the preoperative outpatient readings have been seen in nearly all these cases; and (4) we do [illegible] feel satisfied that in a patient with diastolic pressures of 140–150 mm. Hg a reduction [illegible] less than 20 mm. Hg represents a worth-while return for an extensive surgical procedure. When operation has produced significant changes in blood-pressure this is obvious, as will be seen when the 11 "successful" cases are discussed and when figs. 3 and 4 are compared with figs. 5 and 7. In fact, the "failures" and "successes" can be used reciprocally as control groups.

Taking these facts into account, we have to record 54 "failures," 11 of which are included in the "deaths since completion of operation." In figs. 3 and 4 are charted blood-pressure readings obtained from 6 cases submitted to the Smithwick operation and 6 submitted to the Boyd operation; after operation the first group was followed for eighteen months or more, and the second for eight months or more. It is clear that, both individually and collectively, operation has failed to influence the recumbent blood-pressure in these 12 cases. Similar considerations apply to the 42 remaining cases. The figures *also show clearly* the apparently satisfactory, but misleading, reduction in blood-pressure when the patient *is discharged* from the surgical ward.

Of the failures, 15 [illegible] Smithwick operation and 4 of these hav[illegible] and 1 "benign"). developed *uræmia one, two,* and three years after operation, and the 4th ("benign") *died, probably of coronary* occlusion, three years after operation. We have the results of 'Amytal' depressor tests in 7 of these failures (including the 6 cases used in *constructing fig. 3*). These give basal figures of 125/85, 130/100, 140/100, 155/100, 185/135, and 220/130 mm. Hg. It is obvious that these depressor-test results are unrelated to the results of sympathectomy.

It was with these results in mind that the more extensive Boyd operation was undertaken, and little weight was given to the result of depressor tests (thiopentone and tetraethylammonium) in making the decision to operate. Of 30 completed Boyd operations, 26 were failures by *the criteria discussed above*; of these, 4 have died, 2 a day or two after operation, and 2 three and *six months later.*

It is necessary to give a few details of the 14 patients who have had the "*Adson+*" operation. Of these, 2 have died; in 1 pregnancy has interfered with surveillance; and 1 has been completed too recently for

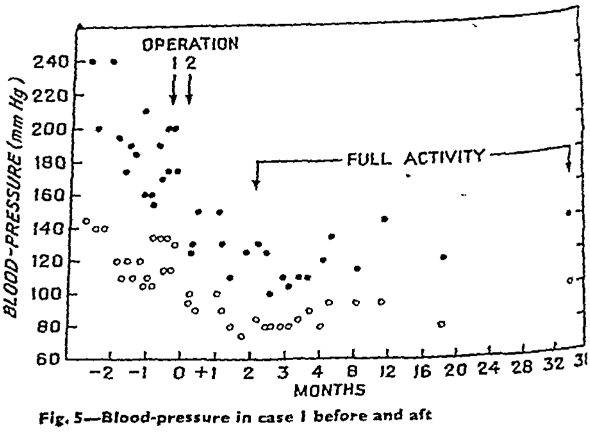

Fig. 5—Blood-pressure in case 1 before and aft

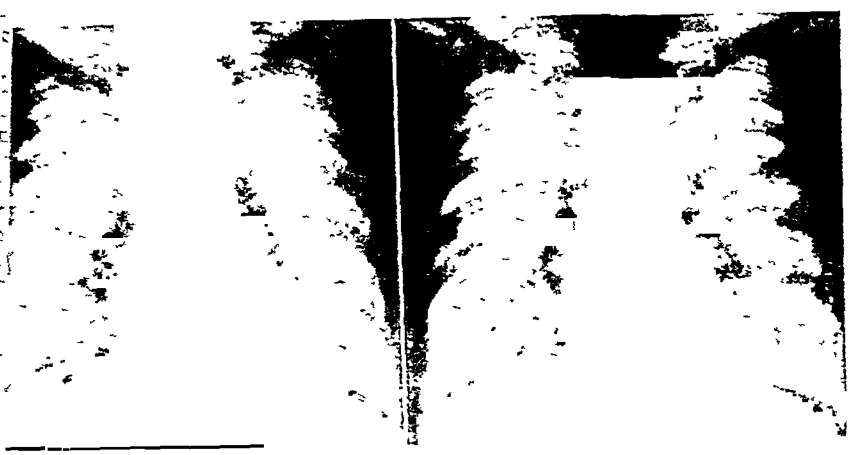

Fig. 6—Radiograph of chest in case 1, before and six months after operation.

adequate assessment. The remaining 10 are failures on the above criteria. Of these 10, 3 have since had a further operation and are converted to Boyd operations but have not yet been assessed as such; in 5 others we shall not recommend completion because of heart-failure and bronchitis (1), development of angina pectoris (1), severe cerebral thrombosis (1), and psychological disturbance in middle-aged females (2).

THE "SUCCESSFUL" CASES

The number of successful cases in which a significant and maintained reduction in blood-pressure has been produced is small and we must therefore devote more detailed attention to these patients. It must be admitted that most of them had been followed preoperatively for too short a time to permit adequate assessment of the rate of progress of the disease, and at least 1 (table II, case 5) would now be regarded as too mild for operation. On the other hand, in view of the serious prognosis associated with sustained high diastolic pressure in youth, one is little inclined to temporise in young patients if there is any hope that therapy will reduce the blood-pressure. Before operation 2 of our female patients had developed mild cerebral thromboses (with recovery of function) at the ages of 27 and 32 years (table II, cases 9 and 10).

All these successful cases have been observed at rest in hospital before operation for several weeks: in all of them, the blood-pressures measured postoperatively in the outpatient department were as low as, or considerably lower than, the lowest pressure recorded at rest in bed. Postoperative outpatient diastolic readings have remained 20–35 mm. lower than the *lowest* pre-operative outpatient reading, and 30–75 mm. below the highest casual outpatient reading. In most cases this state has been maintained for about two years. We would admit that blood-pressure readings obtained at successive visits to a hypertensive clinic may become substantially lower than the initial value, but we have followed a very large number of hypertensive patients in the last three or four years without meeting any case which showed a fall in clinic blood-pressure readings approaching the fall following sympathectomy in these few patients; and we believe that in these cases the attempt to reduce blood-pressure by surgical means has succeeded. Whether or not these desirable results will be maintained, and whether the progress of the underlying disease process has been changed it is still impossible to say.

It is difficult to determine from so small a group of "successful" cases what may be the factors determining a favourable operative result. None had entered into the malignant phase of the disease and all had "normal" renal function, but the response to depressor tests was not uniformly good. The preponderance of females and the general youth of the patients is obvious (table II). Cases 1, 2, 4, 5, 6, 8, 9, 10, and 11 had retinal arterioles which would probably have been passed as normal had the patients been normotensive. Cases 3 and 7 had clear-cut hypertensive vascular changes in the retina, and each presented retinal hæmorrhages; they are 2 of the 3 older patients in the series. It may be that the better results in these younger patients are related to the probable shorter duration of established hypertension and thus to the shorter time during which the hypertension itself could have produced irreversible vascular changes.

There is a possible analogy in the field of experimental hypertension. Flasher and Drury (1949) have shown that when hypertension is produced by unilateral renal interference in the rabbit, the longer the established hypertension is allowed to persist before operation, the fewer the cases that revert to normal blood-pressure after nephrectomy. They believe that long-continued high blood-pressure is a characteristic that tends to be self-perpetuating. In rats, audiogenic stimulation will produce hypertension which is said to subside on withdrawal of the stimulus (Medoff and Bongiovanni 1945). Smirk (1949) has shown that if stimulation is sufficiently prolonged hypertension persists despite removal of the stimulus.

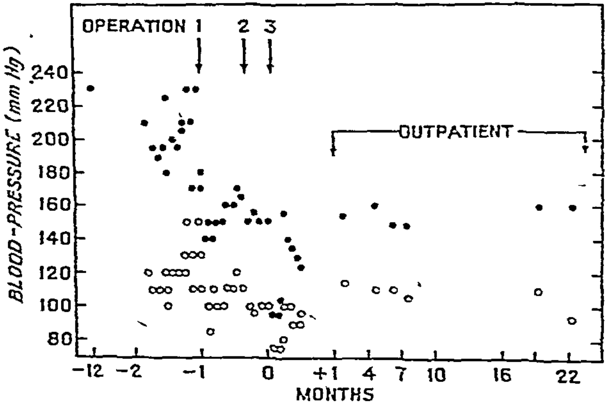

Fig. 7—Blood-pressure in case 3 before and after operation.

Data on the 11 successful cases are summarised in table II; and 3 illustrative case-records follow.

Essential Hypertension in a Young Man

Case 1.—A 27-year-old R.A.F. corporal, who was completely free from symptoms, was found at examination for life assurance to have a blood-pressure of 240/140 mm. Hg. Several times during the next few weeks different doctors recorded similar pressures, and it was found that the pressure fell to 140/100 mm. Hg with 'Sodium amytal' sedation. During four weeks as an inpatient in the Manchester Royal Infirmary the blood-pressure varied from 210 to 155 mm. systolic and the diastolic from 135 to 105 mm. Hg.

A Smithwick dorsolumbar sympathectomy (Mr. Simmons) was then performed in two stages. In fig. 5 are charted all blood-pressure readings obtained before operation and during the subsequent three years with the patient at full duty. He now indulges in weight-lifting and wrestling, and has no symptoms. Postoperatively the outpatient diastolic pressure has remained between 80 and 100 mm. Hg.

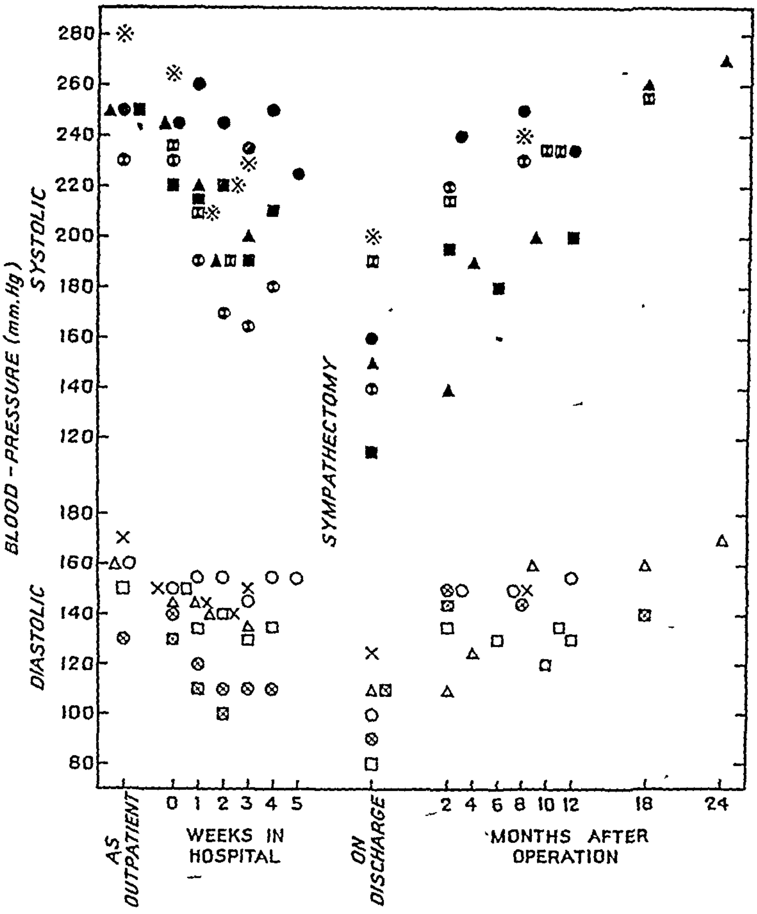

Fig. 4—Scatter diagram of blood-pressure readings obtained in six patients submitted to the Boyd operation. Key as for fig. 3.

during the operation no readings could be obtained by palpation or auscultation until 'Methedrine' was given. Such a profound hypotension could produce severe cardiac or cerebral ischæmia and might easily lead to arterial thromboses in diseased vessels. It seems likely that the hypotension is produced by the combination of loss of venomotor control due to anæsthesia and, perhaps, to interference with venous return through moving and positioning the patient. Methedrine appears to control this hypotensive state, and an attempt is now made to maintain the blood-pressure at its initial level with the aid of this drug. There have been no further inexplicable early postoperative deaths since this procedure was instituted.

THE FAILURES

Considerable difficulty is met in assessing the significance of minor differences between preoperative and postoperative blood-pressures. If all recumbent diastolic pressures measured in the ambulant outpatient after operation remain equal to, or higher than, the highest recorded before operation, the treatment has undoubtedly been ineffective; and this happened in a proportion of the cases classified as "failures."

In other cases the diastolic pressure after operation has appeared to be reduced by 20 mm. Hg or less, compared with the high levels when the patient first attended the outpatient department. We cannot maintain that this represents a "successful" result of operation, for several reasons: (1) the postoperative levels were almost always well above the levels achieved with bed rest before operation; (2) changes of 20 mm. Hg are well within the range of spontaneous variation in even the most "fixed" states of hypertension (Hammarström 1947); (3) isolated readings about as high as the preoperative outpatient readings have been in nearly all these cases; and (4) we do feel satisfied that in a patient with [illegible] pressures of 140–150 mm. Hg a [illegible] less than 20 mm. Hg represents a w[illegible] return for an extensive surgical [illegible]. When operation has produced significant change in blood-pressure this is obvious, as will be [illegible] when the 11 "successful" cases are discussed and when figs. 3 and 4 are compared with figs. 5 and 7. In fact, the "failures" and "successes" can be used reciprocally as control groups.

Taking these facts into account, we have to record 54 "failures," 11 of which are included in the "deaths since completion of operation." In figs. 3 and 4 are charted blood-pressure readings obtained from 6 cases submitted to the Smithwick operation and 6 submitted to the Boyd operation; after operation the first group was followed for eighteen months or more, and the second for eight months or more. It is clear that, both individually and collectively, operation has failed to influence the recumbent blood-pressure in these 12 cases. Similar considerations apply to the 42 remaining cases. The figures also show clearly the apparently satisfactory, but misleading, reduction in blood-pressure when the patient is discharged from the surgical ward.

Of the failures, 15 [illegible] "risk operation" and 4 of these hav[illegible] and 1 "benign"). developed uræmia one, two, and three years after operation, and the 4th ("benign") died, probably of coronary occlusion, three years after operation. We have the results of 'Amytal' depressor tests in 7 of these failures (including the 6 cases used in constructing fig. 3). These give basal figures of 125/85, 130/100, 140/100, 155/100, 185/135, and 220/130 mm. Hg. It is obvious that these depressor-test results are unrelated to the results of sympathectomy.

It was with these results in mind that the more extensive Boyd operation was undertaken, and little weight was given to the result of depressor tests (thiopentone and tetraethylammonium) in making the decision to operate. Of 30 completed Boyd operations, 26 were failures by the criteria discussed above; of these, 4 have died, 2 a day or two after operation, and 2 three and six months later.

It is necessary to give a few details of the 14 patients who have had the "Adson+" operation. Of these, 2 have died; in 1 pregnancy has interfered with surveillance: and 1 has been completed too recently for

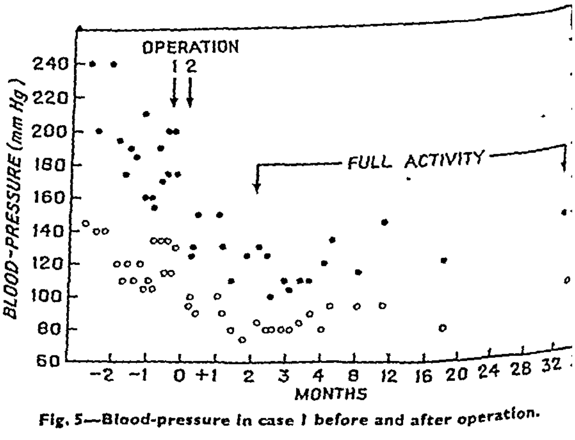

Fig. 5—Blood-pressure in case 1 before and after operation.

ibrosa. The appearances are those of hypertension with evidence of progressive renal damage: chronic pyelonephritis cannot be eliminated by examination of a single segment of kidney."

The patient left hospital fourteen weeks after admission, with a blood-pressure of 130/75 mm. Hg and pulse-rate of 64 per min. (recumbent), postural hypotension of 60/40 mm. Hg, and postural tachycardia of 144 per min. Postural giddiness subsided in two months. Subsequent readings obtained in the outpatient department were as follows:

Months after operation	*Lying* B.P. (mm. Hg)	Pulse-rate per min.	*Standing* B.P. (mm. Hg)	Pulse-rate per min.
5	170/115	96	125/90	112
9	160/105	85	115/80	140
14	145/105	80	145/100	100
19	145/95	88	135/95	128

For some months after operation the patient was subject to more severe asthmatic attacks, and to severe dyspnœa with asthma on exertion. At a year after operation she had few asthmatic attacks, no headaches, and felt well, though she was still easily tired by exertion. The retinal exudates disappeared and have not recurred.

We repeatedly see in young women cases where pyelonephritis is associated with a malignant type of hypertension and with a uræmic termination. We feel convinced that the hypertension itself contributes materially to the development of uræmia, and that in the case recorded above the operative reduction of the blood-pressure from dangerous levels should help to defer indefinitely the development of renal failure. Cases of this type may be the best suited for sympathectomy.

Essential Hypertension

Case 3.—A man, aged 43 years, had suffered from headaches for about a year and had recently developed typical migraine with visual phenomena. Five years ago a systolic pressure of 180 mm. Hg was recorded, and a year ago one of 230 mm. During a month at rest in hospital the systolic blood-pressure varied from 230 to 170 mm. and the diastolic from 150 to 100. Renal function was normal. The heart was slightly enlarged and there were a few small superficial retinal hæmorrhages with fairly well-marked vascular changes. Sympathectomy (D4–L3) was performed by Professor Boyd in three stages, and two weeks after its completion the blood-pressure was 125/90 mm. Hg recumbent and 75/50 standing. When the patient was last seen, two years after the operation, the recumbent pressure was 160/95 falling to 140/95 on standing; he was well and free from symptoms. Blood-pressure readings in this patient are charted in fig. 7.

In this case the result is not so spectacular as in our other "successful" cases; but even here it is significant that a patient who had diastolic pressures of 130–150 mm. at rest in bed now has ambulatory pressures no higher than 110 mm. Hg.

Symptomatic Results

Assessment of the results of operation has so far been confined to its effect on the recumbent blood-pressure. Even when the postoperative blood-pressure remains equal to, or higher than, preoperative levels there may be obvious symptomatic improvement in headaches and retinopathy. On the other hand, whether the operation is a "failure" or "success" from the standpoint of the hypertension, adverse symptoms may be produced, such as postural hypotension and tachycardia, severe exertional tachycardia and fatigability, cold hands or intensification of Raynaud's phenomena, or exacerbation of the asthmatic state. (The effect of the operation on the male sexual function will be reported elsewhere.)

A fair proportion of the most severe cases of hypertension never have headache. Of our patients, 33 who have lived long enough for assessment had significant and often very severe headache before operation: in 29 of these, operation afforded virtually complete relief; while the other 4 patients, classed as neurotic, admitted partial relief. It is regrettable that the types of headache were not analysed before operation. Usually headache was paroxysmal, and in a few patients it was indistinguishable from migraine; in some cases it lasted for twenty-four hours or more and recurred several times a week; in many it was associated with vomiting. After operation headache which had been troublesome for twenty or thirty years has remained in abeyance for three years or more. We are convinced that this relief of headache is not a psychotherapeutic result. Like the hypertensive headache itself, the relief is unrelated to the blood-pressure after operation, and it is also unrelated to the development or persistence of postural hypotension. It would seem likely that the effects on both headache and on retinopathy (see below) are in some way related to the retention by the craniocerebral vasculature of its innervation; just as vasoconstriction occurs in the upper limbs following dorsolumbar sympathectomy, circulatory readjustments could be expected in the extracranial and intracranial circulations.

Of the 14 male cases with papillœdema (which was usually accompanied by retinal hæmorrhages and exudates), 5 have died either before or very soon after completion of the operation. In 2 patients papillœdema persisted despite Smithwick and Boyd operations, respectively, and each died with uræmia. In 7 other cases papillœdema disappeared. In 5 of the 10 females with papillœdema complete resolution has taken place; 2 died immediately after operation: in 1 papillœdema has persisted despite an "Adson+" operation: in 2 we have no reliable postoperative report on the ocular fundi.

In 8 other females (aged 17–48 years) and 2 males (aged 41 and 43 years) retinal exudates and/or hæmorrhages, present before operation, have disappeared completely; and we have been unable to detect any evidence of recurrence.

As with relief of headache, the favourable change in the optic fundus bears no relation to the postoperative blood-pressure. It has been impressive to see patients some months after operation in whom the diastolic pressure has been 150–160 mm. Hg, yet with papillœdema resolved and crippling headache relieved. We cannot say whether it is necessary to have had postoperative postural hypotension in order to obtain these changes. It is, however, possible to say that the favourable response can persist when any detectable postural hypotension has disappeared. Favourable symptomatic results have followed the Boyd, Smithwick, and "Adson+" operations.

ADVERSE SYMPTOMATIC EFFECTS

Postural hypotension occurred in most patients after operation and was associated with postural tachycardia. In some patients the effect has been detectable for a few months only; in others it has persisted for more than a year. We have noted that in some cases postural tachycardia persists when postural hypotension is no longer detectable. These postural effects have never constituted a therapeutic problem, and any associated symptoms have usually passed off within a few months. In many patients in whom operation has failed to reduce the recumbent blood-pressure there has been an appreciable fall on standing. This effect could conceivably help to account for some of the favourable effects of operation (e.g., on retinopathy) in the "failures." Wilkins et al. (1948) have shown that sympathectomy greatly reduces the reflex vasopressor responses of the hypertensive patient, and claim that this may partly account for favourable changes in the cardiovascular system after operation. A similar claim could be made for postural hypotension. The phenomenon merits further systematic study.

A much more frequent source of postoperative distress has been exertional tachycardia, dyspnœa, and easy fatigability. This has been more prominent in cases submitted to the more extensive Boyd operation.

We might now hesitate to operate on a patient of this kind—free from symptoms, with minimal vascular changes, and a labile blood-pressure falling to 150/105 mm. Hg with bed rest. His hypertension had, however, produced cardiac enlargement, which was reversed by the operation (see fig. 6). Renal-biopsy showed hypertensive vascular changes with widespread hyaline changes in the *afferent arterioles* and *endarteritis fibrosa* of intralobular arteries. The pathologist (Dr. J. Davson) reported that the appearances were those of "essential hypertension probably in malignant phase." We think that the operation was justifiable and that the patient has probably benefited therefrom.

Chronic Atrophic Pyelonephritis

Case 2.—A 17-year-old schoolgirl gave a history of occasional attacks of urinary frequency, asthma for two years, and very severe bilious headaches for six months. There was no family history of hypertensive disease. A physician elsewhere recorded a blood-pressure of 190/110 mm. Hg, and a month later of 250/190.

She was admitted to the surgical unit where, during the next fortnight, the blood-pressure varied between 200/145 and 180/120. We ourselves recorded a pressure of 210/140, and we found a few small exudates between the macula and the temporal margin of the optic disc on both sides. The urine was sterile on culture; renal-function tests were normal, and both kidneys excreted 'Diodrast'; ascending pyelography revealed "distended pelvis and calyces on the right side."

Splanchnicectomy with resection of sympathetic ganglia from D4 to L3 was performed in four stages by Professor Boyd. Examination at operation revealed apparently normal adrenal glands and a "small fibrotic right kidney." Renal biopsy on the right side was reported as follows (*Dr. Davson*). "Glomeruli: normal number present; some show distortion and adhesions; one is in process of fibroblastic obliteration others are normal. Several foci of intense round-cell infiltration are present and there is early fibrosis. Arterioles show arteriosclerosis, and one intralobular shows endarteritis

TABLE II—"SUCCESSFUL" CASES OF SYMPATHECTOMY

Case no.	Sex	Age (years)	Diagnosis	Operation	B.P. as outpatient (mm. Hg)	B.P. range as inpatient and duration of observation	Postoperative B.P. before discharge	B.P. as outpatient, months after operation							Remarks
								2–3	5–6	9–10	12–14	18–20	24	26	
1	M	27	Essential hypertension	Smithwick	240/140	210/135 155/105 4 weeks	125/95	125/80	140/95	120/95	..	125/85	..	..	See text
2	F	17	Chronic pyelonephritis	Boyd	250/190 190/110	200/145 180/120 2 weeks	130/75 (60/40)	..	170/115 (125/90)	160/105 (115/80)	145/105 (145/100)	145/90 (135/95)	..	..	See text
3	M	43	Essential hypertension	Boyd	230/120	230/150 170/100 4 weeks	125/90 (75/50)	150/120	160/115	150/105	..	160/115	160/95	..	See text
4	F	23	Pyelonephritis	Boyd (3 stages)	230/170 180/135	200/130 160/115 4 weeks	140/90	155/115	..	140/110 (120/100)	..	140/105 (140/100) 5 mos. pregnant	175/115 (140/100)	160/110 (145/100)	Preoperative asthma intensified for months after operation. Relief of severe migrainous headache. Twin pregnancy with toxæmia 2 years after operation, when still unable to do full housework
5	F	43	Essential hypertension	Smithwick	200/125	210/125 150/110 4 weeks	..	135/95	..	..	110/80 (120/90)	..	130/90 (130/90)	..	With sodium amytal B.P of 145/110 reduced to 120/95. Complete relief of severe headache. Would now be considered too mild for operation except for headache
6	F	22	Pyelonephritis	Adson	235/155 230/140	215/145 160/125 4 weeks	130/80	150/100 (160/100)	175/120	155/90 (140/85)	..	170/110 (160/120)	..	170/105 (170/105)	Full-term pregnancy successfully completed 18 mos. after operation; painless labour. Very well; full housework
7	F	39	Essential hypertension	Smithwick	220/150	220/130 195/115 2 weeks	..	160/110 (155/110)	175/110 (150/110)	125/85	180/110	150/95 (140/100)	..	170/105 (160/120)	A few retinal hæmorrhages before operation; no recurrence
8	F	32	? Essential hypertension	[illegible]	[illegible]	[illegible]	135/95	125/90 (50/30)	155/95 (130/90)	..	145/100 (120/95)	..	..	..	Complete relief of severe headache. Does part housework
9	F	32	? Pyelonephritis	Smithwick	230/130	255/160 225/150 2 weeks	150/90 (100/?)	160/115 (140/100)	..	155/110 (150/105)	..	170/120 (150/110)	..	..	Presented at age 32 with right-sided cerebral thrombosis
10	F	27	? Essential hypertension; very severe Raynaud's syndrome	"Total" (6 stages)	215/135	240/135 210/110 8 weeks	150/70 (100/70)	..	..	..	..	140/100 (140/100)	..	..	Presented with severe Raynaud's phenomenon and threatened gangrene: later developed right-sided cerebral thrombosis. Now fully active with no symptoms other than profuse sweating from remaining innervated areas
11	F	33	Essential hypertension	Adson	[illegible]	[illegible]	[illegible]	..	185/115 (170/105)	170/105 (160/105)	..	..	..	..	Complete relief of severe headache

The postural hypotension corresponding to the given recumbent pressure is shown in parentheses.

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4	F	23	Pyelonephritis	Boyd (3 stages)	230/170 180/135	200/130 160/115 4 weeks	140/90	155/115	..	140/110 (120/100)	..	140/105 (140/100) 5 mos. pregnant	175/115 (140/100)	160/110 (145/100)	Preoperative asthma intensified for months after operation. Relief of severe migrainous headache. Twin pregnancy with toxæmia years after operation when still unable to do full housework
5	F	43	Essential hypertension	Smithwick	200/125	210/125 150/110 4 weeks	..	135/95	..	..	110/80 (120/90)	..	130/90 (130/90)	..	With sodium amytal B.P. of 145/110 reduced to 120/95. Complete of severe hea Would now be considered too mil operation except headache
6	F	22	Pyelonephritis	Adson	235/155 230/140	215/145 160/125 4 weeks	130/80	150/100 (160/100)	175/120	155/90 (140/85)	..	170/110 (160/120)	..	170/105 (170/105)	Full-term pregnancy cessfully comp 18 mos. after ope tion; painless lab Very well; full ho work
7	F	39	Essential hypertension	Smithwick	220/150	220/130 195/115 2 weeks	..	160/110 (155/110)	175/110 (150/110)	125/85	180/110	150/95 (140/100)	..	170/105 (160/120)	A few retinal hæmorrha before operation; recurrence
8	F	32	? Essential hypertension			[illegible] [illegible] weeks	135/95	125/90 (50/30)	155/95 (130/90)	..	145/100 (120/95)	..	..	..	Complete relief of headache. Does housework
9	F	32	? Pyelonephritis	Smithwick	230/130	255/160 225/150 2 weeks	150/90 (100/?)	160/115 (140/100)	..	155/110 (150/105)	..	170/120 (150/110)	..	..	Presented at age 32 w right-sided cer thrombosis
10	F	27	? Essential hypertension; very severe Raynaud's syndrome	"Total" (6 stages)	215/135	240/135 210/110 8 weeks	150/70 (100/70)	..	..	..	..	140/100 (140/100)	..	..	Presented with Raynaud's phenomen and threatened grene: later develop right-sided cere thrombosis. Now fu active with no sym toms other than prof sweating from remai ing innervated areas
11	F	33	Essential hypertension	Adson	220/140 205/130	220/140 210/130 2 weeks	170/100 (110/80)	..	185/115 (170/105)	170/105 (160/105)	..	..	..	..	Complete relief of seve headache

The postural hypotension corresponding to the given recumbent pressure is shown in parentheses.

in the series of Peet and Isberg (1948) have already been stated.

Smithwick's (1949) most recent assessment of his results suggests that sympathectomy does not much influence the prognosis of malignant hypertension, though all agree that retinopathy and headache can usually be improved. Where operation can be expeditiously performed it is certainly worth while if for the rest of his life the patient is protected from blindness and rendered comfortably free from headache: but this group of cases has the highest operative mortality (Peet and Isberg 1948). We shall continue to use the operation in selected cases in an attempt to preserve vision. We remain open-minded about the effect of operation on prognosis.

The final consideration is whether operation is justified in an attempt to relieve severe headache alone. Those of our patients who had suffered incapacitating headaches previously are emphatic in their assertion that it is worth while. It is particularly impressive to be told by a 50-year-old woman, who has had four operations and spent a week in an oxygen-tent with nearly fatal pulmonary œdema, that she would go through it all again for the relief that it has afforded. The same patient takes small account of the fact that, whereas she could do full housework before the operation, she now does virtually none on account of exertional tachycardia and fatigability. We conclude that sympathectomy may be justifiable as a symptomatic measure for the relief of crippling headache: but in a few patients relief may be bought at the price of new symptoms. In cases of this kind it would be useful to know what is the least surgical procedure compatible with relief.

We set out originally to assess the merits of the more extensive Boyd operation, as compared with the Smithwick operation, in the reduction of blood-pressure. Our "successful" cases are so few as to make this impossible. Symptomatic relief is about the same in both (and in the "Adson +"), but the more extensive operation appears to produce more often symptoms of exertional tachycardia and fatigue; we are not much encouraged to continue with it. It is not our intention to become surgical apologists, nor to guess whether accessory sympathetic ganglia, such as those described by Boyd and Monro (1949), or nerve degeneration could be responsible for our failures. All we can say is that sympathectomy, as now performed by competent surgeons, has a very limited rôle in the treatment of hypertensive disease.

SUMMARY

The results of sympathectomy in 80 cases of hypertension are presented and discussed.

Many of the good results recorded by others are attributed to inadequate appreciation of the benign and variable course of mild hypertension.

In this series only cases in which the prognosis was judged to be unfavourable—usually with resting diastolic blood-pressures of 120 mm. Hg or more—have been subjected to operation.

In only 11 of 80 cases was a significant and lasting reduction of blood-pressure achieved. Most of these cases were young women, under 40 years of age, suffering either from essential hypertension or from renal hypertension with good renal function.

Headache and retinopathy are sometimes relieved by a sympathectomy which has failed to reduce blood-pressure.

Sympathectomy should very rarely be advised in hypertensive disease. Some of the indications are defined.

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METHOD OF INQUIRY

There were 375 cases of poliomyelitis notified in Victoria from January to August, 1949. The parents of 340 of these cases were asked whether the child had ever been immunised against diphtheria or whooping-cough, and, if so, the date and the doctor's name. The remaining 35 cases reported during this period could not be similarly investigated, either because of inaccessibility of the patient, or of inability to contact the parents. No selection of cases whose parents were interviewed was made, and every effort was made to interview the parents of every case reported, but in 35 cases this proved impossible.

Of those cases investigated, if any inoculation had been given within three months of the onset, I personally obtained particulars from the parents of the exact dates and of the sites of all inoculations. I then checked the parents' statements with the doctor's records. Occasionally the parents were uncertain of the exact date or site. In only 4 cases confirmation of the parents' statements as to date and site could not be obtained from the doctor. The data of these 4 cases were recorded as doubtful, and they have been excluded from consideration.

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Patients with perfect exercise tolerance before operation find themselves incommoded by stairs and unable to hurry. They adjust by curtailing their activity, and if operation has relieved distressing headaches will often make no complaint of the adverse symptoms.

Two patients with Raynaud's syndrome before operation have complained of an intensification of symptoms after dorsolumbar sympathectomy; and in one, phenol injection of the stellate ganglia was later performed in another hospital. Many other patients note cold hands. In two patients previous asthmatic symptoms were intensified; and in one asthma developed de novo after operation. These adverse effects were of relatively short duration. Other minor sequelæ included loss of ejaculation, and neuralgia in relation to the incisions, the latter particularly after rib resection.

Although these postoperative sequelæ may be distressing, the patient usually regards the operation as worth while if it has removed his headache or improved his vision. If, on the other hand, these develop in a patient, previously symptom-free, for whom operation was recommended merely with a view to reducing a dangerously high diastolic pressure, the patient is likely to be dissatisfied with the result. These points should be borne in mind when sympathectomy is contemplated.

DISCUSSION

The results presented may appear surprising in the light of other reports which enthusiastically endorse the belief that sympathectomy is effective in reducing blood-pressure. The valuable and highly critical survey by Evelyn et al. (1949) of cases submitted to sympathectomy at the Massachusetts General Hospital has, however, shown that "successful" results after five years can be anticipated in no more than 20% of cases. Their material must consist largely of cases previously reviewed by Smithwick at the same hospital; and Smithwick (1944) has made it clear that some of his operations were on patients with resting diastolic pressures as low as 100 mm. Hg, or even below 90. The Boston series with its 20% of favourable results in five years is thus in no way comparable with the present series.

Before attempting to derive any guiding principles from our cases, it is advisable to summarise the results. A significant reduction of blood-pressure has been achieved in 11 of our 80 cases, and the follow-up period has been relatively short. At least 12 cases of malignant hypertension have lost their papillœdema without any appreciable change in blood-pressure; 10 other patients have rapidly lost retinal hæmorrhages or exudates after operation, and 7 of these showed no change in blood-pressure. Nearly all surviving patients who had suffered from severe headache have obtained relief. A few cases of malignant hypertension have died as a result of operation, and some patients have exchanged severe headache for severe exertional tachycardia and fatigability.

The following remarks and suggestions are intended as guidance for the physician whose difficult business it is to decide whether or not sympathectomy should be considered in the management of *a particular case* of hypertensive disease. We are not concerned with the formulation of intricate rules which might enable the surgeon to achieve a good, but possibly academic, score of "successes." Our aim is rather to give, from a consideration of our own results and those previously reported, our clinical advice on the possible indications for, and probable outcome of, sympathectomy in hypertensive disease.

The responsibility for submitting patients to operation should remain with the physician, who must realise two important facts:

1. Hypertension per se may be too mild to warrant operation. There is no evidence whatever that a symptom-free case of essential hypertension with a diastolic pressure of 115 mm. Hg or less would be better prognostically if the pressure were reduced to 80–90 mm. by surgery.

2. If the blood-pressure itself is the physician's concern, he has little chance of changing it significantly by operation in patients of either sex if they are over the age of 45, whether the hypertension be moderate, severe, or "malignant."

The physician must therefore be ready to dismiss the idea of sympathectomy in most cases of essential hypertension. Patients over the age of 45 years (especially male); patients with large-vessel sclerosis, angina pectoris, or myocardial infarction; patients with congestive cardiac failure or renal failure; and patients who have had more than one cerebral thrombosis—none of these should be submitted to operation for hypertension. There is little evidence that sympathectomy benefits them at all, and the risks are great.

Some patients with essential hypertension—often in the late thirties or early forties—develop exertional dyspnœa and are found clinically to have a somewhat enlarged heart and little else amiss. We hold that such cases should be managed on the general lines of restricted activity, sedation, weight reduction, and reduced intake of salt. If this is impracticable or unsuccessful, sympathectomy may be considered, since, as our own case 3 and other reports show, some successes may be achieved. The other group of cases in which we think that sympathectomy may be helpful is that of severe hypertension in young adults. Such cases may be "essential" or clearly secondary to a renal lesion such as pyelonephritis or type-1 nephritis. If the nephropathy is active and progressive, no help is to be expected from sympathectomy, as is shown by the report of Reyersbach and Butler (1949) on the operation in children with nephritis. If the renal lesion is inactive, renal function remains good, and the diastolic pressure is 125–150 mm. Hg, sympathectomy is indicated and we would submit the patient to operation whether or not the hypertension had entered the "malignant" phase (see cases 2, 4, 6, and 9). It appears that useful results may be expected, especially in females below the age of 40 years. If the young adult is thought to have *essential* hypertension, much more thought and care is necessary in arriving at the decision to operate. In almost all such cases it is justifiable to postpone one's decision for months or even a year or two; the decision to operate may then be made because the diastolic pressure remains consistently high (125–140 mm. Hg); because the patient has severe symptoms such as headache, which would be relieved by operation; or because a cerebral episode has occurred (cases 9 and 10) and it is thought that a further episode would be less likely if the blood-pressure were lower.

A word of warning is perhaps necessary in view of the report by Reyersbach and Butler (1949) of sympathectomy in children aged 7 and 13 years with so-called essential hypertension. In one of these we would question the diagnosis, though we agree that symptomless essential hypertension may occur in adolescence; one of us (S. W. S.) has seen eclampsia grafted on to essential hypertension at the age of 14 years. Little is known, however, of the disease in children, of the spontaneous changes in their blood-pressure, and of the pressor effect on them of the doctor and his sphygmomanometer; and we would under no circumstances submit children to sympathectomy on the strength of blood-pressure readings alone.

We find it difficult to give a final opinion on sympathectomy in the malignant type of hypertension. We have already said that we do not regard the malignant phase as a contra-indication to operation in young adults with renal hypertension. Our experiences with malignant essential hypertension have not been encouraging. Others (Poppen and Lemmon 1947, Palmer 1947, Peet and Isberg 1948) are more enthusiastic. Certain objections the series of Peet and Isberg (1948) have already en stated.

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DIAGNOSIS

Of the 375 cases of poliomyelitis reported, 340 were investigated: about 250 of them, including every case of which the particulars are presented in the tables, were fully investigated by me personally. Most of them were admitted to the Infectious Diseases Hospital, Fairfield, Melbourne, where the diagnosis was confirmed by the experienced medical staff. Many were also seen by members of the panel of consultant physicians, appointed by the Consultative Council on Poliomyelitis of this State. Clinically, the cases associated with recent immunisation were indistinguishable from the remaining acute cases of paralytic poliomyelitis seen during this period. Of the patients included in table I, only 1 (no. 161) was not paralysed, a female child aged sixteen months. Her clinical picture was consistent with non-paralytic poliomyelitis. On admission to hospital her cerebrospinal fluid contained 65 leucocytes per c.mm. (70% polymorphs, 30% lymphocytes), and its protein content was 60 mg. per 100 ml.

TABLE I—FINDINGS IN 31 CHILDREN INOCULATED WITHIN THREE MONTHS OF ONSET

Case no.	Age in months	Agent	Days between last injection and symptoms	Limb last injected	Paralysis in injected limb	Paralysis in non-injected limbs				Other injections: days before onset and sites of injections
						RA	LA	RL	LL	
181	54	P	.7	LA	***	**	..	*	0	..
203	25	P	9	RA	****	..	**	0	0	16 (LA)
290	15	P	12	LA	***	0	..	0	0	19 (RA) 35 (RA)
327	24	P	12	RA	**	..	0	0	0	25 (LA) 35 (RA)
372	54	P	20	RA LA	*** **	..	..	0	0	41 (LA) 53, 73 (LA)
56	41	P	26	LL	***	***	**	0	..	33 (RA)
119	17	PD	4	RL LL	**** ****	0	*	..	..	23 (RA) 23 (LA) 9 (?LL, ?RL) 45 (LL)
266	67	PD	7	LA	****	***	..	0	0	
1	12	PD	8	LL	****	0	0	0	..	..
178	26	PD	8	LA	****	**	..	**	0	1, 69 (LA)
358	24	PD	10	LL	****	0	0	0	..	..
348	12	PD	11	LA	***	0	..	0	*	42 (RL)
356	36	PD	11	RL	**	*	0	..	0	42 (RL) 73 (RA)
161	16	PD	13	RA LA	0 0	..	..	0	0	46 (LA, RA)
231	32	PD	13	RL	****	*	*	..	***	51 (LL)
179	17	PD	14	LL	**	0	0	0	..	..
94	18	PD	16	LA	***	0	..	0	0	..
222	16	PD	22	LL	***	0	0	0	..	..
215	30	PD	27	RL	**	0	*	..	*	1 (LL)
216	15	PD	28	RL	***	0	0	..	0	..
2	18	PD	32	RL	**	0	0	..	0	..
85	12	D	5	RA	0	..	0	***	*	..
238	84	D	6	RA LA	0 0	..	..	0	0	29 (RA)
209	42	D	8	LA	0	0	..	***	*	..
211	21	D	8	RA	0	..	0	*	0	1 (RA)
186	18	D	11	RA	****	..	0	0	0	..
259	131	D	12	LA	*	*	..	****	**	29 (RA)
248	69	D	13	RA	***	..	***	0	0	41 (LA)
241	180	D	14	LA	**	0	..	0	0	..
364	93	D	60	LA	0	0	..	0	0	(Note: Palate paralysis only)
336	108	D	60	LA	0	0	..	*	0	..

****	Very severe.	RA,	Right arm.
***	Severe.	LA,	Left arm.
**	Moderate.	RL,	Right leg.
*	Mild.	LL,	Left leg.
0	Nil.		

P, Pertussis vaccine.
PD, Combined pertussis and diphtheria vaccine.
D, Diphtheria toxoid.

TABLE II—RELATION OF SITE OF PARALYSIS TO SITE OF INOCULATION

Agent		Inoculated limbs		Uninoculated limbs		Total limbs
		Paralysed	Not paralysed	Paralysed	Not paralysed	
P (6 cases)	Legs	1	..	1	10	12
	Arms	8	2	2	..	12
	Total	9	2	3	10	24
PD (14 cases)	Legs	12	2	2	12	28
	Arms	6	1	5	16	28
	Total	18	3	7	28	56
D (10 cases)	Legs	..	..	8	12	20
	Arms	6	7	..	7	20
	Total	6	7	8	19	40

ASSESSMENT OF THE SITE OF PARALYSIS AND ITS SEVERITY

The sites of paralysis were determined at the initial examination, or at one shortly after the diagnosis had been made. In the majority of these cases, the extent of paralysis of each extremity was initially assessed by me according to the standard scale of the Australian Association of Physiotherapists. The patients whom I did not initially examine were assessed by members of the staff of the Infectious Diseases Hospital, Fairfield. For the sake of uniformity of presentation, both series have been converted to the following scale:

Very severe	(****)	Complete flaccid paralysis.
Severe ..	(***)	Complete paralysis of at least one muscle group.
Moderate ..	(**)	Partial paralysis of at least one muscle group, sufficient to prevent movement of the involved joint against gravity.
Mild .. .	(*)	Lesser degrees of paralysis, permitting movement against gravity.
Nil ..	(0)	No detectable paralysis of an extremity.

These findings were, in all cases whose particulars are included in this paper, compared with those of the physiotherapists treating the cases and were found to correspond exactly.

It is emphasised that the inquiry into the site and degree of paralysis always preceded the inquiry as to the site of inoculation. This procedure seems sufficient to ensure against any possibility of bias on the writer's part in the assessment of the site and severity of the paralysis.

FINDINGS

Table I summarises the relevant data of all 31 patients who have received an injection of diphtheria toxoid or pertussis vaccine, alone or in combination, within three months of the onset of symptoms, for whom exact information on date and site of injection could be obtained. The findings in the 4 patients where some degree of doubt existed as to date and site have been omitted. There were no other cases in the 340 investigated in whom a history of an inoculation of diphtheria toxoid and/or pertussis vaccine within three months of the onset was obtained.

RELATION OF THE SITE OF INOCULATION TO SITE OF PARALYSIS

The data in table I on relation of site of inoculation (at any time up to three months before the onset) to site of paralysis are collected in table II.

Paralysis is distinctly more frequent in the inoculated than in the uninoculated extremities in those cases which ived pertussis vaccine either alone or in combination. he patients given only diphtheria toxoid, a difference the incidence of paralysis in the inoculated and ioculated extremities is also evident if we compare corresponding extremities (the arms), though this erence is not as striking as when pertussis vaccine used alone.

'he difference in incidence of paralysis in inoculated uninoculated limbs is so great when pertussis vaccine, ie or combined, has been employed, that an exact tistical assessment of significance, which presents some iculties, hardly appears to be necessary. The cases olving diphtheria toxoid alone are few and it is ibtful whether their statistical assessment would be fitable.

IMMUNISATION HISTORY OF ALL CASES INVESTIGATED

)f the 340 cases investigated a history of previous munisation against whooping-cough and/or diphtheria s obtained in 211. Of these, 65 received inoculations hin one year of the onset of their poliomyelitis. ese results are expressed in table III.

TABLE III

Agent	Period preceding onset in which inoculation was received (all cases)		
	Under 3 months	Between 3 months and 12 months	More than 1 year
P	6	3	9
PD	15	8	51
D	10	19	61
Unknown	4	0	25
Total ..	35	30	146

the remaining 129 cases no history of any immunising ocedure against whooping-cough or diphtheria at any riod of the patient's life was obtained.

Of the 340 cases investigated, 69 were children under ree years of age. The immunisation history of these ildren regarding pertussis and diphtheria is contained table IV.

INTERVAL BETWEEN INJECTION AND DEVELOPMENT OF SYMPTOMS

Table I includes all persons who had received a pro- ıylactic inoculation of one of the three agents within ıree months of the onset of symptoms. It would be xpected that the number of inoculations would be the me in each month. That is far from the case, as appears om table V (extracted from table I).

In this table every inoculation received by each subject ithin ninety days of the onset is included: many ıtients, of course, received multiple injections in that eriod.

It is clear that the more recent the injection of any gent, the more likely is its association with the onset of oliomyelitis. This association can be assessed by the χ^2 test, and is significant for diphtheria toxoid alone, as well as for pertussis vaccine, alone or in combination.

TABLE IV

Agent	Period preceding onset in which last inoculation was received (children under 3)		
	Under 3 months	Between 3 months and 12 months	More than 1 year
P	3	2	1
PD	13	3	3
D	3	10	2
Unknown	2	0	3
Total ..	21	15	9

Total Inoculated: 45
Uninoculated: 24

TABLE V

Agent	Interval between inoculation and onset of symptoms		
	1–30 days	31–60 days	61–90 days
P	9	5	1
PD	18	6	2
D	11	3	0
Total ..	38	14	3

INTERVAL BETWEEN THE LAST INJECTION AND ONSET OF SYMPTOMS AND SITE OF PARALYSIS

Many patients received more than one injection. Inspection of the data revealed that the last injection before the onset of symptoms was that usually associated with the location of paralysis. The data are arranged in table I to indicate this relationship.

The fourth column in table I shows the intervals, arranged in order of magnitude, between the last injection (excluding three injections given the day before onset) and the onset of symptoms. The incidence of paralysis in limbs receiving the last injections is shown in the sixth, and that in the other limbs in the next four columns. When pertussis vaccine was used, alone or in combination, 22 of 24 limbs receiving the last inoculation were paralysed, and only 16 of the 60 limbs inoculated prior to this or uninoculated were affected. There is less evidence of localisation in the limb last injected when diphtheria toxoid was used; 4 of 11 of the last inoculated limbs were paralysed, and 10 of 29 of the remainder.

INTERVAL BETWEEN THE LAST INOCULATION AND THE ONSET OF SYMPTOMS

The intervals from the last inoculation before the onset of symptoms to that onset ranged from five to thirty-two days, except in 2 patients in whom this interval was approximately sixty days. These 2 patients received diphtheria toxoid, the limbs injected were not paralysed, and it is quite likely that in them the injections were not related to the attacks of poliomyelitis but were coincidental.

TABLE VI—SEVERITY OF PARALYSIS IN LIMBS INOCULATED WITH PERTUSSIS VACCINE WITHIN 35 DAYS AND IN CONTROLS (CHILDREN UNDER 3)

	Immunised group * (15 cases)					Control group * (48 cases)					
	****	***	**	*	0	****	***	**	*	0	Total limbs
R arm	1	0	1	0	1	0	1	0	3	44	48
L arm	1	3	0	0	1	0	2	1	3	42	48
R leg	2	1	2	0	0	5	3	3	17	20	48
L leg	3	1	1	0	0	3	4	4	13	24	48
All limbs	7	5	4	0	2	8	10	8	36	130	192

* For definition of these groups see text.

In poliomyelitis following tonsillectomy, the intervals between the operation and onset of symptoms have ranged from three to thirty days. The literature is summarised by Horstmann and Paul (1947). Leake (1935) reported 12 instances in which an attack of poliomyelitis closely followed administration of a poliomyelitis virus vaccine. Of these 12, 6 children had a single dose two days or less before onset of symptoms. Discarding these very short intervals as unlikely incubation periods, the intervals from injection to onset were seven to fourteen days, as in the majority of cases (19 of 30) in this series. In Leake's series also there was a marked, but not invariable, association between site of inoculation and site of paralysis.

The incubation period of poliomyelitis itself is usually regarded as lying within these same limits, five to thirty days.

RELATION OF INOCULATION TO PARALYSIS IN THE CASES UNDER THREE YEARS OF AGE

In the 17 cases under three years of age receiving pertussis vaccine either alone or in combination within thirty-five days of the onset, full data are available for 16; in 15 paralysis followed in the limb last inoculated before the onset. The paralysis in the limb last inoculated in these cases is shown in table VI.

By contrast the degree of paralysis in each limb of a control group of all children under three (48 in all), notified during the same period as the above 17 cases, who had not received any inoculation within thirty-five days of the onset, and for whom exact information as to the site and severity of paralysis was ascertained, is also shown in table VI.

It is clear that there is a considerable increase in the severity of the paralysis in the last-inoculated limbs of those children under three who received an injection of pertussis vaccine within thirty-five days of the onset of poliomyelitis.

ADMINISTRATIVE ACTION

A report was submitted to the Chief Health Officer (Dr. G. E. Cole) on July 20, 1949, and it was decided to defer action until further evidence had been collected. When this had been done, the Chief Health Officer, in September, 1949, invited Prof. F. M. Burnet, F.R.S., Dr. E. V. Keogh, of the Commonwealth Serum Laboratories, and Dr. H. McLorinan, superintendent of the Infectious Diseases Hospital, Fairfield, to confer with him and officers of his department. It was agreed that there was certainly evidence of some association between prophylactic injections and development of poliomyelitis in the epidemic. This raised questions of great importance from the viewpoint of public-health administration. It was feared that immunisation, particularly against diphtheria, might be prejudiced if the public were informed. The Chief Health Officer, therefore, laid the facts and the opinions of this expert committee before the Consultative Council on Poliomyelitis of the State of Victoria for an opinion whether or not the medical profession and the public should be informed. The council recommended that doctors be advised to discontinue the use of pertussis vaccine during the currency of the epidemic, just as tonsillectomy had been postponed since it appeared to determine an attack of poliomyelitis in rare instances. They also thought that the public should be informed of the facts in regard to pertussis vaccine, alone and in combination. Similar action as regards diphtheria immunisation was considered unnecessary, (1) because the evidence was less certain, and (2) because temporary cessation of mass diphtheria immunisation could readily be arranged.

On Oct. 4, 1949, the Commonwealth Government and the Department of Health in each State were informed of the Victorian findings by the Chief Health Officer acting on the advice of the council. A circular letter was also addressed to all doctors in Victoria, informing them of the position, and a brief statement was issued to the press. The announcements caused no unfavourable press comment; so there is no reason to suppose that the future of immunisation in Victoria has been prejudiced.

DISCUSSION

Evidence has been presented which indicates that an injection of pertussis vaccine, given during an epidemic of poliomyelitis, may determine the onset of paralysis in the immunised child. The evidence that an injection of diphtheria toxoid may have similar effects is, perhaps, less conclusive.

In discussing various possible explanations of the phenomenon, attention will first be directed to the instances in which localisation in the inoculated limb was the prominent feature, following administration of pertussis vaccine, alone or combined.

Any suggestion that the prophylactic agents, on release by the makers, were contaminated with poliomyelitis virus seems highly improbable. No single batch of any one product could be incriminated. The products were made by three different firms—one English, one American, and one Australian. The same immunising agents have been used throughout Australia, but their injection was followed by paralysis only in Victoria, during a severe epidemic of poliomyelitis. Any harmful effects were therefore associated, not with their origin, but with the epidemic prevalence of poliomyelitis.

The chances of syringe transmission have to be considered. The possibility exists of contamination of the hypodermic needle with virus from the doctor's hands or the patient's skin. Or a syringe used to give, for example, penicillin to a child with an undiagnosed fever, which was in reality a non-paralytic attack of poliomyelitis, might later be employed without adequate sterilisation to give a vaccine to another child. But it has also then to be assumed, either that a viræmia occurs in non-paralytic cases, and that the injection of penicillin or other drugs coincides with the viræmia, or that virus is present for a longer or shorter time in the subcutaneous tissues. And since these injections are not intravenous, the chances of contamination of the interior of the syringe would be relatively slight, even if the needle did pierce tissues in which virus was present.

Allowing that local tissue damage caused by the vaccine might favour the successful implantation of a very small dose of virus, these foregoing assumptions are not in harmony with current views of poliomyelitis.

It is conceivable that, in a subject suffering a non-paralytic infection, circulating virus might be arrested and concentrated in tissue damaged by the vaccine, and then travel, perhaps after multiplication, via the peripheral nerves or some other channel, to the corresponding areas in the cord. Again it is necessary to postulate a viræmia and also that the injection itself is given during the period of viræmia, or that the viræmia occurs before the damage done by the vaccine has been repaired.

The final hypothesis to be considered is that proposed by Horstmann and Paul (1947) in explanation of the effect of exercise and other traumata on the development of paralysis. They suggest that local trauma may be reflected in corresponding areas in the cord in the form of central changes, which favour activation of virus already present in the central nervous system. Although the nature of the presumed mechanism is somewhat obscure, the suggestion seems applicable to the present observations, since it merely adds injection of pertussis vaccine to the list of known traumata which influence unfavourably the course of an infection with poliomyelitis virus. But Levison et al. (1945), in experiments on rhesus monkeys, found that trauma to the muscles of an extremity did not influence the site or extent of paralysis, though exercise to the fatigue-point and chilling in the prodromal period had a pronounced effect. These workers injured the tissues by bruising with hammer blows; it is possible that the type of injury may be decisive, and that pertussis vaccine may specifically favour localisation.

None of the hypotheses considered provides a convincing explanation of the observations. Further information, some of which should be obtainable by perimental procedures, is required. It would obviously of interest to determine whether pertussis vaccine roduced intramuscularly can modify the course of e experimental infection in the monkey. Two lines inquiry might be profitable: (1) to see whether, monkeys infected by the intranasal or oral routes, subsequent or coincident injection of pertussis vaccine n determine paralysis of the injected limb; and (2) to termine whether a minimal dose of virus, non-infective r the intramuscular route, may become infective if ven mixed with pertussis vaccine.

The differences observed between the effects of pertussis ccine and diphtheria toxoid are in harmony with e presumption that local damage to tissue is a deter-ining factor. Since the local damage following the jection of pertussis vaccine, or combined pertussis-iphtheria prophylactic, is much more severe than that sually following diphtheria toxoid alone, one would spect more striking and frequent effects to follow dministration of pertussis vaccine, even if, as is the ase in Victoria, many more children are immunised gainst diphtheria.

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One further point remains to be mentioned. A nursing sister developed typical poliomyelitis after an injection of typhoid-paratyphoid vaccine into the left upper arm. Ten days after the injection she felt unwell and remained in bed for two days. She returned to duty, but on the thirteenth day developed general muscle pains and vomiting. She developed considerable weakness in the injected left arm and in both legs. Another nursing sister who received a similar inoculation at the same time became ill after the same interval and was diagnosed as suffering from poliomyelitis. She was not, however, reported as a case, and no further details are available.

SUMMARY

Evidence is presented that in the current epidemic of poliomyelitis in Victoria there has been a relation, in a number of cases, between an injection of an immunising agent and the subsequent development of paralytic poliomyelitis.

I am indebted to the Chairman of the Health Commission of Victoria, Dr. G. E. Cole, for permission to publish this paper.

I wish to acknowledge gratefully the encouragement and guidance given me by Dr. E. V. Keogh throughout this investigation, and his help in the preparation of this paper. Also I wish to thank Dame Jean Macnamara (who is a constant inspiration to workers in the poliomyelitis field in Australia); Dr. H. McLorinan for his courtesy in giving me access to the patients and their records in the Infectious Diseases Hospital, Fairfield; Mr. Alwyn Mathew of the Commonwealth Serum Laboratories, Melbourne; and Dr. H. O. Lancaster of the School for Public Health and Tropical Medicine, University of Sydney, for statistical advice. Finally, I wish to thank the staff of the Health Department in Victoria who have so willingly assisted me in my investigations.

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ULCERATIVE COLITIS

COURSE AND PROGNOSIS

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ULCERATIVE colitis varies so widely in its severity and course that the prognosis is uncertain and the assessment of new treatments is correspondingly difficult. We have investigated in a series of cases some of the factors which may influence the course of the disease and thus have prognostic significance.

MATERIAL AND METHOD

In the eleven years 1938–48 inclusive, 129 patients were treated for ulcerative colitis in the Radcliffe Infirmary. We have analysed their case-records and followed their progress. The follow-up was conducted initially by post and later at a special outpatient clinic for those still living in the area. The response to inquiry was satisfactory, 121 out of the 129 being traced.

A representative unbiased sample of patients must be studied if one is to get a clear idea of the prognosis in any disease. With a chronic and relapsing disease such as this, the total admissions to a hospital include many patients who have previously been treated in other hospitals. A disease may be more lethal in its early than in its later stages, or vice versa. Hence we have divided the patients into two groups:

New cases: 72 patients in whom ulcerative colitis had been present for less than two years before their first admission to the Radcliffe Infirmary and who had had no previous hospital treatment elsewhere.

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The time limit of two years was set to exclude from the new cases a few patients with the chronic continuous type of ulcerative colitis who had had diarrhœa for years before their first admission to the Radcliffe Infirmary but had not been treated in another hospital.

For the reasons given above we have concerned ourselves mainly with the 72 new cases so far as prognosis is concerned.

RESULTS

Age and Sex

Ulcerative colitis occurs chiefly in the first half of adult life. More than half of the present patients began their illness in their twenties or thirties. The disease may, however, arise at any age after infancy, though rarely before the 'teens or after the fifties. The youngest patient in this series was 5 years old and the oldest 68.

Ulcerative colitis affects both sexes, but different series have yielded very different proportions of males and females. Thus Hern (1931), Buzzard et al. (1938), and Cullinan (1938) had about twice as many women as men in their series, whereas Hardy and Bulmer (1933) and Willard et al. (1938) had roughly equal numbers of men and women. Our series contains nearly twice as many women as men, as follows:

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This sex difference may be partly due to the influence of war, with the removal from the civilian population of a high proportion of men of the most susceptible ages. This view gains support from the numbers of admissions in the war years and in the non-war years, as follows:

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ULCERATIVE colitis varies so widely in its severity and course that the prognosis is uncertain and the assessment of new treatments is correspondingly difficult. We have investigated in a series of cases some of the factors which may influence the course of the disease and thus have prognostic significance.

MATERIAL AND METHOD

In the eleven years 1938–48 inclusive, 129 patients were treated for ulcerative colitis in the Radcliffe Infirmary. We have analysed their case-records and followed their progress. The follow-up was conducted initially by post and later at a special outpatient clinic for those still living in the area. The response to inquiry was satisfactory, 121 out of the 129 being traced.

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The time limit of two years was set to exclude from the new cases a few patients with the chronic continuous type of ulcerative colitis who had had diarrhœa for years before their first admission to the Radcliffe Infirmary but had not been treated in another hospital.

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RESULTS

Age and Sex

Ulcerative colitis occurs chiefly in the first half of adult life. More than half of the present patients began their illness in their twenties or thirties. The disease may, however, arise at any age after infancy, though rarely before the 'teens or after the fifties. The youngest patient in this series was 5 years old and the oldest 68.

Ulcerative colitis affects both sexes, but different series have yielded very different proportions of males and females. Thus Hern (1931), Buzzard et al. (1938), and Cullinan (1938) had about twice as many women as men in their series, whereas Hardy and Bulmer (1933) and Willard et al. (1938) had roughly equal numbers of men and women. Our series contains nearly twice as many women as men, as follows:

Age-group (years)	*Male*	*Female*	*Total*
0–9	2	1	3
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60–69	3	4	7
Totals	47	82	129

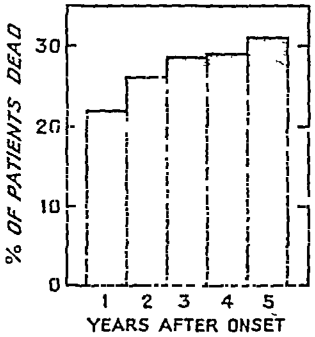
This sex difference may be partly due to the influence of war, with the removal from the civilian population of a high proportion of men of the most susceptible ages. This view gains support from the numbers of admissions in the war years and in the non-war years, as follows:

	Females	*Males*
Non-war years	29	25
War years (1940–45)	50	21

It will be seen that outside the war years there were about $2^1/_2$ times as many women as men. On the other hand, the preponderance of women extends beyond the age limits of military service, so war conditions do not entirely explain the sex difference.

Fatality

It has been the general practice to present the prognosis of ulcerative colitis in terms of the outlook for a number of patients admitted to a hospital in a stated period. This method is fallacious because such a group is heterogeneous, some of the patients having recently been affected by the disease while others may have had it for 20 years or more. Thus Hern (1931) reported a hospital mortality of 28% rising to 40% on follow-up, but his cases were a mixture of new and old patients. Hardy and Bulmer (1933) found a fatality-rate of 33% among 95 patients followed up for 1–12 years, but the duration of the disease in their cases varied from 6 weeks to 32 years. Spriggs (1934), in a study of 35 cases of ulcerative colitis followed up for 2–20 years, recorded 6 deaths from the disease (17%); but no less than 32 of his cases had had an attack before the one in which he first saw them. Willard et al. (1938) likewise gave the prognosis for a mixed group of patients, stating that "the duration of symptoms when seen by us varied from a few days to more than 17 years." The failure to separate fresh from chronic cases makes these results difficult to interpret. Prognosis should be based on the fate of patients seen in their first attack and subsequently followed up. This is the method which we have adopted.



Proportion of new patients with ulcerative colitis dead after various lengths of time.

When the fate of the new patients in the present series is considered over a number of years, the findings, also shown in the figure, are as follows:

Length of follow-up (years)	No. of patients	No. dead	Fatality-rate (%)
1	69*	15	22
2	61	16	26
3	49	14	28·5
4	45	13	29
5	39	12	31

* Of the 72 new cases, 3 were not traced in the follow-up.

After an initially high fatality-rate of 22% in the first year, the dangers associated with the disease diminish. Nevertheless, about another 10% of patients are liable to die before 5 years have elapsed. These results are only a rough estimate because we have followed up 69 patients for at least a year but only 39 patients for at least 5 years, and for periods of follow-up longer than 5 years our numbers are too small to be useful.

Of the 69 patients traced, 15 (22%) died from their first attack within a year. Of these 15 patients, 13 died in hospital, giving a fatality-rate of 19% in hospital for the first attack. This finding contrasts with the fatality-rate in hospital for relapses only, which was less than 4%. The first attack is therefore considerably more dangerous than subsequent attacks. Incidentally, this difference demonstrates the need for precision in the presentation of statistics in ulcerative colitis, and particularly the need to separate first attacks from relapses.

TABLE I—FATALITY-RATE IN HOSPITAL IN RELATION TO MODE OF ONSET (NEW CASES ONLY, IN THEIR FIRST ATTACK)

Onset	No. of patients	No. died	Fatality-rate (%)	Difference and S.E.
Acute	32	7	21·9	6·9±9·2
Gradual	40	6	15·0	

Clinical Types

A further idea of the prognosis can be obtained by classifying patients according to the type of course which the disease runs, as follows:

Group	Course of disease	No. of patients and % of total
I	*Acute fulminating:* a single attack going on to death in less than 1 yr.	15 (20·8%)
II	*Chronic intermittent:* more than one attack with at least several weeks' complete freedom between attacks	27 (37·5%)
III	*Chronic continuous:* continuous symptoms for more than 1 yr.	18 (25·0%)
IV	*Single attack:* followed by complete freedom	10 (13·9%)
V	*Unclassified:* follow-up failed	2 (2·8%)
	Total	72

This method of classification is not ideal, because it offends taxonomical canons. Thus group I is based on a fatal prognosis, groups II and III are differentiated by the type of symptom, and group IV depends on the length of follow-up. But the classification gives an idea of the proportion of different clinical types, and moreover it has been adopted by many other workers since its introduction by Hawkins (1909), so it enables results to be compared with other series.

During the period of follow-up only 2 patients in group II and 1 in group III died. Thus there seems to be little difference in lethality between the two groups. It will be seen that the chronic intermittent course seems to be rather more common than the chronic continuous. In this respect an interesting comparison can be made with our old cases. Of the 55 of these, no less than 41 were classified as chronic intermittent, compared with only 14 as chronic continuous. This is a further example of the importance of dealing with new cases only in finding out the proportion of cases which are likely to run each course. The higher proportion of chronic intermittent types among the old cases can be explained on the following grounds: (1) the bulk of group-IV patients (one attack only) eventually become examples of the chronic intermittent group; and (2) some of the patients originally belonging to the chronic continuous type undergo complete remissions and emerge finally as chronic intermittent cases.

TABLE II—RELATION OF MODE OF ONSET TO SUBSEQUENT COURSE

Mode of onset	Course of disease (group)			
	I	II	III	IV
Acute	8	13	6	5
Gradual	7	14	12	5

In tables II–IV the 2 patients in group V (unclassified) are excluded.

Further, the figures given above suggest that the single attack followed by complete freedom is fairly common. It is, in fact, far less common than appears here, and most of these patients really belong to the chronic intermittent group but have not yet had a relapse. This view is supported by comparing the proportion of group-IV patients among new cases followed up for different times. Thus, if we exclude the acute fulminating group, among 31 patients followed up for 1–5 years there were 8 patients (26%) who had had only one attack; whereas among 23 patients followed up for 6–11 years there were only 2 such patients (9%). This last figure shows how small is the chance of avoiding a second attack over a period of 10 years or so.

Mode of Onset

Ulcerative colitis may first manifest itself acutely with bloody diarrhœa or it may begin gradually with mild diarrhœa or streaking of the stools with blood. An obvious question is whether the type of onset has any bearing on the subsequent course. Table I shows that there is no significant difference in fatality-rate between patients with acute and with gradual onsets.

The comparison is extended in table II, which shows the distribution of the four clinical types in relation to the mode of onset. The two sets of figures are closely similar, and the differences between them are not statistically significant ($\chi^2=1{\cdot}6$; 3 degrees of freedom; $P>0{\cdot}5$). We may conclude that the mode of onset has little bearing on the subsequent course of the disease.

Sex and Age

Published reports contain conflicting statements about the effect of sex and age on the prognosis of ulcerative colitis. Table III sets out the data from the present series.

TABLE III—INFLUENCE OF SEX AND AGE ON COURSE OF ULCERATIVE COLITIS (NEW PATIENTS ONLY)

Age-group (yr.)	Course of disease (group)							
	Men (26)				Women (44)			
	I	II	III	IV	I	II	III	IV
10–	1	1	..	..	1	2	1	..
20–	3	2	..	..	2	6	3	..
30–	1	3	2	2	2	5	4	5
40–	1	3	2	..	1	3	1	..
50–	..	..	1	1	2	1	2	1
60–	..	..	2	1	1	1	..	..
All ages	6	9	7	4	9	18	11	6

From the figures for all-ages it will be seen that sex seems to have little influence on the subsequent course of the disease. Similarly, if the cases of each sex are combined, as in table IV, age likewise appears to have little influence on prognosis. At first sight the proportion of cases which run a rapidly fatal course seems to be unduly high in patients under 30, but this difference is not statistically significant.

In table III the men and women are differently distributed. Among the women there is no obvious difference between the various age-groups. Of the men, 4 out of 7 under 30 died in less than a year, compared with only 2 out of 19 over 30. But statistical analysis shows that this difference might occur fairly often by chance. (Dr. Ian Sutherland, of the Institute of Social Medicine, Oxford, kindly checked this point.)

Degree of Activity

In addition to its lethal qualities, ulcerative colitis is important as a source of chronic ill health. We have therefore tried to assess its effect on the patient's mode of life. From our follow-up data we have classified patients in the following manner, which, though crude, gives a rough picture of their progress (we have omitted patients who died during the course of follow-up, because these have been previously discussed):

A, living a normal or near-normal life, even though they may be subject to diarrhœa, either continuously or in attacks.

TABLE IV—INFLUENCE OF AGE ON COURSE OF ULCERATIVE COLITIS

Age-group (yr.)	Course of disease (group)				Total
	I	II	III	IV	
Under 40 ..	10	19	10	7	46
40 and over ..	5	8	8	3	24
Under 30 ..	7	11	4	0	22
30 and over ..	8	16	14	10	48

B, living restricted lives, often interrupted by hospital admissions.

C, chronic invalids.

TABLE V—DEGREE OF ACTIVITY (NEW CASES ONLY)

Course of disease (group)	Degree of activity			Total
	A (normal)	B (restricted)	C (invalid)	
II	10 (*40%*)	14 (*56%*)	1 (*4%*)	25
III	6 (*37%*)	8 (*50%*)	2 (*12 5%*)	16
Total	16 (*39%*)	22 (*53%*)	3 (*7%*)	41

Table V shows how the new cases were distributed among these three categories.

It will be seen that about 40% of patients are living normal or near-normal lives, about 50% are moderately incapacitated, and *only* a small proportion are totally incapacitated. A striking feature of table V is the close similarity between the chronic intermittent and chronic continuous clinical types of the disease (groups II and III) in their influence on the patient's mode of life.

Treatment

It is not our intention to deal with treatment except in relation to one or two isolated aspects. Throughout the period under review there were no sharp changes in the main lines of medical treatment, which consisted of rest in bed; high-calorie, high-protein, low-residue diets; vitamin supplements; blood-transfusion; control of salt and fluid balance; and various rectal instillations. However, during this period penicillin and the non-absorbable sulphonamides were introduced, and it is of interest to assess the effects of these therapies.

Table VI compares the results of treating patients with and without penicillin and/or sulphonamides. The close similarity between the two treatment groups is evident. The comparison is made on the response to treatment at the time of discharge from hospital and *not* on the apparent effects of these therapies over very brief periods of time. We are satisfied that the two groups did not differ materially as regards other forms of treatment. For reasons which we have already emphasised we have separated patients in their first attack from those admitted in relapse. Table VI is concerned only with new patients in their first attacks only. For patients admitted in relapses similar results were obtained.

TABLE VI—EFFECT OF TREATMENT (NEW PATIENTS IN FIRST ATTACK)

Treatment	Results on discharge from hospital				Total
	Symptom-free	Fair response	Poor response	Dead	
Penicillin and/or sulphonamides	7 (*30 5%*)	8 (*34 6%*)	4 (*17 5%*)	4 (*17 5%*)	23
Neither	18 (*37 5%*)	15 (*31 3%*)	5 (*10 4%*)	10 (*20 8%*)	48

Thus, so far as we can judge, penicillin and sulphonamides have no effect on the course of ulcerative colitis. This does not mean that they are useless—they are almost certainly valuable in preventing and treating pyogenic complications and when used prophylactically before and after operation—but they do not seem to influence appreciably the long-term course of the illness. Similar conclusions have been drawn by Kiefer (1948) and Block and Pollard (1948).

Though we shall not discuss in detail the value of surgery, it should be mentioned that emergency ileostomies done in an attempt to avert death when medical measures seem to be failing do not appear to be justified by this series. Of 10 patients so treated 6 died shortly afterwards. On the other hand, ileostomy or colostomy done as an elective operation in 6 patients caused no deaths. In these patients the operation was done because of some definite complication: stricture in 3 patients and fæcal fistulæ in 3 patients. This is in line with the recent conclusion of Cattell (1948), who found that two-thirds of the fatal cases following ileostomy occur when the operation is done as an emergency. He states that over a 20-year period the mortality with surgical intervention was 22%, but during the last 2 years it had dropped to 4%. One of the causes of his improved results has been the avoidance of emergency operations whenever possible.

DISCUSSION

In spite of the many recent advances in medicine, ulcerative colitis remains dangerous and disabling. In an attempt to estimate as accurately as possible how dangerous and how disabling it is, we have analysed its course in a group of patients admitted to a general hospital in the first attack and followed for 1–11 years. We believe that the results so obtained are more accurate than figures drawn from a heterogeneous group of patients admitted to hospital in all stages of the disease. The failure of workers in this field to distinguish between new and old cases vitiates most previous estimates of prognosis.

The first year of ulcerative colitis is the time when death is most likely to take place, and it is this phase which must be better treated if the present high fatality-rate is to be reduced. Surgery seems to offer no solution at this stage, and our findings, together with those of others, have led us to the belief that emergency ileostomies should not be done. Better results seem to have been obtained by vigorous medical therapy, particularly by replacing electrolytes, blood, and protein by intravenous infusions. Chemotherapy and treatment with antibiotics have been disappointing, and some more specific remedy is probably needed before any further advance can be made.

If the first year of ulcerative colitis is survived, the chances of death diminish considerably. Nevertheless half the survivors lead restricted lives, and in this respect it seems to make little difference to the patient whether the disease pursues a continuous or an intermittent course, and the chances of avoiding further relapses are remote. We have shown that 90% of our new patients had relapsed when followed up for 6–11 years. It is worth adding that among the chronic intermittent cases of the whole series, 20% had periods of freedom between attacks lasting 5 years or more. These findings indicate that claims to have effected a cure of ulcerative colitis, especially as the result of some specific treatment, must be accepted with reserve.

In view of the unsatisfactory state of medical treatment of the chronic form of ulcerative colitis and the high rate of relapse, it is worth considering the possible place of surgery. In our series elective ileostomies and colostomies were done for complications only, but in view of the fact that 50% of the patients are leading restricted lives we believe that surgical treatment might be more often advised in patients who have had ulcerative colitis for several years. However, we have no figures of our own to support this belief, and in each case the balance must be carefully weighed between the inconveniences of the disease and the ileostomy life.

SUMMARY

In the eleven years 1938–48 there were 129 patients with ulcerative colitis admitted to the Radcliffe Infirmary. Of these, 72 were new cases—i.e., of recent onset and not previously treated in another hospital.

Of the 72 new cases 22% died within a year of their onset. Thereafter ulcerative colitis seems to be less lethal, but about a third of these patients are dead at the end of five years.

The risk of recurrence is high. Few patients avoid a second attack over the course of a number of years.

Age, sex, and the mode of onset have little bearing on prognosis.

Half the patients live restricted lives, and a small proportion are totally incapacitated. The effect of ulcerative colitis on the patient's activity does not seem to depend greatly on whether it runs a continuous or an intermittent course.

Penicillin and sulphonamides have not materially affected the course of ulcerative colitis.

Emergency ileostomies do not seem to be justified.

We wish to thank the physicians of the Radcliffe Infirmary for permission to study their patients; Prof. L. J. Witts for helpful criticism; and the staff of the records department for their assistance.

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CONGENITAL ŒSOPHAGEAL ATRESIA WITH TRACHEO-ŒSOPHAGEAL FISTULA

A REPORT OF 5 CASES AND A PLEA FOR EARLY DIAGNOSIS

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THE prognosis in congenital atresia of the œsophagus with tracheo-œsophageal fistula is now exceedingly bad. Though Grey Turner (1944) estimates that 1 baby in every 2650 is born with atresia of the œsophagus there are probably not more than two or three cases surviving in this country. Most of these infants have an advanced aspiration pneumonia by the time they reach the surgeon. Grey Turner (1949) says:

> "Even now I do not think a sufficient number of these cases come before the surgeon at the proper time and I believe that we still require to carry on propaganda among obstetricians, maternity nurses, midwives and even pædiatricians directed to their early recognition."

If more cases were recognised earlier and operated on before the onset of pneumonia, some at least would be saved. My five fatal cases are reported in the hope that they will help others to make an early diagnosis.

Leven (1936) states that the condition was first described by Gibson in 1696; and he mentions two cases, one of which survived for 98 days after operation. Strong and Cummins (1934) say that the abnormality was mentioned by Morell Mackenzie in 1884, and they describe one case which died after jejunostomy.

In America, the condition has been reported more frequently since 1930. Reitter (1933) recorded one case; and Gage and Ochsner (1936) reported two cases, both of which died after gastrostomy and ligation of the tracheo-œsophageal fistula. The case described by Kassebohm and Schrieber (1936) was diagnosed radiologically after the administration of barium sulphate by mouth. Rosenthal (1937), in an account of three cases, recommended giving the barium through a catheter, to prevent regurgitation and aspiration. O'Hare (1937), who mentioned that 281 cases had been reported by 1933, described one case which also had an imperforate anus; the atresia of the œsophagus was diagnosed by endoscopy and by noting the obstruction o the passage of a stomach-tube. A further case is described by Gamble (1938). Congenital œsophageal atresia is described in many textbooks, notably by Abel (1929) and Illingworth and Dick (1938).

The embryological classification of Vogt (1929) has been accepted by most writers:

Type 1.—Complete absence of the œsophagus.

Type 2.—Atresia of the œsophagus with both the upper and lower segments ending blindly.

Type 3.—(*a*) Atresia of the œsophagus with a fistula between the upper œsophageal segment and the trachea.

(*b*) Atresia of the œsophagus with a fistula between the lower œsophageal segment and the trachea.

(*c*) Atresia of the œsophagus with a fistula between the trachea and both segments of the œsophagus.

In this country, Bull (1938) reported a case in which the upper blind œsophageal pouch was revealed by X-ray examination after a barium-in-milk feed and the tracheo-œsophageal fistula was demonstrated post mortem by further X-ray examination after the injection of iodised oil into the trachea. This infant also had a hemivertebra in the dorsal region, and an atrophic left kidney and left genital tract. Other cases have been reported by Addey (1940), by Calvert (1943), and by Ealing (1940), who suggested that œsophagoscopy and bronchoscopy might be the best methods of investigation, the administration of barium by mouth being contraindicated because of the danger of aspiration pneumonia. Grey Turner (1944) described the condition very fully and mentioned a case which died 17 hours after operation.

OPERATION

From 1940 onwards, much progress was made towards devising an effective operation for the condition. According to White and Birdsong (1946), Leven, Ladd, and Haight each had cases surviving from operations performed as early as 1940–41.

Haight (1944) described a one-stage operation with primary anastomosis of the two divisions of the œsophagus and ligation of the tracheo-œsophageal fistula. In 1944 about 30 cases survived this operation.

Ladd and Swenson (1947) and Leven and Lannin (1945) favoured the multiple-stage operation described by Leven (1941). First the tracheo-œsophageal fistula is ligated and a gastrostomy performed; at a second operation the upper œsophageal segment is brought to the surface; and then later an anterior œsophagus is constructed.

Lam (1946) reported some successes with primary anastomosis, and this type of operation was chosen by Franklin (1948), who seems to have been the first to publish details of a successfully treated case in this country.

DIAGNOSIS AND MANAGEMENT

Very early diagnosis is essential if a very young infant is to survive any of these formidable procedures. Signs of dehydration are usually evident soon after birth. Regurgitation and aspiration of feeds leads rapidly to bronchopneumonia. The diagnosis of congenital œsophageal atresia should be considered if regurgitation, combined with attacks of cyanosis from the first feed onwards, is associated with excessive mucus and saliva in the mouth and pharynx. Attempts at feeding should be stopped and pharyngeal suction instituted forthwith. The diagnosis can be confirmed only by X-ray examination, which should be carried out as soon as possible; meanwhile, the child should be nursed in the prone position to ensure effective drainage of saliva from the mouth. Fluids should be given intravenously and a course of penicillin begun.

X-ray Examination

Intermittent pharyngeal suction, using a rubber pipette, is continued until the mouth and pharynx are reasonably dry. An œsophageal tube is then passed until obstruction is met with. No attempt should be made to push the tube farther in, since it may coil up and give the impression that it has passed into the stomach. The infant is then held upright, to avoid spilling over into the larynx, and 2 ml. of iodised oil is injected down the tube. X-ray films are exposed in the anteroposterior and lateral positions to include the whole of the chest and abdomen. The oil is then immediately withdrawn and pharyngeal suction recommenced.

In addition to confirming the diagnosis, X-ray examination reveals the condition of the lungs. If collapse or consolidation is noted, and if this is chiefly confined to one side, the child's position is adjusted so that postural drainage will be as efficient as possible. If an infant with œsophageal atresia is found to have air in the stomach and bowel the presence of a tracheo-œsophageal fistula may be assumed, though the absence of gas shadows in the abdomen does not prove that there is no fistula, since the opening may be valvular.

The length of the gap between the two œsophageal segments should be estimated. This can be done by direct measurement if air can be seen in the lower œsophageal segment on the lateral film. In the five cases reported here no air could be seen in the lower part of the œsophagus, so an indirect method of estimating the gap was devised. The distance between the lower limit of the upper œsophageal segment and the bifurcation of the trachea was measured, and this gave the surgeon an accurate enough indication of the difficulty to be encountered in joining the two œsophageal segments. In all five cases, the lower segment of the œsophagus communicated with the trachea within 1 cm. of the bifurcation.

Finally, the presence of other congenital abnormalities may be detected.

CASE-RECORDS

Case 1.—A girl, aged 5 days, was admitted on June 17, 1947. Weight at birth 6 lb.; on admission 5 lb. 11 oz. Instrumental breech delivery. On the 3rd day after birth it had been noticed that the breast-feeds were being regurgitated. The infant had been taken off the breast but had continued to vomit glucose-water feeds. The vomit had contained no bile but an excessive amount of mucus. The bowels had been opened normally each day.

The child looked wasted and dehydrated. No abnormal physical signs were detected apart from coarse râles over the whole of both lungs. The infant could keep down 2–3 teaspoonfuls of a feed for 20–30 seconds, but then the whole feed would be regurgitated. All mouth-feeding was stopped and fluids were given intravenously. A provisional diagnosis of tracheo-œsophageal fistula was made.

On June 19 X-ray examination of the chest revealed consolidation in the right upper zone. A further examination next day showed œsophageal atresia. Some of the iodised oil spilled over into the trachea and was seen to pass into the stomach through a tracheo-œsophageal fistula. The child died on June 22.

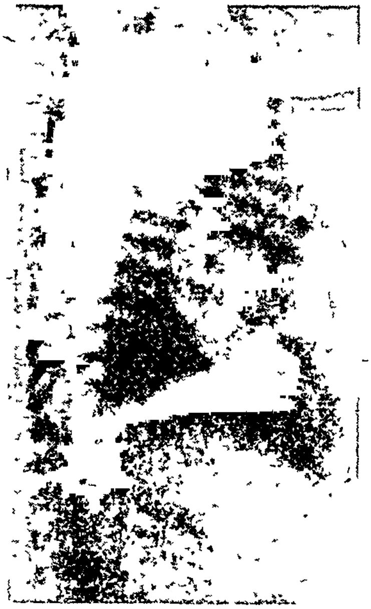
Necropsy.—The upper portion of the œsophagus ended blindly, 3·8 cm. below the cricoid cartilage, in a pouch 1·2 cm. in diameter. The lower portion of the œsophagus communicated with the trachea 0·5 cm. above its bifurcation through an opening 0·25 cm. in diameter externally. Below this point the lumen of the œsophagus appeared normal. The ductus arteriosus was patent but contained a recent thrombus with commencing organisation. Microscopy of the lungs showed extensive severe bronchopneumonia. No other abnormality was detected.

Case 2.—A girl, aged 2 days, was admitted on Feb. 19, 1948. Weight at birth and on admission 5 lb. 2 oz. Instrumental delivery. The child had been unable to swallow breast-feeds and appeared to be choked with mucus; attempts at feeding had been followed by cyanosis. The bowel action had been normal.

The skin was dry, wrinkled, and jaundiced. The 4th and 5th toes of both feet were webbed, though X-ray examination later showed that the bones were normal. No other abnormal physical signs were detected.

X-ray examination on the day of admission showed that the œsophagus ended blindly, opposite the body of the 3rd thoracic vertebra, in a large pouch which moved on respiration and appeared to be causing considerable forward displacement and compression of the trachea (see figure): presence of gas in the stomach confirmed the diagnosis of a tracheo-œsophageal fistula. The gap between the œsophageal segments was estimated to be about 2 cm. The lungs seemed clear and no other congenital abnormality was seen.

On the same day (Feb 19) the tracheo-œsophageal fistula was closed. At a second operation, on Feb. 21, a gastrostomy was done, followed by œsophagostomy of the upper œsophageal segment. On the 22nd hydration was fair but the child's general condition was deteriorating. She died on the 23rd.



X-ray appearances in œsophageal atresia after introduction of iodised oil.

Necropsy.—The œsophagus ended blindly 5 cm. below the epiglottis, the lower end having been brought forward and sutured to the skin on the left side of the neck; the œsophageal pouch was 2·8 cm. in circumference. The lower œsophageal segment, which measured 2·3 cm. in circumference, opened into the trachea at its bifurcation; the opening was valvular and it was more difficult to pass a probe from the tracheal side. A gastrostomy was present. The left lung was collapsed and the right showed severe bronchopneumonia.

Case 3.—A girl, aged 5 days, was admitted on April 8, 1948. Weight at birth 6 lb. 8 oz. From birth the child had regurgitated all feeds and had an excess of mucus in the mouth and pharynx. Attacks of cyanosis had followed attempted feeding.

The child was cyanosed and there were signs of partial atelectasis of both lungs. No other abnormal physical signs were detected.

X-ray examination on the day of admission showed that the œsophagus ended blindly in a pouch opposite the upper border of the sternum. The stomach contained a moderate amount of gas, confirming the presence of a tracheo-œsophageal fistula. The lungs showed partial consolidation with some collapse. No other abnormality was detected.

At operation on the day of admission the tracheo-œsophageal fistula was ligated and the two œsophageal segments anastomosed. Shortly afterwards the child's general condition deteriorated and she died next day.

Necropsy.—The primary anastomosis of the œsophageal segments with ligation of the tracheo-œsophageal fistula, which was at the lower end of the trachea, had been successful. The ductus arteriosus was patent but contracted. Microscopy of the lungs showed severe bronchopneumonia with partial collapse. No other congenital abnormality was found.

Case 4.—A girl, aged 2 days, was admitted on April 19, 1948. Weight at birth 6 lb. 8 oz. The mother's labour had been protracted, and there had been much difficulty in resuscitating the infant. Excess of mucus had been noticed in the mouth and pharynx; she had not sucked well and appeared to be cyanosed.

When examined in hospital the infant had bloodstained mucus welling out of her mouth and moist sounds at the base of both lungs. She had passed very dark meconium. The provisional diagnosis was inhalation pneumonia, possibly associated with congenital œsophageal atresia.

X-ray examination on April 20 showed that the œsophagus ended blindly opposite the anterior margin of the body of the 3rd thoracic vertebra. The stomach contained only a little air, suggesting that the tracheo-œsophageal fistula might be small. The upper zones of both lungs were consolidated.

The child was too ill for operation, and she died on April 21.

Necropsy.—The œsophagus ended blindly in a large pouch, 5·0 cm. below the epiglottis; the diameter of this part of the œsophagus was 1·4 cm. The lower part of the œsophagus was continuous with the upper segment, but attempts to pass a probe from above downwards and from below upwards were unsuccessful; the lower part extended upwards on the anterior surface of the lower end of the upper segment and opened into the trachea 0·7 cm. above its bifurcation. The opening of the fistula was 0·2 cm. in diameter. A small Meckel's diverticulum was found. The right hypogastric artery was absent and the right common iliac artery was only 0·3 cm. in circumference. The left common iliac artery seemed large and measured 1·1 cm. in circumference. Both lungs showed extensive bronchopneumonia. No further congenital abnormality was detected.

Case 5.—A boy, aged 5 days, was admitted on Sept. 9, 1948. Weight at birth 6 lb. 8 oz. Normal delivery. From birth the child had had an excess of mucus in his mouth, requiring frequent aspiration; at each feed he had choked and become cyanosed, but feeding had been persisted with until the day of admission.

The child's general condition seemed fair and there was no dehydration. No abnormal physical signs were found in the lungs. Administration of penicillin was begun.

X-ray examination on the day of admission showed that the œsophagus ended blindly about 2·5 cm. above the tracheal bifurcation. A moderate quantity of gas was present in the bowel. The lungs appeared clear and the cardiac outline normal.

At operation on the same day the tracheo-œsophageal fistula was ligated and the two segments of the œsophagus anastomosed. The child died 3 hours later.

Necropsy.—The primary anastomosis of the œsophageal segments with ligation of the tracheo-œsophageal fistula had been successful. The upper segment of the œsophagus appeared to have about twice the diameter of the lower. The ligated tracheo-œsophageal fistula opened into the trachea 0·8 cm. above its bifurcation. A pneumothorax was present on the right side. The ductus arteriosus was patent but contained thrombus. On microscopy, the lungs showed extreme congestion but no evidence of bronchopneumonia. No other congenital abnormality was detected.

DISCUSSION

In managing cases of congenital œsophageal atresia the presence of other associated congenital abnormalities is very important. If other conditions incompatible with a full and useful life were often found in addition to œsophageal atresia, it would be a waste of time and energy to attempt to treat these infants, but this series shows once again that in many infants atresia of the œsophagus with a tracheo-œsophageal fistula is the only significant abnormality present. Ladd and Swenson (1947) found that of their 82 cases only 18 had serious additional abnormalities, and these were chiefly in the heart.

There may, however, be many undiagnosed cases of œsophageal atresia in which the infants die immediately after birth from associated congenital abnormalities which are incompatible with life. This may be why Vogt's (1929) type 3b of congenital atresia is the most common variety reported; for in most of the other types the child is drowned at the first feed. Holt et al. (1946) agreed that type 3b is the commonest; and all the five cases in the present series fall into this group. The fact remains that the lives of some of these infants can be saved if the atresia is diagnosed sufficiently early. Thus Haight (1944) showed that reconstruction of the œsophagus by primary anastomosis was possible in 16 of the 24 cases he operated on.

In case 5 of the present series necropsy showed no evidence of pneumonia, although attempts to feed the child had been continued for 5 days. This child probably escaped pneumonia because of the administration of penicillin, the frequent pharyngeal aspirations, and the presence of a well-developed pharyngeal reflex. In most cases treatment must be instituted in the first day or two of life if pneumonia is to be avoided and surgery is to have any chance of success.

I wish to thank Dr. L. B. Cole, Mr. B. M. Truscott, Dr. D. M. T. Gairdner, and Dr. Janet Roscoe for permission to publish details of their cases; Dr. A. M. Barrett for the necropsy reports; and Dr. F. R. Berridge for his helpful advice and criticism.

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CARBON DIOXIDE LEVELS IN BABIES' OXYGEN BOXES

ALISTAIR MACKENZIE
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VERY little information has been published on the carbon dioxide levels, oxygen tensions, temperatures, and relative humidities in the air breathed by babies in oxygen boxes. The following findings may therefore be of value.

METHOD

The boxes used for the trials were of the usual rectangular bottomless form and measured 23 × 14 × 13 in. deep; they were made of metal with transparent plastic panels in the sides and top. The tests were made in clinical conditions at the Princess Mary Maternity Hospital, Newcastle upon Tyne, with the box either resting directly on the mattress or raised from it so as to leave a $^3/_4$ in. ventilation gap at the foot. The occupants were healthy babies weighing 5–8 lb.

Oxygen estimations, accurate only to ± $2^1/_2$%, were made by drawing gas samples from the head end of the tent through narrow-bore rubber tubing into a Riseman-Lesnick oxygen analyser. Samples for carbon dioxide estimation were similarly drawn into mercury-filled Hempel pipettes and analysed by Van Slyke's manometric method. Relative humidity was estimated with a miniature Assman type psychrometer.

The oxygen flow was accurately measured and the gas humidified at room-temperature on its way to the box. The makers' suggested flow-rate was 5 litres per minute for 5 minutes and thereafter $1^1/_2$ litres per minute; this rate was used as a basis for the tests.

RESULTS

At the originally recommended rate of oxygen flow, oxygen concentrations in the box may reach 60%, but carbon dioxide concentrations were consistently 1% or more (see table).

CONDITIONS IN OXYGEN BOXES

Test no.	Carbon dioxide (%)		Oxygen (%)		Temperature (°C)		Relative humidity	
	After $^1/_2$ hr.	After 1 hr.	After $^1/_2$ hr.	After 1 hr.	Room after 1 hr.	Box after 1 hr.	Room after 1 hr.	Box after 1 hr.
Oxygen 5 litres/min. for 5 min.; then $1^1/_2$ litres/min. (no ventilation gap)								
1	0·92	1·31	..	..	18·5	20·5	24	59
2	1·00	1·43	..	..	..	..	..	..
3	0·49	1·03	60	65	..	..	..	..
Oxygen 6 litres/min.; then 3 litres/min. (no ventilation gap)								
4	0·27	0·74	59	72	..	..	..	..
5	0·59	0·57	73	81	19	24	42	49
6	0·79	1·26	..	..	23	31	37	87
Oxygen 6 litres/min. for 5 min.; then 3 litres/min. ($^3/_4$ in. ventilation gap)								
7	0·64	0·52	52	54	22·5	20·5	34	59
8	0·49	0·65	51	52	21·5	24	39	66
9	0·28	0·27	50	50	..	..	..	..
Oxygen 5 litres/min. for 5 min.; then 3 litres/min. ($^3/_4$ in. ventilation gap)								
10	0·53	0·45	39	39	..	..	..	..

An increase in the maintained rate of flow to 3 litres per minute produced carbon dioxide concentrations below 1%, except in the case of an 8 lb. baby (test no. 6) crying lustily, when the relative humidity in the box also became high. With this rate of flow, the oxygen concentrations were usually higher than with the slower rate (see table).

When a ventilation gap was created at the foot of the box, carbon dioxide tensions tended to be yet lower, but even the higher rate of oxygen flow yielded only about 50% oxygen concentration (see table). Using the ventilation gap with the originally recommended rate of flow gave oxygen concentrations of only 39%.

CONCLUSION

The conditions desired inside the box must be determined by the clinician for each individual case. In my view an oxygen flow of 6 litres per minute for 5 minutes, followed by 3 litres per minute, with the box placed directly on the mattress, will generally be needed.

LEAKAGE OF AIR FROM PNEUMOPERITONEUM INTO PLEURAL CAVITY

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SENIOR ASSISTANT MEDICAL OFFICER, LENHAM SANATORIUM, KENT

IN view of the widespread use of artificial pneumoperitoneum in the treatment of pulmonary tuberculosis, the following case is of interest because of the unusual complication.

A man, aged 24, was admitted to Lenham Sanatorium on Oct. 25, 1948, with bilateral pulmonary tuberculosis, which had first been diagnosed in January, 1948. A pneumoperitoneum (P.P.) was induced on Feb. 3, 1949, and maintained with weekly refills of about 800 c.cm. of air. Satisfactory rise of both domes of the diaphragm was obtained, but this treatment was regarded only as a preliminary to bilateral artificial pneumothorax (A.P.), which was considered necessary to control the tuberculosis. Hence on April 28 a right A.P. was induced, and this was followed by thoracoscopy and a satisfactory section of adhesions on June 8. The P.P. was still being maintained on June 20, when a routine radiogram showed that the right A.P. was still quite shallow.

On June 29, the patient received his weekly refills—A.P. 500 c.cm.; P.P. 600 c.cm.—and later the same day he consumed an immoderate quantity of fresh fruit. This was thought to be the cause of a violent attack of vomiting which followed soon afterwards, and which was accompanied by sudden dyspnœa. This distressed condition did not last more than an hour, and when the patient was seen next morning he seemed to have fully recovered and was no longer dyspnœic. Physical examination did not reveal any unexpected signs.

Radioscopy a week later, before his next refills, showed that the P.P. had completely disappeared, the A.P. was much larger, and the right lung had almost completely collapsed.

The only explanation for these findings is that air had gone from the peritoneal cavity to the right pleural cavity. This was confirmed by the intrapleural pressures, which were higher than the final readings of the week before.

DISCUSSION

Though the P.P. in this case was not a particularly large one, it must have contained at least 1500 c.cm. of air at the time of the accident, which happened only a few hours after a refill. It is therefore surprising that the constitutional upset was not more profound. The patient was fortunate in that the leakage occurred on the right side, so that the opening in the diaphragm was presumably sealed by the liver, thus averting a diaphragmatic hernia.

Banyai[1] and Sita Lumsden[2] have each reported a similar leakage; Mellies[3] reported a case of rupture of a tuberculous lesion of the diaphragm during P.P. treatment; and Smith[4] reported a case due to defects in the diaphragm. Banyai[5] reported two cases in which the leakage was in the opposite direction—from pleural cavity to peritoneal cavity—and he suggested that the air passed along mediastinal structures traversing the diaphragm. When an A.P. is not already present the diagnosis from a spontaneous pneumothorax would be difficult.

The intraperitoneal pressure must obviously be a factor in the causation of such an injury, but in the present case the resting pressure was not remarkable— + 10 cm. of water. During an attack of vomiting no doubt this pressure would be very greatly increased.

Laird[6] describes air-containing vesicles projecting from the upper surface of the diaphragm which may sometimes be seen on thoracoscopy in cases with a P.P., and postulates the rupture of such a vesicle as the cause of a pneumothorax during P.P. treatment. In patients with a P.P. it is also not unusual for the outline of the diaphragm to present on radiography a lobulated appearance which may be due to Laird's "vesicles." In the present case the right dome of the diaphragm showed this feature.

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AT a meeting of the society on March 8, with Dr. E. CHALMERS FAHMY, the president, in the chair, pelvic tuberculosis in the female was discussed.

Prof. CHARLES CAMERON compared genital tuberculosis in the male and in the female. In the male the incidence was 5% of all tuberculous lesions; and in 60% of cases the disease at this site was associated with renal lesions. In the female the incidence of genital tuberculosis was higher, but it was infrequently associated with renal lesions. Because localising symptoms were commonly absent, and because many of these cases were treated surgically in gynæcological wards, genital tuberculosis was seldom seen or diagnosed by sanatorium workers.

Clinically, the condition presented as an isolated tuberculous phenomenon, although there might be a history of pleurisy or of some other transient tuberculous condition. The mode of infection was usually via the blood-stream, although direct involvement from widespread tuberculosis of the peritoneal cavity was possible. Routine endometrial biopsy in cases of sterility brought to light more cases of tuberculous endometritis; and this was almost always associated with tubal involvement. Diagnosis was by no means easy, but it might be aided by culture of the menstrual blood. Genital tuberculosis was a problem to be faced jointly by specialists in tuberculosis and in gynæcology, and there was still much to learn about its diagnosis, pathogenesis, significance, and treatment.

Dr. W. D. A. CALLAM analysed 67 consecutive cases of pelvic tuberculosis. This, he said, was a disease of the child-bearing years. The presenting symptoms were pelvic pain and vaginal bleeding. Amenorrhœa was uncommon, but the incidence of infertility in the series was 84%. In 40% of the patients there was evidence of tuberculosis elsewhere, especially in abdominal organs and lymph-glands and lungs. The common sites of genital involvement were the tubes, uterus, and ovaries, in that order, but in 2 cases the cervix was involved. With regard to treatment, in 24 (36%) of the cases this was conservative, consisting in advice on diet and general hygiene; and, in the absence of available beds in sanatoria, this had to be carried out in the patients' own homes. Of 43 patients treated surgically, with an operative mortality of 7%, 23 underwent hysterectomy with bilateral salpingo-oöphorectomy, while the remainder had less extensive operations. Follow-up revealed that a further 12% of the patients had died from a tuberculous lesion, while 80% of the survivors claimed good health.

Amongst the conclusions to be drawn from study of this series was the apparently low incidence of genital tuberculosis and the infrequent evidence of associated tuberculosis elsewhere in the body. Without laparotomy, pelvic tuberculosis was difficult to diagnose, but perhaps the newer cultural methods would prove helpful. Therapeutically, the best results seemed to have followed radical surgery. Controlled clinical investigation of the effects of streptomycin and *p*-aminosalicylic acid were urgently required; these drugs might provide the solution to the problem of managing this dread disease.

HUNTERIAN SOCIETY

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Dr. MARSHALL, illustrating the present position in diagnosis, showed that single radiographs could not be depended on to exclude the disease. A repetition and the closest inspection were required before a certain opinion could be given. Similarly a negative report on the examination of a smear of the sputum for tubercle bacilli was quite inadequate; in any doubtful case a culture was an absolute necessity, since this test is far more delicate than a whole series of ordinary smear investigations. Turning to treatment, he showed how important were ordinary routine measures, but how they must be supported by active treatment such as collapse therapy in its various forms. Of the chemotherapeutic agents and antibiotics, streptomycin was of undoubted value in the early stages, its main disadvantage being the tendency of the tubercle bacillus to become resistant, but the trials conducted under the auspices of the Medical Research Council had confirmed that if *p*-aminosalicylic acid (P.A.S.) was given along with streptomycin this tendency was greatly reduced. Further experiments in dosage and with other agents were being considered, but there was little doubt that the use of these substances had been one of the major advances of recent times.

Mr. HOLMES SELLORS began by comparing the rôle of the thoracic surgeon in tuberculosis to that of a demolition squad rather than a fire-brigade. The surgeon's problem was essentially that of dealing with tuberculous cavities and fibrotic contractures, and in this he had several methods of approach. Collapse therapy was the best known, but excision, in the form of lobectomy or pneumonectomy, had a considerable part to play, though its final place in treatment had not yet been determined. A further method of surgical treatment was the drainage of cavities, using either a Monaldi drainage or a deliberate cavernostomy. In this latter procedure a flap of skin and muscle was drawn into the cavity and its healing observed from below upwards. There was still a considerable amount of dispute about the relative advantages of thoracoplasty and extrapleural operations, the latter having gained in favour in the last year or so. Mr. Sellors preferred thoracoplasty as the routine and standard method of collapse, since it was both permanent and selective, and in well-chosen cases gave most satisfactory results. When extrapleural operations were done there were the questions of what was to happen if the artificial extrapleural pneumothorax was given up, and what would happen in the long run to foreign bodies used to fill the space made at the operation.

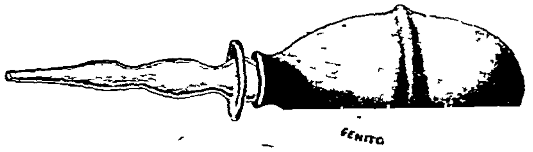
Dr. KENNETH PERRY spoke of the value of fluorescent methods of recognition of the tubercle bacilli and of some of the chemotherapeutic agents which had not yet been finally asessed.

Dr. GEORGE DAY briefly reviewed the present tendency of tuberculosis treatment, and stressed the need for realising that in the long run it was the resistance of the patient's body and tissues that determined the outcome.

New Inventions

A URETHRAL SYRINGE

THE Canny Ryall urethral syringe is ideal for injecting a local anæsthetic into the urethra but is unsuitable for irrigation of a catheter because the nozzle does not give an airtight fit. It has been modified as in the figure to form a syringe which is suitable either for local (surface) anæsthesia, or for aspiration or irrigation of an indwelling catheter. The external diameter at the tip is $^3/_{16}$ in. and at the first expansion $^3/_8$ in. The internal diameter at the tip should be at least $^3/_{32}$ in. The projecting collar at the proximal end prevents the rubber bulb from slipping down the glass nozzle at the first sign of wear. A syringe of 2-oz. capacity has been found of most value in general use but larger or smaller sizes could be made.



After any form of closed prostatectomy this syringe can be used for aspiration of the catheter in case of blockage; it is sufficiently cheap for a separate syringe to be kept for each patient, and it can be sterilised by boiling.

The syringe has been made for me by the Genito-Urinary Mfg. Co. Ltd., of 28a, Devonshire Street, London, W.1. E. W. RICHES, M.C., F.R.C.S.

Reviews of Books

Handbook of Physiology and Biochemistry

(40th ed.) R. J. S. MCDOWALL, M.D., D.SC., professor of physiology, University of London. London: John Murray. 1950. Pp. 767. 30*s*.

THIS standard textbook is now a hundred years old. William Senhouse Kirkes gave it birth, at Barts, W. D. Halliburton helped to foster it in its maturity, and Professor McDowall has been twenty years at the work of keeping it young. Its name alone is misleading—within living memory it has always been a two-hand book—but in all other respects it is trustworthy, as a long succession of students know.

In spite of the many loud calls for "integration" in the teaching of the preclinical subjects, the current trend in medical schools is to separate biochemistry from physiology by the establishment of separate chairs in the two subjects. Professor McDowall wisely disregards the rift, devoting large parts of his book to topics which are nowadays reckoned to be the province of the biochemist. By presenting the whole subject in one textbook, he teaches the elementary student to judge for himself the relations not only between the different systems of the body, but between the different systems of his professors.

Lord Lister: His Life and Doctrine

DOUGLAS GUTHRIE, M.D. Edinburgh: E. & S. Livingstone. 1949. Pp. 123. 15*s*.

A LIFE of Lord Lister has a special interest for us because in his early days he acted as a reporter to THE LANCET, sending accounts of the surgery lectures of his future father-in-law, James Syme; and it was in this journal that there were waged two famous controversies about Lister—that concerning antisepsis and the conditions in Glasgow Royal Infirmary, in which Lister crossed swords with the board, and the accusations made in letters to the editor that he had unjustly criticised his London colleagues, which appeared after the publication in the press of his off-the-record speech to Edinburgh students when he expected to go to London to succeed Fergusson at King's. Dr. Guthrie's book is less bulky than Godlee's "Life" and, of course, different in nature from the Lister Centenary Exhibition Handbook, published in 1927. He gives a number of new letters, including a photograph of one with uncertain spelling but excellent drawings of a frog and lizard by Joseph Lister aet. 8 years; and another, written in 1878—on which Sir Alexander Fleming comments in a recent number of the *Annals of the Royal College of Surgeons*—which mentions a penicillin mould. Dr. Guthrie makes some asides into medical history, outlining, for example, the development of the Glasgow and Edinburgh schools. The book is a most readable account of a great surgeon.

An Atlas of the Blood and Bone Marrow

R. PHILIP CUSTER, M.D., director, laboratories of the Presbyterian Hospital, Philadelphia. Philadelphia and London: W. B. Saunders. 1949. Pp. 321. £3 15*s*.

Dr. Custer has been studying bone-marrow for 18 years, and this lavishly illustrated volume reflects his preference for histological methods. More than half the 278 illustrations of blood and bone-marrow are photographs of histological sections, and most of the rest are photographs of smear preparations, many of them in colour. There are also 5 coloured reproductions from paintings, including 3 first-class plates of malarial parasites from the National Institute of Health, U.S. Public Health Service. Most of the photographs give a very high magnification—sections at about 1000 times and smears at over 2000 times. The page size allows a picture of $6 \times 8^1/_2$ in., and hence there are reproductions of megaloblasts 2 in. across. It is thus not surprising that few of the colour photographs are really clear; but two of them—one showing marrow in sprue and the other blood in monocytic leukæmia—show how good photographs can be today when everything is just right. The photographs of histological sections are uniformly successful.

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THE LANCET

LONDON: SATURDAY, APRIL 8, 1950

Crimes of Violence

Opinions differ just now about almost every aspect of violent crime in our society. Is it commoner than it used to be before the war; or is it less common but more violent? Is it the result of too much discipline in the Army or too little discipline in the fatherless home? Must we blame the brutality of warfare, or the softness of our penal system? Whatever we think about these propositions we all agree that we want less violent crime, and would probably all support the most effective remedy against it, if that could be pointed out to us. The recent debate in the House of Lords showed how many honest and sincere people would like to believe that corporal punishment is such a remedy. "Like to believe" is a fair way of putting it, for the natural impulse of anyone who witnesses or reads of cruelty is to make the punishment fit the crime. When we hear of elderly women coshed, or kicked, or bundled under railway carriage seats, we hate the aggressors quite violently enough to want to do the same sort of things to them. Revenge is sweet; and perhaps to avenge the wrong of another is even sweeter, because it seems so agreeably free from self-interest. Certainly the flogging of criminals delivers many people from a state of angry tension, and restores their peace of mind. If it can be shown, however, that far from being a remedy for violent crime this measure has no effect in reducing it, and may even, in some cases, foster its repetition, then it is surely a duty to curb this impulse and to avenge the oppressed by seeking more telling ways of dealing with the criminal.

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[1] *J. R. statist. Soc.* 1939, 102, 565

The text is less impressive than the illustrations. Dr. Custer has adopted the nomenclature recommended by the recent Clarification Committee, but we are glad to see that he has rejected "rubriblast" and similar terms for erythroblasts. Each section is a cursory account of a group of blood diseases, enlivened by massive but relatively uninformative tables. All of this has been better done elsewhere. The general aim, Dr. Custer says, is to promote accuracy in diagnosis, but the pictures are not arranged in a way to further this end: there are no plates, for instance, representing the various forms of the lymphocyte. Instead the immense compendium illustrates in some way every known blood disease, including many rarities. The only condition omitted seems to be the acute erythræmia of di Guglielmo. Many sections are outstanding—for example the photographs showing the stages of hæmopoietic development in the embryo—but even so the book will be of little use to the general clinician or clinical pathologist. The experienced hæmatologist will value it as a collector's piece, and the pure pathologist will find here information about histological changes in the bone-marrow not to be found anywhere else.

Biology

An Introduction to Medical and Other Studies. P. D. F. MURRAY, M.A., D.SC., professor of zoology in the University of Sydney; sometime university reader in biology, St. Bartholomew's Hospital Medical College, London. London: Macmillan. 1950. Pp. 600. 25*s.*

WRITTEN simply and clearly, this work is just what a really good textbook of biology should be—not merely a compilation of dry descriptions but also comparative and exegetic, with the accent on evolution. Thus, in the description of amphioxus little or nothing is said of what does not help to an understanding of vertebrate structure. Teleology is carefully avoided: "It is not for a textbook of Biology to say whether man's destiny is to live with the angels, but certainly he was born with the apes." The reader's attention is held throughout, from unicellular animals and plants to vertebrates, with the aid of 381 beautifully clear illustrations. The book is written mainly with an eye to the education of medical students; consequently it deals also with such subjects as comparative zoology, histology, embryology, genetics, organic chemistry, physiology of growth and nutrition, and bacteriology. Perhaps we should point out that some of the deductions about Eoanthropus, in the discussion of modern man's fossil ancestry, have been shown to be wrong by the results of fluoride tests published since this book was printed.

Green Thraldom

Essays of a Chinese Biologist. TANG PEI-SUNG, professor of physiology and dean of the college of agriculture, Tsing-Hua University, Peiping. London: Allen & Unwin. 1949. Pp. 127. 12*s.* 6*d.*

THIS delightful series of essays is the work of a man whose varied experiences of life in China, Japan, and the United States—with all the vicissitudes of flight from the Japanese, when they invaded northern China, and translocation of his laboratory to Kunming in Yunnan—have left him still an undaunted biologist and research-worker, and above all a Chinese. The essays can be enjoyed by anyone with an interest in, and a speaking acquaintance with, modern science in the realms of physiology and general biology, and they may also be read with advantage by any specialist; for as might be expected from the land of Confucius, an underlying unifying philosophy runs through them. The theme is that we are still under the thrall of the vegetable kingdom, and the author indicates the slight partial escapes we have made from that thraldom. "Men may hope to become at least partly independent of the green plant, and hence of the land surface, for the supply of raw materials and for the production of food and power." The practically minded person will find in these essays a store of facts and data on the feeding of the nations—particularly the Chinese and Americans—as well as studies of the metabolism of Chinese and American labourers and soldiers. And the philosophically minded, who believes that knowledge is one and indivisible, will meet much to confirm his belief.

Counting Tubes

Theory and Applications. S. C. CURRAN, PH.D., F.R.S.E.; J. D. CRAGGS, M.SC., PH.D. London: Butterworths Scientific Publications. 1949. Pp. 238. 35*s.*

THE Geiger counter originated when Rutherford in 1908 devised a method for detecting the electrical effect of a single alpha particle. The success of his experiment depends upon the phenomenon of ionisation by collision, discovered by Townsend. If an ion, positive or negative, is speeded up in a gas by an electric force, the high-speed ion in its collisions with the neutral gas molecules causes more ions to form and these in turn repeat the process; so we get amplification. Herein lies the secret of the value of the instrument to the physicists, who in the course of forty years have come to use it widely for the detection of minute electrical currents; the counter can then become the detector of radiation—any radiation that can produce an ion. Hospital physicists rely on the counter for a large part of their work relating to methods of protection from X rays and radium, to the distribution of radiation from active sources, and in tracer work with the ordinary radioactive isotopes. About 500 authors have contributed to the advances in theory and application of a most ingenious instrument, and the authors have produced an excellent reference book.

Individual Sports for Women (2nd ed. Philadelphia and London: W. B. Saunders. 1949. Pp. 414. 21*s.*).—This book, by Dorothy S. Ainsworth and six other women members of the staff of the department of physical education at Smith College, encourages the inclusion in school or college physical-education programmes of sports which can be enjoyed alone or with a companion. Such sports are thought to be a social asset for American youth. The eight sections—on archery, badminton, bowling, fencing, golf, riding, swimming, and tennis—are written by experts and helpfully illustrated to show the correct grips and posture, and the general formation of the sport. Instructors or leaders are given much useful advice about equipment. Cheap home-made accessories are described, and practical information given on storage of equipment, arrangement of practice courts, placing of targets, and—in the riding section—care of the horse. Even for a fully trained instructor the book offers useful schemes of progression, and in each section there are valuable hints on class-handling as well as an analysis of common faults. A short history of each game serves as introduction, and references to books or films are listed at the end of each section. The equipment prices quoted are American; but in other ways the book would be useful to those doing club and recreational work in this country.

The World Next Door (London: Gollancz. 1950. Pp. 320. 12*s.* 6*d.*).—This book, the blurb tells us, has "integrated form, breathless drive and a constantly luminous vision." This overpraise may incline the reader to do less than justice to an honest and sincere account of life in an American mental hospital. "The Snake Pit" has stolen some of Mr. Fritz Peters's thunder, and so, in a more subtle but perhaps none the less effective way, has that entertaining play, "Harvey." We all know something now of life in American mental hospitals; we know that some nurses are sadistic and that certification (committal as they call it) can be had for the asking. The hero of this book is depicted as having a very beautiful character. He was however an exceptionally tiresome young man. He irritated his family by his oddness and by taking all his clothes off on the lawn. Trying, one can see, but hardly a sufficient reason for certification. He then irritated the nurses by his literal-minded obtuseness. While this does not justify them in socking him on the jaw, one can see that it might be provoking. Nevertheless, power corrupts, and it is not only great men who tend to be bad when they have the weak at their mercy. This point cannot be made too often.

The hero (like most mental patients in fiction) appears to be suffering from a mixed psychosis. It has some schizophrenic features, including thought disorder; and since it is difficult to describe thought disorder without becoming disorderly, the book gets better as the hero regains his sanity. This book gives a rounder and fairer picture of the good nurses than "The Snake Pit"; but, when it comes to conveying to us the deranged state of mind, Dostoievsky does it better.

THE LANCET

LONDON: SATURDAY, APRIL 8, 1950

Crimes of Violence

OPINIONS differ just now about almost every aspect of violent crime in our society. Is it commoner than it used to be before the war; or is it less common but more violent? Is it the result of too much discipline in the Army or too little discipline in the fatherless home? Must we blame the brutality of warfare, or the softness of our penal system? Whatever we think about these propositions we all agree that we want less violent crime, and would probably all support the most effective remedy against it, if that could be pointed out to us. The recent debate in the House of Lords showed how many honest and sincere people would like to believe that corporal punishment is such a remedy. "Like to believe" is a fair way of putting it, for the natural impulse of anyone who witnesses or reads of cruelty is to make the punishment fit the crime. When we hear of elderly women coshed, or kicked, or bundled under railway carriage seats, we hate the aggressors quite violently enough to want to do the same sort of things to them. Revenge is sweet; and perhaps to avenge the wrong of another is even sweeter, because it seems so agreeably free from self-interest. Certainly the flogging of criminals delivers many people from a state of angry tension, and restores their peace of mind. If it can be shown, however, that far from being a remedy for violent crime this measure has no effect in reducing it, and may even, in some cases, foster its repetition, then it is surely a duty to curb this impulse and to avenge the oppressed by seeking more telling ways of dealing with the criminal.

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Suggestive though these findings were, they might still count for little if it could be shown that flogging prevented those who had never experienced it from committing crimes of violence. Accordingly Dr. LEWIS-FANING examined the relation between changes in the amount of flogging ordered and changes in the prevalence of this class of crime in the country since 1863. Estimating the number of floggings ordered as a percentage of the convictions, in each of those years, of males between the ages of 15 and 54 for robbery with violence, he matched them against the annual number of these crimes known to the police (judging that there could be very few crimes of this type *not* known to the police). The results were most unexpected: for it was found that the volume of flogging fluctuated quite arbitrarily over the years, and bore no apparent relation to the volume of crime. The violent-crime level behaved much more reasonably. In 1858 the rate of such crimes was 150 per million of the estimated male population between the ages of 15 and 54; in 1864, when flogging figures first became available, it had fallen to 128 per million; and from that point it fell more or less steadily until, in 1910, it had reached only 20 per million: and it stayed round about that level until the survey ended in 1938. The flogging figures were very different. Between 1863 and 1892 they never rose above 18% of convictions, and were often much lower; there was a slight peak of 31% in 1895 (*after*, not during, the 1887–94 outbreak of violent crime in Liverpool), but the figures soon settled again to below 19%, and during the early years of the new century they kept mainly within a range of 1·5–6·0%. In 1914, and again in 1917, no floggings were ordered; and the crime level maintained its even tenour. Then, in 1919, for no reason connected with crime, the flogging-rate rose steeply in a series of unprecedented peaks, reaching in 1933 the astounding figure of over 65% of convictions: and *still* there had been no major change in the crime-rate.

What can be the meaning of this curious phenomenon? It might be argued, Dr. LEWIS-FANING notes, that as this type of crime becomes less common it also becomes more abhorrent to the orderly citizen, and that this is reflected in a tendency to punish it more severely. This would be evidence, he says, that corporal punishment is imposed on the retributive principle: but those who advocate it are, of course, hot to maintain its deterrent effect. Another explanation of this rise in the post-war years must surely suggest itself. If war is brutalising, its effects are not confined to one section of the community: none of us is immune from that demoralising experience. The unprecedented and unprovoked rise of the flogging-rate after the 1914–18 war may well have been a measure of such demoralisation: and is it not possible that the same influence is at work now? A taste for the use of the cosh and a taste for the use of the cat may both have been fostered by five years of violence. Small things hint at a general lowering of humane standards—a sermon preached in Winchester Cathedral on Assize Sunday, for example, in which a priest advocated a general return to the beating of children, and enumerated various tools for the purpose. His declared aim was again the suppression of violent crime: he disregarded the fact that in the sections of society from which most violent criminals are drawn a good hiding is still regarded as the appropriate and convenient treatment for a troublesome child.

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[1] *J. R. statist. Soc.* 1939, 102, 565.

If corporal punishment could check crime, or even a tendency to crime, it has had ample opportunity to prove its worth. The evidence suggests that it is worthless as a deterrent, and dangerous as a corrective. Let us keep our heads and tempers and seek more effective methods of protecting society. An adequate police force, all agree, would be a good start.

Prophylactic Inoculation and Poliomyelitis

THE report from Melbourne which appears on p. 659 is important and disturbing but need not be alarming. A complaint by the parents of children who developed paralytic poliomyelitis soon after a prophylactic inoculation led the Health Department of the State of Victoria to investigate the immunisation history of the 375 cases of poliomyelitis notified during the epidemic in the State between January and August, 1949. Apart from a few who could not be found, the parents of all these cases were asked whether their child had been immunised against diphtheria or whooping-cough, and, if so, when and by whom. Complete histories were obtained for 340 cases, and Dr. BERTRAM MCCLOSKEY, who was responsible for this field investigation, found that 31 had received a prophylactic injection of one kind or another within three months of the onset of poliomyelitis. He then personally obtained the exact dates and the sites of inoculations from the parents, and in all but 4 cases confirmed these from the doctors' records.

Since the frequency of inoculations in comparable age and sex groups in Victoria at that time is not known, this finding of 31 cases of poliomyelitis following inoculation is in itself not remarkable. The significant finding is that there was clearly an association between the site of the last injection and the site and degree of the subsequent paralysis. This was particularly well marked in the children who had received pertussis vaccine, either alone or in combination, but it existed for diphtheria toxoid also. The age of the child is known to be an important determinant of the site and severity of paralysis in poliomyelitis: in younger children there is a tendency for the lower limbs to be affected. But here, whatever the patient's age, the injections into the arm were clearly associated with an increased frequency and clinical severity of upper-limb paralysis. It is suggestive, too, that, if we exclude 2 cases, the intervals between the last injection and the onset of paralysis ranged from five to thirty-two days, limits which correspond closely to the usually accepted incubation period of poliomyelitis. As MCCLOSKEY emphasises, however, all the cases of paralysis following inoculation occurred during a severe epidemic of poliomyelitis. This was almost certainly the determining factor.

It would be premature to discuss the possible mechanism of this association in any detail, but it seems likely that the more obvious sources of infection—contamination of the prophylactic agents or of the syringes—will not explain the facts. No single batch of any one product could be incriminated; those used included some from England, from the U.S.A., and from Australia. It is more probable that this is yet another manifestation of the association between trauma (in its widest sense) during the prodromal period—whether by tonsillectomy or severe exercise or chilling—and the localisation of paralysis in poliomyelitis.

MCCLOSKEY's stimulating observations are, of course, only the beginning of the investigations which must be done before their implications in public-health work can be seen. From the practical point of view, we must be able to balance the known risks run by our patients in facing diphtheria or whooping-cough without the protection of prophylactic inoculation against the risk that inoculation during a poliomyelitis epidemic will render them more liable to paralysis. The Australian findings have not established that injection increases the risk of infection by poliomyelitis, but we must be sure on this point. If this is not the case, and the virus infection attack rates are the same in inoculated and non-inoculated groups of children, we must find out whether injection during the prodromal period increases the liability to paralytic manifestations of the disease. These questions cannot be answered by a retrospective investigation where only the instances of positive association are known; a forward investigation of a cross-section of the child population, whether inoculated or not, would be needed. Extensive field surveys of this kind bristle with difficulties but they are essential if the immunisation campaign is not to be marred by either unjustified optimism or unbalanced gloom. We understand that the Ministry of Health is in touch with these developments and has its own studies of this country's experience well in hand. Their conclusions should be made known as soon as possible.

Streptomycin in Urinary Tuberculosis

THE value of streptomycin in urinary tuberculosis still awaits final assessment. So far experience has been mainly favourable: streptomycin often leads to gratifying clinical improvement but it has serious limitations and has certainly not superseded the usual methods of treatment. The course of the tuberculous process in the urinary tract is insidious and unpredictable and the effect of any treatment should be observed for years before it is accepted as solidly established. The type of disease and its advancement must be well-defined if comparisons between one series and another are to be valid. A single detail of pathology may completely alter the course of the disease and its response to treatment. Thus RINKER[1] has studied the rôle of ureteric involvement in renal tuberculosis and its response to streptomycin. Quite apart from streptomycin therapy, complete occlusion of the ureter is not uncommon in this disease; it may occur temporarily in 10–20% of cases, though it probably remains permanent in less than 1%. RINKER found that out of 6 tuberculous kidneys treated with streptomycin 5 developed temporary occlusion of or an impassable stricture in the ureter, and he takes this to be a manifestation of the healing process promoted by the streptomycin. Ureteric occlusion may obviously have a profound effect on the findings in the bladder urine, which are looked on as indicating the course of the disease; for tubercle bacilli may be absent simply because they are being kept out of the bladder, though they are still active in the kidney. In judging the effect of treatment it is therefore essential to determine whether the urine from the affected kidney is reaching the bladder, and this will necessitate cystoscopy, probably combined with indigo-carmine excretion tests or ureteric catheterisation, or excretion pyelography.

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[1] Rinker, J. R. *J. Amer. med. Ass.* 1950, 142, 87.

One of the most important conditions for assessing the results of any method of treatment is a control series. It is in this respect that the work reported by A. H. JACOBS and W. M. BORTHWICK to the urological section of the Royal Society of Medicine on March 23, is particularly valuable. They have studied 90 cases of renal tuberculosis at the Robroyston Hospital near Glasgow, half being treated with streptomycin and half without. To toughen the scientific fibre of the investigation, the patients were allotted to their group by Medical Research Council statisticians in London. A defect of the report, which its authors readily admitted, is that it is made only fifteen months after the beginning of the investigation; but the observations are being continued and more mature results will be reported later. In most of the patients the disease of the urinary system was the only or at least the dominant tuberculous focus. In every case the urine was examined by direct smear, by guineapig inoculation, and by culture, though BORTHWICK found that if the smear result was negative the other tests were rarely if ever positive. Instrumental pyelography was done as a routine on both sides, in addition to excretion pyelography. The standard course of streptomycin was 1 g. daily, given in two doses, for ninety days. The incidence of vestibular damage was high, and in BORTHWICK's experience there was no apparent recovery. The development of streptomycin-resistance in the infecting organism was a frequent difficulty and still occurred in spite of the simultaneous administration of *p*-aminosalycilic acid.

In analysing their results JACOBS and BORTHWICK divided their cases into five groups: (1) minor disease in one kidney; (2) major disease in one kidney treated by nephrectomy, with persisting cystitis; (3) bilateral disease in which one kidney is only slightly involved and the other has been removed; (4) tuberculosis developing in a previously healthy kidney after the other has been removed for tuberculosis; and (5) bilateral disease unsuitable for operation. In the first group the tubercle bacilli disappeared from the urine under treatment with streptomycin in all but 1 case but by the end of six months they had reappeared in half the cases. Streptomycin did not prevent involvement of the healthy kidney in nearly half the cases, but it seemed to reduce the incidence of cystitis, since this complication developed in only 1 treated patient but in 4 of the controls. In the second group the most obvious effect of streptomycin was in relieving the cystitis, which it did in 11 out of 14 cases. In over a quarter of the treated cases in this group the urine became T.B.-negative, and in the third group half the treated cases responded, similarly. The fourth group comprised only 6 cases, and the 4 treated with streptomycin all had severe cystitis; 1 of these 4 became T.B.-negative, 1 died, and in 2 the frequency became worse. This adverse effect on the symptoms of cystitis was very striking in these and one or two other cases. It may be attributed to the fibrosis accompanying healing and is closely allied to the formation of strictures in the ureter, observed by RINKER. The fifth group included two very different types of case: (*a*) those with major disease on both sides in which surgery was out of the question; or (*b*) those with very slight lesions on both sides. In type (*a*) streptomycin had little effect and did not prevent 2 deaths in the 8 cases. Taking the series as a whole, the conclusions reached were that streptomycin has no effect in established ulcerocavernous disease; in unilateral disease nephrectomy should remain the standard treatment but streptomycin may help both before and after operation; and streptomycin is of great value in relieving secondary cystitis, though the primary kidney lesion must be small if it is to be fully successful.

Annotations

FILM ON DEOXYCORTONE

LAST week a new film *Rheumatoid Arthritis: Some Cases Treated with Deoxycortone and Ascorbic Acid* was shown to the press in London. This film, made with Mr. David Le Vay and Dr. Geoffrey Loxton as medical advisers, does not (it is stated) set out to show the value of these compounds in therapy but is intended merely to demonstrate what happens—or what may happen—when deoxycortone and ascorbic acid are given. Of the 7 patients who are included, 1 is shown six weeks after the start of twice-weekly injections, but otherwise the film compares the state before and half an hour after an injection. "The patients were selected," the accompanying résumé tells us, "only to the extent of their willingness to be photographed; subject to this they were consecutive cases." In all 7 cases the range and speed of movement was apparently increased; and the film shows clearly that in a given patient the improvement is not always equal in all joints, and that in a given joint some movements may be improved much more than others. The makers concede that dosage is not yet settled; that it is uncertain whether all patients will respond as these 7 were shown to respond; and that whether the combined treatment will continue to exert a beneficial effect when given for long periods has yet to be established. Their object is simply to record what they have seen: this, they say, is a research film.

This being so, the wisdom of releasing it generally among the profession must be seriously questioned—even if, as is proposed, it is used by rheumatologists simply to illustrate lectures. There is, we fear, a real risk that this record of immediate effects will gain for the technique closer friends than it has so far been proved to deserve. What is quite certain is that it will convert none of the sceptics, who seem still to include a majority of clinicians with wide experience of rheumatism, and particularly those with experience of 'Cortisone' and adrenocorticotropic hormone. One shot seems to show diminution in joint swelling half an hour after a single injection; but otherwise there is hardly any objective evidence to change the mind of those who attach weight chiefly to the psychological effect of this novel method. The opportunity to include control observations, which might have met this objection, has unfortunately not been taken.

On one point there will be no argument—namely the technical brilliance of the production, by Dr. Brian Stanford. The film, which is 16 mm., in colour, and runs for about 16 minutes, has been made for Messrs. Ciba Ltd.

THROMBOCYTOPEN

It has always been surprising that though removal of the spleen causes so striking a remission of primary thrombocytopenic purpura, no really significant structural changes in the spleen have been found. The possibility that the spleen was producing some platelet-destroying substance was soon thought of. Torrioli and Puddu [1] in 1934 discovered that an extract made from the spleen removed from a patient with thrombocytopenic purpura injured the megakaryocytes in cultures of guineapig bone-marrow; a similar extract of a normal spleen and of various other organs showed the presence of this antimegakaryocytic substance, though in lower concentrations. Later [2] they prepared a protein-free extract of a normal spleen, injected it intravenously into rabbits, and showed that there was a definite lowering of the platelet-count in the peripheral blood; they produced some evidence that blood from the splenic vein contained more of this platelet-reducing factor than blood from the splenic artery. So there seemed to be some ground for supposing that in primary thrombocytopenic purpura the spleen produces an excess of a platelet-reducing substance; and this, at least, provided a rational explanation for the success of splenectomy.

Troland and Lee [3] used an acetone extract of spleens. They found that extracts from the spleens of three patients with thrombocytopenic purpura injected intravenously into rabbits caused a sharp reduction of the blood-platelets, but they could not demonstrate any activity in spleens of patients with hæmolytic anæmia or Banti's syndrome, or in extracts from normal spleens. So far as the evidence went, it supported the splenic secretion theory, and Troland and Lee named this unidentified substance "thrombocytopen." In 1941 we commented [4] that evidence both confirming and denying the existence of thrombocytopen had appeared and that the subject remained unsettled. Up to the present, though different methods of preparing the extracts have been tried, and different test animals used, still no finality has been reached, because about as many observers denied the existence of thrombocytopen as could find it, and about an equal number obtained equivocal results.

A new approach has been tried by Singer and Rotter.[5] They argued that if thrombocytopen was formed in the spleen, it would, in the natural course of events, go first to the liver and might there be inactivated; the inconsistent results obtained so far might depend on how much inactivation took place in the liver of the test animal. If so, then the best test animal would be one whose liver was considerably damaged. They therefore used male albino rats which were given two intraperitoneal injections of 0·5 mg./kg. of carbon tetrachloride; this dose caused a suitable degree of liver damage, but only minor kidney damage. They prepared suspensions of spleens and other organs by freezing the tissue, then defrosting and mixing the chopped tissue with saline. The freezing and defrosting process employed damaged red blood-cells and consequently some of their test animals developed hæmoglobinuria; but it was found that injections of red cells alone did not affect the platelet-count. With this technique, they were able to show that a platelet-lowering substance is present in the suspensions of many different organs including spleen, lung, heart, kidneys, and brain. Normal human spleens and those from patients with primary and secondary thrombocytopenic purpura, and from patients with other blood diseases who had normal platelet-counts, all contained thrombocytopen in about the same concentration. Singer and Rotter were also able to extract with ether the platelet-reducing substance from normal human urine and from the urine of thrombocytopenic patients.

These results make it reasonably clear that there does exist a platelet-reducing substance in organ extracts. But no specific connection with thrombocytopenic purpura has been found. Thrombocytopen thus joins the list of splenic substances having some action on blood-clotting; others are the "splenins" described by Ungar [6]—splenin A which increases the bleeding-time of guineapigs, and splenin B which has the opposite effect—and Moolten's "thrombocytosin" which increases the platelet level.[7] Whether any of these agents has any rôle in the physiology of blood-clotting or platelet production and function is doubtful; Singer and Rotter do well to remind us how difficult it has proved to fit that powerful anticoagulant heparin into any scheme of normal blood-clotting.

WHERE DO WE GO FROM HERE?

Those who attend conferences on mental health occasionally feel that great truths and broad principles, however well they nourish the spirit, are not entirely sustaining to ordinary psychosomatic man. He needs his halfpennyworth of bread, even though he does not live by bread alone; and he is even, at times, ready to risk his digestion on a handful of brass tacks. Professor Alexander Kennedy, who consumes brass tacks with relish, hinted, when presiding on the first day of a conference [8] on "Mental Health and the Family," that perhaps our behaviour is not entirely determined; and that it is even possible that the process of evolution may become orderly if we apply common sense and plain English to it. The Archbishop of Canterbury, in opening the conference, also declared for plain English, exhorting psychiatrists to be distrustful—or at least careful—of words. We can make them mean too much, he said; and we can use multitudes of them to mean too little—the more tired we get the more we take refuge in words; and in this we are abetted by the dreadful facility of the secretary and the typewriter. Again, all words are shorthand, but the shorthand of a particular discipline may be too short for good sense: he quoted the term "psychosocial medicine," as an example. He was naturally undisturbed by the notions that man's behaviour is entirely determined, or that God is a projection of the unconscious mind; and he felt that many scientists now shared his confidence. But when psychiatrists, as he said, explore and play about with religion as an aspect of man—which is quite the right thing to do, at one level—they are in some danger of thinking that religion has no relation to any eternal reality. Dr. Alfred Torrie, later in the discussion, remarked that any psychiatrist who professed religious principles was in danger of being told by his colleagues that he was not quite grown up. Dr. J. L. Halliday, in his address on social health, cautiously acknowledged the dynamic effect on society of man's religious projections, but was willing also to concede the possible existence of an "Outer and Beyond." He dealt much with the determinants of human behaviour, however, and it was hard to feel he had much confidence in free will. Professor Kennedy doubted whether it is wise—even if it should prove to be true—to believe that unconscious motives so overwhelm our conscious designs that we can compass nothing at all. That bit of free will, that bit of conscious mind, he said, is precious. And indeed it is our only tool in a world where the children of men live—as more than one speaker hinted—in the midst of perennial inner and outer conflict.

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[1] Torrioli, M., Puddu, V. *Policlinico*, 1934, 41, 245, 647.
[2] Torrioli, M., Puddu, V. *J. Amer. med. Ass.* 1938, 111, 1455.
[3] Troland, G. E., Lee, F. C. *Ibid*, p. 221.
[4] Annotation, *Lancet*, 1941, i, 356.
[5] Singer, K., Rotter, R. *J. Lab. clin. Med* 1949, 34, 1336.
[6] Ungar, G. *J. Physiol. Path. gén.* 1947, 39, 219.
[7] Moolten, S. F. *J. Mt Sinai Hosp.* 1945, 12, 3.
[8] On March 23 and 24, arranged by the National Association for Mental Health.

Adolescents are exposed to a particularly bewildering conflict of values. As Dame Olive Wheeler put it, they have great difficulty in achieving mental and moral health, not because of any lack in themselves, but because home, school, workshop, nation, and church do not speak with the same voice. There is no clear witness in their surroundings of an accepted or acceptable ethical code. They are left floundering at a time when they are making their most critical choices.

On the whole, the conference only formulated our problems; it would be useful to know in plain English, as Professor Kennedy would say, what exactly is being done about them—what proportion of parents are taking enlightened behaviour into the nursery, what schools are educating citizens rather than examination candidates, what approved schools and prisons can boast of reform, what industries are fostering higher ethical standards—in short, how common sense is being applied. Perhaps this might be the subject of the next conference.

POLIOMYELITIS IN SCOTLAND

So long as poliomyelitis remains an unpreventable disease with no causal treatment, the problems of its epidemiology will continue to be an absorbing challenge to all interested in public health. In a survey[1] which we have already briefly noticed[2] Dr. Ian Sutherland, a senior medical officer of the Department of Health for Scotland, has provided a detailed and valuable analysis of the Scottish experience of the 1947 epidemic in Great Britain. In essence it consists of 28 tables of statistics with a commentary on their significance. Each table represents a rearrangement of the information on 2002 case-summary cards. Each summary card is a record of some 30 to 50 facts about each person notified as suffering from poliomyelitis in Scotland between June 1, 1947, and Jan. 3, 1948. These essential details were obtained by the medical officers of health, presumably not without much painstaking effort by their indispensable and still underpaid backroom girls—i.e., health visitors.

Of the 2002 notifications, 626 (31·3%) proved to be not poliomyelitis. The most frequent diagnoses of those "not poliomyelitis" were "no abnormality" (14·2%) and tonsillitis (9·9%). Respiratory disease (27·0%), diseases of the nervous system (18·7%), and diseases of the locomotor system (14·7%) account for nearly two-thirds. The over-all incidence was 2·68 per 10,000 (1 in 3731) with an over-all mortality of 8·87%. The maximum incidence was at one year of age—namely, 20·16 per 10,000 (1 in 496). Of those with paralysis 9% needed respirator treatment and almost two-thirds of these died. There was a male-to-female incidence ratio of 1·45 to 1. About one in four with poliomyelitis had no paralysis, but the proportion was higher in rural districts, higher age-groups, and (especially in younger children) in the later stages of the epidemic. The incidence of poliomyelitis compared with "not poliomyelitis" was significantly associated with (1) more apartments, especially four or more, (2) fewer occupants, (3) higher social class in age-groups over five years, (4) better sanitation, (5) a record of associated cases, and (6) pregnancy. Greater severity, shown by the need for respirator treatment or case-fatality was associated with (1) a shorter interval between onset and notification, (2) increasing age, (3) more apartments, (4) fewer occupants, (5) better sanitary conditions, (6) higher social class. There was no significant association between severity and pregnancy. Of 14 pregnant women 4 died, compared with 12 of 84 non-pregnant women of the same age-groups—a difference which could be expected to occur by chance about once in six times.

In his concluding paragraph Dr. Sutherland writes: "No attempt is made to sum up the observation of the survey in one or two sentences. In fact the survey will have served a useful purpose if it reinforces the danger of categorical statements which, on closer study, demand such modification or amplification that the original simplicity is shown to be false." But a table giving the statistical findings for each association tested would itself have been a summary and a great help to those not actually preoccupied with the epidemiology of poliomyelitis. In sum, however, the survey provides admirable building material, and the author seems well justified in hoping "that the detailed description, when compared with others elsewhere, will help to establish the common features of this serious infection and, with the development of techniques of confirmation of infection, eventually lead towards better techniques of study and control."

CONSTITUTIONAL CHANGES

CONSTITUTIONAL reform seems to be in the air. The House of Lords, the General Medical Council, and now the council of the British Medical Association have all been considering whether their membership should not change with the changing times. On March 29 at a special representative meeting of the B.M.A., Dr. J. A. Pridham, chairman of the organisation committee of the council, explained that during the negotiations before the National Health Service Act was passed they came to realise that the link between the council and the divisions and branches was not close enough. The council should at once know the needs and wishes of the branches and divisions and keep them informed of what was "cooking" at headquarters. The directly elected members of council would find it easier to do this if their constituencies were of more manageable size. It was therefore proposed to increase their number from 22 to 39. But though the council agreed on the need for more directly elected representatives they were also agreed that to increase the total membership of council would be to render it ineffective, and they were faced with the necessity of making economies somewhere. They therefore reluctantly suggested that the number of ex-officio members should be reduced and that the number of members elected by the representative body should be reduced from 20 to 13, mainly by discontinuing the system of election by group representatives. Dr. H. G. Dain put the point of view of those who opposed these changes. He feared that they would endanger the representative body's control of council. They should be able, he declared, to choose people and not be tied down by areas. To make council a second parliament would detract from the authority of the representative body. He also made the point that the present council contains representatives of all types of practice. This balance, he felt, might be less easy to attain if more members were elected from the periphery. The council's proposals[1] were, however, ultimately passed with one amendment—namely, that the deputy chairman of the representative body was retained as an ex-officio member.

In the afternoon the discussion on the constitution of council was interrupted to consider a series of resolutions on the relationship to the association of the autonomous bodies—the General Medical Services Committee and the Central Consultants and Specialists Committee. Lord Horder spoke eloquently for those who viewed their existence with anxiety. He was uncertain of the difference of meaning between autonomous and independent. There was a danger that the representative body might emasculate itself by continuing to add these bodies. Disaster could be avoided only if the repre-

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[1] Poliomyelitis: a Survey of the Outbreak in Scotland in 1947. Department of Health for Scotland, Edinburgh. H.M. Stationery Office. Pp. 83. 1s. 6d.

[2] *Lancet*, Feb. 25, p. 369.

[1] *Brit. med. J.* Jan. 28, suppl. p. 29.

As regards school-children, we recognise the risks attached to school life, when the child is trying to adapt himself, physically and mentally, to life outside the family. It is during school life that the child learns to stand on his own feet and gains an impression of the tasks ahead of him throughout life. The task of helping him can best be carried out by close coöperation between parent and teacher. The school medical officer should play his part in keeping the teacher up to date on health matters, and it would be a good scheme to have one teacher in every school specially interested in health education. Recently, at the Institute of Education, attached to the University of Bristol, a special course on public health was organised for those teachers in the training colleges who are responsible for teaching health education. We hoped to give them first-hand experience of public health in practice and thus make it easier for them to teach their subject. Group conferences are valuable but do not take the place of personal contact between the parent and the teacher. All these methods of tackling the problem help, but it is of prime importance that the parent and the teacher shall confer regularly on the question of the child's upbringing

Puberty and adolescence are periods of life when the individual requires special assistance. Again the parent is the best guide. The health visitor, the teacher, and the family doctor can help, but in my opinion they should not come between the child and his parent. Alas, sometimes there is no parent, or perhaps he or she is useless. In these cases a suitable substitute must be found.

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> The headmaster of a village school used to give a word of advice to his leavers ; he believed it helped them to know what to do and what not to do when they had left school and had to fend for themselves. On one occasion he told a class of boys about the importance of kindness to animals—it was his pet subject. As an example of cruelty he told how once he saw a boy dropping peas into the ears of the miller's donkey. Now, imagine his surprise when he found out that, instead of deterring the boys from doing the same thing, he had actually put the idea into the heads of two or three of them. These two or three tried the experiment for themselves, to see what would really happen.

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OLD AGE

We hear a good deal today about the burden of old age. In actual fact we are told that roughly only one in thirty of the aged people are so unhealthy and so dependent as to need special care. But many of these could have been, and can still be, saved from this dilemma and so claim their independence. How much suffering, of which we may never hear, many of the remaining 29 are bearing in silence. There is no doubt at all that there is a big field of prevention in old age. A simple example : the gradation of physical effort as old age advances would prolong the useful period of life in many cases. But perhaps the mental aspect of this problem is the most difficult, for by the time a person has reached this stage of life he is very much a creature of habit. It is sometimes as dangerous to try to correct life-long habits as it is to try to inculcate new ones.

Retirement from active work may be a great danger to health in the later years of one's life. During my association with public life I have seen useless old age strike down councillors and aldermen when they were retired to make room for the younger generation. This must also often happen in industry. Surely there should be no competition here. Can it be that there is no way to occupy the older people without hindering recruitment of the younger generation into public life ? The late Sir Humphry Rolleston had suggestions to make[1] :

> "Retirement is a problem beset with anxiety and danger ; a successful business man when relieved of routine and able to indulge in idle luxury and, without hobbies may rapidly degenerate. He now has to find occupation to kill time instead of time to do all he must ; he begins to feel that 'his day is done,' that he has little but his dinner to look forward to, and that at last he is old and a 'has been.' Thus auto-suggestion, even if not helped by suggestion from outside, hurries him on the downward path ; any trifling ailment, such as rheumatism or indigestion due to over-feeding, may arouse very hypochondriacal anticipations, and observation of contemporaries with premature senile changes may feed the flame of this destructive auto-suggestion. There is, therefore, a basis for the idea that senility is catching, and for seeking the companionship of the young and thereby letting auto-suggestion work in a constructive direction. A well-occupied mind, a happy disposition that thinketh no evil, naturally smiles instead of frowning on a stranger or a new idea, free from anger, hatred, and jealousy, the vice that gives no pleasure to anyone, and an attitude of charity in its original and best sense to all, tend to prolong life and make it a happy, healthy prelude to crossing the bar. In Sir James Crichton-Browne's words, 'the best antidote against senile decay is an active interest in human affairs, and those keep young longest who love most.'"

EPILOGUE

We are told that people in this country are much healthier today than they used to be. If we evaluate health statistically according to the death-rate, the number of cases of infectious disease, and the amount of morbidity, we can come to no other conclusion. But is that the whole story ? As doctors, we look at life and its problems from one direction. We think that the greatest, if not the only, worry that can enter any home is sickness. Of course, when we visit the home that is so, and everything else is pushed aside so that we may get on with our job. But sickness is only an incident—there are many day-to-day worries and tasks which occupy the attention of the home. In the struggle with these, good health in mind and body is a great asset. But it is whether or not these obstacles are overcome and what impressions the struggle leaves on the mind and body that decide in the end whether or not life has been worth living.

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[1] Rolleston, H. Aspects of Age, Life, and Disease. London, 1928.

HEALTH SERVICE ACCOUNTS

THE system of control and accounting in the National Health Service is examined by the Comptroller and Auditor-General in his report on the civil appropriation accounts for 1948–49.[1]

REGIONAL BOARDS

The report draws attention to an important difference between the practice of the regional hospital boards in England and Wales and in Scotland. Whereas in England and Wales management committees submit separate estimates (which may be curtailed by the boards), in Scotland the boards exercise direct and continuous control of current expenditure and incorporate the accounts of all their management committees in their own accounts; and they have their own auditors to conduct a running review of the committees' expenditure. "The direct and early knowledge of local circumstances available to the Regional Boards as a result of this audit is expected to enable them to correct promptly any extravagant practices"; and it should also assist them materially in their examination of the management committees' estimates.

The first estimates were founded on expenditure in 1946, and in the absence of uniform costing data or statistical information, examination of these estimates could not be based on the comparisons and other checks which are normally relied on for effective budgetary control.

> "Regional boards thus appear to have had little basis either for critical examination of the estimated maintenance expenditure or for judging the relative priority of the numerous capital schemes proposed by some Committees. These conditions to some extent continued to vitiate comparison for 1949–50."

Regional boards have represented that adequate examination of estimates is further hampered by the short time allowed in order to comply with Parliamentary estimates procedure. Some have also expressed the view that the absence of power for them to regulate management committees' establishments has led to excessive staffing and duplication of posts between committees and boards. The treasurers of the boards in England and Wales, in response to an invitation from the Ministry, have made suggestions for strengthening financial control which would bring the system closer to that in Scotland. "The Ministry consider, however, that most of these would be inconsistent with their policy of delegating responsibility to the Committees."

> "The Departments adopted the system of approved budgets as a means of retaining control over total expenditure while giving a reasonable degree of freedom and responsibility to their agents. . . . They see no reason . . . to suppose that when the system has had time to settle down it will not be effective or will lead to extravagance and waste. They consider that, in the long run, dissemination of information of establishments and costs among the hospital authorities themselves, coupled with investigation of particular cases, is likely to provide a more effective check than an attempt to control detailed items in advance. To this end arrangements are being made to instal appropriate costing schemes."

EXECUTIVE COUNCILS

The report states that examination of the records of payments made to general practitioners by executive councils in the period from July 5, 1948, to March 31, 1949, suggests that net earnings as a whole exceeded the Spens (1939) rates by appreciably more than 20%.

> "In particular, the proportions of doctors receiving over £2000 and £2500 (plus betterment) respectively appeared to have been considerably higher than those suggested in the Spens Report. The Departments inform me, however, that they have at present insufficient information as to actual expenses to judge whether the allowance made for these in arriving at the net incomes is adequate. For this reason, and because of the special circumstances prevailing during the initial period, the results of this period by themselves are not considered to justify precise conclusions. They propose to obtain more detailed information of earnings in the year ending 31 March, 1950."

As to the remuneration of dentists, summaries of payments authorised by the Dental Estimates Boards to some 6000 dentists in the period from Oct. 1, 1948, to March 31, 1949, show that about 59% were earning from the N.H.S. at a rate above that intended for full employment therein. Some 1300 (22%) received from the N.H.S. alone gross incomes exceeding £6000 a year. These would be equivalent to over £2880 net if expenses continued at the estimated rate of 52%, or more if, as is probable, expenses did not increase proportionately to fees. Figures recently furnished by the Dental Estimates board for Scotland for the year ended last October suggest that many dentists are still obtaining remuneration much in advance of the Spens scale. Of 688 single-handed dentists the gross fees approved for 138 (20%) were over £6000, and for 7 (1%) were over £12,000. These figures do not take into account the interim cut in earnings over £400 a month, but they include some work at the reduced fees.

Disabilities

49. FACIAL INJURY

WAR-SCARRED London has many reminders of the years 1939–45, but besides its buildings there are many human beings who have outward scars, for show. Many people are very conscious of these scars, for a disfigured face is always noticeable to some extent.

I was one of those unfortunate people who suffered from the flying bombs, having fragments of plate-glass embedded all over the left side of my face and various other parts of my body. However I can now take my place in the world and work for my living like any other normal being. All this has been due to the skill of the plastic surgeon who has rebuilt my face.

In front of me as I write I have a series of photographs, the first taken four days after I was injured. The transformation has been slow (it is now only just a year since I had my last operation, and I was a casualty in 1944); so patience is an essential part of the process of reablement. I was never one of nature's beauties, nor did I ever hope to be, but the face is an integral part of the character of any woman. One's whole attitude to life can be changed by one's appearance.

I never asked for sympathy from anyone; and it seemed to me that if I was going to enjoy my life I had to be cheerful. Nothing can be gained by going about with a long face and carrying eternal hatred in one's heart.

Altogether, I have been in hospital twelve times over a period of 5½ years, and each time another stage has been reached. Apart from losing my left eye, I had suffered severe damage to the right one, and I was almost blind for about 8 months. I had to rely on friends to take me out of doors for exercise. But I never gave up hope of being able to see more one day, and I had to learn to be patient, which was not one of my strong points.

While I was lying in bed during my first spell in hospital I felt I must do something to occupy the time; having been, before my accident, an expert knitter, I decided to try knitting again. Dish-cloth cotton and needles were brought in and I started! Imagine my joy when I found that I could knit very well without seeing. From dish-cloths I progressed and soon I was able to make all sorts of small garments. During my first convalescence I made baby garments and so earned pocket-money.

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[1] Civil Appropriation Accounts (classes 1–9) 1948–49. H.M. Stationery Office. Pp. 480. 9s. 6d.

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> "Retirement is a problem beset with anxiety and danger ; a successful business man when relieved of routine and able to indulge in idle luxury and without hobbies may rapidly degenerate. He now has to find occupation to kill time instead of time to do all he must ; he begins to feel that 'his day is done,' that he has little but his dinner to look forward to, and that at last he is old and a 'has been.' Thus auto-suggestion, even if not helped by suggestion from outside, hurries him on the downward path ; any trifling ailment, such as rheumatism or indigestion due to over-feeding, may arouse very hypochondriacal anticipations, and observation of contemporaries with premature senile changes may feed the flame of this destructive auto-suggestion. There is, therefore, a basis for the idea that senility is catching, and for seeking the companionship of the young and thereby letting auto-suggestion work in a constructive direction. A well-occupied mind, a happy disposition that thinketh no evil, naturally smiles instead of frowning on a stranger or a new idea, free from anger, hatred, and jealousy, the vice that gives no pleasure to anyone, and an attitude of charity in its original and best sense to all, tend to prolong life and make it a happy, healthy prelude to crossing the bar. In Sir James Crichton-Browne's words, 'the best antidote against senile decay is an active interest in human affairs, and those keep young longest who love most.' "

EPILOGUE

We are told that people in this country are much healthier today than they used to be. If we evaluate health statistically according to the death-rate, the number of cases of infectious disease, and the amount of morbidity, we can come to no other conclusion. But is that the whole story ? As doctors, we look at life and its problems from one direction. We think that the greatest, if not the only, worry that can enter any home is sickness. Of course, when we visit the home that is so, and everything else is pushed aside so that we may get on with our job. But sickness is only an incident—there are many day-to-day worries and tasks which occupy the attention of the home. In the struggle with these, good health in mind and body is a great asset. But it is whether or not these obstacles are overcome and what impressions the struggle leaves on the mind and body that decide in the end whether or not life has been worth living.

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1. Rolleston, H. Aspects of Age, Life, and Disease. London, 1928.

undoubtedly have a useful function to perform in addition to the supervision carried out by doctors and midwives." As to the domiciliary midwifery service, some time elapsed before midwives appreciated that the maternity medical service (giving every expectant mother the opportunity of supervision by a doctor antenatally and postnatally, and his attendance at the confinement if necessary) does not place them in the position of maternity nurses; "and in some areas the position is not yet clearly appreciated by the professions."

The new administration has brought under control diverse, though related, services without serious disturbance in their functioning. Already, says the report, some branches of the service were providing facilities which were better and more readily available than before—for example hearing-aids for the deaf.

EPIDEMIC DISEASES

Influenza.—The outstanding epidemiological feature of 1948 was the absence of epidemic influenza. In the first quarter of the year deaths from this cause in the great towns numbered only 280—by far the fewest ever recorded—and it is doubtful whether influenza virus was responsible for any of these deaths since in no instance was influenza virus recovered in the laboratories.

Smallpox.—For the third time in a decade there were no importations of smallpox. "Nevertheless, our experience in 1947 . . . emphasises the importance of applying strictly the well-tried methods for the control of smallpox, whenever its presence is even suspected." The repeal of the Vaccination Acts by the National Health Service Act was followed by an alarming decline in infant vaccination; and the proportion of infants primarily vaccinated during the second half of 1948 was no more than 20%. In 1940 the corresponding rate was 31·5%, and in 1946 it was 41·6%, the average for the ten years 1937–46 being 36·8%

> "It is impossible," Dr. E. T. Conybeare writes, "at present to be certain of the causes of this substantial decline in the acceptance of infant vaccination. The outcome of any introduction of smallpox into this country now depends to a great extent on whether the disease is detected during the first generation of cases, and also on the degree of movement of infected persons before they are diagnosed and isolated. Prompt detection and isolation of smallpox patients cannot be guaranteed, and the greater the decline in the acceptance of routine infant vaccination the heavier becomes the responsibility of those called upon to decide about the policy of recommending general vaccination in dealing with a smallpox outbreak in the initial stages, when its source and full extent may be uncertain. Where, as in Glasgow during 1942 and again in New York during 1947, the populations exposed to infection were very large the wisdom of the decision to recommend general vaccination in the face of an outbreak of smallpox which had escaped detection and control in the earliest stage can hardly be questioned."

Dr. Conybeare goes on to remark that it does not seem to be realised widely enough that the vaccination of a civilian population is now increasingly affected by international considerations as well as by those which are national or individual. There is no young infant for whom parents may be sure that in future there will be no obligation to undertake military service or to travel abroad. "If, as is generally believed, primary vaccination can be most easily and safely performed in infancy then it becomes the duty of parents to see that it is not postponed to a later age."

And the chief medical officer remarks:

> "The National Health Service Act provided, at the instance of the negotiating body, that local health authorities should invite every practitioner engaged in general medical services to play his part in maintaining an adequate state of immunity against smallpox in the population, and it is hoped that family doctors will do their utmost to correct this serious gap in our defences against this pestilential disease. A serious responsibility rests upon us all to prevent the tragedy of smallpox again becoming endemic in this country."

Diphtheria.—By contrast the figures for diphtheria immunisation showed a gratifying improvement. In the section by Dr. W. H. Bradley and his colleagues, the number of immunisations is shown to have risen from 589,343 in 1947 to 702,744 in 1948; and in addition 490,383 children received a reinforcing injection. The over-all percentage of children immunised increased to 63·5. During the year 3575 cases of diphtheria were notified, with a death-rate of 4·4 per 100 notifications; the figures for 1944 were 23,199, and 4·0.

Scarlet fever.—Notifications of scarlet fever numbered 74,824 and deaths only 37. The death-rate at ages under fifteen was 2 per million, compared with 3 in 1947 and an average annual rate (at ages under fifteen) of 2282 per million in the decade 1861–70.

> "The reduction in the case fatality rate, though in part attributable to the sulphonamides and penicillin, is probably in the main, due to a remarkable natural trend, which has lowered the virulence of the disease. Cyclical trends in the pathogenicity of the *beta* hæmolytic streptococci are well recognised epidemiological features. At present its pathogenicity seems at its lowest ebb. When or whether the picture may change in this country, as it did in the United States of America during 1944, and scarlet fever emerge again as 'the fever,' we do not know."

VENEREAL DISEASE

The steep fall in the clinic figures for early syphilis in 1947 was repeated in 1948, the total number of patients attending for the first time falling from 14,166 in 1947 to 10,637 in 1948, 6603 of these being men and 4034 women. The fall was less pronounced in some large seaports, and clearly there were still large reservoirs of infection in a few great inland cities. The incidence was still more than twice that in 1939.

In his section of the report Dr. G. L. M. McElligott remarks that in view of the great increase in early syphilis in 1946, it was perhaps too much to expect that the fall in first-year congenital infections in 1947 would continue during 1948; and the number of these infants did in fact rise from 343 to 372.

> "A possible explanation of this rise is that the growing practice of routine antenatal blood testing has unearthed more latent infections in pregnant women. Infants born of such mothers, even where the latter have been treated during their pregnancies, often show temporarily positive blood tests for the first few weeks of life. This does not necessarily indicate infection, and it seems likely that an increased proportion of these infants may have been wrongly diagnosed as syphilitic and so included among the first year congenital cases."

The number of cases of late or latent syphilis attending the clinics for the first time rose from 5971 in 1947 to 6492 in 1948.

With regard to gonorrhœa, the clinic figures showed a further fall, male infections declining from 29,647 in 1947 to 25,006 in 1948, and female infections from 7019 to 5306. "The continuing disproportion between the male and female numbers suggests that many women still do not realise they are infected and emphasises the need not only for education and contact tracing, but also for improved methods of cultivating the gonococcus in the laboratory."

> "There is no evidence that ignorance is responsible for many of any male infections. On the other hand the high reputation of penicillin in gonorrhœa is becoming almost too well known and multiple re-infections are often due to a cynical appreciation of its efficacy."

There was some evidence that non-gonococcal urethritis might be becoming more common.

ACUTE RHEUMATISM

Between 1931 and 1935 the number of deaths classified by the Registrar-General as due to rheumatic fever

After a certain amount of repair work had been completed I was able to return to my old job—that of a pharmacist in a London hospital. I was able to see much better, but I found that a one-eyed person has many difficulties to overcome—that of focusing and seeing objects suddenly appear from the blind side being two such difficulties.

I was greatly cheered to find that I could still dispense accurately and from that time onwards I was very keen to get on with the repairs, as I wanted to find a permanent position. Having to go back to hospital so often made it difficult for me to take a job where I was in control. To achieve my present position—that of director of an old-established pharmaceutical business—I had to go through many stages. One of the most exciting moments, from my point of view, was when I first had my artificial eye. This may sound trivial, but it meant that I was, once again, in appearance at any rate, more like my fellows. Now that my face is complete the quick passer-by notices little if anything amiss. The hospital almoner made arrangements for me to visit cosmetic specialists who give free advice on make-up for scarred faces. At the Max Factor Salon I was taught which preparations to use, and my face was made up by them to show me how to apply these products to the best advantage. When they had finished no-one would have known I had a single scar on my face.

The Wolfe graft on my forehead is of much lighter colour than the rest of my face, but my hair always had a natural wave over this side of my forehead and so can be arranged to cover most of the graft.

My artificial eye is made of plastic. The main advantage of this material is that the eye is unbreakable, however roughly treated. The colouring has been so well matched that it is difficult to tell which eye is real: in fact many people have told me how fortunate I was not to lose my eye, and needless to say I did not disillusion them. The socket requires frequent washing, but the eye itself needs little, if any, care. I usually remove it when washing my face, and it is easily rinsed under the tap. Only one chemical has any effect upon it, and that is chloroform; so I have to be rather careful when dispensing, as it would be somewhat disconcerting to feel one's eye gradually dissolving.

Wherever I have worked people have been exceptionally kind and understanding. Only once have I had any unkind words said to me: "Wouldn't you rather have died than go about with a scarred face?" That thought had never entered my head, for there are so many things in life to do.

To me there seems to be a choice for those with facial injuries: either you fight on and face the world or else you go behind doors and lead the life of a recluse. The second choice was never, at any stage, mine—even in the beginning, when I was a mass of bandages—and I would encourage all who have similar injuries to realise how much there is to be gained by leading a normal life.

At first one can never be sure of other people's reaction to a disfigured face, and it hurts one's feelings to see any one shrink. But in time one learns to watch others with detachment. When they realise that one's face is scarred they are apt to become somewhat embarrassed and to wonder whether they should look or not. What does it matter? I have been told by many people who know me that after a time they don't notice any disfigurement at all. In time people will get used to seeing these scarred faces, and there are quite a number about in the world today.

Many times I have thought how lucky I have been compared with some of my fellow citizens; for I have good health, two good arms and legs, and one reasonably efficient eye; and, above all, I have been able to carry on with my career.

Public Health

STATE OF THE PUBLIC HEALTH

RETROSPECT OF 1948

THE ninth year of austerity, 1948, was memorable in many ways, writes Sir Wilson Jameson, chief medical officer to the Ministry of Health; for

> "it was one of struggle against economic adversity in the shadow of international gloom intensified in June by the blockade of Berlin, continual anxiety as to the air-lift to that beleaguered city and growing tension in the Near and Far East. But all these and many other depressing circumstances, the British people took with their usual good-tempered grumbling and that cheerful confidence in ultimate success which has never yet deserted them."

It was a memorable year in other ways as well. On July 5 the National Health Service began its colossal task.

START OF THE HEALTH SERVICE

The start of the service is reviewed in the Ministry's report[1] by Dr. G. E. Godber. The immediate advance was not that all things were at once available, but that there was now a way to secure them in the future. Fortunately, such confusion as arose at the change-over was for the most part in offices rather than in hospital wards, doctors' surgeries, or any of the other places where the patient is served.

In the preparatory phase the greatest pressure fell on the hospital service; and soon after the service started, new factors began to appear. Outpatient attendances began immediately to rise; and the increase was particularly noticeable in gynæcology, radiology, pathology, and ophthalmology. This was not unexpected and "indeed marked only an accentuation of a change already apparent before the appointed day—a change which is steadily increasing the emphasis on hospitals as centres for diagnosis rather than mainly institutions providing beds for the treatment of the sick." There was also an increase in the demand for pathological and radiological investigation for general practitioners.

An appendix shows that between July 5 and Dec. 31, 1948, the 4756 specialists undertaking domiciliary work visited 29,246 patients.

Another early effect was an increased demand for beds for the elderly chronic sick. This was more apparent in London and the South than in the industrial North, and again it was an acceleration of a trend already existing before 1948. During the winter the position, especially in London from January to March, 1949, became extremely difficult, and many old people could not be admitted despite acute illness. The rapid development of home-help services and the extensive use of home nursing did much to relieve hardship, "but there is no doubt that many households and particularly elderly couples living alone need greater relief than such services can give."

With regard to health centres, the only scheme approved for the construction of a new centre was that of the London County Council at Woodberry Down, on which work is now proceeding. No authority has yet put forward a comprehensive programme in a scheme for centres, "and it would be undesirable to confirm such a programme, if one were submitted, in view of our present inexperience in this field."

In some areas the attendances at antenatal clinics fell away as a result of expectant mothers seeking antenatal advice from practitioners booked under the maternity medical service. "It is to be hoped that the since they valuable work of these clinics will not be lost, and classes, in which it spreads very quickly with a high attack-rate, the effect on man-power in industrial areas may be considerable. When the day nurseries close, mothers are kept away from work in the factories, and they may remain absent for several weeks because they hesitate to return the child to the nursery until it is quite well.

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[1] Report of the Ministry of Health for the Year ended 31st March, 1949, including the report of the chief medical officer on the state of the public health for the year ended Dec. 31, 1948. Cmd. 7910. H.M. Stationery Office. Pp. 373. 7s. 6d.

Notifications.—The incidence is much higher than notifications indicate. Many cases of Sonne dysentery are never seen by doctors. This may be why notifications, when they are made, relate to cases occurring in nurseries and other communities under continuous medical observation. In the absence of fully effective notification, it is difficult to gauge the amount of infection in the ordinary population.

Prevention and Treatment.—Because of its rapid spread, and (in the case of day nurseries) dissemination to the homes from which the children come, early ascertainment and removal of children with gastro-enteritis is imperative, and the general standard of hygiene in the nurseries must be stepped up to the highest possible level. For treatment, there is still some debate about the best drug to use, but sulphadiazine may have advantages.

Smallpox

The following notes describe the origin of the Glasgow outbreak of smallpox:

1. The S.S. *Chitral* left Sydney on Jan. 21 and called at Colombo (Feb. 8), Bombay (Feb. 11), Aden (Feb. 16), and Port Said (Feb. 20–22). She docked at Tilbury at 03·30 hours on March 5. The voyage was without incident in regard to infectious disease. She disembarked 718 passengers including a spare crew of 133: her own crew, numbering 336, remained with her.

2. The spare crew divided and dispersed. On March 5, 52 Indian lascars went to a seamen's hostel in Glasgow, proceeding by coach to Euston and thence by train. Another 61 went by charabanc to South Shields where they immediately joined another ship. On March 7, 20 Goanese went by coach and train to Glasgow, where they immediately joined another ship.

3. On March 7 one of the men in the seamen's hostel at Glasgow sickened. Some hours after admission to Knightswood Infectious Diseases Hospital on March 10, he developed a macular rash which later became vesicular and was diagnosed as varicella by competent opinion. He was discharged on March 23 to the seamen's hostel but was afterwards admitted to the Smallpox Hospital.

4. On March 23 a nurse who had attended the lascar sickened with tonsillitis. On March 25 she developed spots on the face. By the 27th she was diagnosed as having confluent smallpox.

5. Two other nurses and two patients who were ward contacts with the seaman had been removed to the Smallpox Hospital by March 28. Within the next two days the diagnosis of smallpox was confirmed in three of these.

6. Up to March 29 six other persons had been admitted to the Smallpox Hospital for observation because they had been close contacts or for other sufficient reason.

7. Two of the confirmed cases infected in the hospital had travelled during the period of infectivity: contacts have been under surveillance outside Glasgow, particularly at Rosyth and Kirkcaldy.

8. The crew of the *Chitral* and the relief crews were inspected and found to be free from signs of infection. The passengers had dispersed twenty-two days before the possibility of infection on the ship was known, by which time the usual practice of sending warning notices from the port to the medical officers of health for the districts to which passengers had departed would have served no useful purpose. On March 27 steps were taken to contact these passengers by radio and press notices. Three days later there was no report of suspicious illness amongst them.

Scarlet Fever

During the past two months notifications of scarlet fever have approached or exceeded 2000 each week, compared with 1200–1400 a year ago and a median of about 1200 during the same season in the years 1941–49. There also appears to be a much greater prevalence of streptococcal sore throat, with its otic and other suppurative lesions, than has been seen for some years past. In fact in some districts what is colloquially called "flu" appears to be due to a primary *Streptococcus pyogenes* infection.

The medical superintendent of an infectious-diseases hospital in Essex has reported as follows:

> "My impression is that we are now seeing more 'sharp' attacks of scarlet fever; more patients are admitted with complications, and more complications occur within a day or two of admission, which rules out those complications arising out of cross-infection with another strain. Most of the complications are otitis media and adenitis. One child was admitted recently almost moribund and her life was only saved by penicillin. There were no other signs or symptoms to account for the condition and the cerebrospinal fluid was quite normal. Another feature of the recent epidemic is the increased number of adults (that is, over the age of 21 years) admitted with scarlet fever."

Eighty years ago scarlet fever killed more children under 15 years of age than did respiratory tuberculosis at all ages. The death-rate in the decade of 1861–1870 was 2617 per 1,000,000 population. Since 1943 it has fallen to less than 10. The fall in incidence and mortality was an epidemiological phenomenon and not due to chemotherapy. Should highly virulent types of *Streptococcus pyogenes* again emerge, vigorous control measures applied in the localities where they first appear are strongly indicated. Practitioners should call the attention of medical officers of health to a change in virulence when they notify severe cases of scarlet fever.

Statistics for England and Wales

In his latest quarterly return,[1] the Registrar-General reports the following figures for the three months ended Dec. 31, 1949:

Births totalled 169,563, representing a birth-rate of 15·4 per 1000 population. These figures compare with 183,278 births and a rate of 16·6 for the preceding quarter, 179,473 births and a rate of 16·4 for the corresponding quarter of 1948, and an average birth-rate for the fourth quarter of the five years 1943–47 of 17·1.

Stillbirths.—The 3903 stillbirths registered represent 22·5 per 1000 of the total live and still births.

Deaths.—The number registered was 128,349, representing a death-rate of 11·6 per 1000; this compares with 11·5 for the corresponding quarter of 1948, and an average death-rate for the fourth quarter of the five years 1943–47 of 12·0.

Deaths of children under one year numbered 5643, representing an infant-mortality rate, provisionally corrected, of 32 per 1000 related live births; this was the lowest ever recorded for any fourth quarter. The diarrhœa death-rate for children under two years of age was 2·9 per 1000 births, compared with 2·8, 4·0, 2·4, and 2·6 in the four preceding quarters.

Deaths from acute poliomyelitis and polioencephalitis (provisional total excluding non-civilians) numbered 319, compared with 83, 27, 28, and 250 in the four preceding quarters.

Natural Increase.—The births registered exceeded the deaths by 41,214.

The return gives the following figures for the whole year 1949:

Stillbirths.—The rate was 23 per 1000 total live and still births, the lowest ever recorded.

Deaths.—The total death-rate was 11·7 per 1000 total population. This was 0·9 above that for 1948. Infant mortality was 32 per 1000 related live births, and was the lowest ever recorded.

Natural Increase.—Births exceeded deaths by 220,749. The corresponding increase for the preceding year was 307,073, and the average for 1943–47 was 265,728.

Population Estimates.—The estimated population for the year was 43,785,000 (total) and 43,100,000 (civilian)—an increase of 283,000 and 350,000 respectively over the estimate for 1948.

Births.—The provisional birth-rate was 16·7 per 1000 total population (1·2 below that of 1948). The illegitimacy rate was 50 per 1000 live births (18 per 1000 below the average for the preceding five years).

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[1] The Registrar-General's Quarterly Return for England and Wales: Births, Deaths, and Marriages; Infectious Diseases; Weather; Survey of Sickness; Population Estimates. Quarter ended 31st December, 1949. H.M. Stationery Office. Pp. 33. 1s.

averaged 1210 annually. Thereafter deaths declined more or less steadily to 366 in 1946; but they rose to 400 in 1947 and to 447 in 1948. Yet in the three areas where the disease is notifiable, the incidence during 1948 was less than 1 per 1000 of the child population.

TUBERCULOSIS

The over-all mortality from all forms of tuberculosis reached a new low record—505 per million living. Dr. Norman Smith draws attention to the disturbing increase in the proportion of deaths from tuberculosis of patients not notified before death. Whereas before the late war these were about 1 in 8 of the deaths, they are now almost 1 in 6.

At June 30, 1948, there were 29,420 tuberculous patients receiving institutional treatment—an increase of 7% over the 1947 figure. The increase in the waiting-list, however, was about 12% Some 966,000 civilians were examined by mass miniature radiography, bringing the total thus examined since October, 1943, to 2,985,607, of whom more than 94% were found at the time of examination to have no abnormal chest condition. Previously unsuspected active tuberculosis of the lungs was found in less than 4 per 1000 persons examined.

CONSERVING HOSPITAL BEDS

In the section on hospitals Dr. Charles Maitland draws attention to various means of saving acute hospital beds, as by the greater use of outpatient departments for diagnosis and treatment, or by providing simple hostel accommodation. The time of fully trained nurses can be saved by planning the wards to make observation of patients and their service easier; by reducing as far as possible time-consuming routine nursing procedures such as bed-panning; by encouraging patients to help themselves; and by employing ward "helps," ward orderlies, and other sorts of hospital personnel who, if of suitable temperament, can competently carry out many nursing services customarily reserved for fully trained nurses.

An appendix gives the total number of beds under regional boards and boards of governors as 504,209 (non-teaching 477,729, teaching 26,480), of which 64,695 were temporarily unavailable on Dec. 31, 1948. The number of maternity beds available on that date was 18,786.

"SUFFOCATION" IN INFANCY

The section on child-care refers to the increase in deaths of infants under one year of age ascribed to accidental mechanical suffocation.

Through the maternity and child-welfare group of the Society of Medical Officers of Health, information was collected on 94 cases. In 49 of these 94 deaths cases, death was ascribed to inhalation of stomach contents, in 42 cases to smothering, and in only 3 to disease—i.e., tracheobronchitis or pneumonia. In 68% of the cases the maternal care was regarded as good or satisfactory. In only 9 cases was it recorded that the mother went out to work; and in all but 1 of these 9 the deaths occurred at night or on a Sunday, when the infant was in its mother's care. 73% of the infants were legitimate, so that illegitimacy with its risk of poor mothering could not be regarded as a strong factor. The available information did not suggest that wrong feeding methods or maternal carelessness or preoccupation was a preponderating factor.

Despite accounts indicating that many deaths which clinically might be attributed to suffocation have been traced to infection or other abnormality, "it is still common for no autopsy to be made on a case of alleged mechanical suffocation, reliance apparently being placed entirely on circumstantial evidence at the inquest." Thus, in this series of 94 cases there were 42 where death was recorded as due to smothering in the infant's cot or in its parents' bed, but autopsies had been made in only 24 of these; and "it appears still more uncommon for any microscopic examination to be made, the finding of inhaled stomach contents or the signs of asphyxia being accepted as the cause of death rather than as possibly merely terminal events . . . the coöperation of coroners and pathologists is needed to elucidate the causes of the increased incidence of these deaths."

Influenza

A previous note (March 18, p. 520) reported the incidence of influenza and pneumonia up to Feb. 25. In the following tables the figures for the four weeks ending March 18 have been added. Although during this period, there has been a steady increase in "influenza" deaths, the aggregate of 429 deaths in the 126 great towns compares with 1246 during the corresponding four weeks in 1949. The weekly figures may continue to rise slightly for a week or two, but it would be surprising if epidemic proportions were reached.

PNEUMONIA AND INFLUENZA IN GREAT TOWNS

	January			*February*				*March*		
	14	*21*	*28*	*4*	*11*	*18*	*25*	*4*	*11*	*18*
*Pneumonia**										
Notifications ..	550	487	494	594	582	630	595	505	565	593
Deaths ..	300	233	305	354	378	353	304	323	355	343
Influenza										
Deaths ..	47	39	47	61	80	76	78	76	108	167

* Including influenzal pneumonia.

TOTALS FROM FIRST WEEK OF 1950 IN GREAT TOWNS COMPARED WITH CORRESPONDING PERIOD OF PRECEDING TWO YEARS

	1948	*1949*	*1950*
Pneumonia			
Cases ..	5123 ..	7797 ..	6328
Deaths ..	3064 ..	4453 ..	3547
Influenza			
Deaths ..	242 ..	1677 ..	831

In the Northern Regions a peak of 25 deaths occurred in the week ended Feb. 11, since when deaths have fallen to zero. There appears to have been a trek from north to south, and at the end of March the main incidence was in the north-western and Midland regions. Further small rises in London and the south-west are to be expected. Throughout the year more than two-thirds of the deaths have been in persons over 55 years of age.

Dysentery

Incidence in Recent Years.—The number of notifications of dysentery in England and Wales rose to a peak in April, 1945, and remained excessive for nearly a year. In the spring of 1946 it began to fall rapidly to a low level, the lowest point being attained in June, 1947. Thereafter there was a moderate rise until in 1948 it was a third of the 1945 figure. In 1949 it was slightly lower than in 1948, but it increased in the last quarter.

Incidence in 1950.—This increase gained momentum. The averages of weekly notifications in January, February, and March were:

	Annual mean of 9 years *1941–49*	*1950*	
January ..	171	170	
February ..	195	333	
March ..	208	321	(up to March 11)

These figures suggest that a situation similar to that of 1945 may be developing.

Bacteriology.—The dysentery now gaining prevalence in the country is almost exclusively of the Sonne type.

Geographical Distribution.—So far this year the disease has been almost confined to the northern half of England, the highest incidence being in the West Riding of Yorkshire with a heavy concentration in Sheffield. In recent weeks over half the notified cases have been contributed by seven towns—Manchester, St. Helens, Lancaster, Newcastle, Nottingham, Leeds, and Sheffield.

Comparison with 1945.—Up to March 18 notifications this year totalled 3066, whereas in 1945 there were 5163 in the first quarter of the year. Thus this year's epidemic is on a smaller scale; but a spread to the south might cause a very considerable increase.

Comment.—Though in this country Sonne dysentery cannot be regarded, clinically, as a serious disease, it occasionally kills in the extremes of life. Because the attack falls mainly on young children and the disease has a special affinity for day nurseries and nursery schools tickets weren't used, my dear chap," I replied, "the matrons would be afraid of the generous theatrical folk taking offence and cutting off supplies. And they like their nurses to have little outings." By now he was in his outdoor clothes. "Well, all the same I wish someone would tell them not to come unless they really want to," he said. "Can't you do something about it?" "I'll do what little I can," I promised; and I'm doing it now.

* * *

Reinforced concrete in the construction of modern buildings makes, we are told, for sturdiness and durability. But oh! the trouble when something goes wrong with the works, especially in hospital. Some undiagnosed deep-seated mischief has tried to rear its ugly head under the floor in the kitchen of the private ward, and a pneumatic drill has been called in to unmask it. The noise and vibration are bad enough on the ward involved, but my office immediately below acts as a resonating chamber and is completely uninhabitable. No more postprandial snoozes or smokes; never was the stimulus to go into the ward (preferably to the furthest corner) greater. This must be a speeded-up version of the ancient Chinese torture where the victim lies with his forehead under slowly dripping water. Returning after lunch to find a young and well-controlled epileptic outpatient sitting in anguish, I pondered on the possibility of this fiendish instrument's having similar properties to the stroboscope, but—another blow to clinical research—my own powers of endurance failed first and we adjourned to another room. Sister has been rendered speechless (a state of affairs never hitherto accomplished by any human agency), and contents herself with helpless gestures; but one new patient, admitted for a craniotomy, said to me cheerfully: "Well, Doc., I hear you've got your instruments handy." Poor chap. He doesn't know how close he was to the mark.

* * *

Baby-sitting—after bed-time—is one of my accomplishments; in England I can do it standing on my head. A night or two of the job in Denmark however has taught me a thing or two, and there are still a few points in the contracts which, I think, need clarification.

To begin with, there is some confusion as to just which babies you are minding. In a city your particular family is certain to live in a flat, and the flat will have four contiguous flats, each containing at least one baby not to mention radios, pianos, and female relatives practising soprano arias. The Danes are a cheerful and music-loving people and the evening is the time they let themselves go. The walls, floors, and ceilings of these enormous apartment buildings seem to be made of peculiarly conductive materials, so an infant with hiccups three flats along can send the really conscientious sitter-in on a stealthy tour of the home territory, only to find two sprawling young Nordics, wholly uncovered, wholly at ease, sleeping peacefully.

Again, there may be a little difficulty with language. The reassuring tucking-in after a bathroom excursion or the frank cuddle of the day-time-haughty six-year-old comes easily enough in any language; but what of imperative demands in mime leading to liftings-up and consequent tit-bit hunting in larders? My charge last night insisted on rising at intervals and demanding cotton-wool (which for all I knew was sacrosanct in its bag behind the bathroom door), which with great deliberation she rolled into pledgets and wedged into either ear. She did not appear to be in any pain, so I can only assume the act symbolic and possibly of international significance. This particular infant perturbed her parents by backsliding into baby talk in my presence; it took her mother several days to find out that this was done expressly for my benefit, because I "couldn't talk right."

Telephones are best left to ring unanswered, I find. When one cannot speak one word of the caller's language awful confusion can arise. In any further contracts I shall insist that the times of the B.B.C. news bulletins are observed as a cease-fire. It is only fair that a British sitter-in in Copenhagen should get a little reassurance too.

Letters to the Editor

WAR

SIR,—Dr. Ranyard West's statement, in his letter of March 25, that when we look in the mirror we see a war-monger, is based on profound insight.

It is interesting that the point of view which he puts forward, and that which I outlined in my previous letter (March 18), find perhaps their only modern synthesis not in a psychiatric study but in Camus's novel *The Plague*. The "plague" which Camus describes is, in essence, the irresponsible acceptance of aggressive acts as short-term answers to social problems (more precisely, in Camus's own words, it is "murder," in which he includes judicial execution, war, assassination, and many other forms of rationalised aggressive behaviour): "we are all infected with the plague, and the least we can do is to avoid coughing it in other people's faces"; and again "In this world there are pestilences and there are victims, and it is up to us not to ally ourselves with the pestilences."

The element which I find implicitly in Camus, and far more explicitly in the work of writers such as Reiwald, is the realisation that the conception of law and order which is traditional in Western European thought is itself heavily infected with conscious and unconscious aggression. Reiwald [1] points to the strikingly paranoid attitude of institutional government toward crime—society is always threatened by "armies of criminals" which have no statistical reality—and to the fundamentally aggressive and emotive basis of the idea that law and order depend upon coercion. There is a basic identity between this craving for "defence" and the "adequate defensive forces" which compete to generate an arms race. Our use of the term "public enemy" indicates something of this spill-over into our attitude towards delinquents of the diction and ideology of war. Dr. West himself has given support to this thesis in his explicit suggestion [2] that international order depends upon overwhelming force in the hands of a world authority.

The point I am making is that war is an extension not of anarchy or group hostility but of the processes which are inherent in the traditional view of government. It is precisely this tradition which is being challenged in penology, and the challenge presented by the extension of psychology to political institutions is the same. In the light of this, one may reasonably doubt whether governments do, as Dr. West suggests, confine their delinquencies to the field which lies outside domestic law-giving. If, then, the technique of war is in essence an extension of the technique of government, it might be better to rely upon a mobilisation of world opinion to resist national authority, rather than a mobilisation of authority itself, together with the legacy of psychopathic tradition which such authority already exhibits.

London, S.E.23. ALEX COMFORT.

RESEARCH ON ARTHRITIS TREATMENT

SIR,—We should like to draw your attention to the results obtained with the new preparation 'Cafestol,' one of the group of substances isolated from the unsaponifiable fraction of the seed of *Coffea arabica L.*,[3] which has now been introduced in therapeutics and has the same indications as 'Cortisone.' In our institute a first group of 16 patients treated with this substance were suffering from polyarthritis due to rheumatic fever (4), rheumatoid arthritis (8), degenerative arthritis of spine (3), and ankylosing spondylitis (1).

The results have on the whole been satisfactory. They were more evident in the inflammatory disorders, especially the acute ones; the benefit was less evident

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1. Reiwald, P. Society and its Criminals. London, 1949.
2. West, R. Psychology and World Order. London, 1945.
3. Ferrari, G. *Farmaco*, 1950, 5, 47.

Effective Reproduction-rate.—The effective reproduction-rate corresponding to the births in 1949, allowing for continuing improvement in survivorship conditions, is provisionally assessed at 1·02, indicating that the births were 2% in excess of those required by a par replacement standard.

A report on the survey of sickness in the September quarter, 1949, is also included in the return.

Smallpox at Sea

Smallpox on Merchant Ships, issued by the Ministry of Transport (notice no. M342), outlines for ships' surgeons the main clinical features of smallpox, together with notes on precautions and treatment.

Medicine and the Law

Mistake in Morphine Injection

At a recent inquest upon the death in hospital of a patient aged 72 there was evidence that he died less than four hours after having been given a half-grain injection of morphine and that the injection had been intended for another patient whose name began with the same capital letter and was perhaps otherwise slightly similar. The assistant nurse who administered the drug admitted that she had not checked the prescription with the case-sheet. The coroner expressed the opinion that such checking would have prevented the mistake. The pathologist who carried out the post-mortem examination stated that death was due to heart-failure and chronic bronchitis and was accelerated by the morphine. A verdict of death by misadventure was recorded.

Hospital practice has hitherto required a qualified nurse or sister to "check" the dose—to see that the right quantity of the right drug has been drawn into the syringe. Does the evidence at the recent inquest mean that it is now left to an unqualified nurse to administer the actual injection?

Parliament

QUESTION TIME

Surgeons in Malaya and Singapore

Mr. A. J. IRVINE asked the Secretary of State for War what was the number of British Army surgeons now serving in Malaya and Singapore; and whether he was satisfied that such number was sufficient.—Mr. JOHN STRACHEY replied: There are 7 British Army surgeons serving in Malaya and Singapore. They are available to fly to any locality where their services may be needed. This is an addition of 3 Royal Army Medical Corps surgeons to the numbers previously serving in Malaya and Singapore. I am keeping the requirement under careful review. There are, in addition, 16 European civilian surgeons in Malaya and Singapore who can be, and are, called on should Army surgeons not be immediately available.

Tuberculosis in Scotland

Replying to a question, Mr. HECTOR MCNEIL stated that notifications of respiratory tuberculosis in Scotland in 1939 numbered 4657; in 1945, 7316; in 1947, 7984; and in 1948, 8204. The provisional figure for 1949 was 8427.

Our Calorie Intake

Dr. BARNETT STROSS asked the Minister of Food whether he was aware that the total calorie intake pre-war from grain and potatoes was 34% and in 1946 was 42%; and whether he would now give the figures for 1947, 1948, and 1949.—Mr. MAURICE WEBB replied: The corresponding figures for 1947, 1948, and 1949 are 43%, 43%, and 40%. Dr. STROSS: Is the Minister aware that the last figure shows that we are undoubtedly improving the national dietary?

Mr. HENRY STRAUSS: Has the right hon. gentleman ever invited a friend to a calorie intake?

The Minister of Health has appointed Mr. W. D. Griffiths, M.P. for the Exchange division of Manchester, to be his parliamentary private secretary.

In England Now

A Running Commentary by Peripatetic Correspondents

OUR life has lately been lightened by the arrival of a displaced person—a young woman of 30 who is a Rumanian-born German. She views life in England with a mixture of suspicion, criticism, and admiration, and she is timid of venturing outside the house alone or encountering strangers. Not long ago, just before restraints on the sale of eggs were removed, I wandered out one afternoon to ask for half a dozen eggs from the smallholding nearby. On the way I met the village policeman who always likes a chat; he has a round and guileless face which invites confidences, and a broad Devon accent. Presently I swung my basket and said I must be going along, as I wanted some eggs if Mrs. Smith were at home. "She's at home," said the constable encouragingly, "'cos the man from the packing station's there. I saw his van as I passed." "Then it's no use my going," I said. "All the eggs will be gone. I'll go tomorrow." "You could go and see," said the policeman. "Look, I can see from here, he's just leaving and he'll be gone in a minute." He was clearly anxious I should not be disappointed. But I returned home, knowing there would be no eggs that day, and over tea I recounted my meeting. Then a thought struck me. "There was I," I exclaimed, "doing a little bit of black-marketing and telling the policeman all about it. *It never occurred to me not to.*" I happened to glance at Elsa and saw her face a study of horror. "Told the police!" she murmured. My husband glanced at her and began to speculate aloud on the probable length of my sentence. Presently she realised that he was joking and she relaxed, but remained puzzled. These extraordinary English, who expect their police to behave like reasonable human beings!

* * *

With a deep sigh he smeared removing-cream over his face and wiped the grease-paint off with a towel. "I'm sorry you struck such a poor evening," he said. "It was all right," I replied, "but what on earth was wrong with the audience? I've never been in such an apathetic crowd." "Nurses;" he sighed again, "from Wednesdays onward for the rest of the week we are booked out. For months ahead. But Mondays and Tuesdays are thin: I don't know why. Today the management panicked and papered the house with hospital nurses. Tell me, why are they so damnably unresponsive? Is it because they don't value anything they don't have to pay for?" I felt it was up to me to stand up for the girls. "That has got something to do with it, without any doubt," I replied. "I remember when I was handed complimentary tickets as a houseman. I guessed they couldn't be got rid of in any other way, and my approach to the show tended to be rather. . . ." I hesitated. "Hypercritical?" he suggested. "Worse than that: a sort of 'Damn-you-you-dragged-me-here-now-amuse-me' attitude. Why, I remember once walking out of a revue before the end when I hadn't paid for it." "But you weren't *forced* to go in the first place, were you?" he asked. "You're not *forced* to take the pamphlet a man in the street hands you," I said, "but you do take it and shove it in your pocket, and perhaps you glance at it before you throw it away. But you don't memorise it, or even file it away. What I mean is that my attitude was very different when I'd plonked down five-and-nine for an upper circle or stood my two hours for the pit: then I was bent on enjoying every moment of the show." I felt I was talking too much but as he was merely goggling at me and putting on his tie I swept on. "Another thing: you get a random selection by suddenly enlisting nurses who happen to be having their half-day." "Half-day?" he asked. "In a hospital most of the nurses are on duty till nine o'clock," I explained. "There is only a handful off duty when free tickets roll along. And a good proportion of these wouldn't choose a philosophic comedy for their evening out. Their cup of tea may be musical comedy, ballet, or old Vickery. But they have to take whatever comes their way." "Well," he said, "I wish they wouldn't. I'd rather they stayed away." "But if the provided precautions have been taken to exclude extraneous sources of blood, an attempt must always be made *to trace the cause of the bleeding*.

Interpreted thus critically, these tests can be indeed valuable, as you suggest. If they were widely applied in general practice, alimentary disease would be more rapidly detected at a stage when treatment can be successfully instituted.

Edinburgh. S. LIPETZ.

DIAGNOSTIC CHEST FLUOROSCOPY

SIR,—In advocating the use of fluoroscopy rather than radiography in the search for pulmonary tuberculosis, Dr. Hall and Dr. Tattersall (March 18) are taking a retrograde step. No-one can deny that an X-ray film is more reliable than screening in the detection of a small pulmonary lesion, no matter how much skill and visual purple the fluoroscopist may possess. In addition, the X-ray film provides a permanent record which may be of very great value in the future management of the patient.

Why then should we use fluoroscopy in diagnosis when a better method is available? Dr. Hall and Dr. Tattersall give two reasons—ease and speed of examination, and cheapness. In your annotation on their article you quote an impressive body of evidence, covering some thousands of cases, to show that 13–35% of clinically significant lesions are missed when fluoroscopy alone is employed. I submit that, in the campaign against tuberculosis, we cannot afford such a sacrifice of reliability for the sake of speed and cheapness.

The pioneer work of Toussaint and Pritchard in London has shown the value of coöperation between the chest clinic and the local practitioners when diagnostic radiography is available. The time has come for all tuberculosis workers to insist that every chest clinic must be provided with an X-ray plant and an adequate staff, so that a film may be taken of every patient who comes up for diagnosis. A screening apparatus is also essential in any clinic where pneumothorax refills are undertaken, but its use should be restricted to this work and to the study of movement.

Surely our task is to press for an efficient service and not, as your annotation suggests, " to think of ways of lightening the load." A revival of the obsolescent practice of diagnostic fluoroscopy would be particularly unfortunate at the present time, since it might persuade those responsible for providing the equipment of chest clinics that a relatively inexpensive fluoroscope can be substituted for an X-ray plant.

Brompton Hospital Sanatorium,
Frimley, Aldershot, Hants. A. F. FOSTER-CARTER.

SIR,—Dr. Hall and Dr. Tattersall are to be congratulated on their excellent exposition of the technique of chest fluoroscopy. But surely they go too far in suggesting that fluoroscopy should supplant, rather than supplement, radiography in diagnostic chest clinics. Practitioners referring cases to these clinics are entitled to receive a first-rate opinion based upon all relevant clinical, pathological, and radiological investigations. As far as radiology is concerned, the matter can be summarised by the following equations:

Radiography+fluoroscopy = Best
Radiography alone = Next best
Photofluoroscopy alone or Fluoroscopy alone } = Not good enough.

For years, chest physicians have been urging practitioners to send up cases for examination and chest radiography on the slightest pretext. Now that this advice is meeting with an ever-growing response, we should not resort to second-rate methods just because the volume of work is growing faster than the present provision of facilities. If it is thought that expenditure on X-ray film is likely to become too great for the country to afford, it would, in my personal view, be cheaper in the long run to spend money on research into electronic methods of enhancing the brilliance of the X-ray screen image. If this could be done, there would be little need for radiography. The money spent in the eventual treatment of even a few minimal cases " missed " by chest fluoroscopy would take us far towards achieving this goal!

Leeds. J. ASPIN.

SIR,—Dr. Hall and Dr. Tattersall are to be congratulated on their most timely article of March 18, which amplifies Dr. Tattersall's original account of the use of this method in the chest clinic. There is, unfortunately, still considerable opposition to the use of this diagnostic technique, on the grounds that fluoroscopy does not give as accurate results as does a full-size radiograph or even mass miniature radiography, and that both operator and patient are exposed to radiation risk.

Having screened for diagnostic purposes more than 2900 patients during the last eleven months, I feel that, provided a careful technique is strictly adhered to, the results obtained are at least as good as those of miniature fluorophotography. Where no pulmograph is available, chest physicians should be encouraged to make greater use of fluoroscopy in the interests both of early diagnosis and of economy in time and materials.

In our experience, several minimal apical lesions found on fluoroscopy could subsequently be identified either with difficulty or not at all on the conventional postero-anterior film, though these lesions might be demonstrable by special techniques such as the apical lordotic film. So far no patient found negative by us on fluoroscopy has subsequently been notified as tuberculous, so that it seems that no lesion of any size has been missed by this method. As Dr. Hall and Dr. Tattersall emphasise, fluoroscopy has the advantage of giving a dynamic, three-dimensional view of the lung fields, and of rendering visible obscure portions such as the posterior costophrenic sinuses, the upper and posterior mediastinum, the retrocardiac area, and the regions covered by the conjunction of first rib and clavicle.

Although we are now screening at the rate of 100 patients a week, investigation by the National Physical Laboratory showed that neither physician nor radiographer was receiving as much as 0·05 röntgen of radiation in one week. The British X-ray and Radium Protection Committee recommend that the dose should not exceed 0·5 rontgen per week. There is therefore no evidence that the method exposes the operator to any considerable risk. 3000 screenings in a year represent a notable saving both in the cost of materials and storage space and in the time of patients and staff. The ease with which a fluorography report can be obtained has encouraged practitioners to refer patients with minimal symptoms, and often only because of a bad family history or of a history of contact at work. In this way a higher proportion of early cases has been seen during the past year than previously. It is frequently objected that fluoroscopy leaves no permanent record beyond the operator's report. This is equally true of any other clinical examination except where results can be expressed in figures or by a mechanical tracing (e.g., weight, blood-count, photograph, or electrocardiogram). In my view this objection is more than counterbalanced by the obvious economic advantages.

The merits of diagnostic fluoroscopy must not, however, blind us to its limitations. It is an incomplete method of examination, and a negative report does not exonerate the general practitioner from examining his patient and, if necessary, referring him for further advice. It is noteworthy that all too often patients are referred in the degenerative forms. In the cases of polyarthritis due to rheumatic fever, pain rapidly diminished and there was progressive reduction in the articular swelling, the temperature, and the sedimentation-rate.

This substance has also been tested on 5 cases of blood disease—2 of acute leukæmia, 1 of chronic myeloid leukæmia, and 2 of Hodgkin's disease. In the cases of acute leukæmia it had virtually no effect. In the case of chronic leukæmia, however, the result was encouraging: the size of the spleen diminished and peripheral leucocytes became fewer. The results were also hopeful in the two cases of Hodgkin's disease, where the affected lymph-glands became progressively smaller.

The doses used varied from a maximum of 400 mg. (loading dose) to a minimum of 100 mg. (maintenance dose). The preparations used were always well tolerated; there was no restlessness, insomnia, or change in the blood-pressure or pulse-rate. No appreciable effect on carbohydrate and mineral metabolism has been observed.

In the cases of arthropathy the circulating leucocytes gradually grew fewer and relative lymphocytosis and eosinophilia was observed.[4][5]

Thus for the first time a substance of vegetable origin to which a formula of steroid nature has been ascribed, has been found clinically to have the same applications as the most potent steroids of animal origin. This discovery reveals a new field for biochemical research.

Institute of Pathology,
University of Pavia.

GIORGIO FERRARI
ANNIBALE ALLEGRI.

BLOOD IN THE STOOLS

SIR,—Your annotation of March 18 touches an aspect of diagnosis in which the general practitioner can play an important part. It is to his own doctor that a patient first goes, and it should be almost axiomatic that when symptoms of alimentary upset do not clear up in a few days, or where the cause of an illness is obscure, particularly in patients past middle-age, the stool should be examined for occult blood. It is true, as you say, that tests for occult blood have in some quarters fallen into disrepute. That is not because most gastro-enterologists consider them unreliable, but because of the short cut to diagnosis by X-ray examination, and because of uncertainty about interpretation of positive findings.

The test now pretty generally used in clinical laboratories is the benzidine test: it is perhaps the most sensitive of all, giving a positive result in blood diluted to 1 in 250,000 parts of water. For routine use in general practice, however, there are obvious objections to a test which gives positive results with gum-bleeding, and after the eating of meat in moderate amounts. It was to overcome such objections that Gregersen[6] introduced his slide test, universally known as the Gregersen slide test (G.S.T.). By reducing the sensitivity of the benzidine test to one-third, he produced what is now regarded as one of the most reliable tests for everyday clinical use. He discarded the unstable hydrogen peroxide and substituted the more stable barium peroxide in a concentration of 4%. Using a 50% acetic-acid solution, the benzidine concentration is kept at 0·5%. The practical application of the test is thus standardised, and leaves no room for error.

A powder containing 0·025 g. of benzidine and 0·2 g. of barium peroxide is dissolved in 5 ml. of 50% acetic acid. A portion of fæces, the size of a split pea, taken if possible from the interior of the specimen, is smeared on a clean glass slide; a few drops of the reagent are added. In the presence of blood, a blue colour, varying in intensity with the amount of blood present, develops in less than a minute. Because different makes of reagent give varying results, it is advisable always to use the same make.

The Gregersen slide test is fully described by Harrison[7] and by Hutchison and Hunter,[8] and is widely used on the Continent and in America. Boas favoured it, and Ogilvie,[9] concluded that a blue or a blue-green colour, appearing within 30 seconds, is positive proof of the presence of occult blood, irrespective of the patient's diet, with the obvious exception of black pudding, liver, bone-marrow, and other foods with a high concentration of blood pigment.

Unlike the guaiac test favoured by Hoerr, the Gregersen slide test gives no false-positive results with iron, and it requires only two reagents instead of three. Further, the reagents are stable over a period of at least six months, whereas the guaiac solution has to be renewed after a month. It is surprising, therefore, to read in the report of a discussion following their paper, that Hoerr and his colleagues had no experience of this widely used test which has so well-established a place in the textbooks.

I have used the Gregersen slide test in general practice for the past twenty years and have described[10] a series of 123 alimentary cases (including 102 cases of peptic ulcer) in which both X-ray and G.S.T. findings are available.

The G.S.T. findings were compared with the X-ray and clinical findings, including in some cases confirmation after operation. Both the G.S.T. and X-ray findings were positive in 69 (68%) of 102 ulcer cases, and in 18 (86%) of 21 other conditions. The G.S.T. was positive and the X-ray findings negative, but clinical observations and subsequent history confirmed the positive diagnosis, in 19 of the 102 ulcer cases and 3 of the 21 other cases. The G.S.T. was negative, and positive X-ray findings confirmed the clinical findings, in 14 of the 102 ulcer cases, but in none of the 21 other cases. Thus there were 22 cases which might have been missed if the G.S.T. had not been used, and 14 cases in which the G.S.T. did not support the diagnosis.

In more than two-thirds of all cases both the G.S.T. and the X-ray findings were positive. Of these 87 cases, all but 22 were first diagnosed with the G.S.T. Where the two tests gave differing results, the G.S.T. was right rather more often than the X-ray findings (22 cases and 14 cases respectively). Of the 19 ulcer cases with initial negative X-ray findings, 3, radiographed again after an interval because of a persistently positive G.S.T., gave a positive result; and 2 cases, one of neoplasm and the other of diverticulitis, both of them with initial negative X-ray findings and re-examined for the same reason, subsequently gave positive X-ray findings. These 5 cases are perhaps among the most significant in the series.

As regards ulcer only, both tests agreed in two-thirds of the cases; radiography failed in slightly under 1 case out of 5, and the G.S.T. in slightly less than 1 out of every 7 cases. For the other diagnoses the numbers are too small to give more than a strong indication: 11 cases of neoplasm; 5 which exhibited diverticulosis radiologically and had a positive G.S.T. (presumably cases of diverticulitis); and 1 case each of ulcerative colitis, regional ileitis, torsion of the cæcum, spastic colon, and pernicious anæmia.

For the general practitioner the G.S.T. can be a valuable aid to early diagnosis and treatment of ulcer. By its use he can sift and control his dyspepsias with more assurance and a better knowledge of the underlying pathology. Often it may enable him to decide more quickly which case requires the more expensive and time-consuming forms of investigation. By taking appropriate measures until all occult blood has disappeared from the fæces, it may enable him to avert the more serious complications of hæmorrhage and perforation. As the minimal amount of blood required to give a positive result varies from one person to another, a negative finding must not be considered conclusive and should always be judged in relation to the clinical picture. A positive result is always significant; and, therapeutically, and with the present-day need for economy it would seem that this secret process is a luxury the taxpayer could well forgo.

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[4] Allegri, A. Report on the meeting of the Società Lombarda di Scienze Mediche e Biologiche, Jan. 17, 1950.

[5] Allegri, A. *Minerva Med.* 1950, 41, 246.

[6] Gregersen, J. P. *Ugeskr. Laeg.* 1916, 78, 697, 752, 1197, 1260.

[7] Harrison, G. A. Chemical Methods in Clinical Medicine. London, 1947.

[8] Hutchison, R., Hunter, D. Clinical Methods. London, 1935.

[9] Ogilvie, A. G. *Brit. med. J.* 1927, i, 755.

[10] Lipetz, S. *Lancet*, 1948, ii, 587.

It is high time someone blew up this myth about manufacturers bearing the cost of research and evolution of formulæ. They do not. The consumers do. And the manner in which the consumers pay is very clearly shown in the figures given above.

In conclusion, may I, as a pharmacist, suggest that if the doctor wishes to give his patients the best medicines available but without extravagant cost, he should turn a deaf ear to the eloquence of the manufacturer's representative and ask the nearest chemist. He knows.

ARTHUR BASTOW.

Moorends, near Doncaster.

COBALT AND RED CELLS

SIR,—Having read your leading article[1] under this heading, may I draw your attention to the fact that we did not recommend cobaltous chloride by mouth in doses as high as 500 mg. Only in the first experiments, on ourselves, did we use such a dose, and we found it much too high. For treatment, as we stated,[2] we used intravenous injections.

This misunderstanding may be due to the fact that Kark, and also Castle, misunderstood our doses and erroneously cited in their papers these high doses. 500 mg. led to acute intoxication, whereas, as Kark observed, doses of 20–60 mg. are tolerated without trouble. In our clinic, cobalt therapy has been extensively used, with excellent results, since 1947. Tests in other clinics have proved that these results could easily be reproduced. Even Castle could not deny success in cases of anæmia—for example, Cooley's anæmia—where treatment had previously been unsuccessful.

You are right in supposing that cobalt is an unphysiological stimulus to erythropoiesis. I dare say that cobalt deficiency does not exist in man. Nevertheless cobalt seems to be one of the strongest stimuli to hæmopoiesis: and in certain cases one should use it—not as a panacea but only on special indications. Regarding the mechanism, may I mention that cobalt does not necessarily lead to erythropoiesis through a sort of hypoxæmia of the bone-marrow. As I tried to prove in my monograph,[3] it seems to act through blockade of hydrogen-transferring redox systems which is compensated by polyglobuly.

L. WEISSBECKER.

University Medical Clinic,
Freiburg, Germany.

GENERAL PRACTICE TODAY

SIR,—I have read the Collings report with interest. From my own experience I do not consider Dr. Collings's choice of practices a fair and representative sample. In the field survey which I undertook in 1947 and 1948 on behalf of the British Medical Association I visited nearly three times as many general practices as Dr. Collings, and included the industrial, rural, and agricultural areas, the great cities, their suburban and dormitory areas, the seaports, the holiday resorts, and the mining areas. The data which I obtained built up the narrative of general practice which is given in the British Medical Association's report on health centres, published in July, 1948.

It would be idle to pretend that the conditions that Dr. Collings describes in the industrial areas do not exist, but on the other hand they are not indicative of the general standard of general practice in this country. The encroachment of the specialist into general practice and the substitution of general practice by local-authority service has, as Dr. Collings points out, produced a state of affairs which is reducing the competence of the general practitioner to whom the patient is a member of the family and not just a case. This point was appreciated by the Health Centre Committee of the British Medical Association and it is unfortunate that Dr. Collings did not at least refer to the recommendations made in planning for the future by that committee.

Much of Dr. Collings's first recommendation, that an attempt must be made to define the future province and function of general practice, has, in fact, been carried out. Admittedly this was not carried out by general practitioners alone, but should general practitioners alone undertake this task? In the past general practice has been affected adversely by the mass production by the colleges and universities of diplomas in subjects which rightly remain within the general-practice field, and again, by the Ministry of Health in legislating for a National Health Service which has produced an isolated general-practitioner service, divorced from the specialist and preventive-medicine services. Can the future functions of general practice be defined without the coöperation of representatives of the other services?

I cannot agree with Dr. Collings's second recommendation that basic group-practice units should be formed as soon as possible. I cannot believe that group practice would be either applicable or economical in the rural and sparsely populated areas of England. Further, I think we should be realistic and face the fact that the development of group practice is unlikely in large cities where there are teaching hospitals and large numbers of practitioners in exclusive consultant and specialist practice. A more practicable and possible solution would be the grouping of general practitioners into "family practice units" as envisaged in the British Medical Association's health-centre report.

The need for early experimentation in the setting up of these units is urgent. If Dr. Collings's report—misleading though it be—produces this, it will have succeeded where more considered ones have failed.

Durley, near Southampton. J. REVANS.

SIR,—Having spent part of my weekend reading through Dr. Collings's indictment of general practice and general practitioners, I can only suggest, to start with, that to equate this very one-sided account of medical activities in Great Britain today, Dr. Collings should also "sit in on" consultants at their outpatient clinics. It is conceivable that they also might hear something to their disadvantage from the fault-finding Dr. Collings.

But Dr. Collings suffers from a not uncommon kind of snobbery in which everything done in a hospital takes on some kind of sacrosanct appearance. An examination done in hospital has some mystical properties which it does not possess elsewhere, even if equally well done. An instrument boiled in a steriliser (electric, of course) acquires aseptic qualities quite other than those possessed if boiled in a pan over a gas-ring in a G.P.'s surgery.

He forgets all the ancillaries which hover around the hospital doctor—the houseman, nurses, clerks, almoners—and he makes no attempt to assess the many stresses and strains suffered by the G.P. in his rôle of head cook and bottle-washer, and scribe as well, as he sees these hordes of patients which pass in front of him ("200 out in the garden" in one case). He fails, too, to see the "state of society" in this country today as portrayed by these queues outside a doctor's surgery, the sheer and shameless mendicancy of much of it. But Dr. Collings, the perfectionist, is too much taken up in imagination with himself conducting the practices which he was "sitting in on" (to use his quaint phrase) to see anything else much. His "absolute" standard is presumably his own self doing things as we would all like them done.

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ra *ancet*, 1949, ii, 333.
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to the clinic for what is really a primary examination, rather than for a consultant opinion. A negative report, as with mass radiography, may lead to a false sense of security, for the patient may have been examined before any radiological abnormality was demonstrable.

Diagnostic fluoroscopy is an arduous procedure for the operator, and the number of patients examined at any one session should not exceed 20, because of the risk of vigilance becoming impaired by fatigue. As Dr. Hall and Dr. Tattersall say, certain lesions are difficult to see on the X-ray screen—in particular fine miliary shadows. For that reason I would recommend that the lowest possible kilovoltage and milliamperage to secure adequate illumination should be used when examining the lung fields; otherwise the picture will be too " hard " and fine structure will be " burnt out." With the Phillips D.X.4 set and Phillips Levy-West screen, our practice has been to use on the average patient 3·5–4 mA and 60–70 kV, increasing to 5 and 75 respectively when examining the heart and mediastinum. Fat patients are unsuitable for fluoroscopy, and I have also found it unsatisfactory in the examination of children for hilar enlargement.

So long as these limitations are kept constantly in mind, I think the widespread adoption of diagnostic chest fluoroscopy is to be recommended where mass miniature radiography is not available.

Lancaster House Chest Clinic,
Southend-on-Sea.
E. G. SITA LUMSDEN.

DIET IN HYPERTENSION

SIR,—I have read with interest your leading article of March 25.

There is no doubt at all that a low-protein intake causes a definite reduction in arterial pressure. The cumulative effect of such a reduction over many years must be considerable. We have established that in essential hypertony there is a tendency to nitrogen retention (protein), and on this account alone it is vital that the protein intake should be restricted.[1] Also we found that a high-fat intake is undesirable in these cases, and that the glucose-tolerance curves are abnormal in pronounced essential hypertony.[2] We have succeeded in producing high blood-pressure in rabbits by feeding them on high calcium.[3]

The only possible conclusion from all these facts is that in hypertony there should be an all-round balanced diet of a low-calorie value. Clinical observation confirms that this is the proper dietetic régime. The fluid intake should not be restricted but should be copious.[4]

We are running in Liverpool an institute (established before the war) for the periodical examination of the normal; and the tendency has been, during the late years of the war and the post-war period, for the arterial pressure to become lower. The explanation is, I feel sure, the all-round decreased consumption of protein food. The low-protein intake of this period is very likely a factor, too, in the rise in the incidence of tuberculosis. We found that adolescents in particular require a very large amount of protein. This is the reason why I advocated some years ago the increase of the protein ration to people under 35 years of age at the cost of their elders. It may quite possibly be in the public interest that present supplies of meat should be distributed only among young people, and that the elderly should depend for protein intake on fish, eggs, &c.

Liverpool.
I. HARRIS.

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RHEUMATIC FEVER AND MILK

SIR,—In your issue of March 11, Dr. Buchan suggested that boiling milk would render milk-borne streptococci non-antigenic.

While this may be true of some antigens, it is perhaps worth noting that for the past two years we have been preparing streptococci for animal inoculation by Thulin's method. In this method the organisms are heated for one hour to a temperature of approximately 120°C in an autoclave, and the resulting suspensions are fully antigenic when inoculated into rabbits.

The Bernhard Baron Research Laboratories,
Queen Charlotte's Maternity Hospital,
London, W.6.
R. M. CALMAN.

VITAMIN B_{12} AND PERNICIOUS ANÆMIA

SIR,—Dr. Hartley, in his letter of March 25, states that vitamin B_{12} alone has failed to produce remissions in *many* patients suffering from pernicious anæmia.

These results are of great interest as they are contrary to most of the findings so far published on the effectiveness of vitamin B_{12} or vitamin-B_{12} preparations in this condition. They are also at variance with my own experience. In 19 successive patients suffering from pernicious anæmia, vitamin-B_{12} preparations have produced remissions comparable with those seen in similar patients treated with the best liver extracts. Such experience is obviously limited, and it would be of great value to myself, and I am sure to other workers in this field, if he could give further details of the therapeutic failures to which he refers.

It is, of course, too early to be certain that vitamin B_{12} alone will be as effective as potent liver extracts for the maintenance therapy of patients with pernicious anæmia, and I would agree with him that, until more information is available, categorical statements on this subject are to be avoided. My experience to date has been that B_{12} is as satisfactory as parenteral liver extracts.

London, W.12.
D. L. MOLLIN.

AGAROL

SIR,—I should like to explode one or two myths in Mr. Warburton's letter of March 25.

The first point made by him seems to me so inaccurate that one is at a loss to see the reason for his making such a statement. Compare the price paid to the pharmacist for 'Agarol' and for emuls. paraff. liq. c. phenolphthal. (current price-list and Drug Tariff):

	Agarol 14 oz.		*Emuls. paraff. liq. c. phenolphthal.*
	Retail pack	*Dispensing pack*	
Net cost	4s. 6d.	4s. 6d.	1s. 11d.
33% increase as per Drug Tariff	1s. 6d.	1s. 6d.	8d.
Purchase-tax	1s. 6d.	Nil	Nil
	7s. 6d.	6s. 0d.	2s. 7d.

If the individual pharmacist can afford to buy six large bottles of agarol at once *for dispensing only*, he may buy it free of purchase-tax. The majority of pharmacists cannot afford to, and therefore pay tax and claim it back. But even without tax, agarol is nearly 2½ times the price of the official emulsion. The fact that prescriptions having a cost (including purchase-tax) less than 5s. are priced by average does not reduce the cost of agarol in any way If it so happens that the pharmacist is paid less for agarol than it costs him to buy (and this can only happen where prescriptions for agarol are few in number), it is a tribute to his public spirit that he continues to dispense rather than an argument in favour of prescriptions for agarol.

The *N.F.* formula is different; it contains more liqu
paraffin and less water than agarol.

Agarol may well be milled to a smaller particle-
but it is open to question whether this improv

diagnosis of "debility" or "neurasthenia" would cover hypertensive failures, thyrotoxicosis, or myxœdema.

The equipment of the surgery consisted of a kidney-dish, an ear syringe, a few test-tubes, a spirit-lamp, a metal spatula, a few needles, and a pair of scissors. There was no examination couch.

Nearby were two large well-equipped general hospitals, and several special hospitals and clinics. In a few clinics cases could be treated within a reasonable time—e.g., skins, ears, eyes, and chest surgery. The laboratory service worked well, and the bacteriological laboratory very well. But the medical clinics—particularly those for cardiac, gastric, and neurological cases—and several surgical clinics—notably the orthopædic department—had a waiting-list of two or three months. Even then the diagnostic procedures arranged in these outpatient departments often lasted for months because of the waiting-lists of other departments, especially the radiological. Very occasionally an urgent case would be taken out of turn. A possible short cut was to call in a consultant for a domiciliary visit, when earlier arrangements for special investigations were usually made. Many saw the consultant as private patients, and as a result there were consultants who were doing very well.

To arrange for a hospital admission I often had to spend 1–1½ hours on the telephone, and it was usually hopeless to attempt to get a tuberculous patient admitted—even if he was living in a community where he was almost bound to infect others. That nothing could be done about a medical and social emergency of this kind deserving the highest priority is a very grave reflection on our tuberculosis service. It was not much easier to find a bed for old folk, and in their homes they got little help in the way of fuel, blankets, or nourishment.

My own suggestions for dealing with the problems of such an area include the following:

Birth-control clinics should be set up, and to overcome shyness, a woman doctor from the clinic should *visit* the houses.

An investigation officer, with high personal—not academic—qualifications, should be responsible for instructing and helping women who are finding themselves unequal to the struggle of bringing up a family.

A welfare officer should be appointed who in an emergency would be able to help with money and stores, such as blankets, bedpans, sheets, and other utensils, at her own or the doctor's discretion without applying to higher authorities. She should also teach families the need for hygiene and cleanliness.

Together these three officers would give substantial help to the general practitioner.

The worst bottleneck in the work of the practitioner is the lack of X-ray facilities.

For a population of 200,000, for example, there should be an X-ray plant for taking films of their bones, teeth, and other minor conditions. These machines are not very expensive, and they would relieve the overburdened hospital X-ray department. Attached to this unit, and sharing dark-room facilities, there should also be a mobile electrocardiographic unit to help in detecting early cases of coronary thrombosis and in differential diagnosis. These units, and possibly a small physiotherapy department, could be housed in a prefabricated building.

With these aids the practitioner would be able to confirm his diagnosis, and to carry out with confidence a greater range of treatments. Hospital beds and outpatient clinics would be relieved and would be able to give more time to the more refined techniques. The current practice of referring a patient to an orthopædic surgeon for a film of a bone, or to a neurologist (with a three months' waiting-list) for a film of the skull, is absurd. The same applies to the diagnosis of heart and other diseases.

Competition for longer lists not only leads to neglect and omissions but also prevents the doctor from keeping up to date with medicine. The answer is, of course, to limit the numbers and increase the capitation fee. But, as Dr. Collings says, it is not enough to allow more practitioners to settle in the badly served industrial areas: these must be made professionally attractive. Also the doctor must be given a house on favourable terms, and a loan to cover his own and his family's living expenses for at least 6–9 months. The usual £300 will not even buy a secondhand car, and priority for new cars exists only in theory.

I heartily agree with Dr. Collings that assistants and trainee assistants should not work in practices of the kind I have described. Indeed nobody should. But more assistants should be allocated to good practitioners. There are still many practices which are admirably conducted, even, as Dr. Collings points out, providing their own laboratory facilities. But what emerges from his report is that the conscientious worker carries a greater load, a greater physical and mental strain, and far greater expenses, and finds in the end a smaller reward for himself. The well-trained and conscientious partner or assistant in the kind of practice described in the Collings report, and in this letter, is bound to lose either his job or his standard.

EX-ASSISTANT.

SIR,—Isn't it high time that a "Responsible Observer" was commissioned by the medical profession of this country to write a thirty-page report on the shortcomings of the medical men, and systems, of the United States of America? I think it should be rather good for our morale.

Leicester. J. K. M. DEAS.

Obituary

ARTHUR WILLIAM GARRARD BAGSHAWE

KT., C.M.G., B.A., M.B. CAMB.

Sir Arthur Bagshawe, who died in Cardiff on March 24 at the age of 78, was well known as an authority on tropical diseases. His name will always be associated with the Bureau of Hygiene and Tropical Diseases where he spent over 26 years of his working life, and it was under his wise guidance that the bureau grew from small beginnings to the established position it now enjoys.

[illegible]

Bagshawe was the second son of the Rev. Alfred Drake Bagshawe, rector of Wormhill, near Buxton. As a boy at Marlborough College he showed a strong bent towards natural history, and when at Caius College, Cambridge, he took a first class in part I of the natural sciences tripos. After he qualified from St. George's Hospital in 1895 there was some talk of his joining his uncle Frederic Bagshawe in a large practice at St. Leonard's-on-Sea, but the Colonial Medical Service attracted him as a career and in 1900 he became a medical officer of the Uganda Protectorate.

During his first years in Uganda he served on the Lango Expedition (1901), and with the Anglo-German Boundary Commission (1902–04). He was thus able to put to good use his interest in natural history, particularly in the local flora, and during his tours of duty made extensive collections of specimens of rare plants, which he gave to the British Museum (Natural History) in London. In 1906–07 he was employed on a special sleeping-sickness investigation in Uganda, and he was the first to discover the pupæ of *Glossina palpalis* in their natural breeding-grounds.

And what is the remedy for all this? Harangues and homilies are of no avail where great material advantages are to be gained in a country where the value of the pound gets less and less. Practice as it is today is as inevitable as the fact that night follows day and has been so since the panel system was instituted. The only check people understand is a financial one, and as time goes on and the country sinks lower and lower under the burdens imposed upon it by Socialism, some kind of means test will probably be found, and practice will again gravitate more towards private practice. Then, for the very simple and very obvious reason that doctors will have more time to practise it, general practice will rise to that state of excellence which Dr. Collings no doubt has in mind.

In the meantime, things being as they are and ourselves, willy-nilly, in the throes of trying to make a vast experiment work, we can only pray to be delivered from the unfair and superficial judgment of Dr. Collings, and sincerely, if perhaps somewhat rudely, echo the words once thrown by a critic at Keats, "Back to your gallipots, John."

Brighton. G. L. DAVIES.

SIR,—*Taking the tools away!*—After qualifying I took my fellowship and did seven years' hospital jobs before going into general practice. In 1938 I bought a mobile X-ray unit, which was useful to me, being 9 miles from the local infirmary. When the National Health Service came I offered my plant for use in my practice as part of the service: it was refused. The Special Areas Committee offered to buy it and I sold it to them. When an official from the Ministry of Works came to dismantle the plant, I asked him where it was going, and he told me it was being installed in the local mental hospital, where it now is. Meanwhile, there is a waiting-list of some weeks for "cold" X rays at the local infirmary."

RURAL PRACTITIONER.

SIR,—Dr. Collings's somewhat verbose report draws attention to some of the ills which beset general practice, and a good deal of it would have been equally true fifty years ago.

One of the things which tends to make general practice soul-destroying is the fact that "the customer is always right." Having to appear to be kindly and tolerant with that minority of patients which we all have, who come fussing to the surgery every time the proverbial finger aches, is responsible for the inordinately high death-rate among doctors from cardiovascular disorders. But we do not have the courage to take action. If one were to storm into the waiting-room at every surgery for only one week, and tell every patient to go to the devil, the work for a long time would be reduced by 50%, and it is doubtful if the financial loss would amount to 5%. The reason for this is that the same depressing faces can be seen week after week, with their owners sitting on their hyperkeratinised bottoms wearing holes in the seats of their pants.

I was in the Army during the war, and when I came back, my first surgery seemed to comprise the very same people as I had seen at the last one 3½ years previously. The prospect was so nauseating that I sold out at once and came to a new district.

Another aspect of this same snag is that quite a hopeless doctor with a kindly manner, who can sleep with his eyes open and fixed on the patient, and who talks as though he were pouring a mixture of honey, soft-soap, and goose-oil over the patient, will always have a big and financially successful practice. His neighbour, given "specialist ability" in every branch of medicine, will be the loser if he is forthright and abrupt in manner.

Dr. Collings is right when he draws attention to the failure of so many doctors to examine patients. This failure is not something which results from prolonged disillusionment in general practice, for it is very obvious in young doctors employed as assistants. It results from a slipshod mentality and a lack of conscience, and this type of person is not fitted for the responsibility of general practice. Ideally he should be relegated to posts where his work is permanently supervised.

On superficial examination, group practice would appear to be the answer to the specific points I have mentioned, because it would eliminate competition for patients, and the work of the doctors would be maintained at a higher level by purely professional competition with one another within the group. But we are "independents," and I can think of very few doctors with whom I could work in harmony for more than a few months.

Kidsgrove, Staffordshire. D. G. FRENCH.

SIR,—You are to be congratulated on publishing the report by Dr. Collings. One can only hope that his observations will be impressed on those who have the power to alter such bad conditions as he describes. In my opinion nothing in medical life requires higher priority.

Recently I spent some months as an assistant in a practice in a working-class district with many flourishing industries. In this district for many years there has been no unemployment, and the demand for female workers especially is still great. Housing conditions are extremely bad. Among the poorer families there are many with 4, 5, or more children, and usually the mother is expecting another baby. It is not surprising, therefore, that a large proportion of the patients are small children, inadequately looked after. Hygiene is poor. Half grown-up children sleep in the same room as their parents; only too often they witness unfortunate family scenes. During the day they spend their time in the street because there is so little space in the house.

My experience of this industrial practice supports the strictures made by Dr. Collings. During the crowded surgery hours patients were not examined—many had not been examined for years past—unless they complained of something above the neck or on the arms. Occasionally a small bare area over the top of the sternum in women, and a still smaller area around the centre of the sternum in men, was bared to the stethoscope. But at most the patient undid one button of his shirt and vest, without removing his overcoat. For severe headache over a long period tab. codeini co. was prescribed: the underlying cause was hardly looked for. Little attempt was made to investigate the many causes of cough; but more linctus flows through general practice than water through the Thames!

The local chemist used to hand out a couple of gallons of the four main linctuses per week; 1 in every 8 prescriptions called for 4 oz. of a linctus. Many patients came week after week for their bottle, which they seemed to take as a sort of extra nourishment. Heart-failure, tuberculosis, neoplasms, bronchiectasis, and silicosis were generally far advanced before they were recognised as the cause of a cough.

Often a mother would come to the surgery to ask for a bottle of medicine for her child with diarrhœa. Some magnesia or kaolin was prescribed; and when she called the doctor a day or two later the actual diagnosis would turn out to be pneumonia. Many patients sent their relatives or friends for weeks and months on end for certificates and prescriptions.

Visits had to be made at high speed and there was little time to investigate complicated cases. There was no time to bother with bedsores and similar ailments. Waterlogged patients who could have been relieved by a few injections of mercurials were left waterlogged and seen again on routine visits at monthly intervals. A

Notes and News

ART FOR MEDICINE'S SAKE

MEDICAL artists (not to be confused with members of the Medical Art Society) held a first exhibition of their work at the Royal Society of Medicine between March 28 and April 1—a skilful but macabre entertainment. These drawings of lesions, dissections, dead organs, and dying patients are so vivid and faithful that they disquiet even the seasoned onlooker: they are certainly more disturbing than a greyish specimen in a pot. The level of care and accuracy was very high, and it would not be easy to distinguish particular contributors, even if the absence of a catalogue had not added to the difficulty. Several good and ingenious diagrams were shown, and some first-class wax models of skin lesions had a conspicuous place. Some description of the way in which these were made would have been welcome.

The hon. secretary of the Medical Artists Association of Great Britain, which arranged the exhibition, is Mrs. Blackburn, 19, York Avenue, East Sheen, London, S.W.14.

BLOOD-LETTING FILMED

THE instruments used by the profession to let blood have a historical if slightly gruesome interest. Various tools of the kind, including a lancet, are shown as an introduction to a short film, sponsored by Bayer Products Ltd., on *The Taking of Blood*. The rest deals in detail with the technique of blood withdrawal by means of a syringe, and also by means of the Bayer 'Venule'—a neat little device, especially convenient for those who have to send specimens by post. It consists of a sterile needle, covered by a glass cap, sealed into a glass tube passing through the rubber cap of an evacuated test-tube. The glass cap is filed off, the needle inserted into the vein, and the tube tilted at an angle to it; this manœuvre releases a simple valve and allows the blood to be sucked into the tube. As soon as enough has been withdrawn the valve is allowed to close again, the needle is removed from the vein and the needle holder is filed off. The tube can then be placed in the box supplied and posted off. The action of the valve is nicely illustrated by animated diagrams.

The film has been made for Bayer by the Kinocrat Film Unit, and is intended for showing to doctors, medical students, nurses, and others interested.

GENITAL MYIASIS

THE flesh-fly (*Cochliomyia hominivorax*), which ranges widely in America, lays its eggs in living flesh, usually the mouth, the nose, or an open sore, especially one with an offensive discharge. In 1926 Greenway and Marciano[1] described myiasis of the vulva caused by *C. macellaria*, but these two flies were at that time confused, and *C. hominivorax* must have been responsible, because *C. macellaria* lays its eggs only in carrion. Since then many cases of myiasis of the female genitalia have been reported from South America. Of these, the 12 Argentine cases are summarised by Niño,[2] who adds to them yet another case of vulval infestation. The labium majus was the infested site in 6 of the 13 cases, the clitoris in 3, the labium minus in 2, the urethral meatus in 1, and the uterus in 1. In 6 of the cases the predisposing factor was supposed to be either a menstrual or a pathological discharge; in 2 it was a skin disease; in 4 none was found.

University of Sheffield

On March 25 the following degrees were conferred:

M.D.—H. J. Whiteley.

M.B., Ch.B.—J. D. S. Hammond (with first-class honours); E. A. Badoe, Stella M. Benson-Cooke, E. R. Bowler, Lorna Chippindale, Sheila R. S. Cooper, C. K. Crawford, George Dalton, Margaret R. Davies-Jones, Dora C. Dean, M. W. L. Dibb, J. A. Greenwood, Basil Hirst, P. A. Isherwood, Katherine B. Laird, A. J. Moore, Moreen C. O'Brien, S. S. Scott, Yves J. F. Sojka, C. R. Thickett, W. D. Turner, Audrey J. Warren.

University of Manchester

The following appointments have been made: Dr. G. T. Ashley and Dr. Roger Warwick, lecturers in anatomy; Dr. M. D. Milne, lecturer in medicine; Dr. L. A. Liversedge, [illegible] in medical neurology; Dr. J. L. S. Smith, assistant [illegible]hthalmic pathology; Dr. Eleanor Schill, medical [illegible]men students in the department of education.

Royal College of Surgeons

At the annual dinner of the Faculty of Anæsthetists, held at the college on March 29, Mr. A. D. Marston, the dean, spoke with pleasure of the increasing coöperation between the Royal Colleges and the British Postgraduate Medical Federation. Casting his mind back to 1800, when the college received its first Royal charter as an independent body, he observed that then nothing could have seemed more improbable than that one day it would have a faculty of anæsthetists. Sir Cecil Wakeley, replying on behalf of The College, referred to the important work done by Lord Moran not only for his own college but for medicine during the years he had presided over the Royal College of Physicians. He went on to say that in anæsthesia great advances had been made in the past decade; and he insisted that progress in surgery went hand in hand with progress in anæsthesia. The surgeon looked to the anæsthetist for help both before and after operation; only thus could mortality and complications be reduced. The faculty had done great work in the two years since it was founded. Sir Harry Platt, who proposed The Faculty, recalled the early work of Simpson in Edinburgh, and of Morton, the Boston dentist, and pictured anæsthesia being born by obstetrics out of dentistry. Referring to the Collings report, he said that this had come as a great shock; the widening gulf between general practitioners and specialists must be closed, and he suggested that practitioners might work beside specialists. In reply Dr. Bernard Johnson, the vice-dean, observed that anæsthetists were now the strongest link between pure medicine and pure surgery. Prof. Lillian Penson and Sir John Charles replied for The Guests to a toast proposed by Dr. John Gillies.

Royal College of Obstetricians and Gynæcologists

A postgraduate course of lectures for those studying the special practice of obstetrics and gynæcology will be given at the college, 58, Queen Anne Street, London, W.1, on April 14 and 15, and on April 28 and 29. Further particulars may be had from the secretary of the college.

Faculty of Homœopathy

A meeting of the faculty will be held at the Royal London Homœopathic Hospital, Great Ormond Street, London, W.C.1, on Thursday, April 13, at 5 P.M., when Dr. Duncan Russell will speak on Calcium Compounds.

British Orthopædic Association

The spring meeting of the association will take place in Cardiff on April 21 and 22, under the presidency of Mr. S. L. Higgs.

Territorial Army Medical Officers' Association

A meeting of this association will be held at 2.30 P.M. on May 20, at the Royal Army Medical College, Millbank, London, S.W.1. Invitations to attend have been sent on behalf of the committee to D.Ds.M.S., A.A. Command, A.Ds.M.S., officers in charge of units, and honorary colonels.

Institute of Child Health

This institute's report for 1949 records the retiral from the position of dean of Dr. W. G. Wyllie, who has been succeeded by Dr. G. H. Newns. The new academic board has set up a subcommittee to consider how the teaching arrangements can be improved; and it is proposed to try offering some of the postgraduate students "clinical clerkships" in the wards for part of each term.

Heberden Society

This society met on March 10 at the Royal Infirmary, Manchester, at the Rheumatism Research Centre, with Dr. J. H. Kellgren as the host, and Dr. W. S. C. Copeman, the president, in the chair. Dr. Oscar Janus read a paper on the Assay of Rapidly Acting Remedies in Rheumatoid Arthritis, discussing methods by which it might be possible to recognise the potency of, for example, A.C.T.H., even when given in doses so small that no obvious clinical effect is apparent. Dr. Kellgren showed a film illustrating the effects of A.C.T.H. in a case of rheumatoid arthritis. Among other communications was one from Dr. J. S. Lawrence on Preliminary Findings of the Walkden Survey, which is being carried out in association with the department. On the following day visits were paid to the Walkden Miners' Clinic and the Devonshire Royal Hospital, Buxton.

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[1] [illegible]arciano, A. *Prensa méd. argent.* 1926, 13, 393.

[2] [illegible]950, 37, 234.

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In 1907–08 an International Conference on Sleeping Sickness met in London to discuss the possibility of establishing a central international bureau "to extract and circulate all new literature on sleeping-sickness" to research-workers and field investigators. This international bureau failed to materialise, but the Secretary of State for the Colonies decided to set up a British bureau, of which Bagshawe became the first director in 1908. He began work in a single room put at his disposal by the Royal Society in Burlington House. The total funds provided for running the bureau were £1000 a year, out of which fell to be paid Bagshawe's salary and that of any clerical assistant he might need, as well as the printing bills for the monthly *Sleeping Sickness Bulletins*, and all other running expenses. So near the bone was this allocation that when the question arose of buying a carpet for the one room used by the bureau it was decided to ask the Royal Society to pay for it, on the understanding that the carpet would become the society's property if the bureau were to leave. The need of employing translators for foreign papers, and thus incurring further expense, was ruled out by Bagshawe offering to spend "three weeks' vacation in Germany in order to increase his familiarity with the German language."

During his first four years as director of the Sleeping Sickness Bureau, Bagshawe produced four valuable volumes containing articles treating special aspects of trypanosomiasis in some detail, and abstracts of the current literature, as well as an exhaustive bibliography and maps showing the known distribution of sleeping-sickness and of tsetse flies in Africa. He wrote the whole of the articles and the abstracts in the *Sleeping Sickness Bulletins* himself, and the care he gave to their preparation set up new standards in medical abstracting.

In 1912 the scope of the bureau was enlarged to cover all tropical diseases. Later there was a further extension on the hygiene side, which Bagshawe, whose interests in hygiene had led him to work for the D.P.H. in 1908, welcomed. He continued as editor of both the *Tropical Diseases Bulletin* and the *Bulletin of Hygiene* until his retirement in 1935.

He was an original fellow of the Royal Society of Tropical Medicine and Hygiene, and he held office as honorary secretary (1917–21), treasurer (1925–35), and president (1935–37). He was for a time a member of an expert committee of the Health Committee of the League of Nations dealing with tuberculosis and sleeping-sickness in Equatorial Africa. He was appointed C.M.G. in 1915, and he was awarded the Mary Kingsley medal of the Liverpool School of Tropical Medicine in 1920. In 1933 he received a knighthood.

He married in 1910 Alice Mary Thornber, who died in 1944, and they had two sons. His elder son, who served with a Guards battalion during the war, had lately taken up dairy-farming in South Wales, where Sir Arthur had joined him about a year ago. R. L. S.

LIONEL ALFRED DINGLEY

M.D. LOND., F.R.C.S.

Mr. Dingley, who died on March 16 at the age of 61, was senior surgeon to the West Bromwich and District Hospital and visiting surgeon to the Hallam Hospital. Son of E. A. Dingley, M.D., J.P., he was born at Wednesbury and went from Epworth College, Rhyl, to University College, London. At University College Hospital he won the Fellowes gold medal and the prize for clinical surgery, and in 1912 and 1913 was house-physician to Risien Russell and house-surgeon to Rickman Godlee. He served as a Territorial in the R.A.M.C. from 1914 to 1918, reaching the rank of major and receiving the Belgian croix-de-guerre. He took his F.R.C.S. in 1920 and settled in general practice. His work thereafter is described in the following tribute from L. G. P.

"Although Lionel Dingley could have pursued a surgical career, he deliberately chose the life of a family doctor and joined his father in a busy general practice in Wednesbury. An element of filial devotion may have entered into his decision, because he always aspired to reach and, in fact, did reach the high standard of medical practice and conduct set by his father. The chief reason for his choice was, however, that he believed he could give more service to the community in general, than in consulting, practice and his whole life was a striking demonstration of the fact that 'it is more blessed to give than to receive.' He was an ideal family doctor and was beloved by his patients, to whom his great ability was freely given and he became their confidant and adviser. Throughout his life he never lost his boyish enthusiasm and sense of humour and his bright smile brought cheer and comfort into many a sickroom; particularly when the occupant suffered from a hopeless condition.

"After some years in general practice, he was appointed surgeon to the West Bromwich and District General Hospital and then was able to make full use of his surgical training and ability. The combined duties of a general practitioner and a surgeon to a general hospital entailed extremely hard work, but he revelled in it and it would be difficult to have found a better example of the general-practitioner surgeon. The present high standing of the hospital is largely, if not entirely, due to his drive, ability, and vision. Under his direction it was enlarged and partly rebuilt, the staff increased and strengthened, and its work greatly expanded; indeed, the present hospital can rightly be regarded as a memorial to him.

"To his great delight, he was chosen by the Minister of Health to be one of the original members of the Birmingham Regional Hospital Board, and looked forward to devoting a considerable part of the time of his retirement to the work of the board. I first heard of his illness at a meeting of the board at which he arrived late. He sat next to me and, greeting me with his usual smile, said 'I am sorry I am late, but I have just been sigmoidoscoped and have a carcinoma of the rectum.' Afterwards he said 'This could not have come at a better time. I have my wife settled in our cottage and the children have decided on their future.' This conversation was absolutely typical of his whole attitude towards a distressing and fatal illness and the basis of this attitude was a radiant Christian faith. One of the reasons which determined his choice of the delightful house in the beautiful countryside which was his home for such a short time was the fact that he could spend many of his Sundays preaching in small Methodist country chapels. It is sad to think that he had so few opportunities of realising this ambition.

"He had an extremely happy family life, both before and after marriage. He married rather later in life than is usual, but he leaves a son who is now studying medicine and a daughter who is about to take up a nursing career."

Appointments

Curr, J. F., M.D. Edin., F.R.C.S.E.: civilian specialist in surgery for the Army.

Hatherley, L. I., M.R.C.S.: civilian specialist in surgery for the Army.

Keenan, Donal, M.B.: temp. junior house-physician, Castlerea Sanatorium, Roscommon, Eire.

McGorry, H. D., B.A., M.D. Dubl., D.P.H.: asst. M.O., Castlerea Sanatorium, Roscommon, Eire.

Peach, A. N. H., M.B. Brist., F.R.C.S.: civilian specialist in surgery for the Army.

Pierce, J. W., M.D. Lond., M.R.C.P., D.M.R.D.: radiologist (cons.), X-ray diagnostic department, St. Thomas's Hospital, London.

Appointed Factory Doctors:

Candler, T. O., M.B. Camb., F.R.C.S.: Wells district, Somerset.

Circuit, Kathleen, B.A. Lond., M.R.C.S.: Framlingham district, Suffolk.

Lilly, R. G., M.B. Durh.: Long Buckby district, Warwickshire.

Robb, D. F., M.R.C.S.: Perranporth district, Cornwall.

Robinson, R. A., M.B.: Castleton district, Yorks.

Williams, P. E., B.SC. Wales, M.R.C.S.: Clynderwen district, Pembroke.

Colonial Service:

Afori-Atta, S. B. G., M.B.: lady M.O., Gold Coast.

Bell, Fairfax, M.A., B.M. Oxfd, D.T.M. & H.: M.O., Kenya.

Chhung Hin, A. K. N., M.B., D.T.M. & H.: senior pathologist, Mauritius.

Davies, C. W., M.R.C.S., D.P.H.: senior M.O., Tanganyika.

Dodds, G. E., B.A., M.B. Dubl., D.O.M.S.: senior specialist, Nigeria.

Fung-Kee-Fung, C. O., M.B. Lond., F.R.C.S., D.OBST.: surgeon specialist, British Guiana.

Gilles, E. C., L.R.C.P.E.: regional deputy director of medical services, Nigeria.

Keating, S. R., M.B. N.U.I.: M.O. orthopædic, Kenya.

Kerr, W. G., M.B. Edin., F.R.C.S.E.: surgical specialist, Tanganyika.

Montgomery, T. H. L., M.B. Belf., D.P.H., D.T.M. [illegible] director of medical services, Nigeria.

Rendle-Short, Coralie, M.B., CH.M. Brist., M.R.C.[illegible] logical and obstetrical specialist, Hong Kong.

Tassis, J. A., M.D. Vienna: M.O., Federation of [illegible]

Trim, E. A., M.D. Camb., D.T.M. & H.: deput[illegible] services, Kenya.

PREGNANCY AND PULMONARY TUBERCULOSIS *

H. MIDGLEY TURNER

M.D. Manc., M.R.C.P., D.P.H.

CONSULTANT CHEST PHYSICIAN, SHEFFIELD REGIONAL HOSPITAL BOARD; LECTURER IN TUBERCULOSIS IN THE UNIVERSITY OF SHEFFIELD

BEFORE 1930 the view most generally held was that pregnancy in a tuberculous woman was a disaster. This view was neatly expressed by Young (1926): "For the virgin no marriage, for the married no pregnancy, for the pregnant no confinement, for the mother no suckling." But opinion has changed. It is not now believed that tuberculosis need be a bar to marriage, or that pregnancy should not be allowed or even encouraged in a quiescent case of tuberculosis; and lactation is only contra-indicated where there is a danger of infecting the baby.

This remarkable change in medical opinion has taken place gradually. One of the good papers which challenged the old view was that of Hill (1928), who made a statistical study of pregnancies in 349 women where the pregnancy occurred either during or immediately before active tuberculosis. From this study he concluded that pregnancy had no appreciable effect on the progress of the tuberculosis disease.

Cohen (1943), reporting on the effect of pregnancy and parturition in 100 cases of pulmonary tuberculosis, of which 25 had active disease, states that active tuberculosis is seldom accelerated by pregnancy and labour, and that abortion is not to be advised simply because the woman is known to have had tuberculosis.

My own special interest in this subject goes back to twenty-one years ago. I was then called in consultation on a young married woman who at the third month of pregnancy developed an acute tuberculous lesion in one lung and was having hæmoptysis. I advised immediate abortion, to be followed by admission to a sanatorium, and possibly collapse therapy later. For various reasons her doctor could not terminate the pregnancy until it was about four and a half months advanced. The abortion was then induced, and the patient died from shock and postoperative hæmorrhage.

I report here the results of my observations since then, based on 718 pregnancies in 534 different tuberculous women, of whom 163 are known to have died of pulmonary tuberculosis. Many of the others have been followed for periods up to ten years after pregnancy. Details of the series of pregnancies are given in table I. Each pregnancy is treated as a separate episode, and survival percentages are worked out for yearly intervals after the episode.

CLASSIFICATION

Pregnancies have been grouped into four categories:

(1) Pregnancy in a woman known to have active tuberculosis at the time of conception.

(2) Pregnancy in a woman known to have quiescent tuberculosis at the time of conception.

(3) Tuberculosis first diagnosed during pregnancy.

(4) Tuberculosis first diagnosed within a year of the termination of a pregnancy.

In groups 1 and 2 survival is dated from the start of pregnancy. In groups 3 and 4 survival is dated from the diagnosis of tuberculosis.

TABLE I—DETAILS OF PREGNANCIES ASSOCIATED WITH PULMONARY TUBERCULOSIS

—	Pregnancy in active tuberculosis	Pregnancy in quiescent tuberculosis	Tuberculosis diagnosed in pregnancy	Tuberculosis diagnosed within a year after pregnancy	Total
Pregnancies	240	220	78	180	718
Live births *	196	204	70	171	641
Stillbirths	5	3	—	2	10
Induced abortions ..	20	0	5	0	25
Spontaneous abortions ..	18	13	3	10	44
[illegible] ..	2	..	1	..	3
[illegible] section †	11	4	..	..	15
Neonatal deaths	7	9	3	8	27
Deaths under 3 Years:					
Tuberculosis	9	2	0	21	32
Bronchopneumonia ..	4	..	1	1	6
Infective enteritis ..	3	1	2	1	7
Laryngitis	1	..	..	..	1
Diphtheria	..	1	..	..	1
Measles	..	1	..	..	1
Bronchitis	1	..	..	..	1
Hydrocephalus ..	1	..	..	..	1
Prematurity ..	1	..	..	..	1
Poliomyelitis ..	..	..	..	1	1
Cause unknown ..	3	..	..	..	3
Total deaths under 3 years	30	14	6	32	82

* 5 twins. † Includes 1 stillbirth.

ONSET OF LABOUR

In groups 1–3 labour tended to begin early, but this tendency was not very obvious. Of 264 pregnancies proceeding to term with active tuberculosis, in 43 (17%) labour began in the 38th week or earlier, whereas in 31 (12%) it began in the 41st week or later. The corresponding figures for 203 pregnancies in quiescent tuberculosis were 31 (15%) in the 38th week or earlier and 22 (11%) in the 41st week or later. The chances of spontaneous abortion or stillbirth seem to be rather greater where the tuberculosis is active than where it is quiescent.

TABLE II—SURVIVAL AFTER PREGNANCY

—		Years after pregnancy									
		1	2	3	4	5	6	7	8	9	10
Pregnancy in active tuberculosis	Pregnancies Living ..	240 229 *(95%)*	228 204 *(89%)*	218 173 *(79%)*	194 142 *(73%)*	177 113 *(64%)*	146 96 *(66%)*	127 78 *(61%)*	117 70 *(60%)*	115 67 *(58%)*	114 63 *(55%)*
Pregnancy in quiescent tuberculosis	Pregnancies Living ..	220 219 *(99%)*	188 186 *(99%)*	164 161 *(98%)*	138 134 *(97%)*	111 105 *(95%)*	91 85 *(93%)*	70 64 *(91%)*	59 53 *(90%)*	53 47 *(89%)*	51 44 *(86%)*
Tuberculosis diagnosed during pregnancy	Pregnancies Living ..	78 69 *(88%)*	73 62 *(85%)*	63 50 *(79%)*	51 37 *(73%)*	46 31 *(67%)*	40 23 *(58%)*	34 18 *(53%)*	27 14 *(52%)*	27 14 *(52%)*	27 14 *(52%)*
Tuberculosis within a year after pregnancy	Pregnancies Living ..	180 160 *(89%)*	160 116 *(73%)*	130 83 *(64%)*	117 67 *(57%)*	100 52 *(52%)*	94 47 *(50%)*	83 40 *(48%)*	75 35 *(47%)*	72 32 *(44%)*	68 29 *(43%)*

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* Presidential address to the Sheffield Regional Chest Society.

British Association of Physical Medicine

Mr. Bernard Baruch, of New York, has given the Association £1000, to be used as its president, Lord Horder, may suggest.

Naval Medical Compassionate Fund

A meeting of the subscribers of this fund will be held at 2.30 P.M. on April 21 at the Medical Department of the Navy, Queen Anne's Mansions, St. James's Park, London, S.W.1, to elect six directors of the fund.

International Conference on Speech Therapy

This conference will be held in Amsterdam from Aug. 21 to 26. The speakers will include Prof. T. Pomfret Kilner. The secretary of the conference is Dr. Hanny Veldkamp, 27 P.C. Hooftstraat, Amsterdam-Z, Holland.

Dental Treatment for School-children

The council of the British Dental Association has appealed to its members to organise their own priority service for school-children "until such time as the Ministries of Health and Education and the local authorities have risen to their responsibilities by providing a proper service for the children." Members are recommended to set aside not less than one half-day each week solely for the treatment of school-children who are unable to obtain dental treatment through the school dental service.

Photography and Cinematography by Invisible Radiation

A conference on this subject is to be held on Saturday, April 15, at 10 A.M. at the London University Institute of Education, Malet Street, W.C.1. Dr. E. Rowe, of the Royal Cancer Hospital, will discuss the Observation by Ultraviolet Micrography of fresh Unfixed Tissue and of the separated Tumour Agent from the Rous Fowl Sarcoma. Dr. R. Barer, of the University of Oxford, in his paper on Learning about the Invisible, will deal with both ultraviolet and infrared microphotography. Dr. Russell Reynolds will speak on X-ray Cinematography. Further information may be had from the secretary of the Scientific Film Association, 4, Great Russell Street, W.C.1.

Award to R.A.F. Officer

The George Medal has been awarded to Acting Squadron-Leader R. E. Woolley, M.R.C.S.

In a severe thunderstorm at Seletar, a R.A.F. maintenance base in the Far East, on the night of Nov. 20, a Sunderland flying-boat crashed in shallow water. Braving petrol fire risks, Squadron-Leader Woolley extricated two badly injured members of the crew who were trapped. The pilot could not be released, and, assisted by another officer, Woolley prepared to amputate his foot. In an inaccessible position, with a hand-lamp as the only illumination, he worked for twenty minutes while the pilot, who was under morphine, had his head supported clear of the water. A single spark from the surgeon's saw striking the wreckage might have started a petrol fire from which there could have been little hope of escape. The fumes were overpowering, but the operation was completed and the pilot sent to hospital. He died next morning.

Squadron-Leader Woolley qualified from St. Mary's Hospital in 1946.

Faculty of Ophthalmologists

At a meeting of the council on March 9 it was reported that letters of protest from the chairman of the British Orthoptic Society and the faculty had been sent to the Minister of Health strongly deprecating the recent decision to exclude orthoptists from consideration jointly with other medical auxiliaries. Consternation was expressed concerning the attempt to bracket orthoptists with opticians, because opticians are not medical auxiliaries and are not hospital-trained. Approval was expressed for the Contact Lens Society's recent resolution "that attention be drawn to the necessity for the elimination of unqualified practice in contact lens work and to request the various bodies giving evidence before the Interdepartmental Committee to point out this need." A suggestion that the faculty should issue a ruling about the method of prophylaxis against ophthalmia neonatorum was rejected, on the grounds that (*a*) opinions differed considerably on the subject, and (*b*) the council might thereby lay itself open to the charge of attempted regimentation.

The following have been elected to the council to fill vacancies: Dr. Dorothy R. Campbell, Mr. J. D. M. Cardell, Mr. R. Affleck Greeves, Mr. T. Keith Lyle, Mr. A. B. Nutt, and Dr. G. I. Scott.

Travelling Awards in Ophthalmology and Otology

The Medical Research Council invites applications for travelling awards in these specialties for 1950–51 to be provided from the Alexander Pigott Wernher Trust.

These awards are intended for medical graduates who have had some training in research work in ophthalmology or otology. In general, fellowships will be tenable for periods of up to a year for specific research, but grants may also be given for short-term visits abroad to study methods of investigation and treatment. Fellowships will as a rule provide for appropriate subsistence allowance and travelling expenses, whereas grants for short-term visits (up to three months) will ordinarily cover travelling expenses only.

Applications should be sent to the secretary of the council, 38, Old Queen Street, London, S.W.1, by June 1, 1950.

The staff of the Tavistock Clinic announce that there will be no course for general practitioners in the coming summer term. They hope to hold such a course again in the 1950–51 session.

Diary of the Week

APRIL 9 TO 15

Tuesday, 11th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. B. T. Parsons-Smith: Cardiac Failure. (First Lumleian lecture.)

Wednesday, 12th

INSTITUTE OF PSYCHIATRY, Maudsley Hospital, Denmark Hill, S.E.5
4.30 P.M. Dr. E. Stengel: Postgraduate lecture-demonstration.

Thursday, 13th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. Parsons-Smith: Cardiac Failure. (Last Lumleian lecture.)

NORTH-EAST LONDON CLINICAL SOCIETY
8.15 P.M. (Prince of Wales's General Hospital, N.15.) Dr. L. E. Glynn: Nutrition and Liver Disease.

LONDON JEWISH HOSPITAL MEDICAL SOCIETY, Stepney Green, E.1
3 P.M. Dr. G. I. M. Swyer: Obesity.

Friday, 14th

ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS, 58, Queen Anne Street, W.1
NOON. Dr. Clifford Kennedy: Incoördinate Uterine Action.
3 P.M. Mr. C. W. A. Kimbell: Abdominal Hysterectomy.
5 P.M. Mr. G. F. Gibberd, Mr. A. C. Bell, Mr. J. Howkins, Dr. S. D. Loxton, Mr. Leslie Williams: Any Questions?

BIOCHEMICAL SOCIETY
3.15 P.M. (University College, Dublin.) Short papers.

Saturday, 15th

ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS
9.45 A.M. Mr. H. Harvey Evers: Malignant Ovarian Tumours.
11.30 A.M. Prof. E. M. Robertson: Early Diagnosis of Cancer.

Births, Marriages, and Deaths

BIRTHS

AKEROYD.—On March 26, at Harpenden, the wife of Dr. Alan Akeroyd—twin daughters.

DOUGLASS.—On March 25, in London, the wife of Dr. D. J. Douglass—a son.

EVANS.—On March 25, in London, the wife of Dr. G. M. H. Evans—a daughter.

GLANCY.—On March 25, at Salford, the wife of Dr. C. J. Glancy—a son.

GOW.—On March 26, the wife of Dr. I. M. Gow—a daughter.

REYNOLDS.—On March 28, at Ugley, the wife of Dr. S. R. Reynolds—a daughter.

TITCOMBE.—On March 26, the wife of Dr. J. M. Titcombe—a son.

TODD.—On March 27, at Guildford, the wife of Dr. J. W. Todd—a son.

DEATHS

BAGSHAWE.—On March 24, in Cardiff, Arthur William Garrard Bagshawe, KT., C.M.G., B.A., M.B. Camb., D.P.H.

FELIX.—On March 22, in London, Theodore James Felix, M.R.C.S., aged 25.

LITTLEDALE.—On March 27, at Charing, Kent, Herbert Edward Littledale, B.A., M.D. Dubl., aged 77.

MARTIN.—On March 27, in Edinburgh, George Ewart Martin, M.A., M.B. Edin., F.R.C.S.E.

PIDCOCK.—On March 23, Bertram Henzell Pidcock, M.B. Lond., F.R.C.S.

WILLIAMS.—On March 25, at Aberystwyth, Moses Thomas Williams, M.B. Lond., F.R.C.S., aged 73.

PREGNANCY AND PULMONARY TUBERCULOSIS *

H. MIDGLEY TURNER
M.D. Manc., M.R.C.P., D.P.H.
CONSULTANT CHEST PHYSICIAN, SHEFFIELD REGIONAL HOSPITAL BOARD; LECTURER IN TUBERCULOSIS IN THE UNIVERSITY OF SHEFFIELD

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This remarkable change in medical opinion has taken place gradually. One of the good papers which challenged the old view was that of Hill (1928), who made a statistical study of pregnancies in 349 women where the pregnancy occurred either during or immediately before active tuberculosis. From this study he concluded that pregnancy had no appreciable effect on the progress of the tuberculosis disease.

Cohen (1943), reporting on the effect of pregnancy and parturition in 100 cases of pulmonary tuberculosis, of which 25 had active disease, states that active tuberculosis is seldom accelerated by pregnancy and labour, and that abortion is not to be advised simply because the woman is known to have had tuberculosis.

My own special interest in this subject goes back to twenty-one years ago. I was then called in consultation on a young married woman who at the third month of pregnancy developed an acute tuberculous lesion in one lung and was having hæmoptysis. I advised immediate abortion, to be followed by admission to a sanatorium, and possibly collapse therapy later. For various reasons her doctor could not terminate the pregnancy until it was about four and a half months advanced. The abortion was then induced, and the patient died from shock and postoperative hæmorrhage.

I report here the results of my observations since then, based on 718 pregnancies in 534 different tuberculous women, of whom 163 are known to have died of pulmonary tuberculosis. Many of the others have been followed for periods up to ten years after pregnancy. Details of the series of pregnancies are given in table I. Each pregnancy is treated as a separate episode, and survival percentages are worked out for yearly intervals after the episode.

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Diphtheria	..	1	..	..	1
Measles	..	1	..	..	1
Bronchitis	1	..	..	..	1
Hydrocephalus	1	..	..	..	1
Prematurity	1	..	..	..	1
Poliomyelitis	..	..	..	1	1
Cause unknown	3	..	..	..	3
Total deaths under 3 years	30	14	6	32	82

* 5 twins. † Includes 1 stillbirth.

ONSET OF LABOUR

In groups 1–3 labour tended to begin early, but this tendency was not very obvious. Of 264 pregnancies proceeding to term with active tuberculosis, in 43 (17%) labour began in the 38th week or earlier, whereas in 31 (12%) it began in the 41st week or later. The corresponding figures for 203 pregnancies in quiescent tuberculosis were 31 (15%) in the 38th week or earlier and 22 (11%) in the 41st week or later. The chances of spontaneous abortion or stillbirth seem to be rather greater where the tuberculosis is active than where it is quiescent.

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* Presidential address to the Sheffield Regional Chest Society.

embedding of the ovum and placental development. Browne et al. (1939) found low gonadotropin levels in early abortion, whereas Jeffcoate (1932) found that some cases of inevitable abortion were associated with an excess of œstrogen in the body-fluids. If these findings are correct, and spontaneous abortion in a substantial proportion of cases is associated with either a deficiency of gonadotropin or an excess of œstrogen, the favourable survival-rates in tuberculosis associated with spontaneous abortion can be explained by the hormonic theory outlined above, in that the very factor which is inimical to the pregnancy exerts a favourable influence on the tuberculosis.

It appears incontrovertible that the first four months of pregnancy and the weeks immediately succeeding parturition are the only periods in pregnancy during which any special risk regarding tuberculosis exists. The theory has been advanced that these potential dangers are due to the fact that excess of gonadotropin is an adverse factor and excess of œstrogen a favourable factor, the sudden withdrawal of which, in the presence of a high gonadotropin level, may exert an unfavourable influence, particularly during the period of debility in the puerperium. If this is accepted, it is difficult to justify the induction of abortion once the phase of gonadotropic domination has passed and the phase of œstrogen domination has begun. Perhaps the phase of œstrogenic domination is responsible for those cases in which pregnancy leads to improvement in the tuberculosis. In practice this means that little advantage is to be expected from terminating a pregnancy later than the 14th week. This has been my own view for many years, but mainly on the grounds that with each week after the first trimester the risks of abortion increase while the advantages do not seem to increase. Now there seems to be a more rational scientific reason for restricting induction of abortion to cases in which it is indicated in the first trimester. It also seems that, if pregnancy must be terminated, the earlier in the first trimester at which it can be terminated the greater is the probable advantage.

The modern practice of administering gonadotropic substances to counteract a tendency to early abortion is one which also requires very careful consideration if the patient shows evidence of past or present tuberculosis. On the other hand, the exhibition of œstrogenic substances, such as stilbœstrol immediately after parturition where suppression of lactation is desired, may be beneficial to the tuberculous woman by lessening the impact of the sudden fall in œstrogen level which normally takes place at this time. It is a common practice, and has for long been my own practice and the practice of my obstetrical colleagues, to suppress lactation in this way in active tuberculosis where suckling would be dangerous to the baby. It may well be that this action, which has in the past been dictated by the welfare of the baby, has also an advantage for the mother which more than counterbalances the loss of the tonic effects of lactation on involution of the uterus. Here is a point which merits investigation: would administration of œstrogen for a period after parturition in women with active tuberculosis assist in countering the special dangers of the puerperium?

CONCLUSION

Clinical observations over many years on the complex relationships of pregnancy and tuberculosis have been presented, and certain new theories have been advanced to explain the findings. It is my hope that these theories will be tested by other observers, and that in this way some advances may be made not only in the management of pregnancy in the tuberculous woman but also in the knowledge of the biochemical factors concerned in resistance to tuberculosis.

SUMMARY

A study has been made of 718 pregnancies in 534 women.

Survival-rates for the groups with active pulmonary tuberculosis do not suggest that the effect of pregnancy on the group as a whole is adverse. If the course of the disease is in some cases influenced unfavourably, this is more than counterbalanced by the cases in which pregnancy influences the course of the disease favourably.

Pregnancy in a woman with quiescent pulmonary tuberculosis can be considered to add very little to the risk of reactivation to which any quiescent case is subject. The two periods of pregnancy at which factors arising from pregnancy may exert an unfavourable influence are the first four months and the time immediately following parturition.

The prognosis in active pulmonary tuberculosis where spontaneous abortion occurs seems to be appreciably better than in the group with active tuberculosis where the pregnancy goes on full term.

The theory propounded to explain these findings is that the influence of chorionic gonadotropin is potentially adverse, while the influence of œstrogen is potentially favourable, in patients with coexisting pulmonary tuberculosis either active or quiescent. The danger in the first four months is due to the high levels of gonadotropin in the body-fluids. The danger at parturition arises from the sudden withdrawal of œstrogen from the body-fluids, the gonadotropin level being still very much above preconception levels, while the patient is in the phase of puerperal debility.

If this theory is correct, it seems that little advantage is to be expected from terminating pregnancy in a woman with active pulmonary tuberculosis after the end of the first trimester. Similarly the modern practice of administering gonadotropic substances to counteract a tendency to early abortion may in a woman with tuberculosis carry some risk of reactivating the tuberculous disease.

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PENICILLIN IN THE TREATMENT OF UNCOMPLICATED GONORRHŒA

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THE prompt effect of penicillin in limiting spread of infection and preventing complications in cases of uncomplicated gonorrhœa has led to its general acceptance not only as a major advance in methods of treatment, which it certainly is, but as a panacea, which it certainly is not. The beneficial effects have been so obvious and so striking as to convince many that gonorrhœa is no longer a public-health problem and no longer merits consideration as a subject for research.

Two statements from authoritative sources in recent years illustrate this. The report of the first session of the Expert Committee on Venereal Diseases of the World Health Organisation Interim Commission (1949), makes the following reference to gonorrhœa: "Antibiotic therapy appears to have transformed gonorrhœa from a disease of great chronicity with frequent recurrences, with great tendency to troublesome complications and protracted disability, to an infection readily amenable to treatment and with almost complete freedom from complications or tendency to relapse." Mahoney (1947) giving his views on research on venereal diseases expresses himself as so satisfied with the modern treatment of gonorrhœa that "the only intensive investigative effort which appears to be warranted from the public health point of view lies in the field of prophylaxis."

The present investigation brings evidence which is not conclusive but suggests that some successes of treatment with penicillin may be more apparent than real.

WHAT IS A CURE?

Gonorrhœa is a disease which tends to infectious latency; so cure is always difficult to determine with certainty. In most of the reports of series treated with penicillin, the decision as to cure has been reached after brief observation, lasting a few days or a few weeks, supported by a few negative smears and cultures from the prostatic secretion in the male and from urethra and cervix in the female.

Such criteria of cure are unreliable, we believe, because longer clinical observation and further microscopical and cultural tests reveal a number of additional failures of treatment. Microscopical and cultural tests are most important; but it is not safe to depend on these alone, for, like so many laboratory tests, they suffer from inherent difficulties of technique. A positive cultural test from a reliable laboratory cannot be ignored; but a negative test from the same source may well be of *no significance.*

In males with uncomplicated gonococcal urethritis treated with penicillin the gross signs of urethritis nearly always clear very quickly. If the patient is then examined during the day, after holding urine for two or three hours, he seems quite well and is free from signs. If, however, he attends in the early morning, after holding urine for eight hours or more, there will often be slight secretion at the meatus, smears from which show polymorphonuclear leucocytes and, in an occasional case, gonococci. The urine may show pus or pus threads. These signs of residual infection often persist, and there may be also excess of polymorphonuclear leucocytes in the prostatic secretion. In some of these cases relapse occurs with purulent urethritis, and gonococci may be found again. Such relapses are usually attributed to reinfection, whether the history supports this view or not; for it is part of the moral judgment which even the physician passes upon the unfortunate patient with venereal disease that he is rarely considered capable of speaking the truth.

In most female patients treated with penicillin the gonococcus rapidly disappears from the secretions and any symptoms due to gonorrhœa are relieved. Signs of infection of the cervix, however, are apt to persist, and erosion and mucopurulent discharge may remain indefinitely. In some cases the gonococcus persists or reappears, and in an occasional case it continues to do so in spite of massive doses of penicillin.

The question of relapse or reinfection cannot be settled finally, because the two conditions are indistinguishable. The same difficulty arises in assessing the results of treatment of early syphilis by rapid methods, including penicillin. There is no means of distinguishing between infectious relapse and reinfection, and in the many careful and conservative studies on this subject it has therefore been customary to include all these cases as relapses, so weighting the evidence against the drug under investigation. There is a strong case for equal care and conservatism in assessing the results of treatment of gonorrhœa with penicillin. We suggest, therefore, that all cases of gonorrhœa in which gonococci are found again within three months of the time of treatment should be regarded as relapses. There are cases in which relapse seems to have occurred more than three months after treatment; but the rule we have suggested would probably cover most of the doubtful cases.

The hypothesis sometimes advanced to explain the reappearance of gonococci is that there are foci of infection to which the penicillin in the blood-stream does not penetrate. There is little or no evidence for or against this explanation; for these patients seldom show clinical evidence of abscess formation or any other complication. Alternatively the infection is presumed to be "penicillin-resistant." Bacteriologically this implies that the gonococci in subculture should prove to be resistant to penicillin in vitro. This test might give useful information; but, for various technical reasons concerned with the difficulty of isolating the organism in pure culture, we have not yet succeeded in applying the test to our own cases as a routine procedure. At the same time it may be questioned whether the reactions of the gonococcus in the test-tube are a real index of its probable behaviour in vitro. The incalculable factor of tissue immunity in the host remains. In the days when gonococci were found to be "sulphonamide-resistant" there was little correlation between the findings in vivo and vitro.

SOME RESULTS

In support of these views we present an analysis of 1788 cases of fresh acute uncomplicated gonorrhœa in the male and 481 cases of similar infection in the female. All the females and 805 of the males had been infected for the first time. All were treated with a routine course of 150,000 units of sodium penicillin in water, consisting of five doses of 30,000 units given at intervals of two hours.

Males

Of the 1788 men, 341 did not attend for observation and nothing is known of their subsequent history, leaving 1447 in whom some assessment could be attempted; 403 of these patients attended for three months or more and 1044 for less than three months.

1. Of those who remained under observation 94 (6·4%) are considered to be immediate failures of treatment because gross signs of infection persisted or reappeared within two weeks or because acute complications of the

embedding of the ovum and placental development. Browne et al. (1939) found low gonadotropin levels in early abortion, whereas Jeffcoate (1932) found that some cases of inevitable abortion were associated with an excess of œstrogen in the body-fluids. If these findings are correct, and spontaneous abortion in a substantial proportion of cases is associated with either a deficiency of gonadotropin or an excess of œstrogen, the favourable survival-rates in tuberculosis associated with spontaneous abortion can be explained by the hormonic theory outlined above, in that the very factor which is inimical to the pregnancy exerts a favourable influence on the tuberculosis.

It appears incontrovertible that the first four months of pregnancy and the weeks immediately succeeding parturition are the only periods in pregnancy during which any special risk regarding tuberculosis exists. The theory has been advanced that these potential dangers are due to the fact that excess of gonadotropin is an adverse factor and excess of œstrogen a favourable factor, the sudden withdrawal of which, in the presence of a high gonadotropin level, may exert an unfavourable influence, particularly during the period of debility in the puerperium. If this is accepted, it is difficult to justify the induction of abortion once the phase of gonadotropic domination has passed and the phase of œstrogen domination has begun. Perhaps the phase of œstrogenic domination is responsible for those cases in which pregnancy leads to improvement in the tuberculosis. In practice this means that little advantage is to be expected from terminating a pregnancy later than the 14th week. This has been my own view for many years, but mainly on the grounds that with each week after the first trimester the risks of abortion increase while the advantages do not seem to increase. Now there seems to be a more rational scientific reason for restricting induction of abortion to cases in which it is indicated in the first trimester. It also seems that, if pregnancy must be terminated, the earlier in the first trimester at which it can be terminated the greater is the probable advantage.

The modern practice of administering gonadotropic substances to counteract a tendency to early abortion is one which also requires very careful consideration if the patient shows evidence of past or present tuberculosis. On the other hand, the exhibition of œstrogenic substances, such as stilbœstrol immediately after parturition where suppression of lactation is desired, may be beneficial to the tuberculous woman by lessening the impact of the sudden fall in œstrogen level which normally takes place at this time. It is a common practice, and has for long been my own practice and the practice of my obstetrical colleagues, to suppress lactation in this way in active tuberculosis where suckling would be dangerous to the baby. It may well be that this action, which has in the past been dictated by the welfare of the baby, has also an advantage for the mother which more than counterbalances the loss of the tonic effects of lactation on involution of the uterus. Here is a point which merits investigation: would administration of œstrogen for a period after parturition in women with active tuberculosis assist in countering the special dangers of the puerperium?

CONCLUSION

Clinical observations over many years on the complex relationships of pregnancy and tuberculosis have been presented, and certain new theories have been advanced to explain the findings. It is my hope that these theories will be tested by other observers, and that in this way some advances may be made not only in the management of pregnancy in the tuberculous woman but also in the knowledge of the biochemical factors concerned in resistance to tuberculosis.

SUMMARY

A study has been made of 718 pregnancies in 534 women.

Survival-rates for the groups with active pulmonary tuberculosis do not suggest that the effect of pregnancy on the group as a whole is adverse. If the course of the disease is in some cases influenced unfavourably, this is more than counterbalanced by the cases in which pregnancy influences the course of the disease favourably.

Pregnancy in a woman with quiescent pulmonary tuberculosis can be considered to add very little to the risk of reactivation to which any quiescent case is subject. The two periods of pregnancy at which factors arising from pregnancy may exert an unfavourable influence are the first four months and the time immediately following parturition.

The prognosis in active pulmonary tuberculosis where spontaneous abortion occurs seems to be appreciably better than in the group with active tuberculosis where the pregnancy goes on full term.

The theory propounded to explain these findings is that the influence of chorionic gonadotropin is potentially adverse, while the influence of œstrogen is potentially favourable, in patients with coexisting pulmonary tuberculosis either active or quiescent. The danger in the first four months is due to the high levels of gonadotropin in the body-fluids. The danger at parturition arises from the sudden withdrawal of œstrogen from the body-fluids, the gonadotropin level being still very much above preconception levels, while the patient is in the phase of puerperal debility.

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SOME RESULTS

In support of these views we present an analysis of 1788 cases of fresh acute uncomplicated gonorrhœa in the male and 481 cases of similar infection in the female. All the females and 805 of the males had been infected for the first time. All were treated with a routine course of 150,000 units of sodium penicillin in water, consisting of five doses of 30,000 units given at intervals of two hours.

Males

Of the 1788 men, 341 did not attend for observation and nothing is known of their subsequent history, leaving 1447 in whom some assessment could be attempted; 403 of these patients attended for three months or more and 1044 for less than three months.

1. Of those who remained under observation 94 (6·4%) are considered to be immediate failures of treatment because gross signs of infection persisted or reappeared within two weeks or because acute complications of the

—	Males		Females	
	No. of cases	Percentage	No. of cases	Percentage
Total treated.. ..	1788	—	481	—
Followed for less than three months	1044	—	167	—
Followed for three months or more	403	—	265	—
Total	1447	—	432	—
Early failures . ..	94	6·4	15	3·5
Relapses:	276	19·1	—	—
Gonococcus positive ..	216	14·9	56	13·4
Gonococcus negative ..	60	4·1	—	—
Residual infection: ..	270	18·6	Clinical and microscopical evidence of residual infection in most cases	
Excluding previous infection	129	8·9		
Total late failures: ..	546	37·7	Only 79 out of 265 passed tests for cure	
Excluding previous infection	405	27·9		

disease supervened after treatment. Of these 94, 48 showed signs of urethritis, with gonococci persisting in the urethral secretion in 25, and 34 had gross pyuria without urethral discharge. Further courses of penicillin abolished the signs of infection in almost all these cases. Epididymitis appeared in 5 patients, arthritis in 5, and infection of a Cowper's gland in 2, within five weeks after treatment with penicillin.

2. During observation after apparent cure no fewer than 276 (19·1%) patients developed acute purulent urethritis from two to thirteen weeks after treatment, and 216 (14·9%) of them showed gonococci in the secretions. Of this group of 216 patients, 116 admitted further sexual intercourse while the remaining 100 denied it.

3. A third group of 270 patients (18·6%) who were free from symptoms showed evidence of residual infection in the prostate or seminal vesicles. In 27 of these, abnormalities of prostate or seminal vesicles were detected by the examining finger in the rectum and confirmed by microscopic tests; 6 showed gonococci in prostatic smears and in 19 cases cultures from prostatovesicular material yielded gonococci; and 218 patients without detectable abnormality on rectal examination showed gross excess of leucocytes in secretion obtained by massaging prostate and seminal vesicles. Some of these findings may be interpreted as due to previous infections. Of the 270 patients, 141 had a history of previous gonorrhœa or urethritis while 129 gave no such history. If we discard those patients with a history of previous infection, the percentage showing evidence of residual infection becomes 8·9 instead of 18·6. The total failures revealed by follow-up, including relapses and those with residual infection, amount to 546 (37·7%) or, after eliminating those patients with history of previous infection, 405 (27·9%).

Females

Of 481 women, 49 did not attend for observation, which leaves 432 in whom assessment was possible: 265 of these remained under observation for three months or more and 167 for less than three months. Most of these women continued to show some signs of infection both clinically and by the presence of numbers of polymorphonuclear leucocytes in stained smears, especially from the cervix. Immediate failure of treatment was assessed by the continuing presence of the gonococcus or by its reappearance within two weeks. This happened in 15 cases (3·5%). Disappearance of gonococci followed further injections of penicillin. In 56 (13·4%) of the 417 cases left after deducting the 15 immediate failures, the gonococcus reappeared during the later period of observation—in 25 during the first month, in 8 during the second month, in 11 during the third month, and in 12 others subsequently. Further sexual intercourse was admitted by 27 and denied by 29. Among those who relapsed during the period of observation 11 developed signs of salpingitis and 3 bartholinitis.

COMMENT

The whole group of cases, therefore, male and female, showed an immediate response to penicillin which was just as satisfactory as general experience had led us to expect. Nevertheless there was strong evidence that in a number of cases the infection was suppressed rather than cured. The continuing evidence of a persisting low-grade infection, combined with clinical or bacteriological relapse in a considerable proportion of cases, points unmistakeably, in our opinion, to the conclusion that the results of the treatment of gonorrhœa with penicillin are less satisfactory than is generally believed.

We are aware, of course, that many observers would be prepared to describe as reinfections the cases we have classified as relapses. But according to calculations submitted by Sutherland (1950) the chances of acquiring a venereal infection by non-marital sexual intercourse must be very small in relation to the number of exposures: in other words the probabilities are against the assertion that the cases we have classified as relapses are in reality new cases of gonorrhœa. Furthermore, such is the insensitiveness of present methods of isolating or demonstrating the presence of the gonococcus in human secretions and tissues that it seems wiser to weight the evidence against a method of treatment, by including as relapses some possible reinfections, than to encourage a false conception of the value of the treatment by refusing to admit the fact that relapses occur. Although, for everyday practical purposes, some venereologists may be led to assume that all men are liars, such an assumption is not a very scientific standpoint from which to study a disorder like gonorrhœa, in which our knowledge is so small and our methods of isolation of the causative organism in the chronic stage of the disease are so inadequate.

SUMMARY

1. The results of treatment of 2269 patients with acute uncomplicated gonorrhœa, including 1788 males and 481 females, are presented.

2. All were treated with 150,000 units of sodium penicillin in water, in five doses each of 30,000 units given at intervals of two hours.

3. Assessment is restricted to 1447 males and 432 females who attended for tests for cure.

4. Of these, 94 men (6·4%) and 15 women (3·5%) were regarded as immediate failures of treatment because the gonococcus persisted in the secretions or reappeared within two weeks, or because they developed acute complications of the infection after penicillin had been given. In nearly all these cases the gross signs of infection cleared with additional injections of penicillin.

5. Of the remaining men, 276 (19·1%) developed acute purulent urethritis during observation after apparent cure. Of these, 216 (14·9%) showed gonococci in the secretions in the second attack. A further 270 (18·6%) showed evidence of residual infection in the genital tract, detected by the examining finger in 27 and by microscopic or cultural test in 243. Thus in the male patients the total "late" failures, obtained by adding "relapses" to those with residual infections amount to 546 (37·7%) or, after eliminating those patients with history of previous genital infection, 405 (27·9%).

6. Of the remaining women, 56 (13·4%) showed the gonococcus in genital secretions during observation two weeks or more after treatment.

7. The opinion is expressed that reinfection does not account for the major proportion of these failures. Relapse and reinfection are indistinguishable, and for scientific accuracy all such cases, whether relapses or reinfections, which occur during three months' observation after treatment should be classed as failures. If this method of assessment be accepted, penicillin is less effective in the treatment of acute uncomplicated gonorrhœa than it is generally reported to be.

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STEROID THERAPY IN RHEUMATOID ARTHRITIS

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AN attempt has been made to evaluate the usefulness of certain steroids in the treatment of active rheumatoid arthritis. This therapeutic trial was conducted in two parts; in the first, steroid therapy alone was given; in the second, the same steroids, and also deoxycortone acetate, were combined with ascorbic acid.

I. Steroid Therapy Alone

In view of the possibility that the enzymal systems of the body might be able to convert other members of the cyclo-penteno-phenanthrene ring system into 11-oxysteroids, and since there were other indications for their therapeutic trial, it was decided to treat comparable groups of cases of active rheumatoid arthritis with large doses of methyl testosterone, testosterone propionate, ethinyl œstradiol, progesterone, and chorionic gonadotrophin ('Pregnyl').

These particular steroids were selected for the following reasons. Progesterone has been considered a possible causative factor in the remission of rheumatoid arthritis during pregnancy. Since this work started, it has also been shown that in active rheumatoid arthritis the amount of pregnanediol excreted after administration of progesterone is double the normal; and this suggests some abnormality in steroid metabolism in this disease.[13] Chorionic gonadotrophin has been claimed to benefit rheumatoid arthritis.[12] Testosterone has proved of value in the treatment of the refractory anæmia of hypopituitarism,[17] and it was hoped that it might at least help the refractory anæmia accompanying active rheumatoid arthritis. For many years œstrogens have been a popular remedy for the climacteric type of rheumatoid arthritis.

METHODS AND DEFINITIONS

All cases had routine physical treatment. In view of the number of series that were being followed, it was felt that the groups would act as controls to each other, and that any steroid of definite value would stand out from the remainder when the time for assessment arrived.

Each case was assessed periodically during and after treatment. The clinical observations, which are independent of laboratory findings, are summarised below. Table I presents a complete summary of the clinical changes (including weight), laboratory findings, and "activity indices" in all the cases.

The "activity index" represents an attempt to give a numerical value to the activity of the disease. The index is derived from 4 factors—change in weight, erythrocyte-sedimentation rate (E.S.R.), hæmoglobin levels (Hb), and degree of pain at rest. These are graded on a three-point scale as follows:

Weight.—Stationary or increasing, 0. Slight loss (1–4 lb.), 1. Gross loss (more than 4 lb.), 2.

E.S.R. (Westergren, after 1 hr.).—0–15 mm., 0. 16–40 mm., 1. Over 40 mm., 2.

Hb.—80% or over, 0. 65–79%, 1. 64% or below, 2.

Rest pain.—Absent, 0. Slight, 1. Severe, 2.

The activity index obtained by adding up the appropriate figures is arbitrary; changes in weight and inconstancies of the E.S.R. may obviously be misleading. Many patients feel that they have improved as a result of a stay in hospital, though laboratory findings may suggest that their condition is unchanged or has even deteriorated. For such reasons there are discrepancies in some of the present cases between the clinical assessment and the activity index.

CLINICAL ASSESSMENT

Ethinyl Œstradiol (cases 1–9)

Of the 9 patients, 7 were women and 2 men.

Dosage and Side-effects.—Each of these 9 patients received 0·01 mg. of ethinyl œstradiol thrice daily. In 3 cases this treatment was discontinued owing to bleeding per vaginam—in cases 7 and 8 after two weeks, and in case 9 after nine days—and treatment was later continued with methyl testosterone.

Results.—Early definite improvement was noted in 3 cases (1–3). Case 3, a man, continued this treatment for six months, by the end of which there was pain, swelling, and tenderness of the breasts; the improvement was very marked in the first three months and was maintained for the whole period.

There was slight improvement in 2 cases (4 and 5).

No change was detected in 1 case (6).

In 3 cases (7–9) where treatment had to be discontinued within two weeks the patients' condition deteriorated.

Methyl Testosterone (cases 10–21)

Of the 12 patients, 10 were women and 2 men; 3 of the women (cases 19–21) had previously been treated with ethinyl œstradiol (see above).

Dosage and Side-effects.—All the 12 patients received 5 mg. t.d.s. for three months except:

Case 13, in which 5 mg. t.d.s. was given for five weeks and three days, and 10 mg. t.d.s. for a further eight weeks.

Case 15, in which 5 mg. t.d.s. was given for six weeks and 10 mg. t.d.s. for a further six weeks.

Case 19, in which 5 mg. t.d.s. was given for three weeks, and 10 mg. t.d.s. for a further nine weeks and three days.

In cases 15 and 19, both female, the voice deepened after ten weeks' and eleven weeks' treatment.

Pustular acne developed in 2 cases (20 and 21), both female. The first of these patients developed a mild eruption after six weeks' treatment. After a further four weeks, treatment was stopped because of worsening of the acne and lack of improvement in the rheumatic condition. In the second case, severe acne appeared after four weeks' treatment; the dose was gradually reduced by the patient's own doctor and finally stopped after six weeks' treatment. The patient's rheumatic condition improved quite considerably. Both these patients had previously had ethinyl œstradiol, which had to be discontinued because of bleeding per vaginam.

In 1 case (17), a female, œdema of the ankles developed rapidly a week after treatment was started. Since there was no gross arthritis of the ankles and no evidence of a cardiac or renal lesion, it was thought that the treatment might be responsible, and this was discontinued. The patient, who was an outpatient, failed to report again.

Results.—Fairly definite improvement took place in 3 cases (15, 19, and 21).

Fairly definite improvement in general health with no change or deterioration in the joint condition was observed in 6 cases (11–13 and 16–18).

No change was noted in 2 cases (10 and 20).

One case (14) deteriorated.

Testosterone Propionate (cases 30–36)

Of the 7 patients, 3 were women and 4 men. Case 35 had previously had a course of methyl testosterone (see case 10), completed two weeks before testosterone propionate was begun. Case 33 was suffering from ankylosing spondylitis with pronounced anæmia.

Dosage and Side-effects.—4 patients (cases 30–32 and 36) had 25 mg. intramuscularly thrice weekly for three weeks; 2 patients (cases 33 and 34) had 50 mg. thrice weekly for one week, then 100 mg. thrice weekly for the second week, and 100 mg. daily for the third week. One patient (case 35) had 50 mg. thrice weekly for one week, then 100 mg. thrice weekly for the second week, 100 mg. daily for three days, and 300 mg. daily for one week.

One patient (case 31) said that her appetite increased considerably at her midday meal on the day of each injection (given in the morning), but not at her evening meal or on the days when she had no injection.

Results.—Fairly definite improvement took place in 3 cases (31, 33, and 34).

Slight improvement took place in 1 case (30).

No change was noted in 3 cases (32, 35, and 36).

Pregnyl (cases 22–29, 44)

Of the 9 patients 7 were women and 2 men. Case 27 had previously had a course of progesterone (see case 41), completed two weeks before pregnyl was begun

Dosage and Side-effects.—7 patients (cases 22–28) had 500 units intramuscularly thrice weekly for three weeks. 2 patients (cases 29 and 44) had 2000 units intramuscularly daily for one week.

Cases 24 and 25 had some headache after the first and second injections only; and case 29 had an exacerbation of the pains in all her joints six hours after each injection and lasting six hours, this being most troublesome after the first three injections. This patient did appear to improve when ascorbic acid was added (table II, case 10).

Results.—Fairly definite improvement in general health, without change in the joint symptoms, was observed in 3 cases (22, 24, and 25).

No change was noted in 3 cases (23, 27, and 28).

The condition of 2 patients (cases 26 and 29) deteriorated.

Definite clinical improvement, both in general health and arthritic symptoms, with gain in weight but with deterioration in blood condition, was observed in 1 case (44).

TABLE I—EFFECT OF VARIOUS STEROIDS ON RHEUMATOID ARTHRITIS

Case no.	Treatment			Sex and age (yr.)	Clinical change		Rest pain		Weight (lb.)		E.S.R.‡ mm. (1 hr.)		Hb (%)		Activity index		
	Substance	Total dose	Duration weeks		Joints	General health	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Change
1	Ethinyl œstradiol	2·82 mg.	13	F 28	+	+ +	Sev.	Sl.	92	109	75	77	66	64	7	5	+2
2	,,	2·5 mg.	13	F 55	+	+ +	Nil	Nil	141	149	65	54	71	82	3	2	+1
3	,,	2·73 mg.	13	M 54	+ +	+ +	Sev.	Nil	118	140	49	36	75	81	7	3	+4
4	,,	2·82 mg.	13	M 59	0	+	Nil	Nil	135	141	80	84	80	68	4	3	+1
5	,,	2·73 mg.	13	F 39	−	+	Sl.	Sev.	102	106	60	96	55	59	7	6	+1
6	,,	2·73 mg.	13	F 28	0	0	Nil	Nil	86	89	37	66	58	77	3	3	0
7	,,	0·42 mg.	2	F 23	0	0	Nil	Nil	136	130	65	64	59	63	4	6	−2
8	,,	0·42 mg.	2	F 29	0	0	Nil	Nil	110	108	27	18	75	74	2	3	−1
9	,,	0·27 mg.	1²/₇	F 32	−	0	Sl.	Sev.	108	108	85	..	66	..	4	..	..
10	Methyl testosterone	1·43 g.	13	F 50	−	0	Nil	Sev.	91	109	100	95	58	55	6	6	0
11	,,	1·32 g.	13	M 51	−	+ +	Sev.	Sev.	98	109	84	59	60	61	8	6	+2
12	,,	1·365 g.	13	F 46	0	+ +	Sev.	Sev.	125	123	90	105	58	60	6	7	+1
13	,,	2·25 g.	13	M 20	−	+ +	Nil	Nil	113	120	79	80	58	52	6	4	+2
14	,,	1·365 g.	13	F 46	−	−	Sl.	Sev.	107	114	31	50	70	68	5	5	0
15	,,	1·89 g.	13	F 23	+	+ +	Nil	Nil	84	92	98	53	59	67	6	3	+3
16	,,	1·365 g.	13	F 58	−	+ +	Nil	Nil	100	109	55	33	58	62	5	3	+2
17		0·315 mg.	3	F 59	−	+ +	Nil	Sl.	151	155	91	109	74	64	5	5	0
18	,,	1·365 g.	13	F 66	−	+	Sev.	Sev.	93	91	61	77	65	57	7	7	0
19	,,	2·295 g.	13	F 23	+ +	+ +	Nil	Nil	130	..	64	..	63	..	..	..	..
20	,,	1·055 g.	10	F 29	0	0	Nil	Nil	110	115	27†	21†	75	69	2	2	0
21	,,	0·58 g.	6	F 32	+	+ +	Sev.	Nil	108	114	..	35	..	74	..	2	..
22	Pregnyl	4500 units	3	F 40	0	+ +	Sl.	Sl.	106	114	46	37	53	55	6	3	+3
23	,,	4500 units	3	F 35	0	+	Sl.	Sl.	130	130	53	54	65	66	4	4	0
24	,,	4500 units	3	F 35	0	+ +	Nil	Nil	115	114	88	118	64	55	4	4	0
25	,,	4500 units	3	F 47	0	+ +	Sev.	Sev.	016	1808	40	107	59	54	7	6	+1
26	,,	4500 units	3	M 33	−	0	Nil	Sl.	122	129	31	49	71	73	4	4	0
27	,,	4500 units	3	F 54	0	+	Sev.	Sev.	143	141	87	97	60	62	6	7	−1
28	,,	4500 units	3	F 55	−	+	Nil	Nil	136	140	45	98	56	55	6	4	+2
29	,,	14,000 units	1	F 43	−	0	Nil	Sev.	107	109	48	88	69	63	3	6	−3
30	Testosterone propionate	225 mg.	3	M 34	+	+	Nil	Nil	193	187	45	39	73	85	3	3	0
31	,,	225 mg.	3	F 45	+ +	+ +	Sl.	Nil	109	130	92	92	67	59	6	4	+2
32	,,	225 mg.	3	F 63	0	+	Nil	Nil	115	118	91	86	62	60	4	4	0
33*	,,	1·115 g.	3	M 61	+	+	Nil	Nil	142	142	40	73	79	62	3	4	−1
34	,,	1·15 g.	3	M 43	+ +	+ +	Nil	Nil	157	162	68	73	58	56	5	4	+1
35	,,	2·85 g.	3³/₇	F 50	0	0	Sev.	Sev.	103	106	110	98	50	56	7	6	+1
36	,,	225 mg.	3	M 36	0	0	Nil	Nil	126	126	87	52	31	41	4	4	0
37	Progesterone	525 mg.	3	F 64	0	+	Sev.	Sev.	109	107	61	78	72	68	6	6	0
38	,,	525 mg.	3	M 37	+	+ +	Nil	Nil	145	145	70	39	57	60	4	3	+1
39	,,	1·75 g.	3	M 58	+	0	Nil	Nil	119	121	39	83	78	73	3	3	0
40	,,	1·75 g.	3	M 51	0	+	Nil	Nil	114	117	65	93	68	59	5	4	+1
41	,,	1·75 g.	3	F 54	−	0	Sl.	Sev.	147	141	80	116	67	62	6	8	−2
42	,,	1·75 g.	3	F 36	+	+ +	Sev.	Sl.	84	86	23	40	73	69	4	3	+1
43	,,	1·75 g.	3	F 29	+	+ +	Nil	Nil	139	128	85	65	18	46	6	6	0
44	Pregnyl	14,000 units	1	M 54	+ +	+ +	Sl.	Nil	114	119	22	67	77	62	1	4	0

† Wintrobe. ‡ Westergren. * = ankylosing spondylitis. − = deterioration. 0 = no change. + = slight improvement. + + = well-marked improvement. Sev. = severe. Sl. = slight.

Progesterone (cases 37–43)

Of the 7 patients, 4 were women and 3 men.

Dosage and Side-effects.—2 patient (cases 37 and 38) had 25 mg. intramuscularly daily for three weeks; and 5 (cases 39–43) had 50 mg. daily for one week and then 100 mg. daily for a further two weeks.

Result.—There were no untoward reactions.

Fairly definite improvement took place in 1 case (38).

Slight improvement was observed in 3 cases (39, 42, and 43).

No change was noted in 2 cases (37 and 40).

The condition of 1 patient (case 41) deteriorated.

BLOOD-VOLUMES

On 26 occasions blood-volumes were estimated, by a modification of the method of Gregerson,[5] before and after treatment. Notable alterations were found in only 3 cases—2 women treated with pregnyl and 1 man treated with progesterone (cases 24, 25, and 39). In these 3 cases the blood-volumes after treatment showed increases of 71%, 40%, and 44%; the hæmatocrit values remained virtually the same. These cases showed no particular clinical response.

CONCLUSIONS

It will be seen that of the 9 cases taking ethinyl œstradiol, only 6 completed the course; and of these 6, 3 showed some definite, and 2 slight, improvement. The 3 who stopped treatment, because of menorrhagia, were definitely worse as regards their arthritis. Of the 12 taking methyl testosterone, 3 showed improvement in the joint condition. Of 7 taking testosterone propionate, 3 showed moderate improvement in their arthritis, and 1 was slightly improved. Of the 7 cases taking progesterone, 4 said their joints were slightly easier. Pregnyl produced improvement in the arthritis in only 1 of 9 cases.

About two-thirds of all the patients felt better in general health. None of the preparations used had any significant effect on anæmia.

Allowing for the vagaries of the disease and the benefit usually derived from rest, encouragement, and physical treatment in hospital, we are doubtful whether these steroids played any significant part in the therapeutic results. These findings are in conformity with those of Alexander and Duthie[1] in 5 cases with progesterone.

II. Steroids with Ascorbic Acid

When the therapeutic value of any of these steroids by itself proved far from convincing, it was decided to try the effect of these same preparations with the addition of ascorbic acid, and to compare the results with those obtained with deoxycortone acetate and ascorbic acid, using the method of Lewin and Wassén.[10] At the same time direct eosinophil-counts and urinary uric-acid creatinine ratios were estimated to see whether there was any corticoid effect; and the percentage of ascorbic acid in the urine was also noted in case the extent of ascorbic-acid saturation played any part in the variability of results.

TABLE II—EFFECT OF VARIOUS STEROIDS, USED IN CONJUNCTION WITH ASCORBIC ACID.

Case no.	Treatment (with ascorbic acid)	Sex and age	Clinical change after 1st and 2nd injections										E.S.R.† (mm. 1 hr.)		Hb (g. per 100 ml.)		Eosinophils per c.mm.		Uric-acid creatinine ratio		% Ascorbic acid excd. in urine after 1st inj.
			General health		Joints																
					Pain		Stiffness		Movement		Swelling		Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	
			1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd									
1	Ethinyl œstradiol	M 38	0	0	—	0	0	0	0	0	0	0	48	38	12·3	12·4	31	42	0·60	0·29	..
2	" "	M 60	0	0	+	+	0	0	0	0	0	0	20	7	11·5	11·2	61	150	0·29	0·12	16
3	" "	M 56	0	0	+	—	0	0	0	0	0	0	27	24	12·3	15·1	155	194	0·47	0·22	15
4	" "	F 64	0	0	+	+	0	0	0	+	0	+	24	27	14·0	12·4	33	72	0·36	0·66	30
5	Methyl testosterone	M 61	0	0	+	+	0	0	0	0	0	0	45	33	13·0	11·9	114	122	0·22	0·24	11
6	" "	F 23	0	0	0	0	0	0	0	0	0	0	..	..	..	..	..	..	0·23	0·31	7
7	" "	F 33	0	+	—	+	—	+	0	0	0	0	25	42	12·9	12·5	69	328	0·27	0·14	10
8	" "	M 68	0	0	+	+	0	0	0	0	0	0	32	..	..	..	..	..	..	..	..
9	Pregnyl	F 54	0	0	0	0	0	0	0	0	0	0	42	38	11·7	11·5	111	233	0·17	..	28
10	"	F 43	0	0	0 —	+	+	0	+	0	0	0	28	10	12·9	14·0	86	332	0·2	0·18	32
			0	0	0	—	0	0	0	0	0	0	37	43	12·5	13·2	211	150	0·37	0·2	100
11	"	F 26	—	0	0	0	0	0	0	0	0	0	35	34	11·1	11·4	336	100	0·15	0·16	20
12	"	M 54	0	0	+	0	+	0	0	0	0	0	40	45	14·3	13·6	30	78	0·34	0·5	42
13	"	M 67	0	0	+ +	0	0	0	0	0	0	0	37	43	10·7	10·9	178	194	0·48	0·45	17
14	Testosterone propionate	F 50	0	0	0	0	0	0	0	0	0	0	36	55	10·9	10·3	111	75	0·47	0·51	..
15	" "	F 44	0	0	0	0	—	—	0	0	0	0	47	43	12·9	12·3	121	155	0·24	0·34	6
16	" "	M 62	0	0	+	0	0	0	0	0	0	0	41	36	..	13·8	..	44	0·25	..	21
17	" "	M 23	0	0	+	0	0	+	0	0	0	0	41	41	11·5	12·7	72	250	0·3	0·27	39
18	Progesterone	F 35	+	—	+ +	—	+	—	+	—	0	0	16	21	12·0	13·2	50	75	..	..	..
19	"	F 29	0	0	0	+	0	+	0	+	0	0	42	42	8·9	..	59	..	0·51	0·33	..
			0	0	0	0	0	0	0	0	0	0	42	..	9·6	..	89	..	0·4	..	..
20	"	F 64	0	0	0	0	0	0	0	0	0	0	44	47	12·6	13·7	161	206	0·53	0·30	47
21	"	M 34	0	0	—	—	—	0	—	0	0	0	19	30	14·2	15·1	250	233	0·2	0·34	27
22	Deoxycortone	M 38	0	0	0	0	0	0	0	0	0	0	38	41	12·4	12·5	78	44	0·18	0·18	12
23	"	F 26	0	0	0	0	0	0	0	0	0	0	34	35	11·4	11·0	336	335	..	..	50
24	"	F 44	0	0	0	0	+	0	0	0	0	0	43	37	12·3	11·3	121	190	0·34	0·40	26
25	"	F 23	0	0	0	0	0	0	0	0	0	0	..	..	10·1	10·3	128	194	..	0·15	7
26	"	M 60	0	0	0	0	—	0	0	0	0	0	12	28	11·5	12·5	200	256	0·34	0·44	36
27	"	M 61	0	0	0	0	+	0	0	0	0	0	35	13	12·4	13·5	50	172	0·4	0·24	44
28	"	M 62	0	0	0	0	0	0	0	0	0	0	30	39	13·5	13·1	117	155	0·35	0·32	33
29	"	F 33	0	0	0	0	0	0	0	0	0	0	40	31	12·5	13·0	105	206	0·37	0·27	60
30	"	F 29	0	0	0	0	0	0	0	0	0	0	40	24	9·3	10·1	100	183	0·45	0·6	41
31	"	F 41	0	0	0	0	0	0	0	0	0	0	42	42	12·4	12·7	50	31	..	..	15
32	"	M 62	0	0	+ +	0	—	+	0	0	0	0	43	39	14·5	14·3	100	195	0·42	0·3	7·4
33*	"	M 46	0	0	0	0	+ +	+	+ +	+	0	0	14	22	13·9	13·1	272	155	0·3	0·37	57
34	"	M 23	0	0	0	0	0	0	0	0	0	0	41	44	12·0	11·9	172	294	0·23	0·32	55
35	"	M 34	0	0	0	0	0	0	0	0	0	0	19	16	14·4	14·0	150	428	0·1	0·4	47
36	"	F 64	0	0	+	+	+	+	0	0	0	0	43	46	13·6	12·5	217	328	0·24	0·59	32
37	"	F 43	0	0	0	0	0	+	0	0	0	0	31	28	11·6	11·7	133	267	..	..	..
38	"	F 61	0	0	0	0	0	0	0	0	0	0	41	43	10·1	11·0	139	205	0·32	0·6	36
39	"	F 44	0	0	0	0	0	0	0	0	0	0	34	22	13·8	13·1	112	205	0·19	0·68	48
40	"	F 59	0	0	0	0	0	0	0	0	0	0	10	12	11·6	11·2	50	94	0·25	0·6	33
41	"	F 53	0	0	0	0	0	0	0	0	0	0	31	31	12·4	12·8	67	105	0·5	0·53	53

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1	Ethinyl œstradiol	2·82 mg.	13	F 28	+	+ +	Sev.	Sl.	92	109	75	77	66	64	7	5	+2
2	,,	2·5 mg.	13	F 55	+	+ +	Nil	Nil	141	149	65	54	71	82	3	2	+1
3	,,	2·73 mg.	13	M 54	+ +	+ +	Sev.	Nil	148	140	49	36	75	81	7	3	+4
4	,,	2·82 mg.	13	M 59	0	+	Nil	Nil	135	141	80	84	80	68	4	3	+1
5	,,	2·73 mg.	13	F 39	–	+	Sl.	Sev.	102	106	60	96	55	59	7	6	+1
6	,,	2·73 mg.	13	F 28	0	0	Nil	Nil	86	89	37	66	58	77	3	3	0
7	,,	0·42 mg.	2	F 23	0	0	Nil	Nil	136	130	65	64	59	63	4	6	–2
8	,,	0·42 mg.	2	F 29	0	0	Nil	Nil	110	108	27	18	75	74	2	3	–1
9	,,	0·27 mg.	$1^{2}/_{7}$	F 32	–	0	Sl.	Sev.	108	108	85	..	66	..	4	..	..
10	Methyl testosterone	1·43 g.	13	F 50	–	0	Nil	Sev.	91	109	100	95	58	55	6	6	0
11	,,	1·32 g.	13	M 51	–	+ +	Sev.	Sev.	98	109	84	59	60	61	8	6	+2
12	,,	1·365 g.	13	F 46	0	+ +	Sev.	Sev.	125	123	90	105	58	60	6	7	+1
13	,,	2·25 g.	13	M 20	–	+ +	Nil	Nil	113	120	79	80	58	52	6	4	+2
14	,,	1·365 g.	13	F 46	–	–	Sl.	Sev.	107	114	31	50	70	68	5	5	0
15	,,	1·89 g.	13	F 23	+	+ +	Nil	Nil	84	92	98	53	59	67	6	3	+3
16	,,	1·365 g.	13	F 58	–	+ +	Nil	Nil	100	109	55	33	58	62	5	3	+2
17		0·315 mg.	3	F 59	–	+ +	Nil	Sl.	151	155	91	109	74	64	5	5	0
18	,,	1·365 g.	13	F 66	–	+	Sev.	Sev.	93	91	61	77	65	57	7	7	0
19	,,	2·295 g.	13	F 23	+ +	+ +	Nil	Nil	130	..	64	..	63	..	..	..	..
20	,,	1·055 g.	10	F 29	0	0	Nil	Nil	110	115	27†	24†	75	69	2	2	0
21	,,	0·58 g.	6	F 32	+	+ +	Sev.	Nil	108	114	..	35	..	74	..	2	..
22	Pregnyl	4500 units	3	F 40	0	+ +	Sl.	Sl.	106	114	46	37	53	55	6	3	+3
23	,,	4500 units	3	F 35	0	+	Sl.	Sl.	130	130	53	54	65	66	4	4	0
24	,,	4500 units	3	F 35	0	+ +	Nil	Nil	115	114	88	118	64	55	4	4	0
25	,,	4500 units	3	F 47	0	+ +	Sev.	Sev.	016	1808	40	107	59	54	7	6	+1
26	,,	4500 units	3	M 33	–	0	Nil	Sl.	122	129	31	49	71	73	4	4	0
27	,,	4500 units	3	F 54	0	+	Sev.	Sev.	143	141	87	97	60	62	6	7	–1
28	,,	4500 units	3	F 55	–	+	Nil	Nil	136	140	45	98	56	55	6	4	+2
29	,,	14,000 units	1	F 43	–	0	Nil	Sev.	107	109	48	88	69	63	3	6	–3
30	Testosterone propionate	225 mg.	3	M 34	+	+	Nil	Nil	193	187	45	39	73	85	3	3	0
31	,,	225 mg.	3	F 45	+ +	+ +	Sl.	Nil	109	130	92	92	67	59	6	4	+2
32	,,	225 mg.	3	F 63	0	+	Nil	Nil	115	118	91	86	62	60	4	4	0
33*	,,	1·115 g.	3	M 61	+	+	Nil	Nil	142	142	40	73	79	62	3	4	–1
34	,,	1·15 g.	3	M 43	+ +	+ +	Nil	Nil	157	162	68	73	58	56	5	4	+1
35	,,	2·85 g.	$3^{2}/_{7}$	F 50	0	0	Sev.	Sev.	103	106	110	98	50	56	7	6	+1
36	,,	225 mg.	3	M 36	0	0	Nil	Nil	126	126	87	52	34	41	4	4	0
37	Progesterone	525 mg.	3	F 64	0	+	Sev.	Sev.	109	107	61	78	72	68	6	6	0
38	,,	525 mg.	3	M 37	+	+ +	Nil	Nil	145	145	70	39	57	60	4	3	+1
39	,,	1·75 g.	3	M 58	+	0	Nil	Nil	119	121	39	83	78	73	3	3	0
40	,,	1·75 g.	3	M 51	0	+	Nil	Nil	114	117	65	93	68	59	5	4	+1
41	,,	1·75 g.	3	F 54	–	0	Sl.	Sev.	147	141	80	116	67	62	6	8	–2
42	,,	1·75 g.	3	F 36	+	+ +	Sev.	Sl.	84	86	23	40	73	69	4	3	+1
43	,,	1·75 g.	3	F 29	+	+ +	Nil	Nil	139	128	85	65	48	46	6	6	0
44	Pregnyl	14,000 units	1	M 54	+ +	+ +	Sl.	Nil	114	119	22	67	77	62	4	4	0

† Wintrobe. ‡ Westergren. * = ankylosing spondylitis. – = deterioration. 0 = no change. + = slight improvement. + + = well-marked improvement. Sev. = severe. Sl. = slight.

was given). This improvement has now been maintained for three weeks.

In case 13 there was considerable improvement in joint pain two hours after the first combined injection, and the pain was relieved completely four hours later. This improvement has now been maintained for three weeks.

Cases 10 and 11 were subsequently treated with deoxycortone acetate and ascorbic acid (cases 37 and 23).

Testosterone Propionate and Ascorbic Acid (cases 14–17)

Of the 4 patients, 2 were women and 2 men.

Dosage and Side-effects.—3 patients (cases 15–17) had 300 mg. testosterone propionate intramuscularly daily for three days, and on each of the latter two days had 1 g. ascorbic acid intravenously. Case 14 had been treated with testosterone propionate for over three weeks (case 35 of table I) before ascorbic acid was given intravenously in addition.

Results.—Case 14 showed no significant change.

In case 15 there was very slight insignificant increase in stiffness of both knee-joints shortly after each injection.

In case 16 the joint pains improved two hours after the first combined injection, and this improvement lasted for five days. There was no significant change after the second injection.

In case 17 joint pains improved two hours after the first combined injection, and stiffness diminished three hours after the second.

This improvement was the best the patient had noted for seven months. Both pain and stiffness returned twenty-four hours after the second injection.

Cases 15, 16, and 17 were subsequently treated with deoxycortone acetate and ascorbic acid (cases 24, 28, and 34 respectively).

Progesterone and Ascorbic Acid (cases 18–21)

Of the 4 patients, 3 were women and 1 a man.

Dosage and Side-effects.—3 patients (cases 18, 20, and 21) had 100 mg. progesterone intramuscularly daily for three days, and on each of the latter two days 1 g. ascorbic acid intravenously. Case 19 had been treated with progesterone for three weeks (case 43 of table I) before ascorbic acid was given intravenously in addition. In view of the improvement noted in this case (see below) a further course of progesterone and ascorbic acid was administered, but on this occasion for a three-day period only.

Results.—Case 20 showed no significant change.

In case 18 there was much improvement in joint pains and some improvement of stiffness about three and a half hours after the first combined injection. The patient felt that the movements of her joints were freer, and her steps on walking were bigger. Shortly after the second injection, however, the joint pains, stiffness, and degree of movement all were worse. During that day and for the next few days the patient felt generally unwell.

In case 19 there was no change after the first combined injection, but three hours after the second injection joint pains were less, and there was improvement in the ability to make a fist and in the power of grip of both hands. No further improvement followed the second course of injections a week later. The improvement gained has now been maintained for four weeks.

In case 21, pain and stiffness of the right shoulder increased one hour after the first injection, and pain and stiffness of the left shoulder increased five hours after the injection. This exacerbation gradually settled during the next two days, the second injection apparently having no effect. Thirty-six hours after the second injection pains increased in the right knee and fingers of both hands.

Cases 19, 20, and 21 were subsequently treated with deoxycortone acetate and ascorbic acid (cases 30, 36, and 35).

Deoxycortone and Ascorbic Acid (cases 22–41)

Of the 20 patients, 12 were women and 8 men.

Dosage and Side-effects.—All the patients had 5 mg. deoxycortone acetate intramuscularly followed immediately by 1 g. ascorbic acid intravenously on two successive days. In 2 patients (cases 24 and 25) the ascorbic acid had to be given intramuscularly and in 1 patient (case 31), where the first ascorbic acid was given intravenously, the second was given intramuscularly.

Cases 22 and 26 had previously been treated with ethinyl œstradiol and ascorbic acid. Cases 25, 27, and 29 had previously been treated with methyl testosterone and ascorbic acid. Cases 23 and 37 had previously been treated with pregnyl and ascorbic acid. Cases 24, 28, and 34 had previously been treated with testosterone propionate and ascorbic acid. Cases 30, 35, and 36 had previously been treated with progesterone and ascorbic acid. The remaining patients had had no previous endocrine therapy.

Case 33 was the only patient in the series suffering from ankylosing spondylitis.

Results.—No change whatever resulted in 13 patients (cases 22, 23, 25, 28, 29, 30, 31, 34, 35, 38, 39, 40, and 41).

In 2 cases (24 and 27) the patients noticed that stiffness was less than usual when they got up on the morning of the day after the first combined injection. The stiffness returned to its usual state later during that day and apparently was unaffected by the second injection. The stiffness was not improved on the morning of the day after the latter injection.

In case 36 there was very slight improvement in pains and stiffness two hours after each combined injection The improvement after the second lasted thirty-six hours.

In case 37 there was slight improvement of stiffness of the left shoulder-joint three hours after the second combined injection. There was no change after the first.

In case 26 there was an increase in general stiffness immediately after the first combined injection. This persisted for three days and apparently was unaffected by the second injection.

In case 32 there was well-marked relief of pain in the right knee-joint immediately after the first combined injection; and this relief has now been maintained for five weeks. Stiffness of other joints was increased one hour after the first injection, but much relieved one hour after the second.

In case 33 (ankylosing spondylitis) there was much improvement in the stiffness and degree of movement of the whole spine, especially rotation of the cervical spine, immediately after the first combined injection. Improvement continued during the following week.

In only cases 32 and 33 did the improvement appear to be in any way significant.

LABORATORY FINDINGS

It will be seen from table II that in no case was there a decrease of circulating eosinophils or increase in the urinary uric-acid creatinine ratio to suggest any corticoid effect.

There was no correlation between the saturation with ascorbic acid and the therapeutic result; the route of administration of ascorbic acid showed no correlation with the saturation or the therapeutic effect.

CONCLUSIONS

From the case-reports and tables it may be seen that if patients' statements that they improved are accepted, A preliminary report of these findings is being published in view of the extremely diverse reports now appearing in the medical press.[2–4, 6–9, 11, 14–16]

METHODS

Altogether, 21 cases have been treated with the preparations already tried, but with the addition of ascorbic acid. In the case of the steroids given by injection (testosterone propionate, progesterone, and pregnyl) the technique was to give an injection of the steroid one day and then the steroid and ascorbic acid together on the two succeeding days, the ascorbic acid being given immediately after the steroid. Ethinyl œstradiol and methyl testosterone were taken by mouth for at least a week before, as well as during, the ascorbic-acid administration.

For comparison, 20 cases were treated with deoxycortone acetate and ascorbic acid on two successive days.[10] Deoxycortone acetate (5 mg.) was injected intramuscularly into the lateral aspect of the thigh and ascorbic acid (1 g.) was injected intravenously immediately afterwards. In a few cases, ascorbic acid had to be given intramuscularly because flexed elbows or poor veins made intravenous administration difficult.

All patients were assessed clinically by one observer (L. M.) from the point of view of general health and pain, stiffness, movement, and swelling of affected joints. They were also questioned about functional ability—including ability to dress, shave, brush the hair, use a knife and fork, and walk.

Sedimentation-rates, hæmoglobin, and eosinophil-counts were estimated before treatment and again five hours after the last injection of ascorbic acid. Uric-acid creatinine ratios were estimated on 24-hour urine specimens before treatment; and for the 24 hours immediately after the last ascorbic-acid injection.

Urinary ascorbic-acid excretion was observed in the five hours after the first injection of ascorbic acid (1 g.); in a normally saturated person at least 40% of the dose should be excreted in this time.

RESULTS

The laboratory findings and a summary of clinical observations are given in table II.

In many cases no therapeutic benefit was apparent. Only those cases in which improvement may conceivably have resulted are quoted in any detail. The remainder received no benefit whatever, and in fact 5 patients actually complained of increased joint pain after the injections.

Ethinyl Œstradiol and Ascorbic Acid (cases 1–4)

Of the 4 patients, 1 was a woman and 3 men.

Dosage and Side-effects.—All had 0 05 mg. ethinyl œstradiol by mouth thrice daily for ten days, and on the ninth and also the tenth day had 1·0 g. ascorbic acid injected intravenously.

Results.—In case 1, the joint pains increased two hours after the first injection of ascorbic acid. The pain was unaffected by the second injection, but twenty-four hours afterwards it improved.

In case 2, immediately after each injection, the pain in the right ankle improved and walking was much easier; on each occasion this improvement lasted 1–1½ hours.

In case 3, joint pain was eased two hours after the first injection, but aggravated one hour after the second injection.

In case 4, there was improvement in joint pains two hours after the first injection, this improvement lasting twelve hours. The pain also improved one hour after the second injection, for thirty-six hours. After the second injection, movement (ability to make a fist and power of grip) was better and swelling of the metacarpophalangeal joints was somewhat reduced. The return of pain was associated with a return of swelling and diminished movement.

Cases 1 and 2 were subsequently treated with deoxycortone acetate and ascorbic acid (cases 22 and 26).

Methyl Testosterone and Ascorbic Acid (cases 5–8)

Of the 4 patients, 2 were women and 2 men.

Dosage and Side-effects.—3 patients (cases 5, 7, and 9) had 10 mg. of methyl testosterone thrice daily by mouth for ten days, and on the ninth and also the tenth days had 1 g. ascorbic acid injected intravenously. Case 6 had been treated with methyl testosterone for three months (case 19 of table I) before ascorbic acid was given—intramuscularly in this case. Case 8 was an outpatient.

Results.—In case 5, there was an improvement in the joint pains two hours after the first injection and an hour after the second injection, the improvement after the second injection lasting for forty-eight hours.

Case 6 showed no significant change.

In case 7 there was increased pain and stiffness in all joints during the night after the first injection. This improved somewhat on the following morning (before the second injection was given). On the day after the second injection there was an improvement in general health and in the pains and stiffness of all joints.

In case 8 joint pains were less after the first and second injections. After the second injection the improvement lasted for four days, but then the pain became worse than ever before.

Cases 5, 6, and 7 were subsequently treated with deoxycortone acetate and ascorbic acid (cases 27, 25, and 29).

Pregnyl and Ascorbic Acid (cases 9–13)

Of the 5 patients, 3 were women and 2 men.

Dosage and Side-effects.—Cases 9, 11, and 13 had 2000 units of pregnyl intramuscularly daily for three days, and on each of the last two days had 1 g. ascorbic acid (intramuscularly in case 9). Cases 10 and 12 had 2000 units daily for ten days, with ascorbic acid (1 g.) intravenously on the last two days. Both these cases had been fully assessed after one week's daily pregnyl (cases 29 and 44 of table I). In view of the improvement noted in case 10 (see below), a further course of pregnyl and ascorbic acid was given subsequently, but on this occasion the pregnyl was given *for the three-day* period only, as above.

Results.—Cases 9 and 11 showed no significant change; but in case 11 there was a mild gastric disturbance on the day of the first combined injection.

In case 10, on the morning after the first combined injection (and before the second was given) the patient noticed a definite improvement in the extent of movement of her shoulder-joints. She could lift her arms 9 in. above her head, whereas before she could barely touch the top of her head; and she could dress and brush her hair more easily. On the morning after the second injection she found that she could internally rotate the left shoulder more fully, and the pain in all joints was less. The improvement of movement, which has now been maintained for four weeks, is the best she has experienced for two years. When a second course of combined injections was given a week later, there was no further improvement in the movement, but there was an increase of pain one hour after the second injection, easing off after seven hours.

In case 12 there was slight improvement of pain and stiffness of the left hand immediately after the first injection, and an improvement of the pains in the feet on the following morning (before the second injection was given). This improvement has now been maintained for three weeks.

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Of the 4 patients, 2 were women and 2 men.

Dosage and Side-effects.—3 patients (cases 5, 7, and 9) had 10 mg. of methyl testosterone thrice daily by mouth for ten days, and on the ninth and also the tenth days had 1 g. ascorbic acid injected intravenously. Case 6 had been treated with methyl testosterone for three months (case 19 of table I) before ascorbic acid was given—intramuscularly in this case. Case 8 was an outpatient.

Results.—In case 5, there was an improvement in the joint pains two hours after the first injection and an hour after the second injection, the improvement after the second injection lasting for forty-eight hours.

Case 6 showed no significant change.

In case 7 there was increased pain and stiffness in all joints during the night after the first injection. This improved somewhat on the following morning (before the second injection was given). On the day after the second injection there was an improvement in general health and in the pains and stiffness of all joints.

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Dosage and Side-effects.—Cases 9, 11, and 13 had 2000 units of pregnyl intramuscularly daily for three days, and on each of the last two days had 1 g. ascorbic acid (intramuscularly in case 9). Cases 10 and 12 had 2000 units daily for ten days, with ascorbic acid (1 g.) intravenously on the last two days. Both these cases had been fully assessed after one week's daily pregnyl (cases 29 and 44 of table I). In view of the improvement noted in case 10 (see below), a further course of pregnyl and ascorbic acid was given subsequently, but on this occasion the pregnyl was given for the three-day period only, as above.

Results.—Cases 9 and 11 showed no significant change; but in case 11 there was a mild gastric disturbance on the day of the first combined injection.

In case 10, on the morning after the first combined injection (and before the second was given) the patient noticed a definite improvement in the extent of movement of her shoulder-joints. She could lift her arms 9 in. above her head, whereas before she could barely touch the top of her head; and she could dress and brush her hair more easily. On the morning after the second injection she found that she could internally rotate the left shoulder more fully, and the pain in all joints was less. The improvement of movement, which has now been maintained for four weeks, is the best she has experienced for two years. When a second course of combined injections was given a week later, there was no further improvement in the movement, but there was an increase of pain one hour after the second injection, easing off after seven hours.

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FINDINGS IN ILLUSTRATIVE CASES

Case 1.—A female clerk, aged 47, whose symptoms started in 1944. The injections were given on Dec. 19, 1949.

Joint	Diameters of joints (cm.) before and after injections						
	Before	1 hr.	2 hr.	3 hr.	4 hr.	5 hr.	6 hr.
Rt wrist ..	15·7	15·7	15·7	15·5	15·5	15·5	15·5
Lt wrist ..	14·7	14·6	14·4	14·4	14·4	14·4	14·4
Rt ankle ..	24·0	24 0	23·8	23·8	23 7	23·7	23·7
Rt knee ..	37·0	37·0	37·0	37·0	37·0	37·2	37·2

Finding	Before	2 hr.	4 hr.	6 hr.
E.S.R. (mm. in 1st hr.)	33	47·0	41·0	42·0
Plasma viscosity (sec.)	38	34·6	35·0	35·0

The patient said she felt no improvement in the joints, but a sense of mental exhilaration began shortly after the injection and lasted, gradually diminishing in intensity, for about three days. Since she left the wards she has been attending the rheumatic clinic weekly and has been having, by her own request, weekly injections of deoxycortone and vitamin C. She says that her joints are not improved but that she greatly appreciates the "mental uplift" which lasts for some days after each injection.

Case 3.—A housewife, aged 43, whose symptoms started n 1943. The injections were given on Jan. 12, 1950.

Joint	Diameters of joints (cm.) before and after injections						
	Before	1 hr.	2 hr.	3 hr.	4 hr.	5 hr.	6 hr.
Rt wrist ..	18·0	18·0	18·0	18·0	17·8	18 0	17·8
Lt wrist ..	17·2	17·2	17·3	17·4	17·2	17·3	17·2
Rt ankle ..	25·4	25·2	25·4	25·5	25·3	25·4	25·2
Lt ankle ..	24·2	24·3	24·4	24·4	24·3	24·2	24·4

Finding	Before	2 hr.	4 hr.	6 hr.
E.S.R. (mm. in 1st hr.)	9·0	32 0	38 0	43·0
Plasma viscosity (sec.)	34·8	29·0	31 6	..

There was no increase in the range of movements. The patient said that the joints were not improved but that she felt somewhat exhilarated for two days after the injections. Since leaving the wards she has been attending the rheumatic clinic weekly and has been given, at her own request, weekly injections of deoxycortone and vitamin C.

Case 4.—A housewife, aged 40, whose symptoms started in 1943. The injections were given on Jan. 12, 1950.

Joint	Diameters of joints (cm.) before and after injections						
	Before	1 hr.	2 hr.	3 hr.	4 hr.	5 hr.	6 hr.
Rt wrist ..	18·5	18·5	18 2	18·2	18·3	18·3	18·3
Lt wrist ..	18·5	18 6	18 7	18·6	18·6	18·6	18·6
Rt ankle ..	26 5	26·3	26·3	26 3	26·3	26·3	26·3

Finding	Before	2 hr.	4 hr.	6 hr.
E.S.R. (mm. in 1st hr.)	46 0	40 0	46 0	46·0
Plasma viscosity (sec.)	32 0	33 5	32 8	32 4

There was no increase in the range of movement of the affected joints, and the patient did not feel improved.

CONTROLS

As will be seen from the table, 2 patients (cases 1 and 14) reported some symptomatic benefit from the treatment. At subsequent injections, unknown to them, sterile physiological saline solution was given in place of the deoxycortone and vitamin C. The subjective results were as follows:

Case no.	After injections of deoxycortone and vitamin C			After injections of saline solution		
	Feb. 21	March 14	March 21	Feb. 28	March 7	March 16
14	Improved	Greatly improved	Improved	Improved	Improved	Improved
1	Improved	Improved	Improved	Improved	Greatly improved	Improved

DISCUSSION

We feel that some comments are justifiable concerning the difficulties of assessing improvement in rheumatoid arthritis and the interpretation of these and other reported results.

In rheumatoid arthritis spontaneous remissions are common. These are usually subjective, and are of very variable duration, lasting from a few hours to several months or years. Most patients, indeed, say they have good days and bad days, often associated with changes in the weather.

The patient's performance is limited not only by the damage to, and the pain in, affected joints but also by his or her willingness to move the joints. Thus we have found that aspirin or any other anodyne (e.g., physeptone) will improve the patient's performance without affecting the disease in other respects. It must also be common experience to find greater improvement, with any treatment, in the more suggestible and coöperative patients.

Patients with rheumatoid arthritis may be divided, broadly, into two groups: (1) those who accept their disability as incurable, with the attitude of mind aptly described by the phrase "What can't be changed must be tholed"; and (2) those who refuse to yield to their affliction and struggle on with their work and recreations in spite of their disability. We have further found that symptomatic improvement with any form of treatment is extremely common—at least temporarily—in the second group.

The present investigation has not convinced us that deoxycortone and vitamin C, in the recommended doses, are of any value in the treatment of rheumatoid arthritis. The technique we have followed does not, we think, leave us open to the criticisms directed by Le Vay and Loxton (1949, 1950) at previous work yielding negative results.

Finally, we feel that in view of the wide differences of opinion regarding the value of this treatment, speculation about the mechanism of its beneficial action is, to say the least, premature.

We wish to thank Dr. J. W. Macfarlane for his interest and criticism, and for so willingly placing beds at our disposal.

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there was some betterment in 2 out of 4 cases treated with ascorbic acid and ethinyl œstradiol; in 2 out of 4 treated with methyl testosterone; in 3 out of 5 treated with pregnyl; in 2 out of 4 treated with testosterone propionate; in 2 out of 4 treated with progesterone; and in only 3 out of 20 treated with deoxycortone acetate.

A more critical examination of the results shows that case 4 on ethinyl œstradiol, case 10 on pregnyl, case 17 on testosterone propionate, cases 18 and 19 on progesterone and ascorbic acid, and cases 32 and 33 on deoxycortone acetate can be accepted as showing some definite temporary improvement.

In only 4 out of 42 cases was any pronounced improvement maintained for more than forty-eight hours, and it is definitely felt that the promiscuous use of deoxycortone acetate and ascorbic acid as a method of treatment is to be deprecated at present.

The carefully controlled investigation of the use of other steroids together with ascorbic acid, however, merits further attention.

We should like to thank Dr. Hubert Gibson, Dr. Ruth Pearson, Dr. E. Bene, and the sisters and nursing staff of the hospital for their help.

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TREATMENT OF RHEUMATOID ARTHRITIS WITH DEOXYCORTONE AND VITAMIN C

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GLASGOW ROYAL INFIRMARY

SINCE Lewin and Wassén's original note (1949) on the treatment of rheumatoid arthritis with deoxycortone and vitamin C many papers have appeared on this subject. Some observers (Hallberg 1950) report results even more dramatic than those with 'Cortisone.' Others report no benefit from the same treatment (Hartfall and Harris 1949, Kellgren 1949, Lloyd Hart and Starer 1949, Spies et al. 1949)

It is regrettable that the favourable reports have often been based on uncontrolled experiments and that subjective improvement alone has sometimes been accepted as evidence of improvement in the joints. Most rheumatologists will agree that one of the difficulties in treating rheumatoid arthritis lies in the accurate assessment of improvement. The clinical application of Kendall's Compound E (cortisone) has been most strictly investigated by Hench and his colleagues (1949), due attention being paid to its effect not only on the symptoms of the disease but on the objective signs and range of movements in the affected joints and the erythrocyte-sedimentation rate (E.S.R.); these experiments were also satisfactorily controlled.

This paper records a series of experiments with deoxycortone and vitamin C begun immediately after the publication of Lewin and Wassén's paper and continued until now.

METHODS AND RESULTS

The 17 patients treated were selected as fulfilling the clinical criteria for a diagnosis of rheumatoid arthritis, and in addition all had:

(1) Raised E.S.R.
(2) Negative Wassermann and Kahn reactions.
(3) Negative gonococcal flocculation test.
(4) Normal blood-level of uric acid.
(5) Negative agglutination test for abortus fever.

All the patients volunteered to come into hospital so that they could be kept under proper surveillance. No patient had less than four injections of the drugs.

The method of administration used was the popular one—deoxycortone in an oily solution injected intramuscularly, followed within 10 minutes by an intravenous injection of an aqueous solution of vitamin C. The doses were: deoxycortone 5 mg., and vitamin C 1 g.

The results of treatment in the 17 patients are set out in the accompanying table. More details are given for specimen cases to illustrate the results of the investigations carried out.

SUBJECTIVE AND OBJECTIVE CHANGES AFTER INJECTIONS OF DEOXYCORTONE AND VITAMIN C IN 17 PATIENTS WITH RHEUMATOID ARTHRITIS

Case no. and sex	Subjective improvement	Mental exhilaration	Changes in			
			Joint swelling	E.S.R.	Plasma viscosity	Range of movement
1 F	Definite	Great	Not signif.	Increase	Decrease	None
2 F	None	None	None	Slight increase	Slight decrease	None
3 F	None	Present	None	Great increase	Great decrease	None
4 F	None	None	Not signif.	Decrease	Increase	None
5 F	None	None	None	None	None	None
6 F	Slight, tempry	Present	Not signif.	None	None	None
7 F	None	None	None	Great increase	None	None
8 F	None	None	None	Slight increase	Slight decrease	None
9 M	None	None	None	None	None	None
10 M	None	None	None	Increase	Not signif.	None
11 M	None	None	None	None	None	None
12 F	None	None	None	None	None	None
13 F	None	None	None	None	None	None
14 M	Definite	None	None	None	None	None
15 M	None	None	None	None	None	None
16 F	None	None	None	None	None	None
17 F	None	None	None	None	None	None

Great difficulty was experienced in finding an accurate method of joint measurement. The method ultimately adopted was to ring the skin over the maximum diameter with ink and on each subsequent occasion to apply the tape-measure to this line. Even so, we have found that variations up to 0·5 cm. may arise from experimental error. Consequently, any change in the joint measurements less than 0·5 cm. is not regarded as significant.

The E.S.R. and plasma viscosity were measured at constant temperature in a thermostatically controlled water tank.

on his advice the patient was admitted to the General Hospital. Lumbar puncture again produced normal C.S.F. under normal pressure. A white-cell count of the blood showed 15,000 (63% polymorphs) per c.mm. Blood was taken for culture. The pyrexia and headache continued.

Aug. 13: a few rose spots were seen, and the spleen was thought to be palpable.

Aug. 15: rose spots were still present, and the spleen was definitely palpable. Typhoid bacilli were reported to have been found in the blood-culture. A Widal test was positive: (H) 1/320; (O) 1/120. The patient was transferred back to Ladywell Hospital on the same day.

Aug. 16: the patient's temperature fell in the morning but rose to 103·6°F at 10 P.M. His general condition was not improving, he was toxic, rose spots were present on abdomen and chest, and stools were fluid but not frequent.

Aug. 17: temperature 102·2°F, tongue covered with brown fur, headache complained of, abdomen large, and bowels not opened. Chloramphenicol therapy was started with a loading dose of 4 g.

Aug. 18: temperature 102°F, rumblings in abdomen, bowels not opened. Chloramphenicol 1·5 g. was given twice daily. Rose spots were fading.

Aug. 19: temperature 97°F at 6 A.M., abdomen distended, meteorism, bowels not opened. Flatus tube inserted and saline enema given.

Aug. 20: temperature 100·4°F, complained of abdominal pain, meteorism, bowels not opened.

Aug. 21: bowels opened after an enema, abdomen soft and less distended, temperature 98·6°F, general condition improved, and rose spots almost gone.

Aug. 22: rash faded, temperature normal, no headache, no abdominal pains. Condition improved rapidly from now on.

Aug. 25: the dosage of chloramphenicol was reduced to 1·5 g. twice daily until Aug. 29. It was then reduced to 1 g. daily until Sept. 5, when it was discontinued. The total dosage over twenty days was 41·5 g.

Sept. 12: the patient's fæces still contained typhoid bacilli.

Sept. 30: a week's course of procaine penicillin and sulphadimidine was started. The fæces were negative on Oct. 13, positive on Oct. 17, negative on Oct. 18, 19, and 22, and positive on Oct. 26 and 28. On Oct. 31 a second course of penicillin and sulphadimidine was started. After this course the patient's fæces were negative on six occasions and his urine on three. He was discharged in good health on Nov. 19.

This was a case of severe typhoid with delirium. Chloramphenicol was not given until the seventeenth day of disease. Dosage, after the loading dose, was too small and the doses were spaced too widely—i.e., twelve-hourly—and response was somewhat slow but definite.

Case 2.—A woman, aged 51, had had some ice-cream on Oct. 28 and begun to have a headache and general malaise on Nov. 7 and shivering on Nov. 11.

On admission on Nov. 15 her temperature was 102·6°F, and pulse-rate 96. The patient was flushed, toxic, and felt weary. Her tongue was thickly coated, and she was constipated and had a slight cough. Nothing abnormal was found in her lungs or heart. Her spleen was just palpable, but there was no rash. A Widal test was positive for *S. typhi* (H) 1/640, (O) 1/160, and for *S. paratyphi-B* (O) 1/80.

Treatment.—Chloramphenicol 4 g. was given as an initial dose, followed by 2 g. eight-hourly (6 g. daily), and a simple enema was given.

Nov. 16: a blood-culture was negative, but *S. typhi* was isolated from the fæces. The patient's temperature was 102·6°F and her pulse-rate 96. Her general condition was unchanged, and she was flushed and toxic, but did not complain of anything. Later she became delirious and got out of bed. Her temperature was 102·8°F at 10 P.M. She was given tepid sponging and a sedative.

Nov. 17: temperature 102·6°F, pulse-rate 96, bowels opened, urine passed. The patient was toxic and mentally confused. A few rose spots were seen on her abdomen. Her tongue was dry. The dosage of chloramphenicol was increased to 2 g. six-hourly (8 g. daily).

Nov. 18: temperature 100·2°F, pulse-rate 80. The patient was mentally much clearer. Bowels not opened, but they opened later after an enema of glycerin and magnesium sulphate.

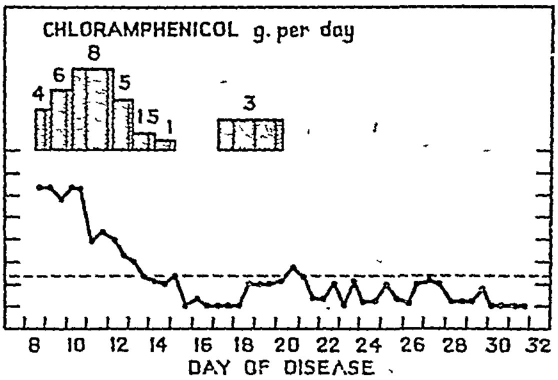

Fig. 2—Temperature chart of case 2.

Nov. 19: temperature 100°F, pulse-rate 80. Condition improved, but tongue dry and coated. More fluids ordered. The dosage of chloramphenicol was reduced to 1 g. six-hourly (4 g. daily).

Nov. 20: temperature 99°F, pulse-rate 80. Patient's condition much improved, and bowels opened. The dosage of chloramphenicol was reduced to 0·5 g. b.d.

Nov. 21: temperature 98·2°F, pulse-rate 80. Generally much improved, bowels opened, somewhat loose. Patient not complaining of anything.

Nov. 22: chloramphenicol discontinued.

Nov. 24: the patient felt well; temperature 97°F, pulse-rate 80, but bowels loose. Chloramphenicol, 1 g. eight-hourly was given.

Nov. 25: improvement continued.

Nov. 27: chloramphenicol was discontinued. The patient's condition continued to improve rapidly, and on Dec. 8 she was allowed up for a short time.

Dec. 13: the patient's fæces still contained typhoid bacilli; so a week's course of procaine penicillin and sulphadimidine was started. After its completion the patient's fæces were negative on ten occasions, and she was discharged well on Jan. 15.

This was a case of severe typhoid fever in a robust woman of 51, and showed a dramatic response to rather a massive dosage of chloramphenicol.

Case 3.—A man, aged 44, had had some chicken (which he had thought was "high") on Oct. 28. Next day he had had abdominal pain and diarrhœa, which had continued for about three days. On Nov. 4 he had had a shivering attack and felt unwell and vomited. His temperature had been 101·7°F, and he had had a headache.

On admission on Nov. 5 the patient had a temperature of 101·4°F, pulse-rate 110, and respirations 22 a minute. He was a big man, with tongue thickly coated, anorexia, and slight headache. His spleen was impalpable, no rose spots were seen, and his pulse was soft and quick.

Treatment and Progress.—Chloramphenicol 2 g. was given eight-hourly (6 g. daily). Next day there was not much change; the tongue was thickly coated and tremulous on protrusion, and the stools were loose. Owing to his having been inoculated against typhoid fever and having a history suggesting gastro-enteritis, and owing to a shortage of chloram-

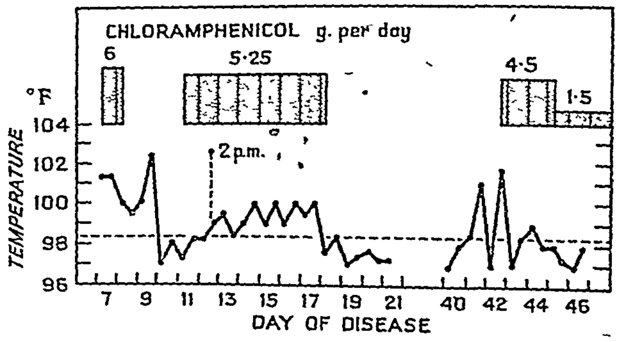

Fig. 3—Temperature chart of case 3.

TYPHOID FEVER TREATED WITH CHLORAMPHENICOL

REVIEW OF SIXTEEN CASES

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At this hospital 16 patients were treated with chloramphenicol in the second half of 1949, 4 females and 12 males (the higher incidence in males was fortuitous, 14 patients having been infected in a men's club when women were present on a guest night). The youngest patient was a girl of 16, and the oldest a man of 75. The average age was 48: of the 4 females the youngest was aged 16, and the oldest 53, average 40; and of the 12 males the youngest was 34, and the oldest 75, average 51.

Before their admission to hospital the illness had lasted on an average 17 days, shortest 7 days, longest 45 (in a female with a bone abscess). The illness was severe in 2 cases, moderately severe in 6, and mild or on the wane in 8.

Chloramphenicol exerted a radical effect on the illness; the classification and prognosis would have been different without it. No definite scheme of treatment could be followed throughout this series; chloramphenicol was sometimes scarce and had to be reserved for the severer cases, and different suggestions about dosage and duration of treatment were received. The effect of chloramphenicol on the course of pyrexia can be seen from the temperature charts (figs. 1–3), but the clinical improvement and complete transformation in a few days can only be appreciated fully by clinicians who have had previous experience of typhoid fever and have known their own helplessness in the past to affect its protracted course.

There were five relapses, no perforations, and one hæmorrhage (a single tarry stool). All the patients made a good recovery. Diarrhœa was a troublesome symptom in 2 patients, and meteorism was severe in 2.

Diet.—Fluids only were allowed during the stage of fever and toxæmia, but when these abated, a gradually increasing diet was given, regulated to the patients' absorptive capacity.

DOSAGE

The average amount of chloramphenicol given for the main attack was 28·3 g., the smallest 11 g., and the largest 47 g. The largest daily dose was 8 g. Chloramphenicol was given usually eight-hourly, but in 2 cases it was given six-hourly to intensify the effect. In 3 cases a first loading dose of 4 g. was given. The duration of treatment averaged 9·5 days, the shortest course lasting 4 days and the longest 20. Treatment was started on an average on the 18th day of illness, the earliest time being the 7th day and latest the 45th day (the patient with the bone abscess).

RESULTS

The temperature in every case was brought to normal by the 6th day at the latest. In the relapses (which occurred on an average on *the 18th day after the temperature* had reached normal, shortest 11th, longest 23rd) the average amount of chloramphenical given was 12·1 g., smallest 5 g., and largest 18 g. The temperature was brought down to normal at the latest by the 5th day on resumption of treatment with chloramphenicol.

RELAPSES

The impression is gained that chloramphenicol has no effect on the clearance of typhoid bacilli from the fæces; in 8 patients bacilli persisted in the fæces. Nor has chloramphenicol prevented relapses: 5 relapses occurred (the patient who had 47 g. spread over 14 days had a relapse and had to be given 18 g. to cure this). Chloramphenicol may not reach the gall-bladder and the intestinal contents in sufficient concentration, and thus the bacilli may be able to survive treatment with chloramphenicol during the main attack. When the body is again freed from chloramphenicol, the way is open for another invasion by the bacilli from the intestines.

BACTERIAL SENSITIVITY

Dr. G. J. Crawford and Dr. E. Greenwood, of the pathological laboratory, Hope Hospital, who did all the bacteriological investigations in these patients, have tested the sensitivity to chloramphenicol of the bacilli from some of these patients; they found that these were sensitive to a concentration of 2·5 μg. per ml. but insensitive to 1·5 μg. per ml. Chloramphenicol 4 g. given to a patient weighing 13 st. would produce a concentration of 51·6 μg. per ml. on the assumption of complete absorption and diffusion through every part of the body. It thus appears theoretically that this dosage is excessive, but in practice it has been found in other diseases that massive doses have to be given to overcome the infection completely. The latest recommendation is an increased dosage and *prolongation of treatment for* a fortnight.

CLEARING FÆCES

To clear the fæces, we gave a week's course of parenteral penicillin and sulphadimidine by mouth, as reported by Rumball and Moore,[1] except that procaine penicillin was given instead of ordinary penicillin. This course was given to 5 patients, and had to be repeated in 2, whose fæces had not been cleared by the first course. After *this treatment the fæces of all the patients so treated* were negative on at least six occasions and the urine on three.

ILLUSTRATIVE CASES

Case 1.—A man, aged 34, was admitted on Aug. 8 as a case of suspected meningitis, which had started with headache on Aug. 1. The patient had continued at his work until Aug. 5. On Aug. 6 he had had shivering, vomiting, and sleepiness, and on Aug. 7 he had become delirious.

On admission the patient complained of severe headache and had a temperature of 100·4°F, some head retraction, and nuchal stiffness. Kernig's test was negative on both sides. There was no rash. The tongue was coated with brownish fur, and the patient was delirious at times. Photophobia was severe; the pupils were equal and reacted to light. Cerebration was somewhat slow, and the patient vomited soon after admission. Lumbar puncture produced 10 ml. of clear cerebrospinal fluid (C.S.F.) under increased pressure and containing albumin. The blood-pressure was 148/70.

Treatment.—Intramuscular penicillin 200,000 units was given six-hourly, and in the evening morphine gr. 1/4 was given for restlessness.

Progress.—Next day the patient had a severe headache and was restless, with temperature 101·4°F. Lumbar puncture produced 30 ml. of clear C.S.F. showing nothing abnormal. A neurologist provisionally diagnosed virus meningitis, and

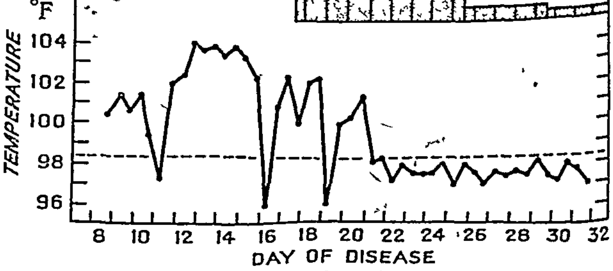

Fig. 1—Temperature chart of case 1.

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[1] Rumball, C. A., Moore, L. G. *Brit. med. J.* 1949, i, 615.

yet another possibility : there might be a local deficiency of prothrombin in the capillaries of the actual lesion only. Some such condition might be explained by the hypothesis put forward by Howell (1941) who considered that prothrombin and fibrinogen might be constantly formed and consumed in the blood, leading to the formation of fibrin, which might provide nourishment or protection for the cells of the capillary walls. Hallam (1930), considering acrocyanosis, which he classified with chilblains, suggested that some unknown factor might render a person susceptible to cold, with a resulting destruction of the endothelium of the peripheral capillaries. A deficiency of prothrombin (Howell's theory) might then produce the effects suggested by Hallam. If such a local defect was present, blood leaving the chilblain capillaries would be so diluted on returning to the general circulation as to leave the systemic prothrombin level and that of the general capillary system unimpaired.

The next step, therefore, was to estimate the prothrombin-time in capillary blood taken from the chilblain itself. This was done in case 6, but again the result was normal.

The coming of spring then ended this investigation.

Therapeutic Results

In the third and present series of cases studied there were 3 failures with vitamin-K therapy. In the same way that the experimental investigation had led to a consideration of local capillary defects in the lesions themselves, so these were also considered in an attempt to explain and overcome these failures. The first step was to consider whether some other deficiency leading to capillary defects might not also be present. According to Bicknell and Prestcott (1945) lack of vitamin P leads to decreased capillary resistance. Vitamin P was therefore given with vitamin K in one of the resistant cases (case 1) but with no benefit.

The next speculation was whether impaired circulation might not impede the correct utilisation of prothrombin in the affected areas. With this in mind, nicotinic acid was given to case 1 for its vasodilatory effect. No improvement resulted from nicotinic acid either alone or in combination with vitamin K. Another vasodilator, 'Padutin,' was then tried, in combination with vitamin K, but again without benefit. Padutin had no beneficial effect in 2 further cases.

Winter having now drawn to a close, it had been found impossible to relieve these 3 patients of their chilblains, though all the other cases had responded to vitamin K alone. Perhaps some parallel may be found in those cases of hæmorrhagic disease of the newborn which do not respond to vitamin K and for which no satisfactory explanation has been found. Possibly Owren's factor V may have some bearing on this problem. Owren (1947) described a case of hæmorrhagic diathesis with considerable hypoprothrombinæmia (estimated by Quick's method) which did not respond to vitamin K, whereas factor V, isolated from normal plasma, restored the blood-coagulability to normal. Other cases have also been described as having increased prothrombin-times and not responding to vitamin K (Butt et al. 1948).

ILLUSTRATIVE CASE-RECORDS

Case 1.—A married woman, aged 45, had had severe ulcerated chilblains every winter for as long as she could remember. She had "spent a fortune" trying to cure them, without success. She was seen in October, when the lesions were just beginning to appear on her fingers. She was given synthetic vitamin K 20 mg. t.d.s. by mouth. A week later there was no change and the toes were now also affected. A further week later they were much worse, and she was given synthetic vitamin K 10 mg. by intramuscular injection twice, with a three-day interval between injections. This was in addition to continued oral medication. There was slight improvement, but this coincided with milder weather. The patient continued with this oral dosage until the following January (three months), with no change apart from fluctuations with the weather. The prothrombin-time was found to be 19 seconds, compared to a normal control of 20 seconds. The patient was next given synthetic vitamin P ('Hesperidin') 150 mg. t.d.s. in addition to vitamin K. There was no improvement after two weeks. Both were then omitted and nicotinamide 50 mg. t.d.s. substituted. There was no improvement after nine days, and the nicotinamide was superseded by nicotinic acid 50 mg. t.d.s. for ten days, with slight improvement. This was continued a further eleven days with the addition of synthetic vitamin K, as before, with no improvement at all, the weather having become colder. Spring then intervened without any improvement in this patient's chilblains during the six months from October to March.

Case 2.—A married woman, aged 50, had had chilblains every winter all her life. She was seen in November, when the lesions were just appearing. The prothrombin-time was 19 seconds, compared to a normal control of 12 seconds. The patient was given synthetic vitamin K 20 mg. t.d.s. by mouth, and a fortnight later the chilblains had completely disappeared. The prothrombin-time was then 13 seconds, with the normal control 13 seconds. The patient remained on this dosage for two months, with no recurrence of chilblains ; and it was then reduced to 20 mg. b.d. for three weeks, with the resulting reappearance of mild chilblains. These rapidly cleared when the doses were given t.d.s. again. For the further two winter months the patient remained clear of chilblains on this dosage, making a total of five months during which she experienced complete relief from chilblains.

Case 3.—A stout matron had severe ulcerated chilblains every winter on hands, toes, and heels. In November these were completely abolished with vitamin K. This was then omitted, with return of the lesions in January, the prothrombin-time then being 11 seconds (control 12 seconds). Further synthetic vitamin-K therapy (20 mg. t.d.s. by mouth) again removed these, and the patient remained clear of chilblains for the remainder of the winter on a reduced dose of 20 mg. b.d.

Case 4.—A woman, aged 30, developed moderately severe chilblains on her heels and toes nearly every winter. In November she was given synthetic vitamin K 20 mg. t.d.s. by mouth, with complete cure of the chilblains. This dosage was continued for two months with no recurrence. The patient was now pregnant and, having some vomiting, omitted the tablets, and the chilblains recurred two weeks later. The prothrombin-time was then 13 seconds (control 12 seconds). When vitamin K was given as before, there was no further recurrence of chilblains during the next two months.

Case 5.—An elderly hypertensive spinster took synthetic vitamin K 20 mg. b.d. by mouth for the relief of her chilblains. This was completely successful and enabled her to continue her employment as a shop assistant, whereas previously her cracked and swollen fingers had prevented her from doing so. This was the state of affairs during December and January. In February she was persuaded to omit the tablets, so that the chilblains might recur and the prothrombin-time be estimated. Both of these events happened, and the prothrombin-time was found to be 10 seconds (control 10 seconds). The patient then resumed her synthetic vitamin-K tablets and continued until the end of March, with no trouble from chilblains.

Case 6.—A young married woman had severe chilblains on her toes and hands every winter, but only when the weather was very cold. In the last cold spell of the present winter, while her chilblains were acute, her capillary prothrombin-time was found to be 35 seconds (control 35 seconds). The capillary prothrombin-time of blood from the lesion itself was also normal, compared to the control.

SUMMARY AND CONCLUSIONS

Two parallel investigations have been made into the experimental and clinical effects of vitamin K in chilblains. The limitations of general practice and this country's climate provided only 26 cases for study. The prothrombin-times of 16 of these were estimated, but in only one was there a slight deviation from normal in the acute stage of chilblains. It is considered that there is no alteration in the systemic prothrombin-time in phenicol, the patient was taken off chloramphenicol and put on sulphaguanidine 2 g. eight-hourly and 'Sulphatriad' 1 g. six-hourly.

Nov. 7: the fæces were green, the patient's temperature was 100°F in the morning and 102·2°F in the evening, and he complained of pain in the left side of the chest on taking a breath, but nothing abnormal was detected.

Nov. 8: the patient's temperature fell to 97°F, and he seemed to be somewhat improved.

Nov. 9: the fæces contained typhoid bacilli; so a course of chloramphenicol 1·75 g. eight-hourly (5·25 g. daily) was started, and the other drugs were discontinued. In the evening the pulse-rate was 120, the tongue was coated, the stools were somewhat loose, and the heart had a tick-tack rhythm.

Nov. 11: pyrexia continuing, the patient was put on intramuscular penicillin 1,000,000 units eight-hourly and sulphatriad 1 g. six-hourly.

Nov. 12: the patient felt weary, and was put on 'Eschatin' 1 ml. b.d. Rose spots were seen on the flanks of the abdomen, the spleen was palpable, and the blood-pressure was 105/50. The patient was given 20 ml. of 50% glucose solution intravenously.

Nov. 14: penicillin was discontinued.

Nov. 16: the patient had perspired freely in the night, and now felt better, his temperature having dropped at last.

Nov. 17: chloramphenicol was discontinued after a total dosage of 42·75 g. had been given.

Dec. 9: the patient was allowed up for half an hour.

Dec. 10: he vomited twice, and his tongue was again thickly coated, his temperature was 101°F in the evening, and he felt heavy and weary and had lost his appetite.

Dec. 11: the patient's temperature was 102°F, and his tongue was coated and tremulous on protrusion. A blood-culture grew typhoid bacilli. A course of chloramphenicol 1·5 g. eight-hourly (4·5 g. daily) was started, and was followed by gradual improvement over the next two days.

Dec. 13: the patient's temperature became normal again.

Dec. 14: the dosage of chloramphenicol was changed to 0·5 g. eight-hourly (1·5 g. daily).

Dec. 16: chloramphenicol was discontinued, a total dosage of 14·5 g. having been given for the relapse.

Dec. 31: the patient was discharged after an uneventful convalescence.

The response to the resumed treatment with chloramphenicol was not so quick as in the other cases; possibly the giving of chloramphenicol for one day had made the bacilli more resistant to it. The relapse occurred the day after patient had been allowed up; possibly he got up too early.

CHILBLAINS AND PROTHROMBIN LEVELS

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> "If 'twere a kibe,
> 'Twould put me to my slipper."
> —*The Tempest*, Act II, Sc. 1.

SEVERAL of the minor ailments which burden the practitioner during the winter months might be described as reactions of the human organism to cold. One of the commonest of these is chilblains, which affected 50% of the A.T.S. personnel investigated by Winner and Cooper-Willis (1946) and are sometimes highly disabling. Opinion seems to be unanimous about the nature of the lesions and that the precipitating cause is cold (MacKenna 1937, Roxburgh 1947, &c.). As regards treatment, however, there is a great diversity of remedies, which fact, as Dowling (1948) remarks, is but proof of their ineffectiveness. Gourlay (1948) has reviewed many of them.

Some of the remedies are directed against the symptoms, but others, such as calcium and vitamin D, are intended to "improve" the circulation. Most of the latter are based on Wright's (1897) finding of diminished blood-coagulability in chilblains, which finding was subsequently disproved by Hallam (1930), who demonstrated normal coagulation-times in patients with chilblains. Percival and Stewart (1924) had already demonstrated a normal blood-calcium level in patients with chilblains and the absence of any beneficial results on raising it with 'Para-thormone.' Nicotinic acid has been advocated by Gourlay (1948), but the only effect it has seems to be a widespread, non-specific, and transient vasodilatation.

The fundamental defects present in chilblains are, according to MacKenna (1937), defective peripheral circulation, increased capillary permeability, and diminished blood-coagulation, but, as already mentioned, there is no proof of the last. Roxburgh (1947) lists only the circulatory changes, consisting of dilatation of minute vessels and small veins and constriction of arterioles. In hypoprothrombinæmia MacKenna's three defects are also present, but the diminution in blood-prothrombin may not necessarily be sufficient to affect coagulation-time. It was felt, however, that these facts constituted as good a reason for vitamin-K therapy in chilblains as for the many remedies already tried—and found wanting.

PRELIMINARY INVESTIGATION

As a preliminary study 8 cases were treated with vitamin K (Wheatley 1947). In only 4 of them was complete success obtained, and it was thought probable that vitamin K would have to be relegated to the multitude of other inconclusive remedies for chilblains. However, it was decided to investigate the effect of an increased dosage and protracted treatment.

The number of cases studied in each series is small. This is because the public has lost faith with the medical profession's ability to treat chilblains, so comparatively few people with chilblains consult a doctor.

With the next 10 cases studied there was a 100% success, maintained throughout the winter in those cases which were followed up for this period. *Up to this point* the results had been judged by clinical improvement alone, without controls or hæmatological investigation. At this stage it was felt that some points had emerged:

(1) Administration by mouth was most convenient.

(2) Dosage was fixed at 20 mg. t.d.s.; less was considered insufficient.

(3) There was a time-lag between the start of treatment and the onset of improvement. This was never less than 3 or 4 days, and in a very few cases as long as 2 or 3 weeks. On an average 5–7 days was the most usual.

(4) It was necessary to continue the treatment as long as the cold weather continued. Otherwise the chilblain recurred, again with a similar time-lag, from cessation of treatment.

PRESENT INVESTIGATION

The previous results were considered sufficiently encouraging to stimulate the undertaking of a further investigation designed to test the hypothesis more stringently. This consists of parallel experimental and therapeutic observations on 19 cases studied during the winter of 1948–49.

EXPERIMENTAL RESULTS

In the first stage of the investigation the prothrombin-time was estimated, by Quick's method, in every case of chilblains in the acute stage. In 16 cases studied this was normal compared to a normal control, except in case 2, in which the value was within the normal range but raised in comparison with the control. In case 2 the prothrombin-time returned to normal after vitamin-K therapy, coinciding with the amelioration of the chilblains. It is obvious, however, that generally the prothrombin level of the circulating blood is unaltered in chilblains, and so there was, as yet, no evidence of deficiency of vitamin K in chilblains.

Chilblains, however, are caused by capillary defects in the affected parts. Though it is difficult to conceive that there could be any difference in the prothrombin content of capillary and venous blood, the capillary prothrombin-time was estimated in 2 of the acute cases (see case 6) and found to be normal. There is, however, *Examination of Pus.*—Dr. I. Lominski reported that the pus from the hepatic abscess yielded a heavy growth of penicillin-sensitive *Staph. aureus*. Extended search of the fresh material for *Entamœba histolytica* was unsuccessful. Schistosome eggs were not found in the fresh pus.

Biopsy Findings. (Prof. D. F. Cappell).—The specimen consisted of a small fragment of liver tissue showing hæmorrhage and suppuration resulting from the acute staphylococcal infection. Small tubercle-like foci of reaction were also present, in the centres of two of which were clearly identifiable schistosome eggs. Serial sections were cut to determine whether the ova had lateral spines (*S. mansoni*) or terminal spines (*S. hæmatobium*), but reconstruction was impossible, and this point remains obscure (fig. 2). Two of the foci consisted of a conspicuous reactive cellular zone round the ova, but others were in the process of involution, and one fully hyalinised form was present (fig. 3).

Treatment of Schistosomiasis.—The patient was given intramuscular 'Anthiomaline' (a lithium salt of antimony) 2 ml. thrice weekly for three weeks. His stools and urine were repeatedly examined for ova with negative results. Cystostomy and sigmoidoscopy did not produce any evidence of schistosomiasis.

Follow-up.—The patient reported well on Oct. 18 and was carefully screened by Dr. S. D. Scott Park, who reported that there was very little abnormality at the right base; the diaphragm on the right side was very slightly elevated and not quite so well curved as on the left side; respiratory movements on both sides were equal; and the lung fields were normal (fig. 1c).

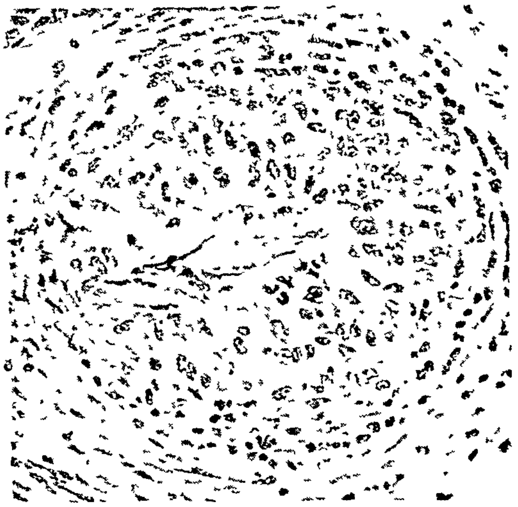

Fig. 2—A cellular "tubercle" showing in centre a schistosome ovum whose spine lies in the long axis and cannot therefore be recognised as lateral (*S. mansoni*) or terminal (*S. hæmatobium*). (× 300.)

DISCUSSION

This case is of clinical interest because the patient was unaware of his infection with schistosomes and presented no evidence of the usual bladder or rectal lesions. He had been in the habit of bathing in Lake Victoria Nyanza at Mwanza, where he was stationed in 1945, but did not realise that he ran any risk.

The ætiology of the hepatic abscess is obscure. The possible initiation of the liver lesion by *E. histolytica* and its subsequent infection by *Staph. aureus* requires consideration. Against this view is the absence of any evidence of such an infection in either gut, stool, or biopsy specimen. This fact, however, is inconclusive, for, as Dr. Robert Kirk, O.B.E. (personal communication), has pointed out, many pyogenic abscesses have been found post mortem in association with amœbiasis which had not been demonstrable in life. However, in the present case the biopsy findings were against such an explanation; moreover in amœbic abscess there is little or no leucocytosis. The patient had had a septic tooth socket, but unfortunately no bacteriological culture was made from this potential source of the hepatic infection.

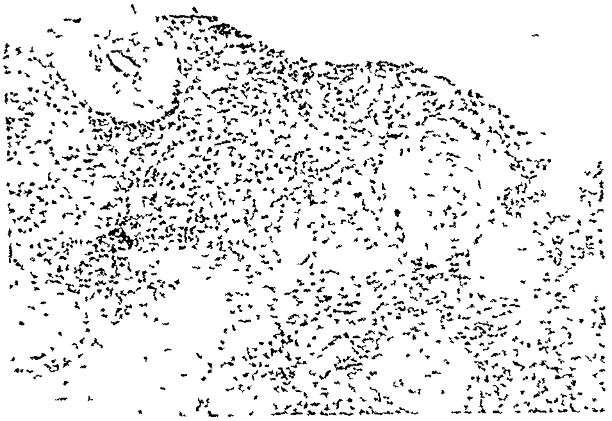

Fig. 3—Biopsy specimen from margin of liver abscess, showing two "tubercles" containing ova, one "tubercle" completely hyalinised, and one "tubercle" partially involuted. (× 40.)

Adult schistosome worms are long-lived, and it is common for active infestation to last 5–15 years; Manson-Bahr (1941) has reported activity after 20 years, and Brumpt (1936) after 28 years. It is common for the ova, especially of *S. mansoni*, instead of ulcerating through the intestine, to pass with the portal bloodstream to the liver, ultimately causing cirrhosis, without ova appearing in the stools (Byam and Archibald 1922, Brumpt 1936, Ash and Spitz 1945, Craig and Faust 1945).

This visceral form of *S. mansoni* infection is clinically difficult to diagnose and has to be considered in the differential diagnosis of every obscure abdominal case in areas where schistosomiasis is endemic. The ova of *S. mansoni* are generally found in the fæces, and those of *S. hæmatobium* in the urine, but this is not always so; the reverse occasionally happens, especially in visceral infections. The absence of ova from the urine and fæces is a point of interest in the present case.

It has been suggested that some of the obscure hepatosplenomegalies in Egypt without a corresponding lesion in the gut are caused by a toxæmia produced primarily or even exclusively by male worms. In such cases eggs in the fæces will be few or even completely lacking (Craig and Faust 1945). The occurrence of ova in our case indicates the presence of at least one female worm.

Dr. Kirk has noted that, though infection by schistosomes may cause abscesses in the intestine which are characteristic in being "eosinophil abscesses" and packed with ova, no report has been published of this condition causing liver abscess. It is generally held that the usual hepatic lesion is of the chronic type with the formation of pseudotubercles and with a tendency to fibrosis.

The suggestion that the hepatic lesion was the result of an infection with *S. mansoni* is thus the more likely one, and this probability is increased when it is recalled that infection was contracted in the more southern part of Africa. The selection of the symptomless schistosome lesion in the liver for the later pyogenic infection is of interest. Though it is possible that the schistosome infection was incidental, one is tempted to suggest that it determined the site of the later pyogenic lesion, possibly derived from the infected tooth socket.

SUMMARY

An Army officer developed a *Staph. aureus* liver abscess associated with visceral schistosomiasis.

The liver abscess was successfully treated by operation and penicillin therapy. The schistosome infection was later treated with anthiomaline.

chilblains. In 1 case capillary prothrombin-times in normal skin and from the lesion itself were estimated, but again these proved to be normal.

Clinically 23 cases responded completely to vitamin K, and 3 cases failed completely. It was not found possible to convert these failures into successes by several means tried for improving capillary circulation in the lesion itself.

No experimental evidence could therefore be adduced to support any therapeutic success of vitamin-K therapy. Neither could any support be demonstrated for the hypothesis that impaired utilisation of prothrombin in the lesions themselves might explain the failures.

I wish to thank Dr. H. Ferreira and Dr. L. W. Cann, of Ashford County Hospital, for estimating the prothrombin-times.

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HEPATIC ABSCESS ASSOCIATED WITH VISCERAL SCHISTOSOMIASIS

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LIVER abscess is rare in schistosomiasis, and in the present case the liver alone was infested and the patient had none of the usual symptoms referable to the bladder and the rectum.

CASE-RECORD

An Army officer, aged 28, had served in Madagascar in 1943 and in East Africa in 1943–45. He gave no history of any tropical disease apart from malaria. His first attack of malaria occurred in August, 1945, and he had a relapse in February, 1946, after demobilisation in this country. On each occasion he was treated with standard Army courses of quinine dihydrochloride followed by mepacrine. He considered that he had been subject to "colds" since his relapse in February. His pre-war history was uneventful save for appendicectomy in 1938, and there was nothing relevant in his family history.

On Aug. 12, 1946, the patient had a rigor followed by fever. Assuming that it was a relapse of malaria he took 2·1 g. of mepacrine over the ensuing 72 hours without any betterment in his condition, the fever (100–102°F) continuing without remission. On Aug. 15 he began to take sulphapyridine 1·0 g. every fourth hour and continued this for 24 hours, after which he discontinued it because of abdominal pain, which he ascribed to the drug, and he complained of pain in the region of the lower lobe of the right lung.

At this point the patient was seen by Dr. J. Mill Irving, of Lenzie, who noted some dullness to percussion and a diminished respiratory murmur over this area. Penicillin therapy was begun on Aug. 17 and continued till the 21st, to a total of 700,000 units. Though the patient improved somewhat he continued to look ill and toxic, and his temperature did not settle (98·4–101°F).

He was seen by one of us (J. G. G.) on Aug. 22. Expansion was slightly diminished at the right base, and there was a small area of relative dullness in the right axillary line. The respiratory murmur was vesicular, and rhonchi were heard at both bases. A small area of pleural friction was detected anteriorly over the sixth and seventh ribs. The upper border of hepatic dullness was at the level of the fourth rib. There was tenderness to palpation over the upper third of the right rectus, but the liver was impalpable.

Stools examined at this time were negative for specific pathogens, amœbæ being specially looked for. The scanty sputum did not contain acid-fast bacilli; scanty pneumococci were present. There was a leucocytosis of 18,000 per c.mm. (neutrophils 60%, lymphocytes 30%, eosinophils 3%, basophils 1%). Malaria parasites were not seen.

On admission to the Western Infirmary on Aug. 23 the patient's physical condition was essentially unchanged. A chest radiogram (fig. 1*a*) taken on Aug. 23 showed clear lung fields, the heart shadow centrally placed and not enlarged, and no elevation of the diaphragm, the excursion of which was equal on both sides, being $1\frac{1}{2}$ in. in the supine position.

Treatment and Progress.—Amœbic hepatitis was provisionally diagnosed, and a course of parenteral emetine hydrochloride gr. 1 daily was begun. There was no response, and the patient's temperature, which on Aug. 24 had been 98·4–100°F, rose on Aug. 28 to 101–101·8°F, and his pulse-rate increased from 80 to 100 per min. A chest radiogram (fig. 1*b*) taken on Aug. 28 showed the right crus of the diaphragm to be slightly elevated, and radioscopy showed that the respiratory excursion was poor on both sides, being rather less on the right than on the left side. There was no evidence of basal congestion. On Aug. 29 one of us (J. L. O.) explored the right perinephric area with a needle but found no pus. Penicillin therapy was started, 30,000 units being given every third hour, and the patient underwent operation on the same day because it was thought that an abscess was forming in the subphrenic hepatic area.

Operation (J. L. O.).—An oblique incision was made below the twelfth rib on the right side and the perinephric area explored with negative result. The twelfth rib was then resected and the subdiaphragmatic area explored without pus being encountered. A needle was next introduced into the liver, and thick creamy pus was then encountered in the right lobe near the postero-inferior margin at a depth of about $1\frac{1}{2}$ in. Pus was evacuated, drainage instituted, and a small portion of liver substance from the wall of the abscess removed for microscopy.

Postoperative Progress.—The patient made an uninterrupted recovery. Intramuscular penicillin 500,000 units daily was continued until Sept. 7. He also received gr. 12 of emetine hydrochloride, and on Aug. 30 plasma 500 ml. intravenously. The temperature fell to 99°F within twenty-four hours of operation and thereafter settled rapidly. The drainage tube was removed on Sept. 9, and the patient got up ten days later.

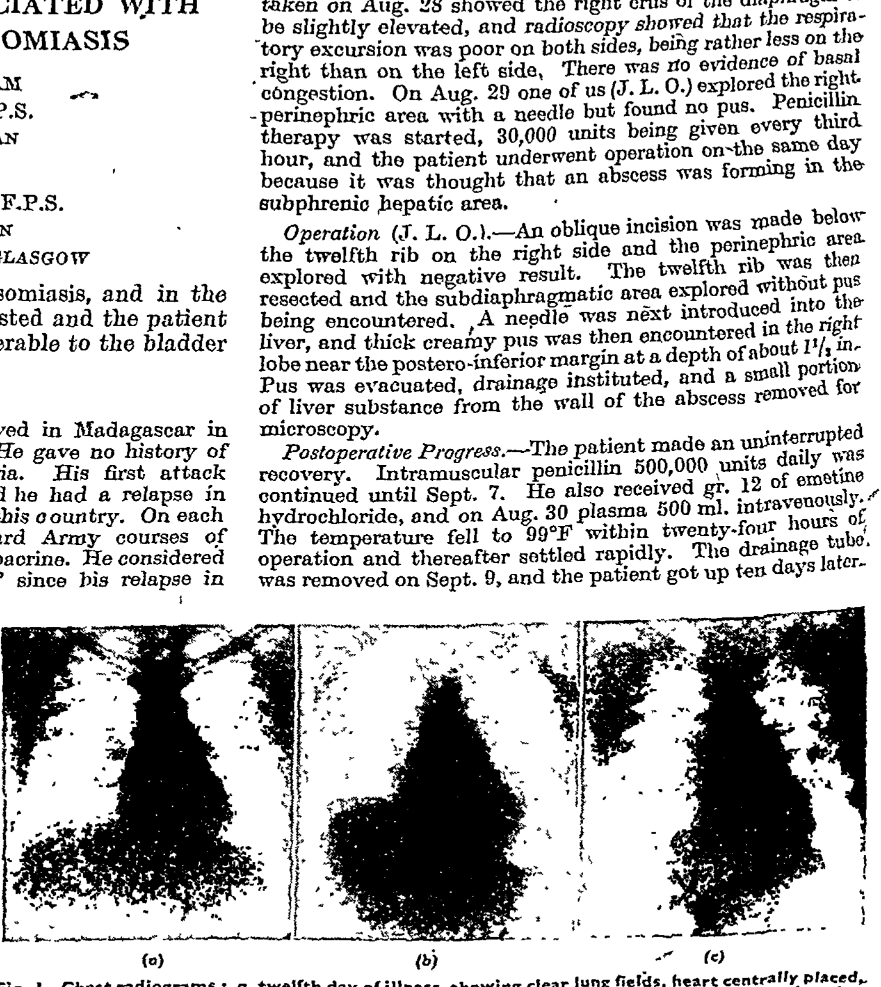


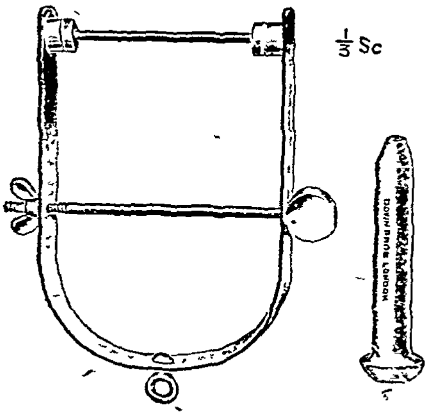
Fig. 1—Chest radiograms: *a*, twelfth day of illness, showing clear lung fields, heart centrally placed, and no elevation of right crus of diaphragm; *b*, seventeenth day of illness, showing slight elevation of right crus; *c*, seven weeks after operation, showing only slight elevation of right crus, which is not quite so well curved as the left.

New Inventions

PIN AND STIRRUP FOR SKELETAL TRACTION

ONE of the drawbacks of skeletal traction with a pin and stirrup is the liability of the pin to loosen in the bone, sometimes to such an extent that pin traction has to be abandoned. Moreover, infection of the track in the bone commonly follows loosening of the pin. Most designers of skeletal pins have ignored this complication of skeletal traction.

Bohler, for this reason, modified his pin and stirrup to allow the stirrup to rotate freely on the long axis of the pin, thus permitting rotary movements of the stirrup without affecting the fixation of the pin in the bone. Despite the undoubted mechanical advantage of this modification, the Bohler pin is more liable to loosen in its track than the Max Page pin, which is rigidly fixed to its stirrup. Investigation of this remarkable immunity of the Max Page pin from a tendency to loosen, showed that there was another force responsible for loosening the pin in the bone—a sideways thrust of the arms of the stirrup in the long axis of the pin, a thrust which is greatly magnified by the width of the Bohler stirrup and minimised by the narrowness of the Max Page stirrup. The pin and stirrup described here (see figure) utilise both mechanical factors; the pin rotates freely within the arms of the stirrup, and the stirrup is narrow.



Another difficulty arising in the use of skeletal pins is that most pins are provided with introducing handles which jam tightly on the pin while the pin is being hammered through the bone, and the force needed to dislodge the handle often loosens the pin in the bone. To obviate this difficulty the design of the handle pin and stirrup have been altered accordingly. The pin is short and round in cross-section, with a tapering conical tip, and a tapering blunted top end. Two circular discs or flanges fit on to these conical ends of the pin. To introduce the pin, one flange is fitted on to the top end of the pin. The handle fits loosely over the top end of the pin and abuts on the flange. The mallet drives the handle on to the flange, and, when the pin has been driven home, the handle is easily removed, leaving the flange in place on the pin. The flange for the other end of the pin is now fitted on. The stirrup clips over the ends of the pin, and round sockets on the arms of the stirrup abut on the flanges. The tendency of a clip on the stirrup to spring off the pin is obviated by the strut across the arms of the stirrup, which is fixed with a butterfly nut.

The instrument is made by Down Bros. and Mayer & Phelps Ltd., of London, W.1.

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Reviews of Books

The Cytology and Life-History of Bacteria

K. A. BISSET, PH.D., lecturer in bacteriology, University of Birmingham. Edinburgh: E. & S. Livingstone. 1950. Pp. 136. 18*s.* 6*d.*

WE stain bacteria in order to see them, and by staining we efface almost all that is characteristic of the living cell. The purpose of this book is to tear off the shroud and reveal the intricate structure that lies beneath. The methods are still crude; Feulgen's reaction lays bare the bacterial nucleus, and if we cannot see the genes at least we are assured that a rod-shaped organ is the bacterial chromosome. Gene recombination is deduced from the appearance of nutritionally unexacting wild-type strains in mixed populations of nutritionally exacting mutants. Sexual fusion is part of the nuclear cycle in many types of bacteria, and the mechanism differs little from that in protozoa or fungi. Bacteria are single cells, but they get round this obstacle by allocating special tasks to groups of cells, the sessile and the motile organisms, or the swarmers in *Proteus.* With numerous diagrams and photographs this book shows that while some bacteria have bad habits all of them behave much like other living creatures.

Physiology of Heat Regulation and the Science of Clothing

Editor: L. H. NEWBURGH, M.D., professor of clinical investigation, University of Michigan. Philadelphia and London: W. B. Saunders. 1949. Pp. 457. 37*s.* 6*d.*

IN the late war fighting went on in all possible climates, and detailed information was needed on the innate and external regulation of body-temperature both at rest and at work. It was especially important to know how far men could adapt themselves, and survive at extremes of temperature, so that wastage of life might be minimal and the comfort of the troops maximal. This book, written by many authors, springs from some of the intensive work, done during those years, in which civilian and Service personnel in Canada and the United States collaborated freely. Most of the work described is recent, but old and new are mingled together to give a fair picture of many aspects of temperature regulation. The first chapter tells of the adaptations of cultured and primitive man to environments varying from arctic to torrid, from wet to dry. Thereafter the book is more strictly scientific, and, before the physiology of temperature regulation and adaptation are discussed, gives some account of the factors that have to be measured and the methods used. The last section deals with the properties of materials and clothing.

The book is interesting, well produced, and thoroughly useful, collating much scattered information and covering aspects of the subject that are often ignored.

Daughters of Britain

An Account of the Work of British Women during the Second World War. VERA DOUIE, librarian of Women's Service Library. To be obtained from the author, 12, Charlbury Road, Oxford. 1949. Pp. 159. 7*s.* 6*d.*

IT would be a pity if the flamboyant title inhibited potential readers who would find this book interesting and useful. It is a sober historical account of the development of the use of women during the recent war, packed with facts and figures—many not readily accessible—which the author has wisely allowed to speak for themselves, and free from the irritating underlinings of militant feminism. Beginning with the mobilisation of women, Miss Douie deals in turn with the Services, Civil Defence, the care of the sick and wounded, transport and communications, war factories, trade unions, and food-production. The experience of earlier wars is reviewed and the story of the late war, with its slow hostile start and its rapidly accelerating development, is told with ample statistical and factual material. The book is free from sentimental anecdote, and the few stories told are amusing and graphic. The cumulative effect is enhanced by understatement. She had indeed a tale to tell.

The patient was unaware of his worm infection, and no lesion was found on sigmoidoscopy and cystoscopy. Stool examination was negative for ova or other parasites, such as cysts of *Entamœba histolytica*. The urine did not contain any eggs. The diagnosis was made by finding schistosome ova in the biopsy specimen from the wall of the hepatic abscess at operation.

The subject of visceral schistosomiasis is discussed especially in relationship to hepatic lesions likely to be caused by *S. mansoni*. The difficulty of precise identification of ova in sections is emphasised.

The liver damage caused by the visceral schistosomiasis may have paved the way for a subsequent pyogenic infection.

We wish to thank Dr. W. R. Snodgrass and Mr. George Dalziel for permission to publish this case; the members of the hospital staff for their willing coöperation; and Professor Cappell for his report on the biopsy specimen and helpful criticism.

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Preliminary Communication

AMINO-ACIDS IN THE FÆCES OF BREAST-FED AND BOTTLE-FED INFANTS

VARIOUS workers have noted the wide difference in intestinal flora between breast-fed and artificially fed infants.[1] In the fæces of the breast-fed infant *Lactobacillus bifidus* predominates, whereas the artificially fed baby has a heterogeneous intestinal flora. This contrast seemed important, especially as lactobacilli are known to be very exacting in their growth requirements, particularly in respect to amino-acids. The fæcal excretion of amino-acids has therefore been investigated in two groups of healthy infants: (1) completely breast-fed; and (2) on artificial milk feeds.

METHODS AND RESULTS

The method of analysis adopted was partition chromatography, using filter paper.[2] A suspension of 2 g. of fæces was made in 10 ml. of distilled water. This was centrifuged for at least an hour, and 2 ml. of the supernatant fluid evaporated to dryness in a vacuum desiccator. The volume was made up to 0·1 ml. with distilled water, and 10–15 μl. was applied to the filter paper.

To obtain hydrolysed specimens, 1 ml. of the supernatant fluid obtained as above was mixed with an equal volume of concentrated hydrochloric acid and refluxed for 24 hours. It was then evaporated to dryness on a water bath, and again evaporated twice after the addition of 2 ml. water. The residue was made up to 0·1 ml., and 10–15 μl. was used for chromatographic analysis.

Hydrolysed and unhydrolysed specimens from 9 breast-fed infants and 11 artificially fed infants have been analysed. Two-dimensional chromatography was carried out, the solvents being butanol-acetic acid and phenol.

Breast-fed group (unhydrolysed).—Table I shows the free amino-acids present in the unhydrolysed specimens from the breast-fed infants, and the relative intensity of the spots. Alanine, glycine, glutamic acid, valine, and leucine were always present. Alanine invariably produced a spot of heavy intensity. Serine, threonine, aspartic acid, and one or more of the lysine group (lysine, ornithine, and arginine) were detected in most of the specimens. In four chromatograms the butanol-acetic acid was allowed to run off the paper, and an unknown spot just separate from valine then developed.

TABLE I—CHROMATOGRAPHIC FINDINGS IN BREAST-FED GROUP (9 INFANTS)

Amino-acid	No. of specimens in which present	Intensity		
		Heavy	Moderate	Faint
Alanine	9	9	..	..
Glycine	9	5	4	..
Glutamic acid ..	9	6	2	1
Valine	9	5	3	1
Leucine	9	2	6	1
Lysine group ..	8	..	4	4
Serine	7	1	3	3
Threonine ..	7	1	6	
Aspartic acid ..	7	..	3	4
Unknown	4	3	..	1

Artificially fed group (unhydrolysed).—Table II gives the findings in unhydrolysed specimens of fæces from 11 artificially fed infants, mostly on National Dried Milk formulæ. Compared with the breast-fed group, few free amino-acids were found, and there was no constant chromatographic pattern. Valine, of variable intensity, was the only amino-acid present in all 11 chromatograms.

Hydrolysed specimens.—The chromatographic patterns of the hydrolysed specimens from the breast-fed and bottle-fed infants were identical. They were similar to the pattern found in unhydrolysed specimens from breast-fed infants, with the addition of proline, tyrosine, and a spot in the position occupied by histidine.

With Collidine as Solvent

Using collidine in place of butanol-acetic acid as the second solvent, unhydrolysed specimens only from a further 12 breast-fed infants and 8 artificially fed infants have been analysed chromatographically. Again, the breast-fed showed an abundant and constant excretion of free amino-acids compared with the artificially fed.

TABLE II—CHROMATOGRAPHIC FINDINGS IN ARTIFICIALLY FED GROUP (11 INFANTS)

Amino-acid	No. of specimens in which present	Intensity		
		Heavy	Moderate	Faint
Valine	11	5	4	2
Glutamic acid ..	8	5	1	2
Leucine	6	1	2	3
Alanine	5	2	1	2
Glycine	5	..	3	2
Lysine group ..	2	..	..	2
Aspartic acid ..	1	..	..	1

DISCUSSION

Further investigation is required before the importance of these results can be assessed. The fæcal amino-acid excretion may obviously be related to the intestinal flora, but it is possible that the excretion of few free amino-acids (as in the artificially fed infants) may imply a state of "subnutrition" with increased susceptibility to infection. This is an interesting speculation which will require further study.

This inquiry is being made under a grant from the Scientific Advisory Committee.

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THE LANCET

LONDON: SATURDAY, APRIL 15, 1950

Penicillin for Gonorrhœa

The tests of time and experience seldom justify the enthusiasm which new remedies so often arouse. Penicillin provides an exception to the rule: for few would have ventured to predict that it would be as widely useful as it has proved. In the treatment of gonorrhœa, for example, it rapidly abolishes the obvious symptoms and signs: the complications, once frequent and intractable, are now relatively uncommon; and there is no evidence that strains of gonococci have become penicillin-resistant. These results have been achieved with dosage which seems absurdly small, and there are no dangers except for the occasional possibility that the signs of early syphilis acquired at the same time may be masked or delayed. Perhaps, indeed, the real trouble about this method of treatment is that it has been too effective, and has therefore filled patient and doctor with a confidence which no remedy has ever justified. With patients it could hardly be otherwise: they are concerned with symptoms and signs, and these are promptly suppressed: the doctors who treat them have no doubts about the outcome: and, after all, penicillin has been hailed in the popular press as "the wonder drug." Of the series of 1788 male patients treated by King, Curtis, and Nicol, who describe their results in our present issue, only 403 stayed to complete three months' observation after treatment, and no fewer than 341 did not attend again after treatment had been given. The women were more faithful, yet only 265 out of 481 completed observation and 49 did not attend again after treatment. But the doctors who give treatment bear a much more serious responsibility, and it may well be that this responsibility is often taken too lightly.

Whatever may have been the case some years ago, the treatment of gonorrhœa is not now limited to specialists: many general practitioners treat such patients and some receive treatment in other special departments. Nothing has happened in the past three years which need modify our view[1] that this may be advantageous to the patients concerned, provided those who treat maintain certain standards and accept certain obligations. But there are disquieting reports that the standards then recommended are not generally observed. Far too many patients with discharges receive large doses of penicillin without any attempt at bacteriological diagnosis: and if the symptoms subside, as they often do, no attempt is made to establish cure by observation and tests. King and his colleagues contend that some of the cures claimed are apparent rather than real, and though the evidence with which they support their contention is not absolute it is highly suggestive. If the remedy is as fully effective as is generally supposed, it is certainly odd that the incidence of the disease has fallen so little in communities where the infected almost all seek treatment. In the United States it is reported that, though the incidence of early syphilis has shown a satisfactory fall, the incidence of gonorrhœa has actually risen in recent years. In this country it is true that the figures for patients attending the public clinics with acute gonorrhœa have shown some decline, but this decline is much less satisfactory than that of early syphilis. The following figures taken from the annual reports of the chief medical officer of the Ministry of Health give a basis for comparison of the incidence of gonorrhœa after the first world war and after the late war. In 1920, the year of highest incidence after the first war, the figure was 40,284; in 1921 it was 32,433, and in 1922 it was 29,477. The peak year after the late war was 1946, when the figure was 47,343; in 1947 the reported incidence was 36,666, and in 1948 it was 30,312. It does not seem likely that this decline owes much to a fully effective remedy, especially when due allowance is made for the fact that so many cases are treated elsewhere than at the public clinics and are therefore not included in the figures of incidence. If these doubts are well founded, it seems that much latent infection is being set free among the population: and we know that such infection carries a serious late legacy of incapacitating illness, both mental and physical.

Clearly the time has come for reassessment, and the plea for care and conservatism should not be ignored. Formerly gonorrhœa suffered from neglect, through indifference or despair: and it would be unfortunate if equal harm were now done through over-confidence.

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[1] *Lancet*, 1947, ii, 248.

Eosinophils and Surgical Shock

The use of adrenal cortical hormones in surgical or traumatic shock is based on Selye's concept of the "stress reaction." Under the influence of stress the pituitary gland releases adrenocorticotropic hormone (A.C.T.H.), which in turn stimulates the adrenal cortex to release its steroid hormones, particularly the so-called 11–17 oxysteroids. Adrenalectomised animals and patients with Addison's disease are specially liable to develop shock, even fatal shock, after relatively minor operations; but, by giving them large quantities of the appropriate adrenal hormones beforehand, the shock can be prevented. Furthermore, in patients with properly functioning adrenals there is a considerable increase of ketosteroid excretion in the urine after surgical operations. If, therefore, we could find a way of assessing the function of the adrenal cortex before such operations, we might detect the patients likely to have a troublesome postoperative course, and we could also tell how much of the postoperative shock is really due to adrenocortical deficiency. With this end in view, Roche and his colleagues[1] have been studying the eosinopenia that characteristically follows the administration of A.C.T.H. if adrenal function is normal.

The connection of lack of eosinophils in the blood with severe illness was noted as long ago as 1907 by Lams,[2] who also observed that the eosinophil level returns to normal or above when convalescence

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[1] Roche, M., Thorn, G. W., Hills, A. G. *New Engl. J. Med.* 1950, 242, 307.

[2] Lams, H. *C.R. Soc. Biol. Paris*, 1907, 62, 459.

For a book covering so wide a field and so full of matter, the general level of accuracy is remarkable. There are small errors in titles and names of bodies, and the author exaggerates the extent to which women manned searchlights in the United Kingdom; there was only one mixed regiment, and over the rest of the country the detachments were all-male. There is also a statement, generally true, that women doctors were not employed in forward units; but one (an anæsthetist) was employed as far forward as a casualty-clearing station. Occasionally Miss Douie takes sides, usually with justice—as when she castigates the Services for the poor use they made of V.A.D.S, and criticises Government policy towards the Land Army. So many facts and figures are conveniently collected here that she ought to have let us have an index.

The book was apparently written for overseas readers and has been published in this country only by the generosity of a private person. It is much the most valuable of its kind which has yet appeared.

Phenol and its Derivatives

The Relation between their Chemical Constitution and their Effect on the Organism. W. F. VON OETTINGEN, U.S. Public Health Service. National Institutes of Health Bulletin No. 190. 1949. Pp. 408. 70 cents.

THIS bulletin, like other scientific symposia published by the U.S. Public Health Service, provides exhaustive references to the chemistry and physiological action of the phenols and phenol derivatives. Their chemical manufacture, their estimation, their effect on the skin and other organs, their antiseptic action, their toxicity, their excretion, and the possible treatment of toxic effects are all analysed. The mechanism of the physiological action is described and where possible the effect of the compound on various enzymes and enzyme systems is discussed. In the case of related compounds and compounds of a homologous series the various properties and effects of the compounds are compared and contrasted. Throughout the book the information is summarised by clear tables. Among the important compounds considered, in addition to the more usual phenols, are the halogenated phenols and the mono- and di-nitrophenols; adrenaline and its derivatives are not mentioned. The importance of most of these compounds in modern chemical industry and the possible hazards arising from their use makes the information valuable to those who are interested in industrial and occupational diseases.

Das Menschliche Knochenmark

(2nd ed.) KARL ROHR, University of Zürich. Stuttgart: Thieme. 1949. Pp. 404. D.M. 47.50.

THE first edition of this book appeared in 1940 and so is more or less unknown here. The second edition is a typical up-to-date Continental textbook, drawing little on American, and still less on British sources. Rohr treats bone-marrow as an active tissue with supporting structure, blood-supply, and nerve-supply, engaged in the production of blood cells of many kinds. He deals with its development, its anatomy, its physiology, its general pathology, and the pathology of its separate parts, giving most space naturally to the pathology of development of the various blood cells, but also taking in conditions that affect cell-development secondarily, like myelosclerosis and secondary tumour infiltration. This is a large programme, and it is extended at many points by excursions into general, but not exclusively clinical, hæmatology; for instance, several pages are devoted to a discussion on the nature of leukæmia—that is, to Continental views on this question.

The programme is thoroughly, even exhaustively, carried through, and there are many interesting parts. The embryology of bone-marrow is very well described, and Rohr adheres to the view that the first erythroblasts are megaloblasts; fig. 45 shows in schematic form an original view of the relation of embryonal and adult blood-cell production. Some parts of hæmatology regularly get more notice in Continental than in English books; so in Rohr's book we find a discussion of the place of the tissue "mast" cells illustrated by a colour plate; the reticulum cell with its relations the histiocyte and the monocyte is thoroughly dealt with and copiously illustrated. Rohr accepts the existence of intermediate forms between megaloblast and normoblast. He describes and illustrates an unusual form of human erythroleukosis.

All hæmatological books should be well illustrated. The illustrations in this one are designed to fit the text and are not for reference on their own. Most of them are monochrome photographs of marrow smears and sections. There are 24 colour figures reproduced moderately well at a reasonable size from paintings. Finally, there are 35 pages of references, but there are many omissions of American and English work published between 1939 and 1946.

Fifteen years ago it was still essential to read the German texts if one was really to know something about hæmatology; but in 1950, it is no longer necessary. Though Rohr's book is a comprehensive account of the subject, most readers will get all they want from English texts.

Masochism in Modern Man

THEODOR REIK. Translated by MARGARET H. BEIGEL and GERTRUD M. KURTH. New York: Farrar, Straus & Co. London: Allen & Unwin. 1949. Pp. 439. 25s.

MASOCHISM has been the centre of an important controversy among psycho-analysts. Dr. Reik, who as one of Freud's early pupils and friends worships him this side idolatry, takes up critically some of the master's theories about the nature of the strange link between pain and pleasure which masochists seem to exhibit. He holds that this link is not an intrinsic one, that the pleasure follows the pain, instead of coinciding with it, and that suspense and demonstration are specific characteristics of masochism in all its forms. He thus builds a bridge between masochism, the sexual perversion, and the many forms of gladly accepted suffering which have no manifest sexual component. After stating the problem, he examines the phenomena, and singles out the masochist's fantasy, his tension through suspense, and his effort to display his humiliation and suffering to others. The dynamics and origin of masochism, its relation to femininity, the gains it brings to the ego, its social forms, especially in religion, and its cultural aspects are reviewed in turn. The book contains much stimulating material, and is written in lively straightforward language.

Mobilization of the Human Body. *Newer Concepts in Body Mechanics* (Stanford, Calif.: Stanford University Press. London: Oxford University Press. 1949. Pp. 65. 16s.).—This book presents in a concise form the methods of physical reablement used by Dr. Harvey E. Billig, jun., and Miss Evelyn Loewendahl, the authors, at the Billig Clinic, Los Angeles. They emphasise the effects of poor posture on the ligaments and fasciæ of the body, and give passive stretching technique, both for testing the shortening of such structures and for restoring mobility. This particular emphasis is refreshing in contrast to the usual pure muscle re-education: but it is not in fact as new as the authors would have us believe; cervical, dorsal, and hamstring stretchings, for instance, are widely used in clinics here. The photographic illustrations show rather clumsy grips on the part of the physiotherapist, who often kneels on the patient's couch. Coordination, rhythmic exercises, and the basic neuromuscular mechanism are briefly touched on.

Handbook of Digestive Disease (2nd ed. London: Henry Kimpton. 1949. Pp. 658. 75s.).—This handbook of digestive diseases is an expansion of Dr. John L. Kantor's original "Synopsis," and now covers over 600 pages, with nearly 150 diagrams and illustrations. With the help of Dr. Anthony M. Kasich, Dr. Kantor presents the subject fully and clearly, and the work is sufficiently documented to be useful even to specialists in gastro-enterology. But its main appeal will be to general physicians and practitioners, who will find in it a concise and comprehensive account of all the important digestive disorders, with some excellent illustrations. The style is pleasant and easy—not specially impressive, but informative and eminently readable. Divergent views on ætiology, treatment, or pathology are fairly given and the reader is left with no more than a gentle bias towards one outlook or another. The background of physiology is good. The book includes four chapters on diseases of the liver and gall-bladder, and an interesting though brief chapter on the psychiatric aspects of digestive disease. There are remarkably few omissions.

Northern Rhodesia, in which an African boy, infected by a virulent strain of *S. typhi* rich in Vi antigen, seemed to be recovering well with chloramphenicol but collapsed suddenly and died in the second week of the disease. But the consensus of opinion is in agreement with Dr. EDGE, who reviews his 16 cases on p. 710 and remarks that the "complete transformation in a few days" can only be fully appreciated by clinicians who recall their own helplessness in the past. In our columns a fortnight ago, GOOD and MACKENZIE,[9] and RANKIN and GRIMBLE [10] recounted their experiences with chloromycetin in typhoid patients, mostly from the small outbreak in Crowthorne, Berks, in April–May, 1949, which affected about 40 people. A trial under controlled conditions was arranged, using a strict "alternate case" method of selection. GOOD and MACKENZIE thus had a group of 6 cases receiving chloramphenicol and a control group of 7 cases, though 3 of the controls were later treated with chloramphenicol when they relapsed. The results were not so satisfactory as might have been expected from the first impressions gained during the trial, published in a preliminary note by BRADLEY.[11] There were 3 relapses in the original treated group and 3 in the controls, and the only persistent excreter identified in this outbreak was one of the female patients in the treated group. Nevertheless, GOOD and MACKENZIE, like all previous observers, reach the conclusion that chloramphenicol is the most valuable drug we have against typhoid fever. The 18 cases reported by RANKIN and GRIMBLE comprised 10 patients from the Crowthorne outbreak, which was caused by a strain of Vi-phage type E1, and 8 sporadic cases treated in the subsequent six months and due to strains of unspecified, and presumably different, Vi-phage types. The virulence of typhoid strains isolated in different outbreaks, and the severity of the disease they cause, vary so widely that one cannot regard these sporadic cases, which received no chloramphenicol, as satisfactory "controls." A similar criticism applies to the report by EL RAMLI [12] from Cairo in the same issue. His series consisted of 200 cases of typhoid fever treated with chloramphenicol at the Abbassia Fever Hospital between May and December, 1949. The average duration of fever after the start of treatment was 3·5 days and the relapse-rate was 27·5%. EL RAMLI did not feel justified in leaving some of the patients without chloramphenicol as controls, so he compared the case-mortality of 6·5% in his treated series with that of all the typhoid cases treated at the same hospital over the past ten years (9–12%). It must be borne in mind here in the small typhoid outbreaks that occurred among British troops in Egypt during the past few years the fatality-rates, in patients receiving no specific treatment, ranged from nil to well over 25%. EL RAMLI also observed in 7 very severe cases that the temperature did not settle quickly but remained high for eight to twenty-seven days. His general conclusion is that chloramphenicol provides the most efficient specific treatment for typhoid fever so far devised, but he hopes to improve the results by combining chloramphenicol with sulphadiazine treatment, as was suggested by EL BOROLOSSY and BUTTLE.[13] In view of the extreme degree of toxæmia commonly seen in severe typhoid cases, however, a combination of chloramphenicol and a potent "Vi + O" anti-typhoid serum, such as that recommended by FELIX,[14] might prove more effective.

One aspect of the typhoid problem has received very little attention in the reports on the use of chloramphenicol in the acute disease. Will the new antibiotic prevent the development of the chronic carrier state and thus contribute towards the ultimate goal of eradicating typhoid infection? This question is of paramount importance and deserves the urgent attention of both public-health officers and laboratory workers. GOOD and MACKENZIE obtained some valuable data by observing the effect of chloramphenicol on the excretion of typhoid bacilli both during and after treatment. The findings in their small series were disappointing and recall the observations made on typhoid cases treated with penicillin and sulphathiazole combined.[15] It may be concluded that the dosage adopted by GOOD and MACKENZIE, which was that originally suggested by WOODWARD and his colleagues, cannot prevent either clinical relapse or the development of the chronic carrier state. Lately SMADEL and his colleagues [16] have advised that treatment should be continued for about fourteen days with a total dosage of about 25 g. But they do not say what effect the larger doses given over longer periods have on the excretion of typhoid bacilli in the fæces and urine. That longer treatment is no guarantee against relapse is seen from the experience of RANKIN and GRIMBLE,[10] who describe a typical relapse in a patient who had received 37·5 g. of chloromycetin in twenty days. The latest suggestion by WOODWARD (quoted by SMADEL [17]), that intermittent short courses of chloramphenicol should be given, was followed in the outbreak at Salford in October, 1949, but the effect on the excretion of typhoid bacilli was no better than that of the original regimen.[18]

The closest coöperation between clinician and pathologist is clearly essential in the planning of future therapeutic trials. This coöperation has not been conspicuous in some of those so far carried out here or abroad. The effect of the drug on the bacteræmia can be assessed only if the organism is shown to be present in the blood-stream immediately before the drug is exhibited and its presence or absence is checked in blood-cultures taken at regular short intervals afterwards. The effect of the drug on the excretion of the organism can be assessed only if bacteriological examinations of the fæces and urine are begun early in the disease and continued at regular and short intervals until convalescence. These simple rules have not always been observed. When it is intended to conduct a trial under controlled conditions, using "alternate case" selection, and the patients come from small groups infected in different localities in an endemic area, equal numbers of cases infected from the same source must be allotted to

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9. Good, R. A., Mackenzie, R. D. *Lancet*, April 1, p. 611.
10. Rankin, A. L. K., Grimble, A. S. *Ibid*, p. 615.
11. Bradley, W. H. *Ibid*, 1949, i, 869.
12. El Ramli, A. H. *Ibid*, April 1, p. 618.
13. El Borolossy, A. W., Buttle, G. A. H. *Ibid*, 1949, ii, 559.
14. Felix, A. *J. Hyg., Camb.* 1938, 38, 750.
15. Bevan, G., Sudds, M. V. N., Evans, R., Parker, M. T., Pugh, I., Sladden, A. F. S. *Lancet*, 1948, i, 545.
16. Smadel, J. E., Woodward, T. E., Bailey, C. A. *J. Amer. med. Ass.* 1949, 141, 129.
17. Smadel, J. E. *Proc. R. Soc. trop. Med. Hyg.* 1950 (in the press).
18. Parker, M. T. Unpublished.

sets in; eosinophilia, in his view, is a good prognostic sign. Roche and his colleagues have used the modern wet count of eosinophils, which is much quicker and more accurate than indirect estimation from a differential count on a stained film. They confirmed that a surgical operation is soon followed by a profound fall, and often a complete disappearance, of eosinophils in the blood. This eosinopenia is most severe 5–8 hours after the operation begins, and it persists for some hours; but usually by 24 hours recovery has begun and the eosinophils rise again, often reaching levels above the normal in the next 7 days. Now, as a rule the level of eosinophils in the blood at any one time means little; it is the change in that level under different conditions that matters. But it is clear that if in the period from 4 to 24 hours after the start of a surgical operation the patient's eosinophil level is very low, it can be assumed that the adrenal cortex is functioning properly, and even if the patient is shocked there is no indication for giving adrenal cortex hormone. The only cautions are that the patient must not have an aplastic bone-marrow, or an allergic eosinophilia. To illustrate their point, Roche and his colleagues quote a very striking case. In 12 normally reacting patients, the eosinophil levels in the blood 10 hours after operation were about 0–5 per c.mm. The unusual patient was a man operated on for a suspected lesion of the sigmoid colon who was profoundly shocked afterwards; his blood eosinophils 10 hours postoperatively were 260 per c.mm.; the patient died in spite of the administration of adrenal cortex hormones, and at the necropsy he was found to have tuberculosis of both adrenal glands, only a little functioning gland remaining.

It is evidently important that we should know the state of the patient's adrenocortical reserves before operation, so Roche and his co-workers have devised two tests to provide this information. The first uses A.C.T.H.: after blood for the eosinophil-count has been taken, 25 mg. of A.C.T.H. is injected intramuscularly and 4 hours later the eosinophil-count is repeated; the fall must be at least 50% to indicate that adrenocortical reserves are normal. The second test is based on the observation that a small dose—0·3 mg.—of adrenaline will also cause a fall in circulating eosinophils; it is thought that the adrenaline acts on the hypothalamus or the pituitary which in turn stimulates the adrenal cortex. The test is thus one of pituitary-adrenocortical reserves. It is carried out by injecting 0·3 mg. of adrenaline subcutaneously and counting the blood eosinophils 4 hours later; again a fall of 50% or more indicates normal reserves.

These tests were tried on two patients with pituitary lesions who might well have had a stormy postoperative course. The first patient had had intensive X-ray therapy of the pituitary gland for Cushing's syndrome 10 months before she was admitted to hospital for a hysterectomy. With both adrenaline and A.C.T.H. tests there was a significant fall in eosinophils, which suggested that the operation could be undertaken without undue risk. The operation was duly performed, and recovery was uneventful. The second patient had a chromophobe adenoma causing visual impairment; with the adrenaline test the eosinophils actually rose slightly, while with the A.C.T.H. test only a 15% fall was recorded. Difficulties were anticipated and an attempt to begin the operation failed because of shock caused by the anæsthetic. She was therefore treated for 6 days with large doses of A.C.T.H., by which time the eosinophils in the blood had fallen 75% and the urinary excretion of ketosteroids had increased from 0·9 to 8·9 mg. in 24 hours. The operation was then performed without incident, and, though the patient had a difficult time after the operation, she recovered satisfactorily. The number of cases reported by Roche et al. is small, but their work is sure to be repeated, and if it is confirmed the surgeon will want to know his patients' eosinophil-counts. Stimulated by the work with A.C.T.H. in rheumatoid arthritis, the technique of eosinophil counting is being improved. Most laboratories use Dungar's method in some form, but this has disadvantages, especially for large-scale use; methods like that of Randolph,[3] which use propylene glycol in the diluting fluid, are coming into use.

Apart from its immediate importance, there are two interesting points about this work. It is one of the first applications of A.C.T.H. and its effects as a "research tool" in conditions other than rheumatoid arthritis. And the results suggest that shock due to failure of adrenal cortical function is likely to be distinctly rare, so that large amounts of adrenal cortical hormone will be saved for the patients who really need it.

Chloromycetin in Typhoid Fever

Until lately typhoid fever had resisted all attempts at chemotherapy. Most of the sulphonamides introduced in the past fifteen years have been tried in this disease, but the initially favourable claims for several of them were soon disproved. The same process has been repeated with each of the antibiotics hitherto tried—penicillin, streptomycin, aerosporin (polymyxin), and 'Aureomycin'—and even the promising results reported with penicillin and sulphonamides combined have not been repeated. There is good reason, therefore, for caution in interpreting the remarkable clinical effects of chloramphenicol.

In the last few months an increasing stream of clinical reports have appeared in this country and abroad confirming the original observations of Woodward and his colleagues [4] with chloromycetin in the treatment of typhoid patients in Malaya. Some of these have already been reviewed in these columns.[5] The drug's action on the constitutional symptoms are so striking that the clinicians are unanimous in acclaiming its value, even though some failures have also been recorded. Thus, out of 6 severely ill patients treated in Bombay by Patel et al.,[6] 3 died and 1 relapsed; and in a series of 63 patients treated in Italy by Conti and his colleagues [7] there were 4 deaths and 9 relapses. Dana et al.[8] have described 5 cases treated in Tunis which showed an alarming rise in blood-urea; 3 of these patients died, but the other 2 improved when the chloramphenicol was stopped and they eventually survived. In our correspondence columns this week Dr. Stephens reports a case from antigens. On the other hand, for protecting mice against *Bact. coli* infection, serum from a calf immunised with endotoxin proved about 30 times more potent than a commercial *Bact. coli* antiserum. Possibly, therefore, a serum could be prepared that would protect young calves against "white diarrhœa," and the immunity might extend to other members of the colon-typhoid group. If it is true that most of the lethal effects of infantile gastro-enteritis are caused by special strains of the colon-typhoid group, as suggested by the work of Giles and Sangster[2] and Mackerras and Mackerras,[3] a similar serum might be valuable in this condition. If really potent, it should at least help in elucidating the ætiology of the disease.

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[3] Randolph, T. G. *J. Lab. clin. Med.* 1949, 34, 1696.
[4] Woodward, T. E., Smadel, J. E., Ley, H. L., Green, R., Mankikar, D. S. *Ann. intern. Med.* 1948, 29, 131.
[5] *Lancet*, 1949, ii, 1001.
[6] Patel, J. C., Banker, D. D., Modi, C. J. *Brit. med. J.* 1949, ii, 908.
[7] Conti, F., Cassano, A., Monaco, R. *Rif. med.* 1949, 63, 901.
[8] Dana, R., Sebag, A., Cohen, J., Borsoni, G. *Tunisie méd.* 1950, 38, 190.

THE AGED WHO ARE MENTALLY INFIRM

MANY old people suffering from relatively mild degrees of mental infirmity have of recent years been admitted to mental hospitals under certificate, largely because there was nowhere else to send them when they were sick. This desperate resort has blocked mental-hospital beds which could be used for the treatment of acute and recoverable patients of all ages. The Ministry of Health[4] has therefore asked the regional hospital boards to consider providing, for people of 65 and over who have deteriorated mentally, both short-stay psychiatric units and long-stay annexes.

In the future, geriatric departments are to be developed in the larger hospital centres, usually in the general hospital of a group; and the Ministry propose that each such department should include a short-stay psychiatric unit capable of dealing with elderly patients whose mental state does not call for immediate mental-hospital treatment. Such a unit will be used to establish the diagnosis and give short-term treatment; and the stay of any patient will not usually exceed 6 weeks. Some of the patients will be well enough to return home after treatment, some will need care in long-stay annexes, a few will need mental-hospital care, and a proportion will die. It is suggested that the wards should not hold more than 25 beds, and should be divided up so that patients can be classified into small groups; a few single rooms should be available.

Long-stay annexes are to be provided for patients without serious behaviour disorders, as distinct from the more disturbed types. The Ministry thinks it may be convenient to associate such annexes either with mental hospitals, general hospitals, or hospitals for the chronic sick, depending on local conditions. At all events they should be within convenient reach of most visiting relatives or friends. If they are in buildings actually in the mental-hospital grounds they should cease to be a part of the hospital and should have a separate entrance, but they should none the less be linked with the mental hospital in some way, since the staff should include mental nurses and psychiatric social workers, and the medical care should be supervised by a psychiatric consultant.

The object is not to set up new mental hospitals for the treatment of acute psychoses; and the Minister is therefore willing to direct that long-stay annexes shall be used "for the reception of persons who are suffering from mental infirmity due to old age and who do not require detention." This gets rid of any question of certification. Mental deterioration associated with grossly disturbed behaviour will, as formerly, be treated in a mental hospital, and so will acute recoverable mental illness. Patients will be referred to the long-stay annexes from the short-stay units, or sent direct from their own homes by the family doctor attending them. The Minister specially recommends that the long-stay annexes should be "simple and home-like in character."

USE OF PETHIDINE BY MIDWIVES

THE Dangerous Drugs Regulations which came into force at the beginning of this month authorise the possession and use of pethidine by midwives. The value of pethidine in obstetrics is now well established, and the new regulation is welcome. It marks a further step in the growing recognition by the medical profession and the Home Office of the wisdom of allowing preparations classed as dangerous drugs to be supplied to trained persons who are not medically qualified, for relief of pain under special circumstances. The careful framing of the regulation leaves little possibility of abuse; the safeguards might even be termed drastic. The amount to be supplied is limited to the quantity of pethidine which would be necessary for the administration of 200 mg. to each pregnant woman whose name is recorded in the personal register which it is already obligatory for the midwife to maintain. A record of supply and administration of the drug must be kept; and, of course, when not actually in use, the pethidine will be kept under lock and key. It is presumed that full instruction in the use and limitations of pethidine will be a part of the course of training of midwives, and that it will be emphasised that the drug is intended for use only when the patient is in labour. It should not be necessary to remind the midwife that if the patient has to be referred to a doctor or transferred to hospital, full information about the use of analgesics should be given.

This new regulation should go some way towards solving the difficult problem of how best to equip the midwife to supply analgesia to women who are being delivered at home. Pethidine has now[1 2] been shown to be a safe analgesic, easy to give and with few side-effects. Used with discrimination, it should be of considerable value, and we hope that after a year or two an attempt will be made to assess the results. In conclusion, dare we hope that further regulations will be made to allow of the wider use of analgesics in first-aid?

TEACHERS ON TOUR

MANY people have said that it is important that the periphery of medical practice should be more closely linked with the centre. Practical schemes to further this agreed policy are less common. But last month Manchester Regional Hospital Board approved two interesting suggestions to this end put forward by Sir Harry Platt. During the past two years some half-dozen orthopædic conferences have been held at strategic points in the region, and the success of these meetings led Platt to suggest that the time had come when the system should be extended to other subjects. A beginning might well be made, he thought, with conferences on general medicine, general surgery, obstetrics and gynæcology, and pædiatrics.

His second suggestion breaks fresh ground. He proposes that not less than once a year a visitor distinguished in one of the main clinical fields should be invited to spend a week, or better still a fortnight, at each peripheral key centre. There he would take charge at the local hospital of the clinical department of his own specialty, conduct ward rounds, and give talks. On one or two evenings there might be discussions to which the general practitioners of the area would be invited. Judging by the enthusiasm for surgical Saturday afternoons which Dr. Collings observed in the Highlands of Scotland, this might well be one of the best parts of a good idea. Platt is keen that the distinguished visitor should live in the town and get to know some of

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2. Giles, C., Sangster, G. *J. Hyg., Camb.* 1948, 46, 1.
3. Mackerras, I. M., Mackerras, M. J. *Ibid*, 1949, 47, 166.
4. Circular R.H.B. (50) 26.

1. Roby, C., Schumann, W. R. *Amer. J. Obstet. Gynec.* 1943, 45, 318.
2. Barnes, J. *Brit. med. J.* 1947, i, 437.

the treated and the control groups. Single sporadic cases cannot be included in a "controlled" trial, because there would then be no control cases from the same source of infection. Vi-phage typing of the strains isolated from the treated and the control cases should be carried out as a routine. The result will confirm or disprove the epidemiological connection between alternate cases. Finally, a thorough serological and bacteriological study should be made of the convalescent patients for three to six months after their discharge from hospital, to make certain that they do not become chronic carriers.

Annotations

LORD MORAN

WHEN in 1941 the Royal College of Physicians elected Sir Charles Wilson as president, it certainly did not foresee that for eight more years his re-election would be an annual event—and an exciting one. Whatever else his critics may say of his nine years' presidency, they cannot fairly describe it as dull; nor did it end tamely. Lord Moran is not one of those who hold that because an institution is old it should reduce its activities and live gracefully in the past: he regards prestige as useful rather than ornamental. Since 1941 constructive proposals have come from the college in reports of committees on social and preventive medicine, psychological medicine, medical education, pædiatrics, neurology, pathology, dermatology, cardiology, and rheumatic heart-disease, and on problems of demobilisation. The Prophit report on tuberculosis came out in 1948, and an International Conference of Physicians was held in 1947. Internally the members have been given opportunities of meeting to express their views, and representation on the council. Externally the Physicians have joined with the Surgeons and Obstetricians in a standing joint committee; but they have preferred to remain in Pall Mall rather than form part of an Academy of Medicine in Lincoln's Inn Fields.

In the preliminaries to the National Health Service, the attitude of the Royal College of Physicians, expressed, and to some extent formed, by Lord Moran, was that the creation of a service was inevitable and that their duty was to help in fashioning it, so that avoidable mistakes might be avoided. Probably it would be correct to say that if the senior college had taken a different line, the profession would have refused to work the service, unless or until compelled to do so. On the narrower issue of the future of consultant practice, Lord Moran believed that grave harm would be done to the whole profession if the highest incomes open to doctors in the service were to be no more than the £2500 a year paid to medical professors; and his arguments in the House of Lords led to the formation of the Spens Committee on the remuneration of consultants, of which he was a member. This committee's report, and its acceptance by the Government, has created confusion wherever medical men are publicly employed; but in the end the whole quality of public service is likely to gain by the committee's stand against the old tradition that public servants must be poorly paid. The committee's further proposal that the highest salaries should be awarded only for special merit, as judged by a man's peers, has led to what we regard as a most important experiment in the technique of public service under the new conditions. For the fact that this experiment is being made, and that the profession has not accepted a conventional system of remuneration on Civil Service lines, we have to thank both Lord Moran and the Minister, both men of imagination.

Lord Moran's qualities are admired most, perhaps, by those who know him best; but even those who deny the wisdom of his policies must be impressed by the courage with which he has pursued them. To his successor, Dr. Russell Brain, he leaves a difficult task, but one whose responsibility he has enhanced.

NEW LIGHT ON ENDOTOXINS

IT has been recognised for some time that the toxic properties of the colon-typhoid-dysentery group, with the probable exception of *Shigella shigæ*, are attributable to a nitrogen-containing polysaccharide complex. Some authors call this substance a somatic antigen and others an endotoxin. It has been extracted from bacterial bodies with trichloracetic acid (Boivin and Mesrobeanu 1933), by tryptic digestion (Raistrick and Topley 1934), and with diethylene glycol (Morgan 1937). It is antigenic; it produces a pathological picture in which the fundamental change is a terminal circulatory hypertension; it causes hyperthermia, transient hyperglycæmia (followed by hypoglycæmia), placental hæmorrhage with abortion, and hæmorrhage in implanted tumours; and its toxicity appears to be less in animals injected with adrenal cortical extract.

When endeavouring to explain the toxicity to guineapigs of some heat-killed saline suspensions of *Bacterium coli*, Roberts[1] found that the toxic substance was a polysaccharide complex, or endotoxin, and that it was present in filtrates of heated suspensions. The high susceptibility of guineapigs (but not mice) and the presence of endotoxin in the filtrate of heated saline suspensions, seemed to conflict with accepted knowledge, and further investigation was therefore undertaken. *Bact. coli* was grown in a synthetic medium vigorously agitated by aeration, and viable counts of 25,000 million cells per ml. were obtained. When these suspensions of *Bact. coli* were heated at 80°C for one hour, almost all the endotoxin entered the suspending fluid and could be recovered from the filtrate. On purification it proved to have the physical, chemical, and biological properties associated with the endotoxins of salmonella and dysentery organisms.

These observations were made by employing guineapigs to detect the endotoxin. Experiments on purified endotoxic complex showed that even when guineapigs were injected subcutaneously and mice intravenously, the guineapigs were, weight for weight, 17·5 times more susceptible than mice. It is possible that guineapigs may be more susceptible to *Bact. coli* endotoxin, and more uniform in their response to it, than to the endotoxins of other enteric bacteria. The gross appearance of lesions in guineapigs suggested capillary hæmorrhage, but microscopical examination did not indicate whether the lesion was due to extravasation or to hypertension. When the trypan-blue technique of Menkin (1938) was applied, no evidence of increased capillary permeability could be obtained. The results thus supported the view that the lesion was a terminal hypertension.

These simplified methods of producing large quantities of *Bact. coli* in synthetic medium and of obtaining the endotoxin will no doubt stimulate further studies in this field. It also looks as though much work on antigenic analysis may need re-examination, because the bacterial suspensions have often been killed by heat, which evidently removes the antigen from the bacterial bodies. Though an active immunity was demonstrated in surviving guineapigs, there appears to be no immediate likelihood of developing a method of detoxifying endotoxin for purposes of immunisation; and, as bacterial cells are as effective as the complex in stimulating immunity, there is no obvious advantage in using endotoxin instead of bacterial suspensions as

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1. Roberts, R. S. *J. comp. Path.* 1949, 59, 245.

Points of View

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or
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The average patient is not concerned with his rhesus factor or his blood-cells: he comes to his doctor for comfort and reassurance. But what is happening? Are we stark, staring, raving mad? We are creating a race of hypochondriacs. Our doctoring is being guided and dominated by the huge medical commercial firms and their showers of circulars. We are handing out the material things—teeth, spectacles, corsets, and medicines of every expensive variety by the ton—all at colossal expense.

Why all this attention to teeth and why start the scheme the wrong way? Free dental treatment should be concentrated on youth up to 18 years. After that until the 70s everybody should make his own arrangements. (The septic tooth causing all the body ailments was long ago a busted flush.) But can you get school dentists now? No!

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The less said about the other material benefits the better—again a matter of understanding of people. Is it likely that Mrs. Smith will get away with new spectacles, corsets, and elastic stockings without Mrs. Jones wanting to have them too? Under the health scheme half a million prescriptions are issued per diem! What a race! What a people! What positive health! Don't blame the poor practitioner—you put him there with a limitless tariff and a waiting-room of 50 people. Feed them properly and house them—it is much cheaper in the long run.

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The practitioner is the rock-bottom basis of medicine in a community, and is rightly guarded by the most stringent principles of conduct. But what is happening today to the training of future practitioners? The Goodenough report, admirable though it was, hardly touched on the training of the practitioner as a practitioner. Disease as a clear-cut entity is rare: the good doctor treats the patient first and the disease afterwards—it is the man that matters. It is most extraordinary that not a single medical school in the country has lectures by practitioners to tell the young, to guide them in the pitfalls, and to tell them about people and "cabbages and kings." I would humbly suggest that the medical schools could pick out a hundred practitioners who would give first-class lectures on their job. It would be no bad idea to institute university chairs of general practice—it would pay a handsome dividend in the long run and bring a human touch to a possibly over-academised teaching school. Today the tendency is to specialise, and the young man sees the potential glittering prizes and the easy way of life. More and more specialist departments are created, and one can be quite certain that whoever is in charge of such a department will see that it is justified and continued—otherwise his living goes. The churning out of specialists at the moment fills me with horror: soon there will be no doctors but all specialists.

Today X rays are to medicine what the B.B.C. and television are to the general public—an ancillary diversion—grossly over-used—abused—an escape mechanism for diagnosis, as the B.B.C. is an escape from facing life. This is a hard statement, but it is true and you all know it.

its citizens as well as its doctors, especially the people responsible for managing the hospital group. He suggests that visitors might be chosen from such people as local regional advisers, consultants, specialists from other regions, and university professors. The invitation should come from the regional board with the backing of the local management committee and the staff of the hospital where the visitor would work. To be a visitor will clearly not be an easy task, but Platt feels sure that it would be possible to find senior men ready to give the time and to take the trouble. Obviously it would be a useful job. To bring the teacher to the postgraduates rather than to draw the postgraduates back to the teaching schools may be a new idea, but it would probably ensure that the teacher reached more postgraduates. Incidentally he might himself gain a clearer idea of the problems of medicine in peripheral practice.

ADMISSION AND DISPOSAL

ONCE again the difficulties of admission to hospital have appeared in the newspapers. In the latest case a woman of 80 with a fractured femur was taken by accident ambulance to a teaching hospital, which was unable to find a bed for her; so she was given some tablets and sent home with a message to her doctor that he should endeavour to get her admitted to some other hospital. This strange procedure on the part of the teaching hospital which sent the patient home rather than search for a bed elsewhere is symptomatic of the awkward relations now prevailing between teaching and other hospitals. The teaching hospitals naturally hold that they must keep a proper balance of cases in their wards for teaching purposes. Before the health service started this was achieved by the simple process of passing on unsuitable cases to the local county hospital. But unfortunately it happens that cases not suitable for teaching are usually those that are generally unattractive to hospitals. Now that the ex-county hospitals are under no obligation to take local patients, they understandably object to taking all the uninteresting ones from the neighbouring teaching hospital. They say, with some reason, that if the teaching hospital's beds are full, so are theirs, and that if the patient is in a teaching hospital he had better stay there.

On the one hand, the new system by which long-term patients may be retained in the general wards of teaching hospitals is both bad for teaching and grossly extravagant. On the other hand, the old system by which teaching hospitals disposed of their cases cannot be restored without exciting serious ill feeling among those hospitals which would have to take them. This being so, the solution seems to be that teaching hospitals should have annexes to which they can pass on such long-term cases as they may involuntarily acquire. By this means it should be possible both to avoid friction with the non-teaching hospitals and also—since a bed in an annexe could be maintained at less cost than a bed in a general hospital—to save a considerable amount of money.

PROPHYLACTIC INOCULATION AND POLIOMYELITIS

LAST week we commented on the association found by McCloskey in Australia between prophylactic immunisation and paralytic poliomyelitis. Similar experience in this country has now been reported by Dr. Dennis Geffen, medical officer of health for the London borough of St. Pancras,[1] and his data show that, even in a single metropolitan borough, the onset of paralytic poliomyelitis in an arm previously injected with pertussis vaccine or alum-precipitated toxoid (A.P.T.) is not extremely rare. In St. Pancras since June, 1949, there have been 19 confirmed cases of poliomyelitis or polioencephalitis in children under five years of age, and in 6 of these cases paralysis has ensued within 14–22 days of the injection of a combined whooping-cough and diphtheria vaccine. As Geffen points out, this experience is not confined to the combined vaccine; in Fulham, for example, the injection of A.P.T. alone into the left deltoid was followed in 4 cases by paralysis of the upper arm. Indeed, the possibility that paralysis follows trauma in its general sense rather than the use of any specific antigen is suggested by the onset of paralysis of the gluteal muscles in one of these inoculated patients who had also received an intramuscular injection of penicillin in the course of treatment for an intercurrent tonsillitis.

In St. Pancras, the antigens used came from different batches and were given by two different doctors who both used different needles for each inoculation. In London as a whole, though there are local differences in the antigens used, the general picture of association between injections and paralysis holds: of the 182 notified cases of poliomyelitis under the age of five, 35 gave a history of inoculation in the four-week period before the onset of paralysis in the injected limb. In 21 of these a combined vaccine was used; in 8 cases A.P.T. was injected; and in 1 whooping-cough vaccine alone was given. The administrative decision following these findings enforced the postponement of the immunisation campaign during the epidemic summer months; but, as we have already said, we must have more facts if we are to strike a balance between the risks of failure to immunise against a disease like diphtheria (which used to cause over 2000 deaths a year before the present campaign started) and the risks of paralysis among children inoculated during an epidemic period.

RESEARCH INTO PRESCRIPTIONS

THE prescription pricing bureaux are still overwhelmed with work, as is testified by the six-month delay before pharmacists receive final payments and by the continuing use of the expedient of averaging the cost of prescriptions under 5*s*. Perhaps because the bureaux are overtaxed with routine work, the Ministry of Health is setting up a special unit whose main function will be to investigate cases of allegedly extravagant prescribing. In such a case the unit will examine the prescribing habits of the practitioner in relation to those of neighbouring doctors, and if it is considered that extravagance is proved, the local executive council will be informed. Perhaps this unit will also be able to study some further questions that need answering. How much, for example, does the practice of ordering proprietary substances vary from one practice, or one district, to another? How great is the variation in prescriptions for dangerous drugs? And is it possible to establish, under present-day conditions, more exact criteria for extravagant prescribing? An affirmative answer to this last question would prevent many doubts and disputes.

SIR HENRY DALE, O.M., has been appointed as adviser to the B.B.C. on scientific programmes for one year beginning on July 1. He will advise on the coördination and content of broadcasts on science and on the choice of speakers and topics. He will also examine the possibilities of developing scientific programmes in television.

AGREEMENTS have been signed by the World Health Organisation with the governments of Czechoslovakia, Denmark, and Poland, to establish in the three countries medical training centres where international courses will be sponsored by W.H.O. In May training centres in anæsthesiology will be opened at Copenhagen and Prague where physicians from neighbouring countries may hold W.H.O. fellowships. There are also to be a training centre in biochemistry at Wroclaw and a training centre in venereal-disease control in Warsaw.

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[1] *Med. Offr.* April 8, p. 137.

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The doctor must be independent—must—must—must be free from the fear of losing his patients unless he plays to their certification whim. Unless this is done the whole fabric of practice is undermined: and remember, the practitioner sees the patient first. Then, what a joy to the doctor, when he sees his waiting-room full of people, to know they are there to see him—for his advice—for his knowledge—for his skill! Whether *their ailment is trivial* matters not one iota: "*I can treat them and comfort them.*" But if the practitioner is going to be subservient to certification of any kind—*law, societies,* or Government—well, we are going to Hell and going very fast. He must remain the independent individual, fearing no-one and fearing only for his patient. Yes, let the patient be absolved from the financial burden of illness, but let us practise our profession as individuals and on our sworn oath when we qualified. You cannot legislate the good practitioner—you might as well try to legislate the good poet.

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The practitioner is the rock-bottom basis of medicine in a community, and is rightly guarded by the most stringent principles of conduct. But what is happening today to the training of future practitioners? The Goodenough report, admirable though it was, hardly touched on the training of the *practitioner* as a practitioner. Disease as a clear-cut entity is rare: the good doctor treats the patient first and the disease afterwards—it is the man that matters. It is most extraordinary that not a single *medical school* in the country has lectures by practitioners to tell the young, to guide them in the *pitfalls*, and to *tell* them about people and "cabbages and kings." I would humbly suggest *that the* medical schools could pick out a hundred practitioners who would give first-class lectures on their job. It would be no bad idea to institute university chairs of general practice—it would pay a handsome dividend in the long run and bring a human touch to a possibly over-academised teaching school. Today the tendency is to specialise, and the young man sees the potential glittering prizes and the easy way of life. More and more specialist departments are created, and one can be quite certain that whoever is in charge of such a department will see that it is justified and continued—otherwise his living goes. The churning out of specialists at the moment fills me with horror: soon there will be no doctors but all specialists.

Today X rays are to medicine what the B.B.C. and television are to the general public—an *ancillary diversion*—grossly over-used—abused—an escape mechanism for diagnosis, as the B.B.C. is an *escape from facing life*. This is a hard statement, but it is true and you all know it.

its citizens as well as its doctors, especially the people responsible for managing the hospital group. He suggests that visitors might be chosen from such people as local regional advisers, consultants, specialists from other regions, and university professors. The invitation should come from the regional board with the backing of the local management committee and the staff of the hospital where the visitor would work. To be a visitor will clearly not be an easy task, but Platt feels sure that it would be possible to find senior men ready to give the time and to take the trouble. Obviously it would be a useful job. To bring the teacher to the postgraduates rather than to draw the postgraduates back to the teaching schools may be a new idea, but it would probably ensure that the teacher reached more postgraduates. Incidentally he might himself gain a clearer idea of the problems of medicine in peripheral practice.

ADMISSION AND DISPOSAL

ONCE again the difficulties of admission to hospital have appeared in the newspapers. In the latest case a woman of 80 with a fractured femur was taken by accident ambulance to a teaching hospital, which was unable to find a bed for her; so she was given some tablets and sent home with a message to her doctor that he should endeavour to get her admitted to some other hospital. This strange procedure on the part of the teaching hospital which sent the patient home rather than search for a bed elsewhere is symptomatic of the awkward relations now prevailing between teaching and other hospitals. The teaching hospitals naturally hold that they must keep a proper balance of cases in their wards for teaching purposes. Before the health service started this was achieved by the simple process of passing on unsuitable cases to the local county hospital. But unfortunately it happens that cases not suitable for teaching are usually those that are generally unattractive to hospitals. Now that the ex-county hospitals are under no obligation to take local patients, they understandably object to taking all the uninteresting ones from the neighbouring teaching hospital. They say, with some reason, that if the teaching hospital's beds are full, so are theirs, and that if the patient is in a teaching hospital he had better stay there.

On the one hand, the new system by which long-term patients may be retained in the general wards of teaching hospitals is both bad for teaching and grossly extravagant. On the other hand, the old system by which teaching hospitals disposed of their cases cannot be restored without exciting serious ill feeling among those hospitals which would have to take them. This being so, the solution seems to be that teaching hospitals should have annexes to which they can pass on such long-term cases as they may involuntarily acquire. By this means it should be possible both to avoid friction with the non-teaching hospitals and also—since a bed in an annexe could be maintained at less cost than a bed in a general hospital—to save a considerable amount of money.

PROPHYLACTIC INOCULATION AND POLIOMYELITIS

LAST week we commented on the association found by McCloskey in Australia between prophylactic immunisation and paralytic poliomyelitis. Similar experience in this country has now been reported by Dr. Dennis Geffen, medical officer of health for the London borough of St. Pancras,[1] and his data show that, even in a single metropolitan borough, the onset of paralytic poliomyelitis in an arm previously injected with pertussis vaccine or alum-precipitated toxoid (A.P.T.) is not extremely rare. In St. Pancras since June, 1949, there have been 19 confirmed cases of poliomyelitis or polioencephalitis in children under five years of age, and in 6 of these cases paralysis has ensued within 14–22 days of the injection of a combined whooping-cough and diphtheria vaccine. As Geffen points out, this experience is not confined to the combined vaccine; in Fulham, for example, the injection of A.P.T. alone into the left deltoid was followed in 4 cases by paralysis of the upper arm. Indeed, the possibility that paralysis follows trauma in its general sense rather than the use of any specific antigen is suggested by the onset of paralysis of the gluteal muscles in one of these inoculated patients who had also received an intramuscular injection of penicillin in the course of treatment for an intercurrent tonsillitis.

In St. Pancras, the antigens used came from different batches and were given by two different doctors who both used different needles for each inoculation. In London as a whole, though there are local differences in the antigens used, the general picture of association between injections and paralysis holds: of the 182 notified cases of poliomyelitis under the age of five, 35 gave a history of inoculation in the four-week period before the onset of paralysis in the injected limb. In 21 of these a combined vaccine was used; in 8 cases A.P.T. was injected; and in 1 whooping-cough vaccine alone was given. The administrative decision following these findings enforced the postponement of the immunisation campaign during the epidemic summer months; but, as we have already said, we must have more facts if we are to strike a balance between the risks of failure to immunise against a disease like diphtheria (which used to cause over 2000 deaths a year before the present campaign started) and the risks of paralysis among children inoculated during an epidemic period.

RESEARCH INTO PRESCRIPTIONS

THE prescription pricing bureaux are still overwhelmed with work, as is testified by the six-month delay before pharmacists receive final payments and by the continuing use of the expedient of averaging the cost of prescriptions under 5s. Perhaps because the bureaux are overtaxed with routine work, the Ministry of Health is setting up a special unit whose main function will be to investigate cases of allegedly extravagant prescribing. In such a case the unit will examine the prescribing habits of the practitioner in relation to those of neighbouring doctors, and if it is considered that extravagance is proved, the local executive council will be informed. Perhaps this unit will also be able to study some further questions that need answering. How much, for example, does the practice of ordering proprietary substances vary from one practice, or one district, to another? How great is the variation in prescriptions for dangerous drugs? And is it possible to establish, under present-day conditions, more exact criteria for extravagant prescribing? An affirmative answer to this last question would prevent many doubts and disputes.

SIR HENRY DALE, O.M., has been appointed as adviser to the B.B.C. on scientific programmes for one year beginning on July 1. He will advise on the coördination and content of broadcasts on science and on the choice of speakers and topics. He will also examine the possibilities of developing scientific programmes in television.

AGREEMENTS have been signed by the World Health Organisation with the governments of Czechoslovakia, Denmark, and Poland, to establish in the three countries medical training centres where international courses will be sponsored by W.H.O. In May training centres in anæsthesiology will be opened at Copenhagen and Prague where physicians from neighbouring countries may hold W.H.O. fellowships. There are also to be a training centre in biochemistry at Wroclaw and a training centre in venereal-disease control in Warsaw.

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[1] *Med. Offr.* April 8, p. 137.

a thorough physical and medical overhaul it is here that, in private, they meet the doctors. It is here that the family comes to know about itself, and to learn how, within its capacity, to make use of the knowledge which science can give to it. The doctors are also brought into close touch with the mind of each individual. There are many aspects to the family consultation procedure and it is precisely the way in which this consultation brings together these various components which give it a unique character.

In the first place the consultation is the point where therapy and enlargement of the personality meet. On the one hand, knowledge of the self opens up the possibility of preventing recurrent illness. On the other, this knowledge may show the individual that it is within his power to enlarge the scope and varity of his own life. In both directions there is the incentive of a wide choice of recreational activities, backing up the process started by an enhanced awareness of what is possible to him. This is the clue to the design of the building in which the centre is housed, and the reason why it is a recreational centre.

Psychologists and sociologists are now aware that a change in individual behaviour is closely related to, and often dependent on, changes in the environment. (Psychotherapy sometimes uses this method by placing a person in a different job, and we may all profit by a change of atmosphere.) In the social sphere the dependence of one person's behaviour on that of another is much greater than we are usually aware of. The less a man is conscious of his social relations the more decisive is this interdependence in the control of his behaviour. Moreover, psychology teaches us that our behaviour towards other individuals is the most inflexible part of our character. Unless therefore a change can be wrought in our relations with our intimate acquaintances, the whole character structure will remain inflexible. Therefore the founders quite rightly made it a condition of membership that member families must be prepared to consider, in consultation with the doctors, the full implications (not the details) of the medical and physiological examinations. In this way individual and reciprocal attitudes within the family were revealed to all the members when the results of the medical overhaul were being discussed.

APPLICATION

Now let us see how the health centre sets about this. It must at once be admitted that technically the scientific investigations were mismanaged owing to a preoccupation with techniques whose validity had not previously been tested. This has meant that modern scientific techniques have found no place in the investigations, and the validity of the centre's results can justifiably be questioned on purely technical grounds. When to this is added an inability to collaborate with scientists in other branches of knowledge, it should be plain why the results of the physiological investigation have not found their place in scientific literature.

In these circumstances the scientific work itself has not demonstrated anything that was not already known; nor have methods been used that are essentially different from the routine medical overhauls carried out in the Army or at school. The novelty lay in applying these methods in a recreation centre where the interaction of social behaviour and recreation upon the psychology and physiology of the individual could be studied. It has been a very expensive way of putting forward this idea. Nevertheless the idea is important and it has been shown that it is quite feasible to obtain continuous records from people from birth to death provided people are given the opportunity of belonging to such a centre.

This has obviously immense potentialities. As we have seen, in Peckham it was possible to relate group social activity to physiological health. Such a concept is not new in itself, since psychosomatic medicine had already illustrated and classified this type of relationship. Nevertheless, the findings of the Peckham Health Centre, in individual instances, have, I think, provided a prima-facie case for the dependence of some quite marked physiological disturbances on relatively mild intrafamilial psychological tensions. They have found that these can be rectified on people's own initiative, provided the information about the state of affairs is given to them. There is no doubt that this method—i.e., obtaining the coöperation of the individual in his own cure and making this potentially dependent on his will—is the aspect of their work which appeals to the non-specialist and members of the general public in particular, and I myself share the valuation placed on it by this wide public. It does moreover link very closely with the concept that the recreational activities which spring from a person's own creative faculty are closely linked with the strength of his will to recover health. In so far as knowledge is a prerequisite of such recovery in their system, the cycle of social activity is an essentially progressive one to which scientists could readily subscribe.

The difficulty scientists find in assessing the value of this type of work is that action and interaction are continually at work, making precise observation very difficult; but this is the real challenge that Peckham holds out to the social investigator. Various schools of sociology in America are already thinking about the problem, but admittedly they do not seem to have got very far.

The fact that the centre fell short of its aim is a great pity; and its shortcomings must be partly ascribed to the arbitrary methods of administration which the founders were unfortunately unable to do without. Inevitably, numbers of other social causes became associated with it, such as the importance of food grown on compost, which after all is quite another matter, but in the minds of those running the centre they were inexplicably interfused not to say confused.

LIMITATIONS ON ACTIVITY

Many investigators who came to the Peckham Health Centre asked where the discipline was, and they always received the answer that there was no discipline. If by this was meant that there were no principles by which people could understand what the limits of their freedom were, this statement is true. But members had only to try something that was disapproved of to find that definite limits were in fact set to social activity. This of course must have been the case, and I suppose the incentive to be a little bit more bold was that much increased by the absence of a prominent set of rules. This in itself might have been, and probably was to some extent, a good element; but the arbitrariness with which on occasions the staff interfered with the activities of the members was startling. Naturally, this need not in other similar experiments be the same. It is clear, however, that lacking serious and frank discussion it has been impossible to find out how to make sociological observations in these circumstances, nor have sociologists been asked to help. Just as there were no obvious limits placed on any particular type of activity by the presence of furniture and equipment designed for specific purposes, so the apparent absence of social *mores* gave an illusionary appearance of an increased social mobility. In fact, however, the social *mores* of the centre were essentially those of the Christian world outside it.

Finally, it is important to remember the relative absence of intellectual and cultural activity which must have struck anyone who stayed there longer than a day. Culture is the expression of accumulated social experience of individuals and incorporates the knowledge of how

To me the ideal training for the practitioner is this. Having obtained his academic degree or diploma he should concentrate on the following:

1. Disease of children, to a high standard.
2. Midwifery, to a high standard.
3. Elementary psychology, the effects of the emotions on the individual, and the organic changes they produce.
4. Disease of the skin.
5. Infectious diseases.
6. Geriatrics.
7. The treatment of incurable diseases.
8. The acute abdomen. Indeed the potential disasters here far outweigh, in my opinion, the acute conditions elsewhere, because elsewhere "a waiting time" is not only common but advisable.
9. Minor maladies and their treatment. Far more satisfaction is given to the patient by their quick and successful treatment than the most heroically successful "ectomy."
10. Human anatomy. The structure of man has not changed for thousands of years; and it is a tragedy that so many doctors, ten years after qualifying, have forgotten their basic anatomy. A good car mechanic has to know all cars, but we only one body. (This is really not a good analogy, but it will suffice for what I want to drive home.) I have yet to meet the doctor who knows his anatomy and is not a good doctor. The good surgeon is the good physician. But what is happening today?—the preclinical stage is being cut! It is just too sad, and to me only reflects the gross error of those who draw up the curriculum; but we must forgive them—they know not—they have never been in general practice.

Medicine is an art, so why should it not be taught a little by the artists rather than almost entirely by the men of science? I would hand to every person on qualifying a handsome book, and it would be a trilogy of *Counsels and Ideals*, *Religio Medici*, and *Rest and Pain*. They live for ever.

Osler—come back—come soon—come quick.

Special Articles

WHERE FROM PECKHAM?

M. R. A. Chance
Ph.D.
BIRMINGHAM

The closing of the Pioneer Health Centre in Peckham comes as a shock to many sympathetic and interested people.

In the last decade this social experiment had become world-famous. It was one to which visitors from abroad were often directed from official quarters. Within recent years it had received publicity not only through articles in the press but also through a Ministry of Information film costing the Government £10,000. A week before the announcement of its closure the centre was being televised.

All this would lead one to believe that it was not only a place of interest to sociologists, but also so successful a venture that many people of diverse interests could be assisted by its work. We may ask therefore how has it come about that the centre is now to be closed?

It is the more necessary to seek the answer to this question since the value of the centre's work has been a subject of controversy for a long time. Scientists were quick to realise that the reporting of the scientific work lacked the standard of accuracy expected in scientific investigation, and most of them have therefore dismissed it as unworthy of further consideration. On the other hand it has continued to attract the attention of progressively minded scientists, and of administrators and social workers throughout the world. In fact it has never lacked the support of prominent people, well known for their achievements in medicine or science.

I was a member of the staff of the Pioneer Health Centre, in an advisory capacity, for some three or four months, and what follows is based on experience immediately before, during, and after that term of employment. There were excellent opportunities for discussing the nature of the work, not only with those primarily responsible for it, but also with many visitors, including some from distant countries. Over and over again one found that though the visitors arrived full of enthusiasm, they left entirely mystified, unable to take back to their friends any clear idea of what was being done. This was a most disappointing experience, and I still fear that the achievements of the centre, and the ideas developed there, will be lost for future generations unless some attempt is made to put forward a statement which could be a basis for discussing future endeavours.

Elsewhere[1] I have pointed out that the achievement of the Peckham Health Centre has two separate aspects. On one hand it appears to have a value as a unique form of social centre based exclusively on family membership; on the other, it was valuable in offering opportunities of scientific investigation of a normal population, made possible by this type of recruitment. In addition we ought now to consider the ideas behind the experiment—ideas which, through the director and his immediate assistants, guided the day-to-day administration of the centre.

We are therefore concerned with *attempting to assess*:

1. What was actually done?
2. What was new about this?
3. What was actually found in the investigations?

We also want to know what is the relation of these things to our knowledge of human society and also to the theory on which the founders interpreted their findings.

THE IDEA

What the founders did was to build a family recreation club of an original design. Their desire was to study the potentialities of this type of recreation for the health of the family. This desire arose from their belief, common to all reformers of the last century, that the health of the population was being impaired by the physical conditions of life in industrial towns. Their unique contribution was the suggestion that the evil results of these conditions were largely due to restriction of opportunities of normal recreation on social behaviour.

This idea was original. Since it contained several components which were essentially biological in origin—e.g., that social behaviour is important, that the unit of study should be the family and not only the individual, and that such a study requires a special environment—it can be regarded as the first serious attempt to found sociological work upon a biological basis. The interaction between social behaviour and health in the individual could, so the founders maintained, be studied by repeated medical and physiological examinations of the members of the centre and by observation of the changes in their social behaviour.

In all human activities, however, there is always an interaction to be reckoned with, between the insight gained through a particular activity and the further direction of this activity. This was especially to be looked for in this instance, since the founders held that the physiological and medical examinations were both scientific and therapeutic in purpose. In fact they took a bold step towards recognising such an *interaction* by introducing the family consultation which put the members in possession of whatever information the centre had obtained about them.

I am convinced that these consultations should be the focal point of attention. After the members have had

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[1] Chance, M. R. A. "Woman Health Officer." Aug., 1948.

In England Now

A Running Commentary by Peripatetic Correspondents

THE hospital management committee has just sent me this note: "Mr. X will, after April 1, 1950, be in attendance at the outpatient clinic of PQR (our local) Hospital each Tuesday at 1.30 P.M. to see cases of backache only."

What will happen? Everybody will first be X-rayed from top to toe on the grounds that they "c/o backache." The women will then be referred to the gynæcological O.Ps. to exclude pelvic pathology" and the men to the venereologist "to exclude prostatitis." After this everyone will be sent to the dentist "? root sepsis" and they will all lose a few ounces of blood for a full blood-count, W.R., G.C.F.T., full Widal, alkaline phosphatase, and blood-urea.

Mr. X will then see the patients. A few will be directed to the chiropodist and will not return to the backache queue for a few weeks. Of the rest, those under 40 will be ordered an E.E.G. and those over 40 an E.C.G. All buxom flatulent women of 40 with two or more children will be ordered a Graham's test; 20–30% of these will "fail to fill" and be referred to Mr. Y, and unless I hear about it in time to put a spoke in Mr. Y's wheel they will ultimately turn up in my surgery, looking even paler and more tired than usual, without their gall-bladders, each with a note requesting me to "dress the small sinus in their operation wound until it heals and refer them back to Mr. Y's O.Ps. in 3/12." Any so stupid as to have "opacities in the lung fields" will be routed back to my surgery bearing "N.A.D." notes, those over 35 coming via the bronchoscopists and those under 35 via the tuberculosis officer.

Mr. Y himself will send most of the remainder back to me in due course. His secretary will write out the long list of negative investigations, to which Mr. Y will add a very sloppy history, a few clinical findings which I know already, and a diagnosis. For people under 45 his diagnosis will usually be "Spinal Arthritis of the Rheumatoid Type," and for those over 45 ditto "of the Osteoid Type. By way of variety he will call about 5% of cases "Whosit's Disease" or "Whatshisname's Syndrome." He will recommend alternate cases "rest preferably in bed," and "light remedial exercises," with an occasional "lighter employment" or "semirigid spinal brace." Then, just to kid us that he has a sense of humour he will order everyone a course of either "infra-red therapy," "ultraviolet light" or "short-wave diathermy," despite the fact that the physiotherapy department is booked up 8 months ahead.

* * *

He was a little Cockney of 32, looking as if he had all the cares of the world on his shoulders and seldom got a night's sleep. He surveyed sister, the X-ray tube, the shining array of syringes and bottles and nozzles, and especially me, with a silent glowering mistrust. I explained that a bronchogram was quite painless; he would feel nothing but a tickle in the back of his throat. He was mollified enough by this to take his Dessicaine lozenge, but after sucking it for a minute his mistrust returned and he grimaced fearfully as he croaked: "It's freezing me froat, guv'nor, an' I can't talk proper." I tried more reassurance, and suddenly his expression changed. A smile crossed his face like a patch of sunlight on the hillside on a cloudy April day, and in a hoarse but urgent whisper he asked: "Got a few o' them tablets to spare?" "What on earth . . . ?" I began, but he went on wistfully: "If I could 'ave a few for me muvva-in-law, doctor . . ."

* * *

When I was a medical student, there were two schools of thought about Truby King. My chief was a devoted disciple, his deputy a rabid opponent. The truth, as I now know, was simply that in his eighth decade Truby King's mind became rigid and fixed, and those who heard him speak found little difficulty in pulling holes in his argument.

Yet for a life of satisfying achievement, Truby King's would be hard to beat. Sceptics have attributed New Zealand's health to its dairy-farms and climate. But when Truby King started his work the infant death-rate in Dunedin was 80 per thousand. In five years, long before the days of family allowances, it had been halved. In 1946, the rate for the whole of New Zealand was down to 25. Truby King started his work in a mental hospital, and it was only in 1920, at the age of 58, that he gave up his post as superintendent of Seacliff Mental Hospital to become Director of Child Welfare for the Dominion. His views on the care of babies developed out of his work among the livestock of the hospital farm, plus a lively belief in the possibility of preventing mental illness by the proper upbringing of children. Of course he had to fight the doctors—but what reformer has not had to? He spent the money he made, like water, to found his first babies' hospital on the beautiful Karitane peninsula, to publish his pamphlets, to help to found and develop the Plunket Society—the backbone of the whole mothercraft movement in New Zealand. On his death, his estate was declared bankrupt, though eventually his few creditors were repaid 20*s*. in the £1. His story, as it has now been written by his adopted daughter, Mary King,[1] proves that bankruptcy is sometimes well worth while. Miss King's book stimulates that gnawing longing to see those beautiful sensible islands on the other side of the world.

* * *

The Rugby game between England and Scotland this year was such an epic performance that Rex Alston and his brother canaries in the broadcasting box, excellent as their account was, really needed the assistance of a poet. I would like to see the 1951 game for the Calcutta Cup reported more like this:

. . . Like maddened kine the mud-stained forwards plunge.
Ah, now the ball is loose—from Smith to Brown,
who sells the dummy—now to Robinson,
whose feet the touch-line swiftly parallel.
But see, MacSpeer, the Scottish back doth streak
like some dark missile to the corner flag,
which idly flaps its pennant, unaware
that here's the trysting-place of supermen.
A silence falls, only the thud of feet
is heard like pin-drops in the Albert Hall.
Terrific dive! MacSpeer has caught the heels
of England's fleetest, and the corner flag
is mixed with rolling bodies on the ground
Now eighty thousand faces gape to let
the steam of their emotions rend the sky.
Line out,—

Scrum before the English goal. What now?
The whistle goes—some warrior is hurt;
they gather round in tenderness—ah, no!
MacSporran's lost his shorts!

Like northern combers now the Scottish pack
surges towards the thin-held English line,
growling strange oaths and Highland diatribes,
until J. Doe, the English scrum-half, curls
himself, a question-mark, around the ball,
a kicked impediment. The whistle goes;
he hath outstayed his asking.

What means that piercing blast? Ah, lemon time.
Sweet lemon time. I'll hand you back to Rex.

A try! A try! A glorious sort of try!
With sinews strained to snapping point Smith swerved
—"That's Smith, that was," the Scotchmen might have said—
and like a scalded cat he lineward streaked
to place the ball between the towering poles
that seem to sway in gusts of acclamation.

And now amid melodious cheers there rasps
the final screech, the multitude is up,
and $\left\{\begin{matrix}\text{Scotland}\\\text{England}\end{matrix}\right\}$ to her muddy bosom clasps
the Calcutta Cup.

Well, perhaps the B.B.C will ask me after seeing my samples.

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[1] Truby King—the Man. London: Allen & Unwin. 1949. Pp. 355. 18*s*.

previously individuals have been able successfully to approach different types of problems. As Norman Cameron says: "Life's complexities seem always to exceed our immediate competence. Need and desire keep ever ahead of our behavioural resources as well as our economic ones."

The centre was thus lacking in an essential social activity peculiar to humans, and in this sense it was biologically inadequate to its task. This deficiency must have been a major factor which made the centre so incomprehensible and at the same time so unsatisfactory to those administrative and social workers who wished to learn from it.

The centre is now closed, but it is to be hoped that the ideas which underlie this conception will one day be put to a searching though sympathetic test.

Public Health

Smallpox in Glasgow

AN Asian seaman, aged 38, was admitted to Knightswood Hospital, Glasgow, on March 10, as a case of pneumonia; and on March 13 he was transferred to a cubicle as probable chickenpox. He had been previously well vaccinated. On March 23 he was discharged well from Knightswood Hospital to the Indian seamen's hostel.

This seaman, as recorded in our last issue, had landed from the S.S. *Chitral* at Tilbury on March 5. The ship had a clean bill of health, and the appearance of smallpox on March 25 among the nursing staff at Knightswood Hospital was the first indication of the true nature of his illness—namely, much-modified smallpox.

Up to last Tuesday there had been 20 secondary cases with 6 deaths—1 from hæmorrhagic smallpox, 4 from confluent smallpox, and 1 of a baby (aged ten months), who also suffered from toxoplasmosis. Of the cases, 8 arose among the nurses (full-time or part-time) who had been in direct contact with the infected seaman, and 3 of these have died. Another fatal case was in a laundry-maid who handled the bedclothes from the original patient. Most of those who died were unvaccinated or had an unsatisfactory history of vaccination.

Up to Tuesday the outbreak had been entirely confined to direct contacts with this Asian seaman in the hospital. In the absence of any further cases arising from contact with the secondary cases, Glasgow will be clear of smallpox by April 17. Approximately 300,000 persons in the Glasgow area have now been vaccinated, including 170,000 by the public-health department's own clinics.

Infectious Diseases in England and Wales

Disease	Week ended March			
	4	11	18	25
Diphtheria	70	62	62	76
Dysentery	280	362	398	427
Encephalitis—				
Infective	2	3	4	2
Postinfectious	2	1	1	3
.. ..	27	50	40	65
.. ..	4692	5482	5592	5716
.. ..	42	27	37	52
.. ..	34	34	39	37
Paratyphoid fever	7	8	3	1
Pneumonia, primary or influenzal ..	1000	1016	1078	1082
Poliomyelitis—				
Paralytic	22	27	19	22
Non-paralytic	6	14	8	7
Puerperal pyrexia and fever	82	106	100	116
Scarlet fever	1758	2096	1841	1805
Smallpox	..	..	..	..
Typhoid fever	14	4	3	4
Whooping-cough	1616	1917	2235	2365

Medicine and the Law

Inquests in Private

AT an inquest in Yorkshire on March 25, held in a room in the house of the deceased, the coroner excluded representatives of the press. He afterwards described the proceedings to three reporters who had sought admission. It was, he explained, within his discretion to deal with the press as he wished; in cases of that kind relatives would speak more freely if reporters were not present.

There is no doubt that the coroner was legally justified in this action. In the leading case of Garnett *v.* Ferrand (1827) Garnett was turned out of the room by the coroner, though there was plenty of space for him; he had not been summoned to the inquest, was not in any way under suspicion in respect of the death, and was not a relative of the deceased or even an inhabitant of the place in which the body had been found. He had, said Lord Tenterden, C.J., no interest in the matter of the inquest and no information to offer.

> "It was admitted in the argument that secrecy and exclusion may be proper and necessary when charge and accusation begin. It is obvious that this may begin as soon as the evidence may begin. Cases also may occur in which privacy may be requisite for the sake of decency, others in which it may be due to the family of the deceased. Many things must be disclosed to them who are to decide, the publication whereof, to the world at large, may be productive of mischief without any possibility of good. Who then is to decide whether privacy be necessary or proper? We answer, the coroner and the coroner alone, and that the propriety of the decision cannot be questioned in an action."

Lord Tenterden summed up his views by declaring that "the power of exclusion is necessary to the administration of justice," in which connection it may be recalled that section 19 of the Indictable Offences Act, 1848, authorises the examining justices to sit in private "if it appear to him or them that the ends of justice will be best answered by so doing."

The layman, associating all legal procedure with a sitting in open court, may feel some surprise at this tolerance of secrecy. During 1933 the Leeds coroner, criticised by the press for holding an inquest in private, replied that he had held 83 such inquests in 1932, whereupon the newspaper rejoined that this showed that the office of coroner ought to be abolished. The departmental committee on coroners over which Lord Wright presided in 1935 were content to observe that inquests were "almost invariably" held in public. Their report referred respectfully to the ruling in Garnett *v.* Ferrand that "for special reasons—e.g., in the interests of justice, decency, order or even from a consideration of what is due to the family of the deceased—the coroner may hold the whole or part of an inquest in private." There the matter remains, though in 1938 Lord Atkin, addressing the Coroners Society, expressed misgivings. He had noticed with surprise, he said, in the case of accidents on railways or in the course of air travel that at a certain stage whoever was conducting the inquiry announced that he intended to take the remainder of the inquiry in private. Lord Atkin thought that was not right; the public were interested in ascertaining the reasons and the responsibility for the accident; he hoped sincerely that coroners would conduct the whole of their inquiries in public and have the whole of the facts disclosed.

The coroners doubtless took note of an opinion proceeding from so high an authority. As, however, Parliament has made no permanent change in the law of coroners and inquests since 1926, the country may be supposed to be satisfied with the status quo.

In England Now

A Running Commentary by Peripatetic Correspondents

THE hospital management committee has just sent me this note: "Mr. X will, after April 1, 1950, be in attendance at the outpatient clinic of PQR (our local) Hospital each Tuesday at 1.30 P.M. to see cases of backache only."

What will happen? Everybody will first be X-rayed from top to toe on the grounds that they "c/o backache." The women will then be referred to the gynæcological O.PS. to exclude pelvic pathology" and the men to the venereologist "to exclude prostatitis." After this everyone will be sent to the dentist "? root sepsis" and they will all lose a few ounces of blood for a full blood-count, W.R., G.C.F.T., full Widal, alkaline phosphatase, and blood-urea.

Mr. X will then see the patients. A few will be directed to the chiropodist and will not return to the backache queue for a few weeks. Of the rest, those under 40 will be ordered an E.E.G. and those over 40 an E.C.G. All buxom flatulent women of 40 with two or more children will be ordered a Graham's test; 20–30% of these will "fail to fill" and be referred to Mr. Y, and unless I hear about it in time to put a spoke in Mr. Y's wheel they will ultimately turn up in my surgery, looking even paler and more tired than usual, without their gall-bladders, each with a note requesting me to "dress the small sinus in their operation wound until it heals and refer them back to Mr. Y's O.PS. in 3/12." Any so stupid as to have "opacities in the lung fields" will be routed back to my surgery bearing "N.A.D." notes, those over 35 coming via the bronchoscopists and those under 35 via the tuberculosis officer.

Mr. Y himself will send most of the remainder back to me in due course. His secretary will write out the long list of negative investigations, to which Mr. Y will add a very sloppy history, a few clinical findings which I know already, and a diagnosis. For people under 45 his diagnosis will usually be "Spinal Arthritis of the Rheumatoid Type," and for those over 45 ditto "of the Osteoid Type. By way of variety he will call about 5% of cases "Whosit's Disease" or "Whatshisname's Syndrome." He will recommend alternate cases "rest preferably in bed," and "light remedial exercises," with an occasional "lighter employment" or "semirigid spinal brace." Then, just to kid us that he has a sense of humour he will order everyone a course of either "infra-red therapy," "ultraviolet light" or "short-wave diathermy," despite the fact that the physiotherapy department is booked up 8 months ahead.

* * *

He was a little Cockney of 32, looking as if he had all the cares of the world on his shoulders and seldom got a night's sleep. He surveyed sister, the X-ray tube, the shining array of syringes and bottles and nozzles, and especially me, with a silent glowering mistrust. I explained that a bronchogram was quite painless; he would feel nothing but a tickle in the back of his throat. He was mollified enough by this to take his Dessicaine lozenge, but after sucking it for a minute his mistrust returned and he grimaced fearfully as he croaked: "It's freezing me froat, guv'nor, an' I can't talk proper." I tried more reassurance, and suddenly his expression changed. A smile crossed his face like a patch of sunlight on the hillside on a cloudy April day, and in a hoarse but urgent whisper he asked: "Got a few o' them tablets to spare?" "What on earth . . . ?" I began, but he went on wistfully: "If I could 'ave a few for me muvva-in-law, doctor . . ."

* * *

When I was a medical student, there were two schools of thought about Truby King. My chief was a devoted disciple, his deputy a rabid opponent. The truth, as I now know, was simply that in his eighth decade Truby King's mind became rigid and fixed, and those who heard him speak found little difficulty in pulling holes in his argument.

Yet for a life of satisfying achievement, Truby King's would be hard to beat. Sceptics have attributed New Zealand's health to its dairy-farms and climate. But when Truby King started his work the infant death-rate in Dunedin was 80 per thousand. In five years, long before the days of family allowances, it had been halved. In 1946, the rate for the whole of New Zealand was down to 25. Truby King started his work in a mental hospital, and it was only in 1920, at the age of 58, that he gave up his post as superintendent of Seacliff Mental Hospital to become Director of Child Welfare for the Dominion. His views on the care of babies developed out of his work among the livestock of the hospital farm, plus a lively belief in the possibility of preventing mental illness by the proper upbringing of children. Of course he had to fight the doctors—but what reformer has not had to? He spent the money he made, like water, to found his first babies' hospital on the beautiful Karitane peninsula, to publish his pamphlets, to help to found and develop the Plunket Society—the backbone of the whole mothercraft movement in New Zealand. On his death, his estate was declared bankrupt, though eventually his few creditors were repaid 20s. in the £1. His story, as it has now been written by his adopted daughter, Mary King,[1] proves that bankruptcy is sometimes well worth while. Miss King's book stimulates that gnawing longing to see those beautiful sensible islands on the other side of the world.

* * *

The Rugby game between England and Scotland this year was such an epic performance that Rex Alston and his brother canaries in the broadcasting box, excellent as their account was, really needed the assistance of a poet. I would like to see the 1951 game for the Calcutta Cup reported more like this:

. . . Like maddened kine the mud-stained forwards plunge.
Ah, now the ball is loose—from Smith to Brown,
who sells the dummy—now to Robinson,
whose feet the touch-line swiftly parallel.
But see, MacSpeer, the Scottish back doth streak
like some dark missile to the corner flag,
which idly flaps its pennant, unaware
that here's the trysting-place of supermen.
A silence falls, only the thud of feet
is heard like pin-drops in the Albert Hall.
Terrific dive! MacSpeer has caught the heels
of England's fleetest, and the corner flag
is mixed with rolling bodies on the ground
Now eighty thousand faces gape to let
the steam of their emotions rend the sky.
Line out,—

Scrum before the English goal. What now?
The whistle goes—some warrior is hurt;
they gather round in tenderness—ah, no!
MacSporran's lost his shorts!

Like northern combers now the Scottish pack
surges towards the thin-held English line,
growling strange oaths and Highland diatribes,
until J. Doe, the English scrum-half, curls
himself, a question-mark, around the ball,
a kicked impediment. The whistle goes;
he hath outstayed his asking.

What means that piercing blast? Ah, lemon time.
Sweet lemon time. I'll hand you back to Rex.

A try! A try! A glorious sort of try!
With sinews strained to snapping point Smith swerved
—"That's Smith, that was," the Scotchmen might have said—
and like a scalded cat he lineward streaked
to place the ball between the towering poles
that seem to sway in gusts of acclamation.

And now amid melodious cheers there rasps
the final screech, the multitude is up,
and $\left\{\begin{array}{l}\text{Scotland}\\ \text{England}\end{array}\right\}$ to her muddy bosom clasps
the Calcutta Cup.

Well, perhaps the B.B.C will ask me after seeing my samples.

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[1] Truby King—the Man. London: Allen & Unwin. 1949. Pp. 355. 18s.

Letters to the Editor

THE CARNAGE ON THE ROADS

SIR,—Surely it is time that someone pointed out that most widely perpetuated, longest neglected, most easily explained, and least considered anomaly of all. It is to do with night driving. It is simply that all the lights on a vehicle point the wrong way.

The sidelights of a car are direct descendants of the candle in a glass box. No-one has ever reconsidered their function. They are too feeble to illuminate the road in front, but their direct rays are quite bright enough to dazzle the oncoming motorist. By official circles they are happily supposed to indicate the position of a vehicle to which they are attached. The headlights are the boon conferred by electricity and optics upon the dazzled motorist to shatter the wall of darkness advancing behind his opponent's sidelights. They work well until the opponent switches on *his* headlights. A pair of approaching motorists have the choice of dazzling each other with equally bright lights or with equally feeble lights. Whichever they choose, the equipment, so disposed as always to send a direct ray into the other man's eyes, is perfectly arranged to dazzle. Behind and around the dazzling source of light is that advancing wall of darkness.

In a sensible world all the lamps would be pointed differently—almost any way would be better than the way we have them at present. The sidelamps would be twisted round to point backwards to illuminate the wings and radiator. Then the bewildered pedestrian would at last cease worrying as to whether the two lights he sees are far apart and a long way away or near together and close to, and whether their progressive separation signifies high-speed approach or merely two cyclists. He would for the first time be able to recognise a car at night as he recognises it by day, by seeing it, and thereby be able to judge where it is and what it is doing. The rear light would be directed forwards to flood the back of the car. It could be any colour to taste, red if you wish, so long as it serves to reveal a *car* and not a red disc devoid of almost any property by which its distance away might be judged. The near-side headlight in the dipped position would be screened so as to be invisible to the oncoming motorist (by means of a "venetian blind" mask or by being set back behind and below the bonnet), and the offside headlight would point sideways to the right, so as to illuminate, for the benefit of the other fellow, the area behind the wall of darkness. (He would do the same for you.) In the undipped position anything you like can be switched on. Anything else revolutionary? Oh yes. The interior light may be left on for choice—a bus is one of the easiest vehicles to miss.

The rules throughout are, "no rays from a lamp should ever fall on a driver's eyes" and "we see things by the light they reflect." The elements of illumination are just being appreciated by the folk who floodlight their buildings.

Could this possibly be achieved? Of course not. It requires us to do something for the other fellow, and this is a characteristic foreign to our nature. Also the neat symmetrical appearance of our cars would be upset; the bodywork designers would have to make serious alterations; and no-one with a dollar to spend would buy such a crazy car. Otherwise I would have patented the system long ago.

SURGEON.

SIR,—It is to be hoped that many doctors will agree with Dr. Clausen (April 1) that the prevention of road accidents is worthy of the interest of the medical profession. It would, however, be unfortunate if THE LANCET were to encourage indiscriminate denunciation of the motorist, or to spread the myth that there are separate classes of road-users, each condemned to wage bloody or verbal war on the others.

Drivers are also pedestrians and so are their children, while many have been cyclists and motor-cyclists. Most pedestrians and cyclists would like to drive a car and some will later do so. All should consider the problems of their fellow road-users, because they are also their own problems; but all at times fail. No doubt the duty of showing consideration falls most heavily upon the driver, but it is hardly correct to accuse motorists or the "motoring interests" of carrying out an anti-safety campaign. Accidents are certainly not beneficial to drivers.

In his interesting article (Feb. 25), Dr. Learoyd rightly emphasises the number of children killed and the importance of educating children and parents in road safety, but characterises the driver as "the person who does the killing" and recommends strict training of drivers. This is perhaps an over-simplification, for it takes no account of the wider social and economic causes of road accidents; for instance, if towns were better planned, housing less inadequate, and housewives less hard-pressed, there would be few young children unattended on busy streets.

Dr. Learoyd blames the A.A. and the R.A.C. for opposing the present driving test as being of very doubtful practical utility, but devotes much space to criticising it, by implication, for the same reason. A comprehensive course of instruction, with searching examinations and psychological tests, such as he advocates for motorists and motor-cyclists, may, in principle, be the ideal requirement for many sections of the community who in one way or another are responsible for the safety of others. The difficulties in each case are economic and administrative. Moreover, irrevocable disqualification from driving on psychological or medical grounds would have to be subject to appeal to the courts, whose present attitude towards psychologists' evidence makes it unlikely that they would readily uphold the doctrine of "accident-proneness," true though we may believe it to be.

It appears that, for the present, education of the public must continue to be the main weapon against road accidents.

Is the road-safety campaign gathering momentum as rapidly as it should? How many of your readers, for instance, are constantly aware of it as a helpful influence in their multiple rôles as parents, pedestrians, motorists, and so on?

Finally, can the medical profession do more to help, by providing material for education through those "instructed asides" to which Dr. Learoyd refers, by establishing more firmly the objective criteria of fitness to drive, and in other ways?

London, S.E.26. C. D. L. LYCETT.

HYPERTENSION

SIR,—Recent views and practice in the treatment of hypertension were summarised in your leading article of March 25.

For many years I have been accustomed to prescribe for these patients an empirical remedy which is successful in a fair proportion of cases. It is simple enough, consisting of 10 minims of dilute hydrochloric acid given four times daily, between meals. After three weeks, in the successful case, the systolic pressure will be found to have dropped appreciably, and often also the diastolic. The patient is usually well aware of the change and reverts to the acid whenever he feels that the pressure is rising.

Work on experimental nephrosclerosis by Selye, Hall, and Rowley[1] has given a rational explanation of the benefit derived from this medication. Groups of rats, unilaterally nephrectomised, treated with adrenal-cortex compounds, developed nephrosclerosis and died. If ammonium chloride was incorporated in the water imbibed by these rats, then they remained healthy. This salt is a combination of urea and hydrochloric acid.

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[1] Selye, H., Hall, O., Rowley, E. M. *Lancet*, 1945, i, 301.

London, W.1. H. WARREN CROWE.

UNSUCCESSFUL TREATMENT OF TYPHOID FEVER WITH CHLORAMPHENICOL

SIR,—Typhoid fever is more or less endemic in this part of Africa. Cases are rarely associated with definite outbreaks, but the incidence is higher during the wet months from November to March. The vast majority of cases are mild clinically, and the patients usually recover, without complications, on conservative treatment. However, there do occasionally occur extremely severe attacks more akin to the classical typhoid picture; these cases invariably yield a strain of *Salmonella typhi* rich in Vi antigen, and their prognosis is, on the whole, poor. It was in such a case that chloramphenicol was first used in this hospital.

An African boy, aged 7 years, was admitted on Feb. 10, 1950. His parents, who were intelligent and coöperative, said he had been taken ill suddenly two days before with fever and diarrhœa, having previously been perfectly well.

On admission the boy's temperature was 105·6°F and pulse-rate 128 per min. He was semi-delirious but said he had a bad headache and colicky abdominal pain. His general condition showed moderate toxæmia without appreciable dehydration. There was generalised tenderness over the whole abdomen, with no rigidity, and the spleen was felt 2 finger-breadths below the costal margin. The stool was watery, of normal colour, and contained no blood. Treatment with quinine and sulphaguanidine was started.

Progress.—On his fourth day in hospital (sixth day of disease), there being no improvement in his condition apart from cessation of the diarrhœa, the possibility of typhoid was considered, and a blood-culture was made. The quinine and sulphaguanidine were stopped. Three days later (ninth day of disease) the culture was reported to have grown *S. typhi* rich in Vi antigen. By this time the child was extremely toxic. Chloramphenicol was begun, an *initial* dose of 1·5 g. being followed by 0·25 g. two-hourly (3 g. daily). There was no vomiting, and within twelve hours the boy's temperature began to fall more rapidly and his general condition seemed much improved. By the morning of the third day of treatment (eleventh day of disease) his temperature had fallen to 98·2°F and his general condition appeared good, though he was very weak. After midday, his condition began to deteriorate rapidly; his temperature rose to 99·4°F, his pulse was feeble, rate 150 per min., and restlessness returned. During the evening he remained in a collapsed state, and he died early next morning (twelfth day of disease), after receiving a total of 7·5 g. of chloramphenicol.

Necropsy showed numerous typhoid lesions in the jejunum and ileum but no evidence of intestinal hæmorrhage or perforation. The heart muscle was pale, soft, and friable. Death was ascribed to acute toxæmia due to typhoid fever.

The dosage of chloramphenicol recommended for children is 100 mg. per kg. of body-weight as an initial dose, followed by 100 mg. per kg. daily in divided doses. This child weighed 62 lb. (28 kg. to the nearest kg.). The recommended initial and daily maintenance doses would therefore have been 2·8 g. Cook and Marmion,[1] however, have shown that high initial doses of chloramphenicol are not tolerated by very toxic patients, and are often vomited. It was therefore decided to halve the initial dose but to keep the maintenance dose at about the recommended level. The doses were given two-hourly to lessen the risk of vomiting, and there was no evidence of gastric intolerance.

The sudden collapse after such striking improvement is difficult to explain. It may be that a reaction similar to the Jarisch-Herxheimer reaction in syphilis took place. On this supposition, when the chloramphenicol began to take effect, endotoxins were suddenly released from the virulent strain of *S. typhi*. The resultant toxæmia might well overwhelm the resistance of an already weakened patient. The necropsy findings do not conflict with this view.

One should perhaps conclude that special care must be taken in treating cases caused by virulent strains of *S. typhi*. The chemotherapeutic attack must be powerful enough to hold the organisms in check and then destroy them, but not so powerful as to release endotoxins at a rate greater than the body can stand. The optimum dosage can only be established after considerably more experience with chloramphenicol.

I wish to thank the Director of Medical Services, Northern Rhodesia, for allowing chloramphenicol for this case and for permission to publish this report.

African Hospital, Lusaka,
Northern Rhodesia.
P. R. STEPHENS.

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[1] Cook, A. T., Marmion, D. E. *Lancet*, 1949, ii, 975.

STERILISATION OF SYRINGES

SIR,—May I comment as follows on Dr. Barnett Mallinson's letter in your issue of April 1?

1. The support adduced for the implication that oil at 120–130°C rapidly drawn into a syringe, swilled round, and expelled, several times, does sterilise the interior of the syringe, by reference to the description of such a method in M.R.C. War Memo. no. 6, 1942, omits mention of the fact that M.R.C. War Memo. no. 15, 1945, rejected this method, stating that it "has been tested . . . and has been found unsatisfactory for sterilizing syringes. Even vegetative organisms dried on to the glass are not uniformly destroyed."

2. The "layer of superheated steam" which "presumably . . . is the most effective sterilising factor" would, with oil in the reservoir at the temperature range stated, hardly exceed an average temperature of, say, 120°C—i.e., approximately that attained in autoclaving at 15 lb. pressure. The effective exposure would hardly exceed 1 minute; but Dr. Mallinson states that 15 minutes are needed to achieve sterility, and War Memos. nos. 6 and 15 say 20 minutes.

3. In so far as reliance is placed on the hot oil itself (and this would obtain, perhaps, for the needles placed in it "for $^1/_2$–1 minute," since they would not be evenly wetted by water however well rinsed) the process must be regarded as equivalent to sterilisation by dry heat.[1] For this, however, 60 minutes and 160°C are stated to be required to ensure true sterility.

4. The method described can only be used for procedures where the inevitable small amount of remnant "contamination" of syringe and needle is permissible. The kind of oil used is not stated—but even liquid paraffin *B.P.* rapidly deteriorates below *B.P.* standard when heated with access of air. The apparatus illustrated by Dr. Mallinson appears to provide a relatively large oil/air interface per volume, and the factor of air access would be increased by the manipulations. It would seem to be implied by the existence of the very stringent *B.P.* "Acid Test" that whatever substances develop in heated oil, causing it to fail this test, are undesirable as constituents of an injection.

As Dr. Mallinson points out, the importance of satisfactory sterilisation of syringes is a real source of worry. M.R.C. War Memo. no. 15 described techniques which seem to be either too cumbersome, or demanding of special equipment and too much attention to minutiæ of procedure, to be readily accepted by most practitioners.

I wish it could be a contribution to a solution of this problem to draw attention to the method of sterilisation developed by Foster,[2] who took advantage of the fact, confirmed by Prof. L. P. Garrod, that addition of 2% of sodium carbonate to boiling water secures death of *all* organisms in 5 minutes' boiling. Investigating the extension of this method to dental instruments (including syringes) Harvey[3] found that the biologically inert surface-active agent added by Foster had also an effective detergent action which increased its usefulness. The inevitable remnant "contamination" does, of course, contain a minute amount of the alkali; but this is stated to have no detectable inactivating effect on local-anæsthetic solutions used in dentistry—indeed it may be advantageous. I believe that further experimentation along these lines—of addition to boiling water (even without alkali, perhaps) of one of the many recently developed synthetic detergents and surface-active agents, some of which have marked antibacterial properties—might lead to a cheap, simple, quick, and universally applicable method of achieving true sterility of injection and aspiration syringes and needles.

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[1] Knighton, H. T. *J. Amer. dent. Ass.* 1949, 38, 309.
[2] Foster, J., Le May, C. H., Johnstone, K. I. *Proc. R. Soc. Med.* 1945, 38, 465.
[3] Harvey, W., Le May, C. H., Shuttleworth, C. W. *Ibid*, 1947, 40, 507.

London, W.1. C. H. LE MAY.

"INTENSIVE" INTRAVENOUS ANTITOXIN TREATMENT OF DIPHTHERIA

SIR,—While I have not yet had the pleasure of reading Dr. Stanley Banks's new book *The Common Infectious Diseases*, I feel obliged, "in the interests of historical accuracy," to correct a statement in the final sentence of his letter (April 1), where he claims that in 1928 the routine treatment of hypertoxic cases of diphtheria, except in Copenhagen, was by intramuscular antitoxin. This was certainly not the case while I was a resident medical officer at Plaistow Hospital, under Dr. Donald McIntyre, from 1924 to 1927. The usual treatment of severe cases of diphtheria at that time was by 40,000–50,000 units given intravenously and a similar or larger dose intramuscularly. This dose was often repeated on the following day.

In a disease so variable and complex as diphtheria, I believe that clinical judgment and impressions must count for more than statistics of case-mortality. After a long experience in the treatment of this once-menacing infection, using doses of antitoxin both large and small, I am not convinced that the astronomical doses recommended by Dr. Banks and others are superior to more modest amounts given by the same route. Deaths in diphtheria have been due more to faults in early diagnosis than to underdosage of antitoxin, and it is to this aspect of the disease that we should direct our attention if the disease should ever again assume its former proportions.

Rush Green Hospital,
Romford, Essex.

E. JAMES
Medical Superintendent.

VAGOTOMY AND PARTIAL PYLORECTOMY

SIR,—Mr. Beattie must be congratulated on his operation of partial pylorectomy as a supplement to vagotomy, which appears to be a real advance, and on the excellence of his results. His article (March 25) prompts me to comment on the physiological basis for vagotomy.

The mechanism of production of psychogenic ulcers is obscure, but some may find hyperacidity difficult to accept as an entirely satisfactory single explanation. A vascular factor may play an important part. Vascular lesions have been described on stimulation of an area in the cortex (hyperæmia, petechial hæmorrhages, and small ulcers [1]): on stimulation of the hypothalamus (petechial hæmorrhages and hæmorrhagic erosions,[2] and multiple hæmorrhagic erosions [3]); and on stimulation of the vagus (hyperæmia and occasional ulcers [4]). Wolf and Wolff's [5] patient showed hyperæmia and petechial hæmorrhages at times of mental stress.

The matter is not entirely academic, as the vascular hypothesis tends to focus attention upon the rôle of the vagus in the *initiation* of ulcers, and this may point the way to the rational selection of cases for vagotomy. The hyperacidity hypothesis tends to focus attention on the perpetuation of ulcers, for whatever view may be taken of its rôle in initiation, it is generally accepted as the agent responsible in perpetuation. If the importance of vagotomy lies in the *prevention* of ulcer formation, it at once becomes obvious that too much should not be expected of it in the treatment of chronic ulcer. The reduction of acidity will assist natural recuperative powers and medical measures, and will lead to the healing of small chronic ulcers. Its failure in ulcers of any degree of chronicity and attachment to surrounding structures is readily understood. On the other hand, it should be of great benefit, as suggested by Mr. Beattie, in the treatment of patients with recurrent subacute ulcers. I would suggest, too, that patients with recurrent hæmatemeses in whom no radiological lesions are found and in whom the cause is presumably acute erosion, would be similarly benefited. Owing to the similarity in behaviour of prepyloric and duodenal ulcers, I would suggest also that further trial might be given to vagotomy in recurrent subacute and small chronic ulcers in the prepyloric region.

North Middlesex Hospital,
London, N.18.

D. FERRIMAN.

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[1] Mettler, A. E., Spindler, J., Mettler, C. A., Combs, J. D. *Arch. Surg.* 1936, 32, 618.

[2] Watts, J. W., Fulton, J. F. *Ann. Surg.* 1935, 101, 363.

[3] Hoff, E. C., Sheehan, D. *Amer. J. Path.* 1935, 2, 789.

[4] Stahnke, E., cited by W. C. Alvarez. *Amer. J. Surg.* 1932, 18, 207.

[5] Wolf, S., Wolff, H. G. Human Gastric Function. New York and London, 1943.

FEMORAL HERNIORRAPHY

SIR,—With regard to the operation described on April 1 by Mr. Hughes and Mr. Fathi, I recall that some years ago [1] a similar procedure was described by Mr. Percival Cole.

Plymouth. JAMES RIDDELL.

WAR

SIR,—Apparently neither Dr. West nor Dr. Comfort thinks it necessary to search for particular responsibility in the causation of war. Faults on both sides is their theme. If at first sight culpability should seem to be not quite equally shared between contestants they do not hesitate to cast round for something to restore the balance. Evidently they consider that in the recent struggle we were much to blame. "We have already witnessed," says Dr. West, "the destruction of much of our civilisation by men who still lead us." To many it may have seemed at the time that in this destruction leaders other than our own played a more notable part. Dr. West, however, prefers to avoid selective condemnation. Rather does he ascribe all wars to the infirmity of mankind, to those human shortcomings which Grotius judged as ". . . a madness" periodically driving men "to all kinds of crime." We, too, implies Dr. West, "like other lunatics," were lately moved to rave, to wreck, and to kill, believing in our frenzy that there was "no other way."

But, in 1939, was there any other way? It takes two sides to make a fight but only one to start it. Had the Allies not defended themselves there would have been no war. Instead the Germans would by now have established an odious hegemony over the rest of the world. The will to provoke this catastrophe arose in the minds of men. But so indeed did the will to prevent it. Should we chide the defenders equally with their enemies? Or should we not rather be grateful to them?

Nothing is to be gained by self-abasement. The "you're another!" line was always one of Goebbels's favourites. Even several hundred thousand civilians killed by bombs in the exigencies of battle scarcely merit comparison with the policy that condemned twelve million men, women, and children to be asphyxiated in gas-chambers or shot into lime-pits. Neither is the most prejudiced examination of our war leaders likely to reveal a psychopath worthy to rival Hitler.

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[1] *Brit. med. J.* June 21, 1919.

Dr. West, it would appear, anticipates Orwell's *Nineteen-eighty-four* in contending that were men not besotted by propaganda there would be no cause which they would consider worth fighting for. This is not yet true. Moreover he assumes that a threat of overwhelming force could be offered by an organisation of "power-units" which had abrogated some of their national sovereignty; such a threat would suffice to deter aggression. The assumption is vain unless the threat presented be real. The adherents of the new bloc must still believe that their way of life merits defence with arms. It is illogical, therefore, to deprecate fighting qualities which may yet be vitally needed.

Dr. Comfort is so preoccupied with the avoidance of war that he has lost sight of the greater evil. In his distaste even for the limited coercion necessary for organised self-defence he advocates a course which would render almost inevitable a tyranny infinitely more grievous. Suppose that his philosophy of "rational disobedience," were to gain a wide following in democratic countries while achieving somewhat fewer disciples elsewhere. All recent precedent proclaims that the democracies who refused to fight would be annihilated. Yet it would be better that all life in this island should be obliterated by atomic bombs rather than that a degraded selection of its inhabitants should survive, destroyed in dignity and spirit, under a totalitarian occupation.

To preserve peace, then, there must first be force, manifest and benevolent, ready to deter aggression. Metternich's motto "Force within Law" may be amplified to "Force within World Law."

With aggression rendered impracticable there yet remains to be decided what it is that projects in the minds of men the desire to attack their neighbours. For this communal resolve, it may be granted, is the cause of war. The rôle of the psychopath in office may well increase in the future but this factor has not hitherto been important. Most of the old motives are out of date. The specious Marxian theory of economic necessity can certainly be discounted. In modern times what hopes can be excited by the prospect of war? What is it, for example, that gets into the Germans? Here issue must again be taken with Dr. West.

It was not "we" nor "mankind" nor any universal human infirmity that caused the last three great European wars. Neither was it Hitler who instigated the most recent one. Never in history can a ruler more completely have expressed the temper and purpose of his people than did Hitler in 1941. It was the Germans who caused these wars. Why? The strange truth is that by 1941, when success, admittedly, had exalted their dearest anticipations, every German was fighting to win a little gang of slaves that he could have for his very own. In pursuit of this ideal he was prepared to live on one meal a day indefinitely. Such, in its fullest flowering, was the vision of the German *Weltanschauung*.

Because this aim was monstrous the peoples of the world outside Europe are now largely unable to believe that it existed. By contrast, on the Continent, it is too well understood even to merit discussion. It would be well if comprehension were more general, for only with recognition and acceptance can the menace of such behaviour be dissipated. The German aberration owes nothing to heredity. It is the result of conditioning. New contacts and a changed mental environment, if long enough continued, would effect a cure.

In other nations today impulses of genuine fear may be shaping the minds of men towards "preventive" aggression. No effort should be spared in the attempt to identify and allay such apprehensions. Whatever its origin, however, it is to be hoped that in future the remainder of the world will more readily accept evidence of aggressive intent. For the present it is unwise that Dr. West and Dr. Comfort should seek an end to well-tried loyalties. In doing so they must place in jeopardy the only foundations which as yet offer practical hope for the defence of freedom. In the recent words of Winston Churchill: "How easy it is to impair great unities and how hard to make them."

Bristol. I. McD. G. STEWART.

DANGER FROM THE NEWER INSECTICIDES

SIR,—I have read with interest your annotation of March 4, and the subsequent correspondence. As a layman, may I ask if, apart from any question of humanity, we are wise in using insecticides which, if so dangerous to man, must be death to small birds and the wild animals? Have they no value? Can we live in a desert?

Caterham, Surrey. E. E. RICHARDS.

PELVIC TUBERCULOSIS IN THE FEMALE

SIR,—Your account last week of a meeting of the Edinburgh Obstetrical Society recorded a high mortality in the surgical treatment of pelvic tuberculosis in the female, and ended with the statement that a controlled clinical investigation is urgently required into the effect on this disease of streptomycin and *p*-aminosalicylic acid. There is good reason to believe that an extended study of this problem will be arranged in the near future. In the meantime, we would report, for the encouragement of others, that of the last 6 women with tuberculous endometritis and salpingitis treated in this department with streptomycin alone, 5 have been apparently cured.

The diagnosis was made only when a positive culture from the endometrium was obtained, and apparent cure was assumed only when three consecutive biopsies at monthly intervals yielded negative cultures and no histological evidence of disease. It is too early to state with assurance that the cure is absolute.

In the last ten years, 49 women have been treated by us for pelvic tuberculosis. Prior to the use of streptomycin the only cures were obtained by radical surgery, using the same technique as we adopt for carcinoma of the corpus; 14 patients were treated in this way with no operative and no postoperative deaths and no fistulæ. If the encouraging results so far obtained with streptomycin continue, it may be possible in many cases to both cure the disease and preserve normally functioning organs.

The Radcliffe Infirmary, Oxford. J. A. STALLWORTHY
D. N. STRUAN ROBERTSON.

ANTIGEN-ANTIBODY REACTIONS

SIR,—I was much interested in Dr. Stratton's article of Feb. 11.

The concept of non-specificity was suggested very early. A number of workers have urged me to use Rh-negative hapten as a "control": but I think that the conviction that hapten made from Rh-negative blood is inactive is based on a misconception. The term "Rh-negative" suggests that such blood lacks something; but, of course, thanks to a number of workers, including R. R. Race and R. A. Fisher, we know that this is not the case.

An individual who is Rh-negative (or Hr-positive) carries a factor in his blood which, in all probability, is very closely similar, biochemically speaking, to Rh. From the viewpoint of biochemistry, the difference between D and d may be not greater than the difference between glucose and fructose, or even *d*- and *l*-isomers.

I have made hapten from Rh-negative blood; and I have made other specific haptens from the various subtypes. These I have assayed very carefully. With an anti-D serum one obtains strong reactions with a D antigen, and weaker reactions with a C or an E or a cde surface-active agent added by Foster had also an effective detergent action which increased its usefulness. The inevitable remnant "contamination" does, of course, contain a minute amount of the alkali; but this is stated to have no detectable inactivating effect on local-anæsthetic solutions used in dentistry—indeed it may be advantageous. I believe that further experimentation along these lines—of addition to boiling water (even without alkali, perhaps) of one of the many recently developed synthetic detergents and surface-active agents, some of which have marked antibacterial properties —might lead to a cheap, simple, quick, and universally applicable method of achieving true sterility of injection and aspiration syringes and needles.

London, W.1. C. H. LE MAY.

"INTENSIVE" INTRAVENOUS ANTITOXIN TREATMENT OF DIPHTHERIA

SIR,—While I have not yet had the [illegible] Dr. Stanley Banks's new book *The* [illegible] *Diseases*, I feel obliged, "in the interests of historical accuracy," to correct a statement in the final sentence of his letter (April 1), where he claims that in 1928 the routine treatment of hypertoxic cases of diphtheria, except in Copenhagen, was by intramuscular antitoxin. This was certainly not the case while I was a resident medical officer at Plaistow Hospital, under Dr. Donald McIntyre, from 1924 to 1927. The usual treatment of severe cases of diphtheria at that time was by 40,000–50,000 units given intravenously and a similar or larger dose intramuscularly. This dose was often repeated on the following day.

In a disease so variable and complex as diphtheria, I believe that clinical judgment and impressions must count for more than statistics of case-mortality. After a long experience in the treatment of this once-menacing infection, using doses of antitoxin both large and small, I am not convinced that the astronomical doses recommended by Dr. Banks and others are superior to more modest amounts given by the same route. Deaths in diphtheria have been due more to faults in early diagnosis than to underdosage of antitoxin, and it is to this aspect of the disease that we should direct our attention if the disease should ever again assume its former proportions.

Rush Green Hospital,
Romford, Essex.

E. JAMES
Medical Superintendent.

VAGOTOMY AND PARTIAL PYLORECTOMY

SIR,—Mr. Beattie must be congratulated on his operation of partial pylorectomy as a supplement to vagotomy, which appears to be a real advance, and on the excellence of his results. His article (March 25) prompts me to comment on the physiological basis for vagotomy.

The mechanism of production of psychogenic ulcers is obscure, but some may find hyperacidity difficult to accept as an entirely satisfactory single explanation. A vascular factor may play an important part. Vascular lesions have been described on stimulation of an area in the cortex (hyperæmia, petechial hæmorrhages, and small ulcers[1]): on stimulation of the hypothalamus (petechial hæmorrhages and hæmorrhagic erosions,[2] and multiple hæmorrhagic erosions[3]); and on stimulation of the vagus (hyperæmia and occasional ulcers[4]). Wolf and Wolff's[5] patient showed hyperæmia and petechial hæmorrhages at times of mental stress.

The matter is not entirely academic, as the vascular hypothesis tends to focus attention upon the rôle of the vagus in the *initiation* of ulcers, and this may point the way to the rational selection of cases for vagotomy. The hyperacidity hypothesis tends to focus attention on the perpetuation of ulcers, for whatever view may be taken of its rôle in initiation, it is generally accepted as the agent responsible in perpetuation. If the importance of vagotomy lies in the *prevention* of ulcer formation, it at once becomes obvious that too much should not be expected of it in the treatment of chronic ulcer. The reduction of acidity will assist natural recuperative powers and medical measures, and will lead to the healing of small chronic ulcers. Its failure in ulcers of any degree of chronicity and attachment to surrounding structures is readily understood. On the other hand, it should be of great benefit, as suggested by Mr. Beattie, in the treatment of patients with recurrent subacute ulcers. I would suggest, too, that patients with recurrent hæmatemeses in whom no radiological lesions are found and in whom the cause is presumably acute erosion, would be similarly benefited. Owing to the similarity in behaviour of prepyloric and duodenal ulcers, I would suggest also that further trial might be given to vagotomy in recurrent subacute and small chronic ulcers in the prepyloric region.

North Middlesex Hospital,
London, N.18.

D. FERRIMAN.

FEMORAL HERNIORRAPHY

SIR,—With regard to the operation described on April 1 by Mr. Hughes and Mr. Fathi, I recall that some years ago[1] a similar procedure was described by Mr. Percival Cole.

Plymouth. JAMES RIDDELL.

WAR

SIR,—Apparently neither Dr. West nor Dr. Comfort thinks it necessary to search for particular responsibility in the causation of war. Faults on both sides is their theme. If at first sight culpability should seem to be not quite equally shared between contestants they do not hesitate to cast round for something to restore the balance. Evidently they consider that in the recent struggle we were much to blame. "We have already witnessed," says Dr. West, "the destruction of much of our civilisation by men who still lead us." To many it may have seemed at the time that in this destruction leaders other than our own played a more notable part. Dr. West, however, prefers to avoid selective condemnation. Rather does he ascribe all wars to the infirmity of mankind, to those human shortcomings which Grotius judged as ". . . a madness" periodically driving men "to all kinds of crime." We, too, implies Dr. West, "like other lunatics," were lately moved to rave, to wreck, and to kill, believing in our frenzy that there was "no other way."

But, in 1939, was there any other way? It takes two sides to make a fight but only one to start it. Had the Allies not defended themselves there would have been no war. Instead the Germans would by now have established an odious hegemony over the rest of the world. The will to provoke this catastrophe arose in the minds of men. But so indeed did the will to prevent it. Should we chide the defenders equally with their enemies? Or should we not rather be grateful to them?

Nothing is to be gained by self-abasement. The "you're another!" line was always one of Goebbels's favourites. Even several hundred thousand civilians killed by bombs in the exigencies of battle scarcely merit comparison with the policy that condemned twelve million men, women, and children to be asphyxiated in gas-chambers or shot into lime-pits. Neither is the most

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1. Mettler, A. E., Spindler, J., Mettler, C. A., Combs, J. D. *Arch. Surg.* 1936, **32**, 618.
2. Watts, J. W., Fulton, J. F. *Ann. Surg.* 1935, **101**, 363.
3. Hoff, E. C., Sheehan, D. *Amer. J. Path.* 1935, **2**, 789.
4. Stahnke, E., cited by W. C. Alvarez. *Amer. J. Surg.* 1932, **18**, 207.
5. Wolf, S., Wolff, H. G. Human Gastric Function. New York and London, 1943.

1. *Brit. med. J.* June 21, 1919.

prejudiced examination of our war leaders likely to reveal a psychopath worthy to rival Hitler.

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Institute of Pathology,
The Western Pennsylvania Hospital,
Pittsburgh, Pennsylvania.

BETTINA B. CARTER
Immunologist.

INTRAMUSCULAR ADMINISTRATION OF VITAMIN E

SIR,—In the original reports on the use of vitamin E (α-tocopherol) in the treatment of certain cardiac conditions, arterial obliterative disease, and diabetes mellitus, I dealt almost exclusively with the oral method of administration. The reason for this is obvious, economy and comfort to the patient being not inconsiderable factors.

From time to time, however, one sees cases in which, because of dire need, one cannot wait from four to ten days for therapeutic effect. Cases of severe heart-failure, of diabetic, arteriosclerotic, or Buerger's gangrene, or of semicomatose states will demand immediate action, which can best be provided by intramuscular injection of α-tocopherol. In the past four years I have used this technique in some forty-five cases, mainly of severe heart-failure.

An 18-gauge needle of at least $1^3/_4$ in. is used. Because the oil is heavy a higher gauge will cause great difficulty both in aspiration and injection. The oil should not be heated to make it more manageable lest the tocopherol be inactivated. A 'Luer-lok' syringe helps to avert untimely separation of syringe and needle during injection. The material is injected deeply into the upper and outer quadrant of the buttock.

A reliable standard dosage is 300–400 international units daily for four or five days; but this dosage must be modified in the presence of certain conditions discussed below.

The first injection generally produces a dramatic change within twelve hours. In cases of extreme heart-failure excess fluid and transudates are rapidly eliminated by the kidneys and skin. Patients who are beyond middle age lose most of this fluid through the kidneys, probably because of atrophic changes in the sweat-glands; younger patients often sweat very profusely. The dosage on succeeding days may be regulated by the degree of compensation effected by the initial injection.

Great care must be exercised where any of the following conditions are observed:

Digitalis intoxication.—Through its synergistic action with digitalis bodies in protecting against the destruction of co-enzyme I,[1] α-tocopherol sensitises the myocardium to digitalis. For this reason the maintenance dose of digitalis given by mouth to patients receiving vitamin E is less than usual. Furthermore, the mobilisation of body-fluids, which is a part of the profuse diuresis, will greatly increase the amount of circulating digitalis bodies, as with any diuretic. Consequently, one must be careful not to give large doses of vitamin E by injection to patients who show any sign of digitalis intoxication.

Extensive renal damage.—The relatively sudden diuresis described above can be harmful where the kidney glomeruli are severely damaged. A case of rheumatic heart-disease with mitral stenosis in complete failure with massive pulmonary œdema, hepatomegaly, ascites, and well-marked dependent œdema was compensated in twenty-four hours by an injection of 400 international units; but after five days the blood non-protein nitrogen began to rise to alarming heights and the patient died in uræmia. Presumably there had been widespread renal rheumatic involvement which prevented the kidneys from handling the sudden excretory overload.

Prostatic obstruction.—In anticipating profound diuresis it is wise to ensure free drainage of the bladder where there has been any prostatic difficulty. An indwelling catheter will prevent any danger of undesirable back-pressure.

Diabetes mellitus.—Before using vitamin E by injection in a diabetic, one must bear in mind that pronounced hypoglycæmia will develop, reaching its maximum in about four hours.[2] One must therefore watch the blood-sugar very carefully in order to prevent severe hypoglycæmia, and it is usually best to reduce the dosage of insulin to allow some room for this effect.

Hyperthyroidism.—No patient with any evidence of thyroid overactivity should be given α-tocopherol. Some later investigators claim that in hypertensives vitamin E raises the blood-pressure; but in my opinion these "hypertensives" were probably cases of hyperthyroidism.

The results achieved are illustrated by the following case:

A 72-year-old man had dyspnœa and œdema of the ankles which for the past four months had become progressively more severe. Nocturnal dyspnœa had become so pronounced that for the last two weeks he had spent his nights in a chair.

The pulse was irregular, rate 108 per min.; blood-pressure 186/100 mm. Hg. Weight 157 lb. Chest: moist râles throughout both lung fields; pleural effusion over the lower third of the right lung. Heart: on percussion and fluoroscopy, enlarged about 2 in. to the left of the mid-clavicular line; mitral systolic murmur. Liver: tender and enlarged four finger-breadths below costal margin. Ankles: severe pitting œdema. Ocular fundi: well-marked arteriosclerotic silver-wire appearance with "nicking."

The patient was given 300 international units of vitamin E, in the form of 'Natopherol' acetate in oil (Abbott) by intramuscular injection and 0·1 mg. digitoxin as 'Purodigin' (Wyeth) orally for five days. In twelve hours the œdema of the ankles had disappeared; the fluid in the right pleural cavity had gone; the moist sounds in both lungs had almost completely vanished; and the liver was less than two finger-breadths enlarged. By the second day he was "compensated" and could lie flat in bed to sleep.

This patient had previously received no digitalis; and it does not seem possible that the effect noted could be due to the 0·1 mg. doses of digitoxin.

Thanks are extended to the Abbott Laboratories, of North Chicago, Illinois, and to the V.C.A. Laboratories, of Newark, N.J., for generous supplies of injectable α-tocopherol.

London, Ontario. ARTHUR VOGELSANG.

DEOXYCORTONE WITH ASCORBIC ACID IN MENTAL DISORDER

SIR,—With regard to the article of March 25 by Dr. Cranswick and Dr. Hall, it may be of some interest to point out that since 1949 we have been carrying out research into adrenal cortical reactions to various stimuli with the blood ascorbic-acid at different levels. These studies have been made both in animals and man, either healthy or experimentally or naturally suffering from various conditions which could be grouped with the "adaptation syndromes"—among them, psychoneurosis and psychosis. We have published preliminary results from these researches, including data on the blood and on urinary steroid metabolites.[3]

These results cover over 40 cases of rheumatoid arthritis, allergic stat [illegible] conditions, submitted to stimuli [illegible] l Wassén's[4] technique. The results are therapeutically favourable, and interesting for the hæmatological and urinary findings. In particular, one of us[5] has pointed out some really remarkable effects in 23 neuropsychiatric cases; these patients were chiefly depressives, with hæmatological and urinary findings comparable to those recorded by Cranswick and Hall.

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[1] Govier, W. M., Yanz, N., Grelis, M. E. *J. Pharmacol.* 1946, 88, 373.

[2] Butturini, U. G. *Clin. med.* 1945, 26, 90. Vogelsang, A. *Med. Rec.* 1948, 161, 6.

[3] Fachini, G., Ceresa, F., Morpurgo, E., Korenyi, Z., Rubino, G. Lombardy Society of Medical and Biological Sciences, Dec. 13, 1919.

[4] Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.

[5] Morpurgo, E. Congress of the northern section of the Italian Society of Neurology, Jan. 29, 1950.

Further results from researches—which we are continuing—on arthropathies and psychoneurosis or other possible "adaptation syndromes," as well as on experimental arthropathies in normal and adrenectomised or hypophysectomised animals, on biological tests, and on passive transportation of the apparent "cortisone-like" action, will perhaps give some information about the central or peripheral mechanism of these interesting actions.

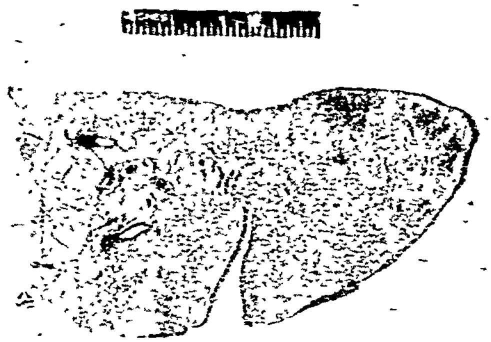
Department of Physiology, Faculty of Agriculture, University of Milan. G. FACHINI
General Medical Clinic, University of Turin. F. CERESA
Department of Neuropsychiatry, Ospedale Maggiore, Milan. E. MORPURGO
Research Laboratory, Ormonoterapia Richter, Milan. Z. KORENYI.

ESSENTIAL BROWN INDURATION OF THE LUNGS

SIR,—Since the publication of an article with the above title,[1] I have had some interesting letters from American and English pædiatricians, who ask how I attribute the entity to a neurovascular disorder.

The illustration is of a thin slice of affected lung cut with a bacon-slicing machine. It shows well the uniform and gross consolidation, which is due to massive diapedesis of red blood-corpuscles into the air-sacs. (The condition illustrated is universal in the lung tissue.) A few cystic air-sacs are seen at the apex of the lung. These, relative to the other pathological findings, are inconspicuous.

The histological picture of the lung corresponds to the edge of a pulmonary infarct where the capillaries are dilated and stuffed with blood and there is massive diapedesis but the walls of the air-sacs are still viable.



In other words, this corresponds to severe but incomplete anoxæmia. The induration (interstitial fibrosis, thickening of basement membranes) of the alveolar walls is consistent with chronic anoxæmia. One could conceive of such a condition being produced by spasm of the pulmonary artery: while an intermittent and variable degree of spasm would tally with the clinical picture of variable, intermittent bouts of severe anoxic anoxæmia. The pathological picture is somewhat similar to renal lesions in eclampsia which can also be attributed to arterial spasm.

A hypothesis of arterial spasm, however, does not explain the deficiency of elastica in the alveolar walls. In the absence of any special knowledge of the problem of elastica, I would also attribute this deficiency to chronic anoxæmia. It is interesting to note that, in addition to the pathological lesions confined to the pulmonary capillaries, the other pulmonary lesions (fibrosis, elastica deficiency) are confined to the air-sacs. The septal and peribronchial connective-tissue framework is not altered. To me this also points to a prime vascular disease; and, since it is universal, one should work back to a prime abnormality in the pulmonary artery. Investigation of this disease in life, with a hypothesis of pulmonary arterial spasm in mind, should help to unravel the mystery.

Regina General Hospital, Saskatchewan. N. G. B. McLETCHIE Director of Laboratories.

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[1] McLetchie, N. G. B., Colpitts, G. *Canad. med. Ass. J.* 1949, 61 129.

AGAROL

SIR,—Mr. Bastow's enthusiasm for exploding myths has run away with him: the prices he quotes as paid to the pharmacist for both Agarol and the *N.F.* substitute are wrong. He has omitted the dispensing fees (8*d.* in each case) and the 1½*d.* for the bottle, which is added to his charge for the *N.F.* emulsion, but not for agarol.

Mr. Bastow is quite right that the public pay for research—as they pay for the money that he (if a retail pharmacist) has invested in his business, as they pay for a successful doctor's training. If Mr. Bastow belongs to the school that would prefer to pay for research out of taxes, he might reflect that the public then pays for *all* research; the manufacturer can *only* recoup himself when research has yielded valuable results.

William R. Warner & Co. Ltd., London, W.4. ELIOT WARBURTON.

PULMONARY BILHARZIASIS AND LOEFFLER'S SYNDROME

SIR,—In his letter of Jan. 28, Dr. Malhotra reported four cases of filariasis with diffuse mottling of the lung fields and eosinophilia. Dr. Ball referred to this communication in his letter of Feb. 25, and added pulmonary bilharziasis to the list of diseases [1] in which pulmonary infiltration and eosinophilia are associated.

I wish to express a different view and incidentally to settle the question of priority of the description of chronic pulmonary bilharziasis with eosinophilia.[2–4]

Actually, I was the first to describe, in 1935, the clinical features and radiological appearances of this entity [5]; and a year later I published a paper with the first reproductions of radiographs of the disease,[6] which unfortunately were not clear in the earlier article. In a subsequent report [7] a classification of the radiographic appearances was proposed. Whilst these findings were presumably due in the majority of cases to infestation with *Schistosoma hæmatobium*, analogous lung involvement was reported in intestinal bilharziasis (*Schistosoma mansoni*) [8] and in bilharzial bronchial asthma.[9] The entire findings were finally surveyed in a concluding paper.[10] referred to by Erfan.[2 3]

These earlier reports on a clinical finding now common since once one has become "lung-conscient" in bilharziasis, were only partly confirmed some years ago. This is evident from an article on bilharzial heart-disease in Egypt,[11] where it is stated:

> "Mainzer (1938) has described the X-ray appearance of miliary infiltration of the lung fields in pulmonary bilharziasis, but . . . these miliary shadows have only been observed . . . during the course of antimony treatment, and are regarded as due to an allergic action around the ova."

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1. Apley, J., Grant, G. H. *Lancet*, 1945, i, 812.
2. Erfan, M. *Trans. R. Soc. trop. Med. Hyg.* 1948, 42, 109.
3. Erfan, M., Erfan, H., Mousa, A. M., Deeb, A. A. *Ibid*, 1949, 42, 477.
4. Tidy, H. *Brit. med. J.* 1949, i, 977.
5. Mainzer, F. *Act. med. scand.* 1935, 95, 538.
6. Mainzer, F. *Fortschr. Geb. Roentgenstr.* 1936, 54, 154.
7. Mainzer, F., Yaloussis, E. *Ibid.* p. 373.
8. Mainzer, F. *Puerto Rico J. Publ. Hlth trop. Med.* 1939, 15, 111.
9. Mainzer, F. *Trans. R. Soc. Trop. Med. Hyg.* 1938, 32, 253; *J. Allergy*, 1939, 10, 349.
10. Mainzer, F. *J. R. Egypt. med. Ass.* 1938, 21, 762.
11. Bedford, D. E., Aidaros, S. M., Girgis, B. *Brit. Heart J.* 1948, 8, 87.

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SIR,—The Collings report has already called forth both friendly and hostile comment. The *British Medical Journal* is particularly trenchant in its criticism. "What we must ask ourselves" it states, "is whether Dr. Collings's limited experience of only 55 general practices is a true reflection of the whole of general practice. The answer is obviously 'No.' And it is most regrettable that he has attempted to generalise from so few particulars."

The truth of the matter is that 55 practices of the types selected provide a very fair cross-section, surely comparable with that provided by a Gallup poll. Moreover, if we have no political or sectarian axe to grind, are we not all aware that general practice today is sick at heart? Far from the report being tendentious and one-sided, it does, in effect, offer a springboard from which an early campaign may be launched to provide this countr[illegible]dical service worthy of its great [illegible] Furthermore, it entirely justifies the fears so many of us have felt, and from time to time dared to express, that all could not be well technically, ethically, clinically, or indeed in any other way, in hundreds of practices boasting full lists and maximum incomes.

To be exact, our present system has, by its encouragement of large and competitive panels, reduced the status of many practitioners to that of the shopkeeper, and their potentialities for exercising a proper professional discipline and skill in some cases to precisely nil. Chapter and verse for these heart-rending conclusions have been given at such length, so frequently, and in so many places (not only in the Collings report) that further elaboration of the theme is redundant.

We are, then, faced with a tragic fait-accompli. As Dr. Collings has been at pains to emphasise, this state of affairs is not the direct outcome of the National Health Service Act; but he does point out that "extension of National Health Insurance" has so increased the load as to cause serious strain or near-breakdown. What nonsense it is to expect any man to cope effectively with 120 items of service, or even half that number, in any one day.

The precipitate action of the Minister in launching the service, the surrender of the profession's official representatives to what appeared to be (but was not in fact) superior force, and, perhaps above all, the pathetic apathy shown by the rank and file since July, 1948, have all contributed to the present tragedy.

In considering the therapeutic measures necessary to restore health to the general medical service, a far more heroic method will be required than that suggested by Dr. Collings. The "deliberative task" of "defining the future province and function of general practice" must be undertaken by a body with the highest powers of taking and sifting evidence, and one whose recommendations will receive immediate attention at top level. Such a body should, in fact, be no less than a

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Royal Commission—not a departmental committee—the membership of which should include a fair proportion of general practitioners.

Our official representatives and negotiating bodies have not in the past done a great deal to warrant any real faith in their abilities to express the sentiments of the "ordinary" doctor. It may be that it is not too late to hope for a change of heart in the hierarchy of the B.M.A. Should this be true, the democratic means of enforcing action in accordance with our opinions exist and should be used fully. The B.M.A. is not, however, the only means of expression. Much can also be effected by resolute approach through local medical committees.

The main points which require the earliest possible *attention, are these:*

1. The widening gap between hospital services and general practice must be closed. For this to be effective the good will of professional colleagues in the consultant and specialist ranks is essential—its existence at present is somewhat doubtful. The provision of G.P. beds in hospitals, appointments to part-time clinical posts, and a wider recognition, especially by more junior hospital officers, that general practitioners, given the opportunity, can be good doctors and helpful colleagues, would all go far to improve clinical standards and unite the profession.
2. Some means must be found to reduce the maximum panel list to 2500 patients while retaining a reasonably high rate of emolument. Even this number is far higher than it should be for the maintenance of a truly high standard. The optimum figure should probably be in the neighbourhood of 1500. That this requirement must incur great increases in cost is unfortunately true. Further, we may expect little consideration from a hard-pressed Treasury. But to build an efficient G.P. service, retrenchment elsewhere is justifiable; therefore reduce the dental service really drastically, allowing only grants-in-aid, and cut out provision of free spectacles and surgical appliances other than those absolutely essential. Watch administrative costs and expense allowances. Enforce the charge on all prescriptions. And let it be remembered that less crowded G.P. consulting-rooms will relieve the hospitals immeasurably.
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Dr. Collings has raised a standard to which we must now rally and which may well serve to unite our apathetic and discouraged profession. The truths he has served up are no doubt unpalatable to many, and in certain circles every effort will be made to belittle his contribution to a solution of this most important social problem. British medicine has had a high reputation, much of which has already been dissipated. That reputation can and must be restored.

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If there is to be a decisive turn to coöperative forms of practice, as Dr. Collings suggests, it is essential that the medical curricula provide means by which students can appreciate the limitations and possibilities of general practice, at a time when it would be impossible for them to reconcile themselves to the dual standards applied in the average industrial practice on the one hand, and the teaching hospital on the other. At the same time they would more readily appreciate that the practice of medicine is conditioned as much by housing, wages, old-age pensions, and the like, as by the latest advances in hospital treatment.

Medical School, St. George's Hospital. J. TUDOR HART.

SIR,—The main value of the Collings report is that it will enable the general public to have a better idea of the poor return obtained for the heavy expenditure on medical services. The poor return is not confined to the general-practitioner service, and a report on part-time consultants will reveal similar widespread low standards of practice—standards which will continue as long as the majority of doctors regard their patients as mere capitation fees or as providers of "sessions."

The common attitude to patients is colourfully put by Dr. French (April 8) whose "nauseating" surgeries were full of "depressing faces with their owners sitting on hyperkeratinised bottoms." It is amazing that a doctor should rush into print to express such an attitude, for he thereby shows that he has completely failed in his responsibilities to his patients. That surgeries are overcrowded is almost entirely the fault of general practitioners themselves, who, for fear of the loss of a capitation fee, will forgo an honest approach to patients' problems and fob them off with a tonic or placebo. The patient, with continued frustration and anxiety, returns in another vain seeking for help; but the practitioner, encouraged by such writings as those of Dr. Gooddy (Feb. 11), regards this as confirming his belief that the patient is only trying to get "something for nothing."

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DR. EDITH SUMMERSKILL, Minister of National Insurance, made the following statement in the House of Commons on April 4: I am informed by the National Assistance Board that they will be sending me next week draft regulations proposing increases in their current rates. I hope to be able to submit the necessary regulations for the approval of the House shortly after the recess. I understand that under these proposals the weekly rate for single householders will be increased from 24*s.* to 26*s.* and that for a married couple from 40*s.* to 43*s.* 6*d.*, in both cases exclusive of rent, with corresponding increases in other rates. The additional cost of the proposals, allowing for attraction of new cases over a period, may be expected to approach £10 millions in a full year.

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In the House of Lords on April 5 Lord SALTOUN suggested that the measures for coping with the necessities of solitude and old age taken under the recent Acts and the reorganisation of the social services were either defective or ineffective. It was not a question of wealth or poverty. In fact the people who were in receipt of public assistance were probably better off in many respects than the well-to-do. He proposed that local authorities should be empowered to pay 2 or 3 guineas a week to relatives who had an old person living with them, for these relatives had no longer any duty in law to maintain their old people. As it cost at least 7 guineas a week to keep an old person in hospital, it would be cheaper for the public and better for the old people if they could be kept with their relatives. Lord Saltoun was especially concerned for old people living alone. Though the local authority now had power to remove these old people to homes when necessary, there seemed to him to be no organisation for what was really more important—to obtain early information of cases likely to give trouble and to arrange for regular visits to them. It was mainly a problem of the towns and he thought there should be welfare officers with small districts who would be responsible, as was the old relieving officer, for ferreting out these cases. Visiting he believed might usefully and suitably be undertaken by voluntary associations.

Lord AMULREE agreed that there was often difficulty in getting old people into hospital for they tended to occupy a bed for a long time and some authorities preferred to take in more people rather than admit those who were going to remain for a long time. But there was a change of mind coming, certainly in the medical profession, because it had been found possible to rehabilitate many of these old people so that they might at least be discharged from hospital, but the improvement in their treatment made it essential that there should be homes to which they could be sent on their discharge. He believed that Rochdale had already established a large number of homes of this kind.

It must be the experience of most of us that though we often hear general practice praised in a vague and general way as the highest and most satisfying calling in medicine, this is contradicted at every turn both by the home experience of those of us who come from medical families, and by the view of general practice which is in fact adopted by the teaching hospitals, where the working-class practice is concerned. On the contrary, general practice is obviously the least satisfying and the most frustrating field of medicine. The only justification for this mythology of general practice is that there one is indeed faced with enormous difficulties, which all the time become more impossible to deal with by individuals even of the highest integrity; and it is accounted a virtue for any man in his right mind to tackle such a problem, if he is not compelled by circumstances to do so.

If serious-minded students are to be turned to this field of work, it is no use to conceal the real situation from them. Unfortunately, during their formative period, while they are still able to think of changing the conditions and limitations of general practice, they are completely isolated from this aspect of medicine, and in most cases their own previous background gives them no personal experience (as a patient) of the typical working-class practice.

If there is to be a decisive turn to coöperative forms of practice, as Dr. Collings suggests, it is essential that the medical curricula provide means by which students can appreciate the limitations and possibilities of general ractice, at a time when it would be impossible for them o reconcile themselves to the dual standards applied n the large industrial practice on the one hand, and the teaching hospital on the other. At the same time they would more readily appreciate that the practice of medicine is conditioned as much by housing, wages, old-age pensions, and the like, as by the latest advances in hospital treatment.

Medical School, St. George's Hospital. J. TUDOR HART.

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Lord WEBB-JOHNSON pointed out that the difficulty of finding a hospital-bed for an old person was not a new one—it had been a problem to his own knowledge for the last half century. He agreed that the right solution was wherever possible to help the younger generation to keep their old folk in their own homes.

Lord KERSHAW claimed that the introduction of the National Health Service and the new National Assistance scheme had greatly improved the care of old people; but he agreed that in the evolution of a new scheme defects might well appear. It was often suggested, for instance, that the new Acts had created a division of responsibility. But he believed the National Assistance Board through their officers were in sufficient touch with the old people whom they were helping, while the fact that everyone was now entitled to free medical service made it less likely that anyone could suffer in silence or alone. He admitted that there were many old people who should be in an institution. But 5000–6000 beds of the 57,000 available for the chronic sick were unoccupied because of lack of nurses. That was roughly the number of elderly people who would be the better for hospital treatment. Without claiming that it was perfect, he did feel that the present system had diminished the possibility of old people suffering in loneliness.

QUESTION TIME

Purchase-tax on Hospital Equipment

Mr. ANTHONY GREENWOOD asked the Minister of Health what was the amount spent on surgical and medical requirements by regional hospital boards and teaching hospitals in England and Wales during the last convenient period of 12 months; and what proportion of that expenditure was attributable to purchase-tax.—Mr. ANEURIN BEVAN replied: The revised estimates of regional hospital boards and teaching hospitals in England and Wales show that for the year ending March 31, 1950, the amount spent on medical and surgical requirements will be about £13,280,000. The proportion of this expenditure attributable to purchase-tax is not known but is thought to be quite small.

Replying to Sir IAN FRASER, Mr. BEVAN said he did not intend to publish accounts of individual hospitals, or of hospital groups, but as required by section 55 (4) of the National Health Service Act summarised accounts of the hospital service would be presented to Parliament annually.

Cost of Drugs and Medicines

Mr. R. S. RUSSELL asked the Minister the total cost of drugs and medicines supplied under the National Health Service up to the most recent convenient date; what proportion of this total cost was in respect of proprietary medicines; and how much of the cost was due to purchase-tax. —Mr. BEVAN replied: The total amount paid to chemists and doctors up to Feb. 28, 1950, for supplying drugs under the general medical and pharmaceutical services was about £43¹/₄ million. It is estimated that at the rate at which proprietary medicines are now being prescribed they account for rather more than 30% of the current cost. It is estimated that purchase-tax accounts for about 1% of the total cost.

Replying to Mr. EMRYS HUGHES, who asked what new proposals he had to prevent the exploitation of the public by vendors of patent medicines, Mr. BEVAN said that the general question of prescribing proprietary preparations was under consideration by a special subcommittee of the Central and Scottish Health Services Councils.

Purchase-tax on Proprietary Medicines

Mr. A. C. BOSSOM asked the Chancellor of the Exchequer what proportion of the retail price of the majority of proprietary medicines was taken by his Department in purchase-tax, tax from the manufacturer, wholesaler, and retailer. —Mr. DOUGLAS JAY replied: The average incidence of purchase-tax on chargeable proprietary medicines is approximately 20% of the retail selling price.

Diabetic Patients and Sugar Tests

Mr. WILLIAM TEELING asked the Minister of Health whether he was aware that some diabetic patients were unable, by reason of physical infirmity, to make use of sugar tests by means of Benedict solution; and whether, for that reason, he would ensure that 'Clinitest' sets and tablets are equally made easily available under the National Health scheme. —Mr. BEVAN replied: Yes Sir, and I intend to do this.

Dangers of New Insecticides

Mr. E. G. GOOCH asked the Home Secretary if he was aware of the dangers to agricultural workers involved in the use of some of the new insecticides, particularly D.N.O.C., dinitro-orthocresol, and 'Parathion,' diethyl-*para*-nitrophenylthiophosphate, both used as sprays for crop protection and deadly in their effect upon man; and if he would ban their use.—Mr. CHUTER EDE replied: The Poisons Rules, which control the sale of these valuable insecticides provide for a warning notice on the containers in which they are sold, and I am advised that if reasonable care is taken there is little or no risk in their use.

Silicosis in South Wales

Mr. DAVID WILLIAMS asked the Minister of National Insurance how many miners in South Wales applied for disablement certificates to the Silicosis Board in 1949; how many were certified; and what were the corresponding figures for 1948.—Dr. EDITH SUMMERSKILL replied: In 1948, 3792 applicants were examined by the Silicosis Medical Board under the Workmen's Compensation Acts, of whom 1509 were certified. The corresponding figures for 1949 were 1531 and 520. In addition in 1948 there were 3992 applications for benefit for pneumoconiosis under the Industrial Injuries Act, of whom 1687 were found to have the disease. For 1949 the figures were 12,764 and 3612.

Hearing-aids

In answer to a question Mr. BEVAN stated that last month the average weekly output of 'Medresco' hearing-aids was 1500.

Liverpool Doctor's Patients

Mr. K. PUGH THOMPSON asked the Minister of Health if his attention had been drawn to the disquiet and distress caused to many patients of Dr. W. F. Jones of Walton, Liverpool, following their summary removal from his list; and if he would issue instructions to the executive council that their position was to be reviewed before any final decision was made.—Mr. BEVAN replied: This doctor had over 6800 patients on his list, the number agreed with the profession as the maximum which normally a single-handed doctor can adequately care for being 4000. He did not himself take steps to meet the situation and in the circumstances the action taken by the executive council seems to me to have been reasonable.

Extraction Rate of Flour

Dr. BARNETT STROSS asked the Minister of Food what was the degree of extraction of flour from wheat in use today for the making of normal bread; the degree of extraction in 1938; and what were the contents in each case, of protein, fat, iron, calcium, phosphorous and vitamins, including carotene.—Mr. STANLEY EVANS replied: The extraction rate of flour used in 1938 varied, but 70% was the most usual; the present extraction rate is 85%. The average composition of flour of 70% and 85% extraction rates is as follows:

	70% extraction per oz.	*85% extraction per oz.*
Protein	3·1 g.	3·3 g.
Fat	0·3 g.	0·5 g.
Iron	0·28 mg.	0·6 mg.
Calcium	4·5 mg.	46 mg.*
Phosphorous	26 mg.	54 mg.
Vitamin B_1 (aneurin)	0·021 mg.	0·082 mg.
Riboflavin	0·017 mg.	0·037 mg.
Nicotinic acid	0·23 mg.	0·57 mg.

* Includes calcium added as creta preparata.

Flour contains a negligible quantity of vitamin A (or carotene) and no vitamins C or D.

Health in the African Dependencies

Mr. SIDNEY MARSHALL asked the Secretary of State for the Colonies what had been done to implement the recommendation of the Kenya Development Subcommittee on Health in regard to the setting up of a royal commission to inquire into the health of all the peoples of H.M. dependencies in Africa.—Mr. JAMES GRIFFITHS replied: The recommendation of this subcommittee was also the subject of an approach in 1947 by the Kenya branch of the British Medical Association who asked that the royal commission should in addition cover population questions. These proposals were considered by my predecessor who, in 1949, decided that as far as the East African Territories were concerned the appointment of a royal commission on population would be inappropriate.

Further statistical information is at present in the course of preparation and the position will be reviewed again when it becomes available. Innumerable efforts are being made by the governments of the British Colonial Territories in Africa to improve the health of the people and it is considered that an official inquiry of the kind suggested could not be of real value until a stage has been reached at which it will be possible to draw conclusions from the results of these efforts. I am not therefore prepared to recommend the appointment of a royal commission at present.

Obituary

JOHN CLARENCE WEBSTER

C.M.G., M.D. EDIN., LL.D., F.R.C.P.E.

Dr. Clarence Webster, who died at Shediac, New Brunswick, on March 16 at the age of 86, was a graduate of Edinburgh who had achieved distinction as a gynæcologist in the United States and as a historian in Canada.

Of Scottish and Yorkshire stock, he was born at Shediac, where his father was a prosperous storekeeper, and graduated B.A. at Mt. Allison University in New Brunswick when he was 19. He persuaded his father in 1883 to send him to Edinburgh. After a brilliant career as a student he graduated M.B. with honours in 1888. From postgraduate study at Leipzig and Berlin he returned to Edinburgh to take his M.D. in 1891, receiving the gold medal for his thesis. In 1893 he became F.R.C.P.E.

In 1890 Sir Alexander Simpson, the professor of midwifery, appointed him as his assistant. He held this post for six years and he seemed marked out as Simpson's successor. But severe attacks of laryngitis and bronchitis impelled him to leave the damp climate of Edinburgh, and in 1896 he accepted an appointment in Montreal as lecturer in gynæcology at McGill University.

Three years later he migrated to Chicago to take the chair of obstetrics and gynæcology at the Rush Medical College. There he spent twenty strenuous years in teaching and in an extensive private practice. He also served as chief gynæcologist at the Presbyterian Hospital and the Central Free Dispensary, yet he found time to write freely. *The Practice of Obstetrics* (1899), *Human Placentation* (1901), *A Textbook of Obstetrics* (1903), and *A Textbook on Diseases of Women* (1907) were all produced during his early years in Chicago. But by 1919 the strain of his busy life had begun to affect his health, and, since his standard fee of $1000 for each accouchement had enabled him to accumulate a comfortable fortune, he decided to retire from all his medical work. The University of Illinois made him an emeritus professor of obstetrics and gynæcology in 1942.

It was open to him to live in leisured ease in a pleasant climate like that of California or British Columbia, but he elected to dwell among his own people at Shediac, where he had built himself a house at the mouth of the Scugog River. He threw himself actively into the life of his native town, joined the governing body of Dalhousie University, and took a keen interest in local education and in Canadian public affairs. From his boyhood history had interested him and he now became an assiduous collector of Canadiana—pictures, books, maps, and documents. Later he embarked on original research into Canadian history, and in successive winters he visited libraries, archives. and museums in Canada, the United States, Britain, and France, gathering a large store of interesting material relating to the early history of Canada. Writing never came easily to him, but in his private autobiographical memoir, *The Crowded Years* (1943) he was able to list some 50 short books and monographs on historical subjects. His reputation as an authority on the history of Canada's maritime provinces led to his appointment as a member of the Historic Sites and Monuments Board of Canada, in which he served as chairman for six years. He was appointed C.M.G. in 1935. He also held honorary degrees of the universities of Edinburgh, New Brunswick, Dalhousie, Mt. Allison, and Cincinnati.

A friend writes: "Clarence Webster was a singularly handsome man, who remained slim and straight and retained in an amazing degree the élan of youth till the end of his long life. He had great personal charm and he was the best of company, for he was a fine talker with a wide range of interests. Though he did not suffer fools gladly and was accused by some of having too autocratic a temper, there was no more respected or widely beloved figure not merely in Shediac but in the whole province of New Brunswick."

In 1899 he married Miss Alice Lusk of New York, who survives him with a son who is a distinguished physicist. Their elder son was killed in a flying accident in 1931 and their only daughter, who had married a French artist, died in a German internment camp in 1944.

GEORGE EWART MARTIN

M.A., M.B. EDIN., F.R.C.S.E.

Dr. G. Ewart Martin, senior ear, nose, and throat surgeon to Edinburgh Royal Infirmary and senior lecturer on otolaryngology at Edinburgh University, died on March 27, at the age of 61. Though he was no narrow specialist, and his wise counsel on general medical affairs was welcome in many important quarters, Ewart Martin was best known as an endoscopist. He was the leading exponent of broncho-œsophagology in Britain and, indeed in Europe.

His old chief, Logan Turner of Edinburgh, who was the first bronchoscopist in Britain, persuaded Ewart Martin in 1920 to take a postgraduate course at Philadelphia under Prof. Chevalier Jackson. Ewart Martin was the first British postgraduate to do so; he returned to Edinburgh full of enthusiasm, and in after years he never found any necessity to depart from Jackson's principles or from the design of his instruments. By the middle of 1947 he had personal records of 4040 endoscopic cases, and he was the first to treat bronchiectasis by bronchoscopic lavage, not, as was sometimes assumed, as a cure, but because he believed that lobectomy or pneumonectomy should not be attempted until the rest of the chest was entirely clear. He was invited to address the section of otolaryngology at the Centenary Meeting of the American Medical Association in 1947, and to give the Semon lecture at the University of London in 1948; on each occasion he spoke on broncho-œsophagology, regretting that in many centres it appeared to be passing from the hands of the laryngologist into the hands of the thoracic surgeon, and pointing out that the foreign-body emergencies still came to the ear, nose and throat departments and that the teaching of the subject must remain with the laryngologists.

A native of Inverness, he was educated at Inverness Royal Academy and Edinburgh University, where he graduated M.A. in 1910 and M.B. in 1913. In 1914 he went to France as a surgical specialist in a casualty-clearing station, and after the war he became clinical assistant in the ear, nose, and throat department of the Edinburgh Royal Infirmary, taking the F.R.C.S.E. in 1920. Besides his teaching appointments, Ewart Martin held consulting appointments at Bangour Hospital, Kirkcaldy Hospital, and Kelso Hospital. He was also adviser in otolaryngology to the Department of Health for Scotland, consultant aural surgeon to the Ministry of Pensions, a member of various committees of the Medical Research Council, a member of the faculty of medicine of Edinburgh University, and a member of the council of the Royal College of Surgeons of Edinburgh. He had been president of the Scottish Otological and Laryngological Society, and president of the section of laryngology of the Royal Society of Medicine.

A colleague writes: "Ewart Martin was an unmistakable Scot, good-natured and with a boyish sense of humour, a non-smoker and teetotaller, an elder of West St. George's Church, an old-fashioned Liberal, apt to be a little ruffled if he thought Scottish interests in any subject were being neglected or pushed aside. He was excellent in committee, where his practical common sense was always valued, though he held his opinions firmly and on occasion his comment could be blunt. A sound clinician and a dextrous operator, he had no exaggerated ideas about the amount of otolaryngology that medical students could absorb in three months and he was perhaps at his best with young postgraduates, to whom he was a constant stimulus as well as a kind friend and adviser. The consultant otologists to the Army and to the R.A.F. have each asked that it should be put on record that both Services owed a great deal to Ewart

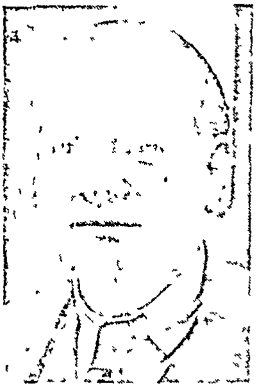
Martin for his friendly advice and for his training of many young specialists in his department at Edinburgh."

He is survived by a widow, two young married daughters, and two sons.

HECTOR BRUCE MACKENZIE

M.B. EDIN.

Dr. Bruce Mackenzie, who died in Auckland on March 13 at the age of 57, was the son of the late Sir Thomas Mackenzie, prime minister of New Zealand in 1912, and a brother of the late Kenneth Mackenzie, surgeon, of Auckland, who died in 1942.



[*New Zealand Herald*

Bruce Mackenzie graduated at the University of Edinburgh in 1918, and after serving as a medical officer at the end of the first world war returned to New Zealand. In 1921 he started in practice in Auckland as a radiologist, and he steadily built up a large practice on both the diagnostic and the therapeutic sides. For many years he was treasurer of the Auckland branch of the British Medical Association, and later he became its president. Our New Zealand correspondent writes: "Mackenzie's work was always thoughtful, thorough, and painstaking, and he was known and loved by a wide circle of colleagues and patients. He had a quiet charm and dignity of manner, and was a happy man to whom nothing was too great a trouble in obliging a patient or colleague. He served the Auckland Hospital in a part-time capacity from 1923 to his death. His sound ideas and practice played no small part in raising the status of radiology as a specialty in New Zealand. He was a keen chess player, and an outstanding exponent of contract bridge."

He is survived by his widow, two daughters, and one son who is a final-year medical student.

ARTHUR BRITON SMALLMAN

C.B.E., D.S.O., M.D. MANC., D.P.H.

Lieut.-Colonel A. B. Smallman, who died on March 4, was the first representative of the Ministry of Health on the National Radium Commission when it was set up in 1929, and he served in this capacity until 1935. After his retirement from the Ministry in 1938 he acted as liaison officer between the two bodies. He combined this work with that of secretary of the commission, at first jointly with G. F. Stebbing and later (1939–41) alone.

Born in 1873, he was educated at Manchester Grammar School and at the Victoria University, where he graduated M.B. with honours in 1897. After serving as a civil surgeon in the South African war he joined the Royal Army Medical Corps in 1902. A year later he took his M.B. Lond and the D.P.H. During the Balkan war he saw service with the Turkish forces, and in the 1914–18 war he was D.A.D.M.S. with the 1st Division in France, and later at G.H.Q., afterwards becoming D.A.D.G. and A.D.G., Army Medical Services. For this work he was five times mentioned in despatches and appointed C.B.E. and D.S.O. He retired in 1920 and joined the staff of the Ministry of Health.

"Smallman's all-round knowledge of cancer was invaluable to the Radium Commission; he had done much at the Ministry to lay foundations on which the commission was later to build. In particular, the statistical committee, of which he was a member until its dissolution in 1948, made constant calls on his knowledge of cancer statistics in its efforts to initiate and improve a national system of cancer records. Throughout the years when he represented the Ministry of Health on the commission his scrupulous fairness and lack of bias were greatly appreciated by his colleagues."

Colonel Smallman married, in 1916, Alice Florence, second daughter of the late Hon. R. G. Duncan, and they had two sons.

Notes and News

ROYAL AUSTRALASIAN COLLEGE OF PHYSICIANS

THE twelfth annual meeting of the college, and the first to be held in New Zealand, was held in fine summer weather, at Auckland Hospital and Auckland University College from March 21 to 23. Members from various States in Australia and the south of New Zealand attended, and a full programme of clinical and scientific work was discussed. Examinations were held before the meeting and six new members were admitted, three being presented at the public meeting in the college hall. This was held in full academic dress and presented a brilliant spectacle. Dr. Holmes à Court, of Sydney, the president, gave an address, and Dr. E. M. Blaiklock, professor of classics at Auckland University College, described Some Medical Personalities of Ancient Times.

MISUSE OF STREPTOMYCIN

THE World Health Organisation has issued a warning against unrestricted distribution and indiscriminate use of streptomycin, in a move to avoid the emergence of streptomycin-resistant strains of tubercle bacilli. In a letter to all member states, Dr. Brock Chisholm, director-general of the Organisation, calls attention to the warnings issued by the executive board on the basis of reports produced by the expert committee on tuberculosis. The warning against abuse of streptomycin points out that: (1) despite the reduced toxicity of new forms of streptomycin, the drug must still be regarded as having danger; (2) precise knowledge as to its clinical indications, especially in pulmonary tuberculosis, is still lacking; and (3) the attention of the public may be focused on this drug to an extent out of all proportion to its value in the total campaign against tuberculosis. W.H.O. is now providing a consultative service to a number of countries in Europe—Austria, Czechoslovakia, Greece, Italy, Poland, and Yugoslavia—which are receiving supplies of the drug from UNICEF.

MOTH DERMATITIS

THE latest report on moth dermatitis comes from Norway. On Feb. 28, 1949, Bergen City Hospital received a wireless message from a 16,000 ton Norwegian tanker in the Atlantic asking for advice: "If possible wire medical advice for so-called Caripito itch caused by dust from the wings of moths. The whole crew attacked. The rash like that from primula. Violent itching, no fever. Have given remedies for itch, but result negative." From Bergen, Dr. J. Boe[1] prescribed ephedrine tablets three or four times a day and frequent washing with a weak solution of ammonia. A couple of days later the captain reported that all his patients were better. Later it was learned that 41 of the crew of 44 were attacked by a papular rash which became vesicular, and in some cases covered the whole body. The itching was terrible, and in the worst cases the resulting insomnia did not respond to soporifics. Water on the rash made matters worse. On an earlier visit to Caripito, a Venezuelan port, the tanker had been warned by the harbour master to beware of dust from the wings of moths; and when last in Caripito, during the rainy season, the ship had been visited by swarms of moths. Dr. Boe heard from Venezuela that the offending moth belongs to the family *Saturnidæ*, genus *Hylesia*. In 1947 a migrating swarm of female *Hylesia* was responsible for a spectacular outbreak on board an oil tanker off the coast of Venezuela.[2]

University of London

On Tuesday, April 25, at 5 P.M., at Guy's Hospital Medical School, London, S.E.1, Prof. G. Westin (Stockholm) will give a lecture on Histological Aspects of Gingival Disease.

Prof. R. W. Russell, PH.D., has been appointed to the chair of psychology at University College from Oct. 1.

University of Aberdeen

On March 29, the following degrees were conferred:

D.Sc.—G. A. G. Mitchell.

M.D.—K. B. Fraser (with honours).

M.B., Ch.B.—T. P. G. Allison, Miriam Blank, John Breeze, J. M. Craig, Eileen Davis, G. B. Farquharson, James Geddes, J. L. Hardie, Duncan McNicol, T. F. P. Pimley, M. R. Pinnock, Donald Ross, P. M. Sammon, J. W. T. Shepherd, A. J. Tulloch, M. J. A. Watson.

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1. *Nord. Med.* Feb. 17, 303.
2. See *Lancet*, 1949, i, 165.

Royal College of Physicians of Ireland

On March 3 Haldane Graham Nelson was admitted to the membership.

On March 31 the following were admitted to the licentiateship:

P. J. Briggs, M. L. Brosnan, O. G. Corrigan, Ellen P. Doyle, D. P. Harris, Julianne Horgan, Noel Hurley, Anthony Loftus, Anne M. Maguire, Margaret M. Murphy, Joyce M. McCall, P. J. McCormack, Alice T. McGlinchey, Sybil B. Orgel, M. F. Plunket, Joseph Vilensky, J. J. Walsh, Gladys I. Wilson.

Royal College of *Surgeons in Ireland*

On March 31 the fellowship was conferred on D. F. V. Lane, C. C. D. Martin, and E. A. McVerry.

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty held on April 3, with Dr. W. R. Snodgrass, the president, in the chair, the following were admitted fellows of faculty:

B. R. Hillis, Kashi Ram Mahajan, Ravindra Vasant Rele, I. D. Riley, J. A. Simpson, G. A. Walker, *qua* physician; R. R. Gilfillan, J. H. Miller, *qua* surgeon.

Association of Surgeons of Great Britain and Ireland

The annual meeting of the association will be held at the Royal College of [illegible] W.C.2, on May 4, 5, a[illegible] ussions on Gravitationa[illegible] Boyd); the Gastric Bl[illegible] Anticoagulants in Surgery (Prof. R. M. Janes); and the Physiology of the Alimentary Tract following Operation for Simple Peptic Ulcer (Prof. Charles Wells).

Royal College of Obstetricians and Gynæcologists

An appeal was launched last week for £400,000 to further the work of this college. It is proposed to devote £200,000 to building, £150,000 to research and the general funds, and £50,000 to establishing a Commonwealth travelling professorship. The president of the appeal is Lieutenant-General Sir Ronald Weeks.

Society of Apothecaries of London

At a meeting of the court of assistants on March 28, with Mr. Duncan Fitzwilliams, the master, in the chair, it was announced that the Minister of Town and Country Planning had included the society's property in the final list of buildings of special architectural or historic interest.

Ten postgraduate lectures on Modern Methods of Diagnosis and Treatment are to be held from Dec. 4 to 8.

A. W. Kendall, examiner, was clothed by the master with the livery of the society. The following were admitted to the freedom of the society by redemption:

H. L. Shepherd, A. D. Briscoe, R. L. Jillett, B. G. Parsons-Smith, G. E. W. Wolstenholme, Victor Dix, G. I. M. Swyer.

The following diplomas were granted:

D.I.H.—M. M. Abdel-Latif, D. E. Barton, R. E. W. Fisher, E. A. W. Marien, R. Murray, G. H. G. Southwell-Sander, J. Watkins-Pitchford.

L.M.S.S.A.—M. A. Abraham, S. N. Shenai, M. E. M. Grasse, J. C. Anderson, L. I. Norman, D. H. Le Clus, A. C. De Beer-Eksteen, C. R. Lynn.

Congress on Industrial Medicine

The tenth International Congress on Industrial Medicine will be held at Lisbon from Sept. 9 to 15, 1951, under the presidency of Dr. Alex Ribeiro da Cunha. Further information may be had from the Service de Relations Internationales, Institut National du Travail et de la Prévoyance, Praça do Comércio, Lisbon, Portugal.

Conference of the Social Services

The theme of the British National Conference on Social Work, which is to be held at Harrogate from April 19 to 23, is to be the respective rôles of statutory authorities and voluntary organisations. This will be studied through commissions on child welfare; social aspects of health, including mental health; rehabilitation and the care of the handicapped; social adjustment, including family counselling, problem families, and juvenile delinquency; community services, including recreation and informal education; and social aspects of town and country planning and of housing. The speakers will include Prof. J. C. Spence and Dr. Alice Stewart. Dr. Albertine Winner is to be chairman of the commission on social aspects of health. Further particulars may be had from Miss M. L. Harford, 26, Bedford Square, London, W.C.1.

International Congress on Asthma

The second International Congress on Asthma will be held at Mont-Dore on June 3, 4, and 5, under the presidency of Prof. Pasteur Vallery-Radot. Further information may be had from Dr. J. Galup, 59, rue Bonaparte, Paris VI.

Research Defence Society

On Friday, April 21, at 5.30 P.M., at 11, Chandos Street, London, W.1, Mr. A. L. Bacharach, F.R.I.C., will speak on the Production and Care of Laboratory Animal Stocks.

R.A.F. Reserves Club

This club, of which Sir Archibald McIndoe is a vice-president, would welcome as members doctors who are ex-R.A.F. officers. Further details may be had from the chairman of the membership committee, R.A.F. Reserves Club, 38, Hill Street, London, W.1.

Claims to Sickness Benefit

In England and Wales new claims to sickness benefit under the National Insurance Act during the weeks ended March 7, 14, 21, and 28 numbered 181,200, 188,600, 188,400, and 165,700; during the month the weekly average was 181,000. The weekly averages from March, 1949, to February of this year were: 185,200, 114,400, 97,700, 83,500, 78,600, 88,800, 100,900, 119,100, 136,200, 96,700, 154,900, and 178,100.

Employment of Nurses on Unauthorised Conditions

Hospital authorities have been advised that after April 30 no nurse or midwife may be employed in any hospital in the National Health Service except at the rates of remuneration, and on the conditions of service, authorised by the Minister of Health in accordance with recommendations of the Nurses and Midwives Salaries Committees or agreements reached by the Nurses and Midwives Whitley Council.

Inquests in London

At a meeting last Tuesday the London County Council received a report showing that 2089 inquests were held in the county during 1949. Altogether 1113 persons met their death by accident; 24 deaths resulted from injury and 30 from drowning; 14 deaths were found to be caused by want of attention at birth; and 13 deaths were caused by excessive drinking. Suicides numbered 462 (152 over the age of 60 years). A verdict of "death from natural causes" was returned in 314 cases.

Royal Society

On Thursday, April 27, Prof. H. D. Kay will describe the functions and scope of the National Institute for Research in Dairying, and on Thursday, May 18, Mr. F. Kidd the functions and scope of the Food Investigation Board. On Thursday, June 15, Dr. F. M. Burnet will deliver a Croonian lecture on the Interaction of Virus and Cell-surface. On Thursday, June 29, Prof. J. Z. Young will give the Ferrier lecture on Growth and Plasticity in the Nervous System. All the lectures will be held at the society's rooms, Burlington House, Piccadilly, London, W.1, at 4.30 P.M.

Mental Health Congress *in Eire*

A congress on mental health is to be held at the Hospital of St. John of God, Stillorgan, co. Dublin, on April 17, 18, and 19, in conjunction with the commemoration of the fourth centenary of the death of St. John of God. Dr. Alfred Torrie is to deliver the opening address on the Individual's Responsibility for Mental Health. Other speakers will include Dr. Leslie Hilliard, Dr. Richard Lavelle, Dr. F. L. McLaughlin, Dr. P. F. O'Brien, Dr. A. J. Devlin, Dr. M. M. Walsh, and Dr. Mary Mulvany.

Science and Food Rationing

A conference on this subject is to be held on Friday and Saturday, April 28 and 29, at University College, London. The aim of the conference is "to bring a greater sense of realism to the teaching of biology in relation to nutrition in schools, and to provide members of the general public with a better scientific understanding of food." There will be sessions on Science and Food Rationing, Food and Mankind, the Nutritive Value of the Average Family Diet, and Food Supplies—Future Prospects. The speakers will include Professor John Yudkin, M.D. Tickets for the conference can be had from the British Social Hygiene Council, Tavistock House North, Tavistock Square, W.C.1.

Royal Visit to Mill Hill

On Friday, May 5, the King, who will be accompanied by the Queen, will open the new building of the National Institute for Medical Research at Mill Hill.

Robert Jones Travelling Fellowship

The first award of this travelling research fellowship will shortly be made from the Robert Jones National Memorial Fund. Further particulars will be found in our advertisement columns.

New Hospital for Chronic Sick

The Wilderness Hospital at Mitcheldean, Glos, which was formerly an isolation or smallpox hospital, is now to be used for the accommodation of the chronic sick. There will be accommodation for 30 cases. The hospital is now to be known as The Mitcheldean Hospital.

National Marriage Guidance Council

The annual conference of the council will be held at Rustington Lido, near Littlehampton, from May 6 to 13. Further particulars may be had from the secretary of the council, 78, Duke Street, London, W.1.

Modern Microscopy

The Royal Microscopical Society and the Electron Microscopy Group of the Institute of Physics are holding an international convention on this topic at King's College Medical School, Newcastle upon Tyne, from April 18 to 21. The secretary of the convention is Dr. A. E. J. Vickers, Wynnstay, Millfield Road, Whickham, Newcastle upon Tyne.

International Conference of Social Work

A meeting of social workers and others engaged in social service will be held in Paris from July 23 to 28 to discuss *Social Work in 1950: its Boundaries and its Content.* Leaflets giving further information may be had from the Secretary, British National Committee, National Council of Social Service, 26, Bedford Square, London, W.C.1.

International Conference on Geriatrics

The first international conference of gerontological societies will be held in Liége, from July 9 to 12. Each society may send up to five delegates, and the delegates of the British Society for Research on Ageing are Prof. E. C. Dodds, F.R.S., (chairman of the delegation), Prof. J. B. Duguid, Prof. R. E. Tunbridge, Dr. Macdonald Critchley, and Dr. V. Korenchevsky. In addition to the presentation and discussion of the results of gerontological research, it is the purpose of this conference to establish an International Union of Gerontological Societies and to promote the financing of research in this subject throughout the world. Further information may be had from Prof. L. Brull, chairman of the organising committee, Hôpital Bavière, Liége, Belgium.

Births, Marriages, and Deaths

BIRTHS

CAYTON.—On March 27, the wife of Dr. H. R. Cayton—a son.

COHEN.—On April 2, at Preston, the wife of Dr. S. Cohen—a daughter.

DAVIES.—On March 29, at Abergavenny, the wife of Dr. T. G. Davies—a daughter.

DOWLING.—On April 4, at Bristol, the wife of Dr. Alexander Dowling—a daughter.

ELLIOTT.—On April, 2 at Oxford, the wife of Dr. John Elliott—a son.

FORBES.—On March 31, at Oxford, the wife of Dr. H. A. W. Forbes—a daughter.

GOODWIN.—On April 4, in Manchester, the wife of Mr. M. A. Goodwin, F.R.C.S.E.—a daughter.

GOW.—On March 28, at Crowborough, the wife of Dr. A. H. Ferguson Gow—twin sons.

MILNES.—On March 24, in London, the wife of Dr. J. N. Milnes—a daughter.

MORRIS.—On March 29, in London, the wife of Dr. David Morris—a son.

SELLICK.—On March 30, in London, the wife of Dr. B. A. Sellick—a son.

MARRIAGES

BROWN—PENNELL.—On April 1, at Seal, Kent, Kenyon Carnarvon Brown, M.B., to Sylvia Doris Pennell.

SUTHERLAND—CARLILE.—On April 1, at Burton-on-Trent, Charles Morrison Sutherland, M.B., to Mary Carlile, M.R.C.S.

DEATHS

BRADFORD.—On April 3, at Bridport, John Bradford, B.A., M.B. Camb.

FLEMING.—On April 1, at Robroyston, Glasgow, Janet Haddow Allan Fleming, L.R.C.P.E.

GRANT.—On March 24, at Cerrig-y-Druidion, North Wales, Lewis Grant, M.A. Aberd., M.D. Edin.

RILEY.—On April 3, at Broadstairs, Ronald Riley, B.A. Camb., M.R.C.S.

Diary of the Week

APRIL 16 TO 22

Monday, 17th

MAIDA VALE HOSPITAL, W.9
4.30 P.M. Dr. Russell Brain, P.R.C.P.: Opening address of the spring session.

HUNTERIAN SOCIETY
7.30 P.M. (Talbot Restaurant, 64, London Wall, E.C.2.) Mr. Peter Casson: Hypnotism.

Tuesday, 18th

SOCIETY FOR THE STUDY OF ADDICTION
4 P.M. (11, Chandos Street, W.1.) Dr. A. Spencer Paterson: Modern Techniques for the Treatment of Acute and Prolonged Alcoholism.

UNIVERSITY OF EDINBURGH
5 P.M. (Physiology lecture-theatre, University New Buildings, Teviot Place.) Dr. Douglas Guthrie: Science of Retrospection. (First of a series of lectures on A Retrospect of Medicine and Science.)

Wednesday, 19th

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
3.30 P.M. Dr. G. Scott Williamson: The Pioneer Health Centre.

Thursday, 20th

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Desmond Curran: Psychiatry lecture-demonstration.

SOCIETY OF MEDICAL OFFICERS OF HEALTH
5.30 P.M. (B.M.A. House, Tavistock Square, W.C.1.) Dr. Joan Taylor: Salmonella Infections in Humans and Animals.

HONYMAN GILLESPIE LECTURE
5 P.M. (Anatomy Theatre, University New Buildings, Teviot Place, Edinburgh.) Prof. L. S. P. Davidson: Physiological and Clinical Effects of the Pituitary Adrenocorticotrophic Hormone and the Adrenal Cortical Hormones.

Friday, 21st

FACULTY OF RADIOLOGISTS
2.15 P.M. *Diagnosis Section.* (Royal College of Surgeons, Lincoln's Inn Fields, W.C.2.) Dr. J. C. H. Mackenzie: Chest X Rays in Infectious Diseases. Dr. J. D. Dow: Venography in Varicose and Post-phlebitic Ulceration. Dr. E. Hanson: [illegible]

WEST LONDON MEDIC [illegible]
8 P.M. (Hammersm [illegible] oad, W.12.) *Clinical* meeting.

MIDDLESEX COUNTY MEDICAL SOCIETY
3 P.M. (Central Middlesex Hospital, Acton Lane, N.W.10.) [illegible]

ROYAL [illegible] 16, Princes Gate, S.W.7
7 P.M. [illegible] *B. Brain*, F.R.P.S.: Dental Microscopy and its Photography.

Appointments

*CHARRETT, M. A., M.R.C.S., D.P.H.: M.O.H., Slough, and area M.O., South Bucks.

CRAN, EVA, M.A., M.B. Aberd., D.P.H.: asst. divisional M.O., public-health department, London County Council.

MACKENZIE, K. G. F., M.A., M.B. Camb., F.R.C.S.: consultant asst. surgeon, North West Durham group of hospitals.

* Amended notice.

Appointed Factory Doctors:

CROMARTY, J. W., M.B. Edin.: Stromness district, Orkney.
HAMILTON, J. N., M.B. Glasg.: Lovenwick district, Shetland.
KERR, W. A., M.B. Glasg.: Fleetwood district, Lancs.

CORRIGENDA.—*Fig.* 4 in Professor Stammers's article (*Lancet*, April 1, p. 604) was reproduced by permission of *Surgery, Gynecology, and Obstetrics.*

Diagnosis of diabetes insipidus.—Our report (April 1) of this discussion by the endocrinology section of the Royal Society of Medicine did not make clear the test devised by Dr. A. A. G. Lewis and Dr. T. M. Chalmers.

In this test the antidiuretic response to nicotine is calibrated in terms of the milli-units of pitressin needed to produce an inhibition of diuresis of the same duration. Every subject is given a water load of 1 litre and empties his bladder every 10 minutes. Arbitrarily, the time of inhibition is taken from the end of the infusion or inhalation to the time when the urine flow returns to the level of 10 ml. a minute. This procedure is then repeated, substituting a measured intravenous dose of pitressin for the nicotine. In any one subject there is a linear relation between the duration of inhibition after pitressin and the logarithm of the dose; and by giving different doses of pitressin on two occasions, the dose-response curve can be constructed and the antidiuretic response to nicotine evaluated in terms of milli-units of pitressin. Subjects with a normal supraopticohypophyseal system give responses greater than 100 milli-units of pitressin, provided enough nicotine is given to produce definite malaise. In subjects with a damaged supraopticohypophyseal system the response is less than 10 milli-units of pitressin.

THE OPEN WOUND IN TRAUMA

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I. The Case for Early Closure

AT the beginning of this century, following the work of Friedrich in 1898 on the early excision of recent wounds, surgeons began to reduce the high incidence of serious infection associated with open wounds and fractures by primary excision and closure. Conditions in the early years of the first world war, however, were such that primary closure was not attempted, and the dire consequences of grave infection were again evident until surgeons began to treat the wounds by excision and delayed primary closure.

The success of this technique in the last two years of the war was largely forgotten in the inter-war years, and the practice of leaving wounds open was encouraged by the publication in 1939 of Trueta's work on the closed-plaster treatment applied to open fractures. His advice perhaps obscured the greater value of complete skin cover provided at the earliest possible moment. As Cleveland (1946) points out:

> "At the outset of this war, our surgeons were dominated by the closed-plaster technique of treatment of compound fractures. This invites infection of bone and soft tissue and healing ensues slowly by second intention, with massive granulations which developed into scar tissue. . . . So firmly ingrained was the idea of closed-plaster technique, that it was not a little difficult to persuade the medical officers at first to attempt closure of these compound fractures."

Trueta (1949) now says: "since penicillin came to the help of the surgeon, no well excised wound ought to be left open for more than 8–10 days for fear of sepsis after its closure. And it is the duty of the surgeon to effect this in every case." There is still, however, considerable confusion.

In this paper I shall recommend primary closure of the open wound in civilian accident surgery, believing that the dangers of added infection incurred by leaving a wound open are far more serious and far-reaching than those of primary closure. I shall show that added infection of an open wound, such as a burn, can be prevented by an elaborate technique, and shall suggest that if, for technical reasons, a wound cannot be closed at once, this technique must be applied until closure can be achieved by skin.

There is little in this paper that is new, but the results of much recent work have not been fully applied and the practice of immediate closure is still not universal. Böhler (1935), for over twenty years, has taught the principles which will be discussed here, and produced in 1926 results which have seldom been bettered, in spite of the additional security afforded by modern bacteriostatic agents. Gissane (1939) has advocated and practised these principles in this country for over ten years with equally good results.

There is no need to differentiate between the treatment of an open fracture and an open wound of soft tissues, for one is merely an extension of the other. The argument for early closure applies to any deep tissue exposed to the air. It is true that the effects of added infection are more serious where a fracture complicates the open wound, but the bacteriological and clinical evidence is as valid for the open wound as it is for the open fracture. From what follows it will be clear that the proper treatment of open wounds is a time-consuming matter, and for this reason adequate space, theatre, and staff are essential in every casualty department. No-one, for example, can treat an open fracture of a long bone properly in much under one hour of theatre time, and it may well take two or more hours. It is an emergency operation which cannot wait till the end of a list of strangulated herniæ, appendicectomies, and the like in the general theatre.

CONTAMINATION

Generations of surgeons have tried to prevent putrefaction and gangrene after war wounds, and since 1879, when Pasteur published his work on micro-organisms, it has been assumed that all open wounds caused by trauma are contaminated with pathogenic organisms. In his book Trueta (1943) contributes no evidence that this is so; but his technique of wound surgery is apparently based on a belief in such contamination, and he ranks the provision of drainage as one of the principles in his five-point programme—namely, (1) prompt surgical treatment, (2) cleansing of the wound, (3) excision of the wound, (4) provision of drainage, and (5) immobilisation in a plaster-of-paris cast. Though I shall produce evidence that in fact open wounds are *not* commonly contaminated by dangerous organisms at the time of injury, this does not mean that I am questioning all Trueta's five points. Prompt surgical treatment, cleansing, and excision are vital parts of the treatment: moreover, where the open wound is large or complicated by fractures, plaster immobilisation is invaluable, and the meticulous care and attention to detail stressed by Böhler and Trueta are essential to success.

If, however, a wound is not initially contaminated by pyogenic organisms, the provision of drainage is not necessary, and it may even be harmful, for infection may enter through the open wound. Furthermore, if infection is present, as Sir Almroth Wright proved, "so long as the wound remains open the infection is never extinguished, and washing and dressing impose only a temporary restriction upon bacterial growth." By a beautiful series of simple experiments Wright showed that the leucocytes can rapidly sterilise a wound when they are concentrated by apposition of its walls and by the elimination of dead spaces. "The proper principle when dealing with a wholesome wound is to close in order to sterilise, instead of using antiseptics with a view to closing."

INFECTION

It has been taught that contamination becomes infection through the multiplication of pyogenic organisms and their invasion of the tissues. The fact that infection sooner or later occurs in almost every case of traumatic wound left open has been adduced as evidence of this process, and variation in the interval before its onset has been attributed to variation in the virulence of the organisms or the immunity of the tissues or to delayed growth in the species.

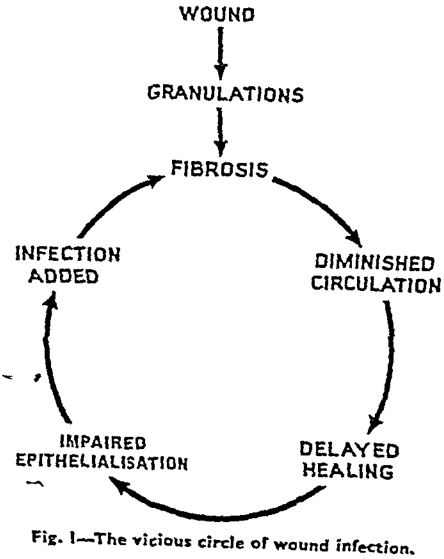

Fig. 1—The vicious circle of wound infection.

There is no doubt that infection is the most dreaded complication of any open wound. Not only may it threaten life and limb but it always delays healing and increases fibrosis. The vicious circle of wound infection is well known: Marquis Converse (1941) and others have described it many times (fig. 1). Granulation tissue becomes fibrous tissue, which contracts and cuts down the blood-supply: poor vascularity delays epithelialisation and permits added infection through the ulcer, which in turn produces more granulation tissue, fibrosis, and so on. As Colebrook, Duncan, and Ross (1948) put it, " the wound did not heal, because it was infected; and it remained infected, because it did not heal."

Fibrosis is the enemy of function. Any wound which is left to " heal from the bottom " or which has become infected, heals by second intention—i.e., by the formation of granulation tissue, fibrosis, and epithelialisation. Late split-skin grafting over granulation tissue is open to the same objection—fibrosis and contracture—and granulation tissue and fibrous tissue should be removed where possible before grafting. If we want full function and a soft supple scar, we must avoid fibrosis; and to achieve this the wound must be made to heal by first intention and without infection.

THE EVIDENCE FROM WOUND BACTERIOLOGY ON ADMISSION

What is the evidence for the statement that wounds are not commonly contaminated by pathogenic organisms at the time of injury? Colebrook, Duncan, and Ross (1948) showed in the burns unit of the Birmingham Accident Hospital that over 90% of 734 recent burns and scalds were completely free from pathogens on admission; indeed, if we exclude cases burned more than a few hours previously, the proportion is almost 100%. Many workers have demonstrated that about four-fifths of all recent wounds are free from pathogenic organisms (table I) and that in most of the others a few colonies of *Staphylococcus aureus* constitute the only danger—these being mainly in the 10–20% of people who are normally skin carriers of this organism (Miles et al. 1944, Williams and Miles 1945, Williams 1946). Admittedly, bacteria can be found in every wound, and the distinction between pathogens and non-pathogens is not clear cut; but, broadly speaking, the organisms now recognised as capable of causing sepsis by invasion of tissues are the coagulase-positive *Staph. aureus, Streptococcus pyogenes, Pseudomonas pyocyanea,* and *Proteus vulgaris.* The last two are seldom found ab initio; they are later additions.

On bacteriological grounds it can be stated that the *immediate closure of the recent open wound is safe* provided the wound is free from all dead or dying tissue which could act as a nidus for the growth of pathogenic organisms, including anaerobes.

THE EVIDENCE FROM EXPERIMENTAL PATHOLOGY

The work of Sir Almroth Wright (1919) goes further than this, for he proves that even where there is moderate contamination and infection the wound can combat this best when it is closed. In 1919 he said: " if he [the surgeon] provides the requisite conditions—and he does provide them when he excises all devitalised and heavily infected tissues and brings together the walls of the wound—the protective mechanism of the body can, without any antiseptics, deal successfully with every kind of infection."

TABLE I—WOUND BACTERIOLOGY ON ADMISSION

Author	Material	Age of wounds (hours)	Wounds free from pathogens* (%)
Colebrook, Duncan, and Ross (1948)	734 recent burns and scalds	—?	90
Williams and Miles (1945)†	432 fresh lacerations of hands	0·6	78·2
Hare and Willitts (1942)	355 fresh wounds	2	90
De Waal (1943) ..	708 fresh wounds	10	80
Altemeier and Gibbs (1944)	99 fresh wounds	3	*c.*90
Cooper and Williams (1945)	134 fresh wounds	0·6	80
Bentley and Thompson (1945)	100 war wounds	?	49

* Organisms regarded as pathogenic include the coagulase-positive *Staph. aureus, Strep. pyogenes, Ps. pyocyanea,* and *Proteus vulgaris.*

† In cases contaminated only with *Staph. aureus* a few colonies were grown.

TABLE II—WOUND HEALING BY FIRST INTENTION

Author	Material	% healing by first intention	
		Immediate closure	Delayed primary closure
Ehalt and Bohler (1926)	127 open fractures	86·6	..
Davis (1948)	150 open fractures	87	..
Birmingham Accident Hospital	95 open fractures of tibia	95	..
Stammers (1948) ..	180 war wounds	90	..
Hendry (1945) ..	166 open fractures of war	..	90
Cleveland and Grove (1945)	5042 open fractures of war	..	93
Edwards (C.M.F. figures) (1945)	343 war wounds and fractures	..	94
Lawrence and Sturgis (1946)	1110 war wounds and fractures	..	84·4
Brown (1945)	721 war wounds	..	91·4
Bentley (1944) ..	200 war wounds	..	95
Murray (1945) ..	729 war wounds	..	85
Wilson (1945)	224 war wounds	..	96
Churchill (1944) ..	c.25,000 war wounds (clean on gross appearance)	..	c.95
Kirtley and Trabue (1944)	217 war wounds	..	92·7
Farris and Jones (1947)	725 war wounds	..	96

In all these cases healing was said to be satisfactory, though in a small proportion the scar was " moist " for a few days. The majority of war wounds were dusted with sulphathiazole and/or penicillin powder.

From his research at Boulogne during the first world war he advocated closure of wounds (after excision) in order to eliminate any residual bacterial infection. His principles are so true today that they are worth repeating in his words:

> " (1) The procedure here enjoined is that which nature herself employs. She extinguishes the wound infection only by closing the wound.
>
> " (2) There is in the modus operandi of closure employed by nature one outstanding defect. The epithelium grows in only very slowly from the edges of the wound. In consequence of this dilatory ingrowth the bacterial infection will in extensive wounds persist for indefinitely long periods, with the result that contracting scar tissue takes the place of the normal epithelial covering.
>
> " (3) By artificial closure, whether by suture, by drawing together of the edges by strapping, or by skin grafting, the wound is promptly sealed, with the result that the bacterial infection is rapidly extinguished and the formation of scar tissue is avoided " (Wright 1933).

THE EVIDENCE FROM PRACTICE

Is the evidence from bacteriological study and experimental pathology supported by practice? Ehalt and Böhler (1926) achieved 87% primary healing in 127 open fractures closed at once. Davis (1948) in Pennsylvania has reported 87% first-intention healing of wounds in 150 compound fractures.

Between 1941 and 1948 at the Birmingham Accident Hospital, 95 open fractures of the tibia and fibula were treated. Of these, 85 were closed at once and only 4 became infected (5%). The 10 treated by the Trueta technique all became infected.

Cleveland and Grove (1945) reported 93% successes with delayed primary suture in over 5000 open fractures from the battlefields of Europe—cases believed to be the most seriously contaminated of all. Kirtley and Trabue (1944) record the same rate of successful healing; Farris and Jones (1947) produced 96% successful healing in 725 wound closures, whether local chemotherapy was used or not, and Churchill (1944) reported about 95% successful healing in 25,000 war wounds closed by delayed primary suture, selected on gross appearance only. If they were still clean at five days then they could, under other circumstances, have been closed on the first day (table II).

In war, under field conditions and the pressure of work, delayed primary closure is the right treatment still : *in civilian surgery primary closure is safe in most* accidents. Greater judgment is needed with injuries from direct violence, for contamination is found mainly in this group. With multiple injuries, where shock may dominate the clinical picture, the general condition of the patient may preclude a long operation. In these cases, and in some with gross soft-tissue loss or damage, immediate excision and delayed primary closure may be the right treatment. Individual surgeons will have to judge whether the facilities in their hospital make delayed primary closure necessary, but casualty departments will have to be improved until immediate excision and suture is possible in every case where the wound permits it.

THE EVIDENCE OF THE DANGER OF ADDED INFECTION

Is it, however, as safe to leave a wound open ? Is hospital infection—airborne and added infection—a myth or a most serious danger ? Added infection can occur only where there is a wound to add it to.

The work of Miles et al. (1940), McKissock et al. (1941), Bourdillon and Colebrook (1946), Colebrook et al. (1947), and a multitude of others on hospital infection has shown that a great reservoir of pathogenic organisms exists in every hospital—on blankets, dirty dressings, wounds, and the skin and noses of patients and staff alike—and these workers have described in detail the elaborate techniques necessary to prevent these organisms from reaching the open wound, where they can cause infection.

Atmospheric or airborne contamination from this reservoir can be blamed for much of the added infection which occurs. Such contamination can very easily be studied by the Bourdillon et al. (1941) slit sampler in which the air which is suspect is passed through a slit at a known volume per minute. Beneath this slit a blood-agar plate or other suitable medium is slowly revolving. This plate is then cultured. Slit sampling the air of wards, dressing-stations, and operating-theatres has demonstrated high atmospheric counts of pathogenic organisms after disturbance of blankets, pyjamas, and dirty dressings, and after sweeping, bed-making, and walking (fig. 2).

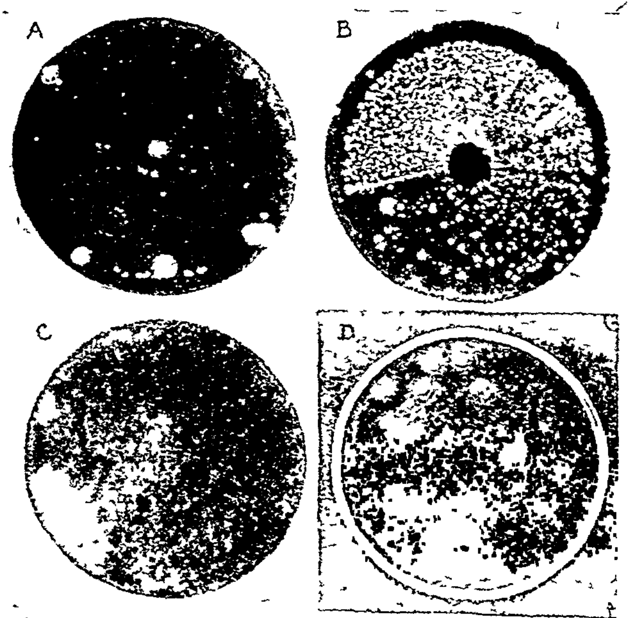

Fig 2—" Bacteriograms " showing air contamination by organisms.
(A) Clean air in the burns dressing-station after slight traffic in the room (1·18 organisms per c. ft.).
(B) During removal of bandages of a clean shoulder burn (67·5 organisms per c. ft).
(C) Air free from organisms in air-conditioned dressing-room 15 minutes after removal of patient (0·12 organisms per c. ft.).
(D) Air contamination with *Proteus vulgaris* from infected case.

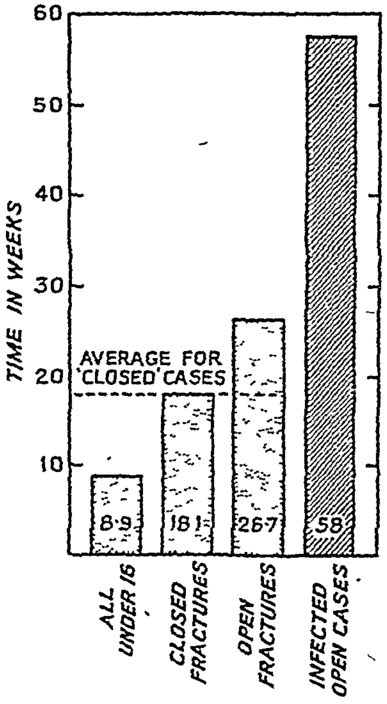

Fig. 3—Average times for union in 217 tibial fractures treated at the Birmingham Accident Hospital, 1941-45.

The shower of pathogens released into the air hovers and slowly settles, readily infecting an exposed open wound or landing on a plaster or bandage. Owens (1943) and Colebrook and Hood (1948) proved experimentally that a dressing or plaster soaked with tissue fluids acts as a semi-solid culture medium through which pathogens can grow in a few hours. De Waal (1943), who showed that only 19% of all wounds on admission contain pyogenic staphylococci, found that 86% of all wounds left open, and 67% of all burns, became infected during treatment, and he also found that wounds treated by first-aid " cleaning " were much more often contaminated than wounds merely covered with a sterile dressing.

Orr-Ewing et al. (1941) made a careful bacteriological survey of wounds treated by the Trueta technique in plaster and found new flora between the third and twelfth day in every case. They *concluded that these were* initial contaminants with delayed growth, but they did not prove that the organisms did not grow through the dressing ; and it can be assumed that these were in fact all examples of added infection. Wilson (1945) obtained healing without infection in 85% of cases sutured under ten days, but in only 38% of those sutured after ten days, and he found that the higher proportion of failures was due to infection. De Waal (1943) noted that 34 out of 38 wounds treated in closed plaster became infected during treatment.

The 14 cases (10 ab initio and 4 which broke down) of open fractures of the tibia and fibula treated at the Birmingham Accident Hospital by the Trueta technique all became infected ; they took on an average fifty-eight weeks to unite, and 1 died after a year, from infection. In the remainder of the open fractures treated the average time for union was twenty-six weeks (fig. 3). Arnaud et al. (1939), analysing 600 cases treated by the Trueta technique in the Spanish war, record that about half the patients—and all the open *femoral fractures*—suffered from infection, deformity, osteomyelitis, and delayed union.

Eighty years ago added infection was expected to follow every open wound and operation : hospital gangrene made the decision to operate into a death-warrant. Today we criticise our work carefully every time a clean wound fails to heal.

We do not expect infection in a clean wound we have closed. This statement stands in strong relief against the absolute certainty of infection in a wound we have left open, unless we are prepared to enact the careful ritual in bacteriologically clean, air-conditioned dressing-rooms and operating-theatres which the prevention of airborne added infection demands (Bourdillon and Colebrook 1946).

EARLY CLOSURE OF WOUNDS

The evidence suggests:

1. That most wounds are clean on admission, and that after prompt and careful excision of devitalised tissue immediate closure is safe whether the wound is complicated by fracture or not.
2. That such early closure is desirable because healing is more rapid and fibrosis thereby cut to a minimum. Function is thus more completely restored and painful scars are eliminated.
3. That, because of the great danger of added infection unless elaborate precautions are taken, early closure is imperative if life and limb are to be saved.

This plea for early closure of the open wound is no academic matter: every day many hundreds of lacerations—some small, some large—are sustained by men and women at work in industry and in the home, many of them being injuries of the hand; open fractures are common, and the largest open wound of all, the burn, is a frequent occurrence. The cost of these injuries in suffering, in lost time, and in hard cash is enormous.

It is the doctor's duty to his patient and to the community to minimise them so far as he can. It is possible by careful excision and closure of wounds at least to halve the time needed for the treatment of simple lacerations, and we cannot ignore the difference between twenty-six weeks for union in the open fractures of the tibia which were closed, and fifty-eight weeks (with 1 death in 14 cases) where the wound was allowed to remain open.

PRINCIPLES OF TREATMENT OF THE OPEN WOUND

I would urge that the five principles of treatment of the open wound enunciated by Trueta should be modified. In the light of experience, and where the conditions are suitable in civilian surgery, traumatic open wounds, whether complicated by fracture or not, should be treated on the following principles:

1. Prompt surgical treatment.
2. Cleansing of the skin around the wound.
3. Excision of devitalised and non-viable tissue.
4. Immediate closure by suture or skin graft.
5. Abolition of dead spaces by firm pressure-dressing, and plaster if necessary.

I believe that if these principles are universally adopted infection will almost disappear, the lifelong misery of chronic osteomyelitis after an open fracture will be abolished, wounds will heal more quickly, fibrosis and deformity will be minimal, and function will be maximal.

II. The Technique of Early Closure

THE FIVE REQUIREMENTS

1. *Prompt Surgical Treatment.*—No-one will dispute that surgical treatment should be given at the earliest possible moment after trauma. Bohler stated that in cases first seen after six hours primary excision and closure was not advisable. With the evidence of the bacteriological picture at various stages after the infliction of the wound (Pulaski et al. 1941, Cooper and Williams 1945) and the experience of delayed primary closure, it is apparent that this interval can be safely prolonged to twenty-four hours or even more. A screen of systemic penicillin renders this safer and the need to prevent added infection makes it permissible to run the risk of a "moist" wound which takes a few days longer to heal. After twenty-four hours, when added infection by pyogenic bacteria has almost certainly occurred, excision and delayed primary closure is the better treatment.

2. *Cleansing the Skin around the Wound* is a most important part of the procedure. It has been shown that 1% cetrimide (C.T.A.B.) is a very efficient means of preparing the skin in the theatre for immediate operation. It is an excellent detergent for oil, grease, and road dirt, and thorough cleansing with cetrimide for four minutes will leave the skin clean and sterile (Williams et al. 1943, 1944). Repeated application tends to cause scaling and dryness with delayed healing; so it is not suitable for a forty-eight-hour preparation. Sensitivity has been reported but is very rare (Cruickshank and Squire 1949).

3. *Excision of Devitalised Tissue.*—The technique of wound excision is so well known that detailed recapitulation is unnecessary. What is essential is to provide a viable bed of healthy living tissues from which all dead and devitalised material which could act as a nidus for infection has been removed. Surgeons agree that the commonest cause of failure in delayed primary closure is residual dead tissue in the wound (Arnaud et al. 1939, Churchill 1944, and others). Local sulphonamides appear to contribute nothing to success in primary closure, except a false sense of security; if they are relied upon to the detriment of excision, they lead to worse results (Churchill 1944, Meleney 1945). Local penicillin is, however, of value in war wounds (Mason Brown 1944), and we may reasonably assume that this holds true for civilian practice.

From the practical point of view, however, the problem is not so simple. At the time of operation it is often extremely difficult to decide what tissues are in fact viable. This is particularly true of muscle, where necrosis may result from local damage to, or from remote interference with, the blood-supply. Late swelling may place in jeopardy the circulation in a muscle, or part of a muscle, which is living at the time of the excision. Our knowledge of the exact anatomy of the blood-supply to each muscle is scant, and the effect on the muscles of interference with the circulation in individual vessels—by trauma, spasm, or pressure—is largely unknown. The need for further study is great; for dead muscle or parts of a muscle must be accurately localised and excised if success in the treatment of a wound by any means is to be ensured, and if the danger of gas-gangrene is to be eliminated. Until we have more knowledge, we must depend upon loss of contractility and failure to bleed; though each of these guides is unreliable. In recent cases alterations in colour are not always observed, even when the whole muscle is dead.

4. *Immediate Closure by Suture or Skin Graft.*—Closure of the wound is accomplished by interrupted silk sutures, placed close together and carefully inserted to provide edge-to-edge apposition of the skin. No tension must be present, especially over bone, and if swelling or skin loss prevents closure without tension then closure must be achieved by other means.

5. *Abolition of Dead Space and Prevention of Post-traumatic Œdema by Pressure-dressing.*—The abolition of dead space, and the control of œdema, by means of carefully applied pressure-dressings of crêpe bandage over quantities of wool is a most important part of the procedure (Blair 1924). Elevation of the part concerned is essential during the first few days. The value of even pressure after trauma is another of the great lessons we have re-learned during the late war.

TREATMENT OF WOUNDS WITH SKIN LOSS

When damage or actual loss of skin complicates the open wound, even the surgeons who normally close their wounds often abandon their principles, speak glibly of contamination or drainage to cover their discomfiture, and then leave the wound open to heal as best as it may. Healing under these conditions, even if infection can

Fig. 4—Transposition flaps to close small skin defect in open fracture of tibia, with split-skin grafting of secondary defect.

be avoided, is always by fibrosis and is long delayed. Open wounds, with or without a fracture, where skin has been lost must still be closed at once, and it is worth considering the various ways in which this can be done.

Split-skin Graft

The simplest, safest, and most certain way of covering a skin defect is always a split-skin graft, and such a graft will take on any viable bed which does not have in its base :

(*a*) cortical bone deprived of periosteum (a split-skin graft will take on living cancellous bone) ;
(*b*) tendon deprived of paratenon ; or
(*c*) cartilage (though a thin split-skin graft will even bridge about 4 mm. of this—e.g., an intertarsal joint).

These grafts should be cut thin, unless a thicker graft is particularly required ; they should be applied to a living bed, pressed home with firm pressure by wool pledgets containing paraffin or saline solution, and covered with wool and a crêpe bandage. Where the surrounding tissues are normal the graft should be sutured into place. It is most important to see that the graft is cut much larger than the wound to be covered ; for by the time it has been pressed into every crevice the excess will be taken up, and cover without tension will still be achieved.

The main causes of failure in split-skin grafting are :

1. A non-viable bed after inadequate excision.
2. Hæmorrhage beneath the graft. This is often encouraged by imperfect apposition when too small a graft is stretched over the wound.
3. Failure of immobilisation until the graft has taken.

The split-skin graft may not be suitable as a permanent cover, for one reason or another : the site may be subject to heavy wear and tear, the graft may be unsightly, or further operations such as arthrodesis or tendon-grafting may be necessary beneath it for functional reasons. At two or three weeks from the injury, other things being equal, the split-skin graft may be replaced by a flap graft or pedicle with certainty of minimal fibrosis and an absence of infection.

Corachan (1933), Reverdin, and Wolfe grafts are not suitable for the recent wound.

Split-skin grafts are so useful for a multitude of purposes that the acquisition of skill in cutting them should be an essential part of the training of every medical student. The technique presents no difficulty that practice and a really sharp knife cannot overcome.

Transposition Flaps

In the limbs this method is of limited value for acute trauma and is suitable for only small defects. Damage to the circulation and soft tissues of the limb always extends far more widely than the area of the wound, and this disturbance of normal physiology and blood-supply jeopardises the viability of the skin during the acute stage of the injury. It is dangerous to take any liberties with skin at this time, for large areas may slough as a result. Relieving incisions, placed well away from the wound to avoid necrosis of the bridge, are a form of transposition flap which will sometimes allow closure of the skin over bone ; but where it means that the surgeon increases the undermining caused by the trauma, this method should probably not be used. The secondary defect over muscle can be grafted with split skin. Undermining the skin to the extent suggested by Otto (1947) is not safe in acute trauma. Alternatively the defect can be extended by curved incisions with as large a radius as possible and the flaps so formed rotated slightly on their base (fig. 4).

Flap Grafts

There is undoubtedly a place for the immediate flap graft from leg to leg, or (rarely) from abdomen or arm to arm ; so the surgeon who treats wounds should be familiar not only with the technique but also with the complications and dangers in acute cases. There is no other means of getting early closure, for example, in the severe open fracture of the leg with extensive skin loss or destruction, where after excision of non-viable tissues and skin a grossly unstable fracture lies widely exposed. Such a fracture can first be stabilised with a plate, and a cross-leg or cross-arm flap can be applied with as wide a base as possible. In acute trauma a base-length ratio of at least 2 to 1 is essential if the flap is to take successfully, and skin should be sacrificed to allow these proportions. At the Birmingham Accident Hospital 4 such cases have been done in the last eight years, but it is possible that with increasing technical knowledge more severely injured limbs (particularly upper limbs) will be saved by this means (fig. 5). It

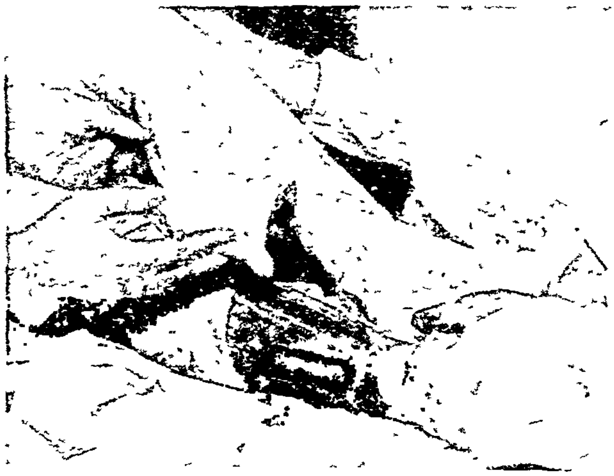

Fig. 5a.

Fig. 5b.

Fig. 5—(*a*) Primary plating and cross-leg flap to unstable fracture of tibia and fibula with considerable skin loss. (*b*) First-intention healing of wound. Union of fracture in ten weeks. Symptom-free since discharge two years ago.

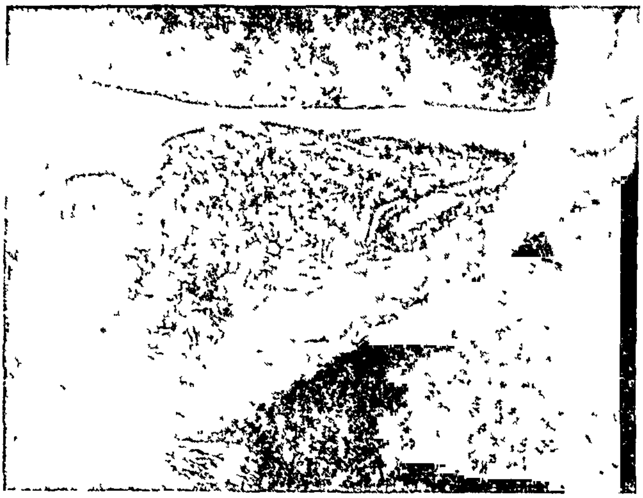

Fig. 6a.

must be emphasised, however, that performance of a cross-leg or cross-arm flap two or three weeks later, the wound having been closed initially by a Thiersch graft, is much safer, more desirable, and easier (fig. 6). The technique for these flaps has been well described by Braithwaite and Moore (1949).

In suitable cases, however, small flaps to the ends or sides of fingers following traumatic amputations are well worth while. The flap is applied with the same attention to detail as the larger ones, including thick split-skin grafting of the donor area and the careful suture of the return flap so that no bare area is left. Such flaps can be fashioned from the adjacent skin of palm or finger (which provides the best-quality cover) or from the skin over the extensor mass of the opposite forearm.

PROBLEM OF "DEGLOVING" OR POTENTIAL SKIN LOSS

With extensive degloving or stripping of the skin from the subcutaneous tissue, where the separated skin retains a limited attachment, it is hard to know how much of the flap will survive. The problem is to decide whether such skin should be scrapped on sight, or replaced on the chance that some or all may live. It is well to remember that even dead or dying skin will act for a time as a barrier to added infection, though it will *not* prevent the formation of granulation tissue between the living and dead tissues. An arm caught in rollers may, by a violent twisting movement applied to the skin, be effectively degloved without an external wound of any sort. In such a case, of course, swelling of damaged muscle and hæmatoma formation may destroy by pressure the last chance of skin survival unless the pressure is relieved. There are no hard and fast rules about the survival of degloved skin: a bleeding edge may or may not denote survival (for thrombosis in the base may occur later), and a flap which does not bleed may live in its entirety or in part. In one case of extensive degloving of the leg in a child we observed survival of degloved subcutaneous tissue and fat with death of the overlying skin. Greater experience may lend inspiration to a guess; but, in general, degloved skin should be sutured back into place in preference to excision unless conditions for immediate replacement are very suitable.

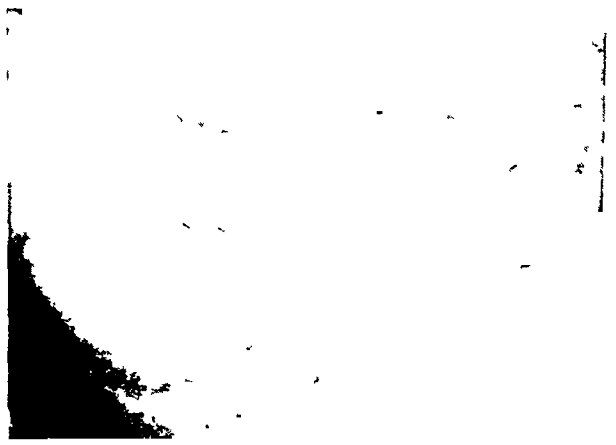

Fig. 6c.

Fig. 6—(a) Dirty wound of foot with skin loss, exposing joints, treated by primary split-skin graft. (b) Replacement by pedicle graft completed at sixteen weeks (c).

THE MAJOR HAND INJURY

Injury by power-driven saws, the guillotine, or the power-press often produces a severely damaged hand in which form has been irretrievably destroyed. The provision of skin cover is the surgeon's first duty, but in achieving it he must bear future function in mind. By ingenious exploitation of tags of surviving skin, by filleting damaged fingers which can be spared, he can often provide a hand in which the vice action of gripping and the pincer action of apposition are represented. Ruthless amputation is wrong, but the sacrifice of damaged digits to provide skin cover for essential function is justified (Evans 1949).

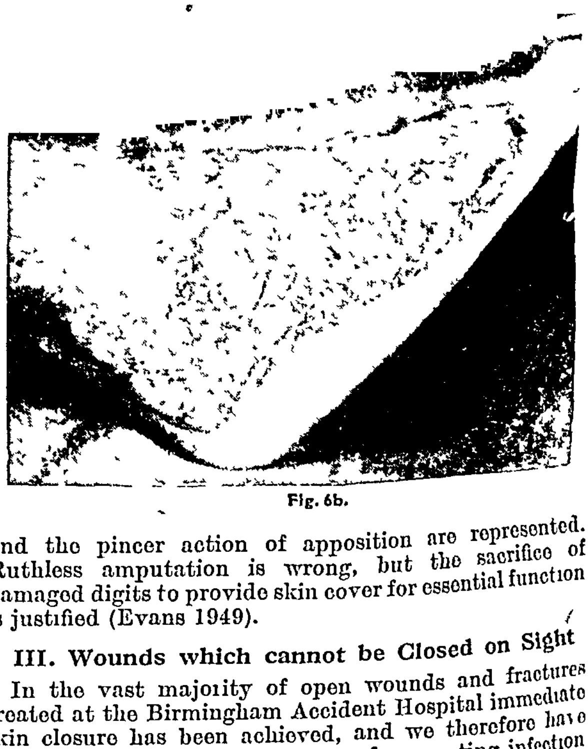

Fig. 6b.

III. Wounds which cannot be Closed on Sight

In the vast majority of open wounds and fractures treated at the Birmingham Accident Hospital immediate skin closure has been achieved, and we therefore have little experience of the problems of preventing infection in open fractures treated without closure. Nevertheless the Burns Unit has shown conclusively the value of preventing added infection in burns (Colebrook et al 1947, 1948) and details of the technique of prevention have been published. For all practical purposes the burns with partial skin loss, and those cases of whole skin loss in which primary excision and closure by graft is not done, can be regarded as open wounds. In them, as in open fractures, the protection afforded by the intact epithelium against infection has been lost. It is logical, therefore, to argue that a technique applicable to burns applies equally to the open wound.

It has been proved that infection of a burn during healing can be largely prevented. Colebrook and Hood (1948) point out that a fourfold attack is necessary.

1. No pathogens must be allowed to reach the wound at the time of dressing.

2. No pathogens must be allowed to reach the wound between one dressing and the next.
3. The reservoir of pathogens in the wards must be kept as low as possible (by eliminating them from the wounds which have them).
4. Raw surfaces must be reduced by early grafting.

These four principles are as true for the open wound as they are for the burn; but, their application in practice, as achieved in the Burns Unit at the Birmingham Accident Hospital, involves moderate expense, devoted and unremitting care, and unlimited patience.

Prevention of Infection During Dressings.—A very careful no-touch technique is practised, but recognition of the danger of airborne infection, and the provision of an air-conditioning system to prevent it, has proved so strikingly successful that its use elsewhere is now fully justified both for dressing-stations and for operating-theatres. The principle of flushing out all organisms mechanically by an abundant stream of filtered air is discussed fully by Bourdillon and Colebrook (1946). The evidence is now such that there can be little excuse for failing to guard against added infection by this means wherever open wounds are exposed.

Prevention of Infection between Dressings.—Perfect cover of a wound is always difficult to maintain; in fact Colebrook et al. (1947) stated that "the incidence of added infection in burns which were found to be imperfectly covered when they arrived for re-dressing was ten times as high (8·6%) as that of the burns which had perfect cover throughout the period between dressings (0·8%)." In view of the experimental evidence of Owens (1943) and Colebrook and Hood (1948) that organisms can grow rapidly through a soaked dressing or plaster, it can no longer be accepted that closed dressings or plasters provide safe protection against added infection, for the majority become stained with blood and tissue exudate. Recently, however, a semi-permeable membrane has been devised of such a molecular structure that organisms cannot, but water vapour can, pass freely through it (Bull et al. 1948). This 'Nylon' derivative, at present undergoing clinical trials, can be sealed to the skin round the wound under the dressing and should act as an effective barrier against organisms. Its permeability to water vapour prevents sogginess and maceration of the skin.

Elimination of the reservoir and reduction of raw surfaces have been discussed earlier.

IV. Conclusions

The evidence in favour of early excision and primary closure of traumatic open wounds and fractures is overwhelming. The experiences of all who have practised it, and the scientific data accumulated to prove its safety and desirability, cannot be ignored. There is no doubt that delayed primary closure is the correct treatment both in war and in certain conditions of civilian life; but the provision of a whole healthy skin must be the surgeon's most urgent task. Until the wound has healed, restoration of function cannot begin, and if healing is delayed, or accompanied by infection or fibrosis, then crippling deformities and stiff joints may be the immediate sequelæ.

The argument for careful excision and early closure applies to every open wound, be it a small laceration or a massive open fracture with extensive skin loss: until the skin is healed no reconstructive surgery or restoration of function can be started. Every minute a wound is left open increases the risk of added infection, with its danger to future function, to the life of the limb, and even the life of the patient.

In major and minor hand injuries fibrosis from healing by second intention will inevitably interfere directly with function, and there is no more potent cause of frozen useless hands than chronic infection and immobilisation. Primary healing is the sine-qua-non of full function after hand injuries.

The burn with partial thickness cannot be closed at once; yet infection can be avoided, provided that faithful and loyal attention is given to every detail of the elaborate technique which alone can prevent it. In peace-time it is rare to encounter an open wound which cannot be closed at once; but when this happens it should be treated by the same technique.

Skin is the only safe barrier to added infection—it is the barrier nature has designed for this purpose—and deep tissues are perfectly well able to deal with a few colonies of initial contaminants provided only that they are viable and healthy.

The present-day view can be summarised adequately in the words of Furlong and Clark (1948): "Infection of a wound can be excluded only by surgical closure and this must be done at the optimum time although its accomplishment may tax the ingenuity of the surgeon to the utmost."

I am indebted to my surgical colleagues at the Birmingham Accident Hospital for help and criticism in the preparation of this paper. I would also express my thanks to Mr. William Gissane, Dr. Leonard Colebrook, F.R.S., and Mr. Ruscoe Clarke for permission to use photographs from their records, and to Mr. N. R. Gill of the photographic department for preparing the illustrations.

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IDIOPATHIC STEATORRHŒA (NON-TROPICAL SPRUE) WITH MEGALOBLASTIC ANÆMIA

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Liver treatment for the tropical and non-tropical varieties of steatorrhœa with macrocytic anæmia has been recommended for many years, though it has been known that the response is unpredictable. When bone-marrow examinations were made in these patients, only some were found to have a megaloblastic picture like that seen in pernicious anæmia; a reasonable inference, therefore, was that only those with such a marrow change could be expected to respond to liver extracts prepared for the treatment of pernicious anæmia. But, once again, expectation was not borne out in practice, and patients whose anæmia was more or less resistant to liver treatment were still encountered. The advent of folic acid (pteroyl-γ-glutamic acid) provided a new line of approach, because some of the earliest reports on the effect of folic acid in the West Indian form of tropical sprue showed that there was a remission of the megaloblastic anæmia, and the accompanying symptoms of sore tongue, anorexia, and the passage of bulky fatty stools were dramatically relieved (Darby et al. 1946, Garcia Lopez et al. 1946). There was thus a clear indication for giving folic acid to patients with non-tropical sprue, and the results have been encouraging, though the number of adequately studied cases is relatively small.

Moore et al. (1945) gave 20 mg. of folic acid intravenously daily for ten days to a patient with non-tropical sprue with macrocytic anæmia and megaloblastic marrow; they reported a brisk reticulocytosis and slight improvement in red cells and hæmoglobin. Davidson and Girdwood (1946) and Davidson et al. (1947) described 3 cases of non-tropical sprue treated with folic acid by mouth with satisfactory clinical effects, such as prompt cessation of diarrhœa, improved appetite, and a sense of well-being; fat-balance tests with 50 g. of fat daily for three days showed defective fat-absorption, which, however, was unaffected by treatment. The marrow was frankly megaloblastic in 1 case, and occasional megaloblasts were reported in the other 2 cases. Only 1 patient showed a good hæmatological response to folic acid; the red-cell count rose from 1,370,000 to 3,590,000 per c.mm. in twenty-nine days; but no further rise could be obtained, and subsequent injections of 'Anahæmin' were also without effect; however, the red-cell count increased by 1,000,000 per c.mm., and the mean cell volume returned to normal, after fourteen days' treatment with an oral proteolysed liver preparation. This patient had previously had a megaloblastic marrow and had proved refractory to potent liver extracts. From these and other observations Davidson and his co-workers suggested that some other factor, presumably present in liver, is necessary for the complete repair of the anæmia. Davidson (1948) has also given brief details of 25 patients classified as "idiopathic refractory megaloblastic anæmia," 5 of whom were refractory to anahæmin but responded promptly to folic acid.

Wilkinson (1948) described 3 patients with non-tropical sprue who had some megaloblasts present in the marrow before treatment; 1 responded very well to treatment and 1 responded slowly but quite well, but in the third the response was poor.

Ferguson and Calder (1948) reported 7 cases of non-tropical sprue treated with folic acid by mouth, but they were mainly concerned with the effect of the treatment on fat-absorption and the radiological appearances in the small intestine; none of their patients had severe anæmia, and no hæmatological improvement was noted during treatment. In 2 of their patients the marrow was normoblastic; 2 others initially had a megaloblastic marrow but, by the time folic acid was given, they had already been treated with an oral liver preparation and had responded.

No report has so far appeared about the action of folic-acid conjugates in non-tropical sprue; but Spies and Suarez (1948) reported that a case of tropical sprue showed a typical response when pteroyltriglutamic acid was given, and another case responded similarly to pteroyldiglutamic acid.

Vitamin B_{12} also has been given to patients with non-tropical sprue. Spies et al. (1948, 1949a and b) reported the effect of a single dose of 6 µg. on a patient with this syndrome having a megaloblastic marrow; in spite of a reticulocyte rise of 22·3%, the response was poor and not sustained. Spies et al. (1949b) also gave vitamin B_{12} by mouth to 2 patients with non-tropical sprue; one dose of 50 µg. had no effect, but 450 µg. daily for six days produced a slight response, with a rise in red-cell count from 1,730,000 to 2,320,000 per c.mm. fourteen days after treatment began; reticulocytes increased to 9·1% on the fourth day.

The patients described in the above-mentioned reports were all known to have steatorrhœa; some had had it for years. We are reporting here 5 patients who had a megaloblastic anæmia refractory to liver treatment and were not known to have steatorrhœa at the time of its onset—in fact, in 2 of the patients there were few symptoms to suggest the correct diagnosis to those who had been looking after them. These patients were refractory to liver treatment, and in 3 cases we found that they were refractory to vitamin B_{12}. They did respond, however, both clinically and hæmatologically to folic acid. We are reporting these cases to draw attention to the difficulty of clinical diagnosis, the possibility of effective treatment, and the influence of such findings on our views on the ætiology of megaloblastic anæmias.

CASE-RECORDS

Case 1.—A female clerical worker, aged 17. In January, 1948, when 16 years old, this patient first noted slowly increasing fatigue, breathlessness on exertion, decrease in appetite, and pallor; she lost a little weight. Early in August, 1948, her doctor prescribed iron tablets, but they had no effect. In late August, within a few hours, she developed rapidly progressing weakness with dysæsthesiæ first in the right leg and then in the right arm; she went to bed and three days later was admitted to another hospital. Examination revealed a pale girl, very underdeveloped for her age, with no body hair, and with clubbed fingers and toes. The spleen and liver were palpable 1 cm. and 5 cm. respectively below the costal margin. Her knee-jerks and ankle-jerks were absent, there was an extensor plantar response on the right side, and there was well-marked relative weakness of the right lower limb without increase in tone. She was very anæmic, and a blood-transfusion was given at once. Blood-counts are shown in the accompanying table. After the transfusion the neurological symptoms and signs disappeared; a week later the liver and spleen were no longer palpable. At this time a test-meal showed free HCl in the gastric juice; liver function-tests were normal, and tests for occult blood in the fæces were negative. During the first seventeen days in hospital the patient received daily injections of 2 ml. of anahæmin and, since she had a low pyrexia up to 100°F, she was given penicillin by injection as well. There was no response to the anahæmin, and further blood-transfusions were necessary. The patient's sternal marrow was now reported as normoblastic; 1 megaloblast was seen among 15 erythroblasts counted in 250 cells.

After some time the patient again relapsed and was transferred to Manchester Royal Infirmary on Nov. 13, 1948.

BLOOD-COUNTS, BONE-MARROW FINDINGS, AND TREATMENT

Day or date	Red cells (millions per c.mm.)	Hb (g. per 100 ml.)	C.I.	Reticulocytes (%)	White cells (per c.mm.)	Platelets (thousands per c.mm.)	Bone-marrow findings and treatment
Case 1							
1	..	..	..	..	..	..	Transf. 1 pt packed cells
2	2·20	6·8	1·05	..	5000	..	Anahæmin 4 ml., then 2 ml. daily
13	1·10	3·5	1·09	..	2000	..	Transf. whole blood
21	..	4·7	..	..	2000	..	Anahæmin stopped, transf. 2 pts packed red cells
24	..	..	..	..	..	..	*Marrow* : in 250 cells, 14 normoblasts, 1 megaloblast
25	..	10·5	..	..	5000	..	..
53	1·80	5·0	1·00	..	6000	..	..
72	2·45	6·8	0·94	..	2400	146	After transf.
85	1·57	4·6	0·99	..	5000	..	..
86	..	..	..	..	..	..	*Marrow* : Megaloblastic hyperplasia
88	1·62	4·5	0·93	2·4	5500	..	..
93	..	3·8	..	1·6	..	..	Transf. 1 pt packed cells
100	..	4·5	..	1·0	..	88	,, 1 pt whole blood
104	1·48	4·1	1·01	0·8	..	30	,, 1 pt ,, ,,
107	2·01	5·9	1·00	1·0	2400	50	Folic acid 20 mg. daily by mouth
108	..	5·9	..	1·2	..	..	,, ,, 100 mg. I.V., transf. 1 pt blood
114	2·82	8·0	0·96	17·4	9700	95	,, ,, 20 mg. daily by mouth
114	..	..	..	..	..	..	*Marrow* : Normoblastic hyperplasia
121	4·11	11·5	0·95	2·6	7200	395	Folic acid continued
142	5·01	13·3	0·90	..	7200	195	Do.
412	4·47	13·9	1·05	..	3800	..	Do.
510	4·36	15·0	1·14	..	8000	..	Do.
Case 2							
1	1·63	4·3	0·86	..	3600	..	Transf. 1 pt whole blood
3	2·45	5·0	0·69	..	..	..	,, 1 pt ,, ,,
7	1·96	5·3	0·92	..	..	..	,, 1 pt ,, ,,
16	..	..	..	..	..	..	*Marrow* : Megaloblastic hyperplasia
16	1·25	3·1	0·84	..	2300	..	Transf. 1 pt packed cells
20	1·45	4·7	1·10	0·6	1800	54	..
23	1·21	3·9	1·07	0·6	2000	..	Transf. 1 pt packed cells
30	2·03	5·6	0·94	0·4	2300	60	Vitamin B_{12} 60 µg.
34	2·16	5·9	0·93	1·6	2400	75	..
41	1·52	4·4	0·98	5·0	4000	95	..
44	..	..	..	..	..	..	*Marrow* : Megaloblastic hyperplasia
44	..	..	..	2·2	..	..	Folic acid 150 mg. I.V.
47	1·29	3·9	1·00	19·8	12,700	105	..
49	..	..	..	24·2	4700	..	..
55	2·33	6·8	0·99	8·4	3000	205	..
56	..	..	..	..	..	..	*Marrow* : Normoblastic hyperplasia
57	..	..	..	6·2	..	..	Folic acid 20 mg. daily by mouth
61	..	8·6	..	11·6	..	..	Do.
68	3·72	11·0	0·99	2·2	7200	210	Do.
85	5·03	12·7	0·85	..	..	..	Do.
112	4·45	13·3	1·00	..	3200	..	Do.
140	4·18	13·8	1·11	..	2800	215	Do.
168	4·61	12·5	0·92	..	4600	..	Do. + ascorbic acid 4·5 g. in 28 days
196	4·43	14·5	1·08	..	5200	..	Folic acid 20 mg. + ascorbic acid 50 mg. daily
Case 3							
1	1·09	4·1	1·27	1·2	2200	120	..
1	..	..	..	..	..	..	*Marrow* : Megaloblastic hyperplasia
15	0·60	1·7	..	1·0	..	..	Vitamin B_{12} 60 µg.
16	..	1·8	..	1·5	..	..	Do. 40 µg.
21	..	1·7	..	3·5	..	..	Teropterin 120 mg. I.V.
21	..	..	..	..	..	..	Transf. 1 pt packed cells
22	..	5·3	..	..	..	..	..
27	..	6·5	..	37·0	..	..	..
31	..	..	..	..	..	..	*Marrow* : Normoblastic hyperplasia
32	..	8·8	..	8·0	..	..	Teropterin 40 mg. I.M. twice weekly
34	2·66	8·4	1·05	9·2	..	..	Do.
42	3·21	9·8	1·03	..	9000	..	Do.
56	3·35	9·4	0·94	..	5600	..	Teropterin 80 mg. I.M. twice weekly
62	3·63	10·3	0·95	..	4500	543	Folic acid 150 mg. I.V.
72	4·54	12·2	0·91	..	9000	313	..
Case 4							
1	2·68	10·0	1·27	..	3200	..	Examen 2 ml. I.M. weekly
60	2·32	8·3	1·21	..	3000	..	Do.
98	2·62	9·2	1·18	0·6	3000	..	Liver extr. stopped
101	..	..	..	..	..	..	*Marrow* : Mixed megaloblastic-normoblastic hyperplasia
106	2·52	9·2	1·23	1·2	2200	..	..
113	2·62	9·5	1·22	2·2	5900	205	Vitamin B_{12} 20 µg. daily for 3 days
116	..	..	..	4·0	..	..	..
120	2·46	9·2	1·26	1·2	2300	118	..
127	2·52	9·5	1·27	1·4	4700	..	Folic acid 20 mg. daily by mouth
132	..	..	..	9·4	..	..	Do.
134	3·01	11·2	1·26	5·6	4200	150	Do.
137	..	..	..	..	..	..	*Marrow* : Normoblastic hyperplasia
141	3·31	11·8	1·21	2·0	4900	..	Folic acid continued
168	3·77	14·0	1·24	..	3250	151	Do.
225	4·61	14·4	1·05	..	4800	..	Do.
Case 5							
28/ 6/45	3·05	11·8	1·33	..	5000	..	I.M. liver 1 ml. and des. stomach 1 oz. daily
8/11/45	1·48	5·6	1·28	..	3000	..	Liver "press juice" 1 oz. daily by mouth
9/ 1/46	4·82	15·0	1·08	..	4400	..	Do. ½ oz. ,, ,, ,,
20/ 3/46	2·78	8·9	1·08	..	5800	245	Do. 1 oz. ,, ,, ,,
26/ 4/46	2·77	10·2	1·23	..	3900	..	Do. 2 oz. ,, ,, ,,
17/ 6/46	3·62	12·7	1·19	..	5500	..	Proteolysed liver ½ oz. daily by mouth
27/ 9/46	3·33	12·4	1·26	..	3500	..	Do. + 2 oz. oral liver extract daily
15/11/46	1·97	7·4	1·27	..	3200	..	Folic acid 20 mg. daily by mouth
13/12/46	4·10	14·4	1·20	..	7600	..	Do.
7/ 1/47	4·58	15·4	1·13	..	5200	..	Folic acid 10 mg. daily by mouth
27/ 8/47	5·37	16·0	1·01	..	3400	..	Folic acid stopped
14/ 1/48	2·94	11·4	1·19	..	3400	..	Folic acid resumed, 10 mg. daily by mouth
14/ 1/48	..	..	..	..	..	..	*Marrow* : Mixed megaloblastic-normoblastic hyperplasia
28/ 1/48	4·62	14·8	1·08	..	..	..	Folic acid continued
25/ 2/48	5·11	15·4	1·02	..	4700	..	Do.
7/ 7/48	5·22	15·1	0·98	..	5600	..	Do.
17/ 8/49	4·91	14·8	1·02	..	5000	..	Do.
14/11/49	4·81	15·1	1·06	..	6000	..	Do.

Questioned at this time, she said that her growth and development were normal until about the age of 9 years, when they almost ceased; she had never menstruated; her mental development and interests were normal for a girl of 16. Soreness of the tongue had developed in August but soon subsided. She stated that bowel movements and stools seemed normal. No relevant previous medical history was given.

On examination, apart from the anæmia and clubbing of the digits previously noted, the patient presented the typical picture of pituitary infantilism with prepubertal genitalia and no secondary sex characters. Her height was 60 in. with body measurements in proportion, and body-weight 84 lb. Mild glossitis was noted; the abdomen was somewhat protuberant, and the liver edge could be felt. Investigation now showed a severe normochromic anæmia, with 1,570,000 red cells per c.mm., Hb 4·6 g. per 100 ml., mean corpuscular volume 96 c.μ, mean corpuscular diameter 7·6 μ; serum-proteins 5·6 g. with albumin 3·4 g. per 100 ml.; serum-bilirubin 1·0 mg. per 100 ml.; thymol-turbidity and alkaline-phosphatase normal; and Wassermann reaction negative. An oral glucose-tolerance test with 50 g. of glucose showed a flat curve with maximum rise of 18 mg. above the fasting level of 73 mg. per 100 ml.; an insulin-tolerance test showed normal sensitivity. The 24-hour excretion of 17-ketosteroids was 1·8 mg., and no gonadotrophins were detectable. Aspiration biopsy of vaginal contents was attempted, but no material was obtained. Barium-meal radiographs showed normal stomach, duodenum, and intestinal pattern; radiograms of long bones and skull were normal. Sternal marrow, examined the day after admission, showed typical megaloblastic hyperplasia like that of pernicious anæmia in relapse. The presence of free HCl in the gastric juice was confirmed.

These findings, together with the previously unexplained clubbing of the digits, suggested that steatorrhœa might be present; and the stool was found to be orange-yellow, soft, bulky, and unformed, with an average fat-content of 67·8%, dried weight. It transpired that this was regarded by the patient as a "normal" stool, and her parents, when directly question, revealed that she had had an illness at the age of 5 years, when she had had frequent diarrhœa with light-coloured stools, and that this diarrhœa had persisted, in spite of treatment, until the age of 13. We have since noted this feature in other cases of steatorrhœa; the patients do not know what a normal stool looks like.

A twelve-day fat-balance test with 70 g. of fat daily showed 79·8% absorption, but this figure may be low because the patient's appetite was capricious and she therefore left some of her food.

In the meantime the patient had four blood-transfusions. The first, of packed red cells, when her hæmoglobin had fallen to 3·8 g. per 100 ml., was given because of recurrence of the dysæsthesia and motor weakness in the right arm and leg associated with motor aphasia; her symptoms were promptly relieved, but some days after this episode she noted blurring of vision, and widespread flame-shaped hæmorrhages were seen in both retinæ. All further transfusions were therefore of fresh citrated blood.

Folic-acid treatment was started on Dec. 7, 1948, 20 mg. being given daily by mouth, and 100 mg. intravenously on Dec. 8. Clinical and hæmatological response was prompt; reticulocytes increased to 17·4% on the seventh day, when the sternal marrow showed normoblastic hyperplasia. Almost immediately her appetite and general condition improved, and she began to gain weight. No change was noted in the frequency or character of the stools. A month after the start of treatment a 24-hour urine contained 12 mouse units of gonadotrophin and 10·6 mg. of 17-ketosteroids; a week later a vaginal smear showed no evidence of œstrin effect, but after a further eleven days a smear showed about 50% of the epithelial cells keratinised, indicating œstrin activity.

The hæmatological improvement was steady (see table). After a month's folic-acid treatment, when the blood-count was almost normal, a further twelve-day fat-balance test showed only 61% absorption, and the fæcal fat was still high—69% of dried weight.

Folic acid 20 mg. daily has been continued, with a high-protein low-starch low-fat diet. After two months' treatment slight enlargement of the breasts and external genitalia was noted and some pubic hair appeared. The 24-hour urinary excretion of gonadotrophin was almost 30 mouse units and of 17-ketosteroids was 9·3 mg., and an œstrin effect was observed in the vaginal smear. Development of secondary sexual characters has continued, and menstruation first appeared after five months' treatment with folic acid. The patien has gained 30 lb. in weight.

Case 2.—A female shop-assistant, aged 23. This patient was admitted to another hospital on June 7, 1949, with severe normochromic anæmia. For some weeks she had noted gradually increasing tiredness and some soreness of the tongue. A week before admission she had had an attack of dizziness and severe dyspnœa after climbing a flight of stairs which she normally climbed without effort; she had stayed in bed because of this dyspnœa on exertion.

At the age of 9 years she had jaundice. At 14 she had pneumonia, and thereafter she had occasional mild diarrhœa with watery stools lasting a day or so and always checked with castor oil; no precipitating factor for these attacks was known. In 1945, at the age of 19, she nursed her brother through a severe attack of jaundice and dysentery; after this she felt poorly and stayed in bed for three weeks; there was one attack of diarrhœa with mucus in the stools. During the next year she took a small dose of castor oil daily and had no diarrhœa; but on stopping the oil she again had diarrhœa. Her weight was steady, and there was no dyspepsia. Menstruation had always been irregular, and the menses ceased in April, 1949. At that time a blood-count showed 1,630,000 red cells per c.mm., Hb 4·3 g. per 100 ml., colour-index 0 9. She was treated with anahæmin 2 ml. daily for six days, followed by 'Neo-hepatex' 2 ml. daily for two days, with vitamins A, B, and C, and ferrous sulphate gr. 3 daily. This treatment had no effect, and three blood-transfusions were given. During this period she had an intermittent pyrexia up to 102°F that did not respond to penicillin. She had several small epistaxes, some oozing of blood from the gums, and slight blurring of vision. She was transferred to Manchester Royal Infirmary on June 24, 1949.

On admission she was a small, rather poorly nourished, underdeveloped, and dark-complexioned young woman with gross anæmia. Scattered over the skin of her trunk and extremities were faint chocolate-brown oval macules measuring about 3×2 cm. with superficial scaling; she was not sure how long these had been present. Her tongue showed moderate papillary atrophy, and there was some oozing from the gums. Her liver was palpable 2 cm. below the costal margin, and the spleen was just palpable. The retinæ showed widespread perivascular hæmorrhages and numerous patches of "cotton-wool" exudate.

Hæmatological data are shown in the table. The sternal marrow showed active megaloblastic erythropoiesis. Serum-bilirubin 0·7 mg. per 100 ml. An oral glucose-tolerance test gave a flattened curve with a rise of 37 mg. above the resting level of 81 mg. per 100 ml. an hour after 50 g. of glucose. Free HCl was found in the gastric juice. The serum-iron was 40 γ per 100 ml.; this is a low figure and contrasts with the raised levels found in pernicious anæmia. The 24-hour excretion of 17-ketosteroids was 5·7 mg. and of gonadotrophin 5 mouse units; both these figures are low. Liver-function tests, including bromsulphthalein excretion, were normal. Serum-albumin was 4·0 g. and globulin 2·4 g. per 100 ml. A six-day fat-balance test with 70 g. of fat daily showed 98% absorption. Radiography of the small bowel showed the clumping of the barium commonly present in sprue. Three days later, the patient had mild abdominal colic, relieved by passing a constipated dark stool, and shortly afterwards she passed a loose pale fatty stool—the only macroscopically fatty stool that she had. The fat-balance test was repeated for twelve days with 70 g. of fat daily, and 85% absorption was now found.

While these investigations were going on, the patient was given two blood-transfusions. After the second fat-balance test she was ordered a high-protein low-starch low-fat diet. She was then given vitamin B_{12} 60 μg. parenterally, a dose we have found adequate for initiating a remission in pernicious anæmia. There was no hæmatological response, and the marrow remained megaloblastic. After fourteen days, folic acid 150 mg. was given intravenously. The hæmatological response was striking and rapid, as the table shows. The sternal marrow was completely normoblastic twelve days after the folic acid. Further doses of folic acid were then given by mouth, 20 mg. daily. Clinically the patient improved rapidly; as the anæmia remitted she gained 14 lb. She now passes two formed stools daily, which are paler than before but not bulky or unduly offensive. Menstruation was resumed, but irregularly. The pigmented areas of skin faded rapidly but not quite completely.

On Dec. 1, 1949, three months after her discharge from hospital, the patient complained of aching and swelling of the ankles. The skin of both legs showed severe follicular hyperkeratosis, with hæmorrhages into the papillæ; there were a few small bruises on the forearms and a mild hypertrophic gingivitis. This scorbutic condition responded to 4·5 g. of ascorbic acid given in the next month, and the hæmoglobin rose to over 14 g. per 100 ml. for the first time.

Case 3.—A girl, aged 18. This patient was admitted to the Royal Infirmary under the care of Dr. A. H. Holmes on Nov. 8, 1949, for infantilism and increasing anæmia. She had always been a pale child, and a protuberant abdomen was noted early in life. At the age of 9 years she was sent into a children's hospital, where tuberculous mesenteric glands were diagnosed; the stools at this time were said to be somewhat loose, bulky, and pale. At the age of 13 she was admitted to another hospital because of anæmia; she had a microcytic anæmia with Hb 6·8 g. per 100 ml., and cœliac disease was suspected, but the fat-content of her stools was normal. The anæmia responded partially to iron treatment, and she was transferred to a tuberculosis sanatorium where she remained until the age of $16^{1}/_{2}$. While in the sanatorium, her anæmia fluctuated and her hæmoglobin fell as low as 5·9 g. per 100 ml. at one stage, but on discharge her red-cell count was 4,380,000 per c.mm. and Hb 12·5 g. per 100 ml. However, from that time on her condition steadily deteriorated and her pallor increased. She had never menstruated, and no secondary sex characters had developed. For two years she had complained, on and off, of a sore tongue and sore angles of the mouth.

On admission the patient was small, thin, and very pale; she did not complain of diarrhœa. There was no sexual development, the breasts were flat, and the body hair was almost absent. Her tongue was moist and looked atrophic; there were fissures at the angles of her mouth; her skin was dry and scaling, particularly round the eyes but there was no rash. The heart, lungs, abdomen, central nervous system, and urine showed no abnormalities. Her temperature was raised. Fractional gastric analysis showed some free HCl. The fat in the fæces was 36% of dried weight, and a five-day fat-balance test showed 89% absorption. Radiography showed no unusual intestinal pattern, and no evidence of pulmonary tuberculosis. The serum-bilirubin was raised to 1·5 mg. per 100 ml. She was severely anæmic, with red cells 1,090,000 per c.mm., Hb 4·1 g. per 100 ml., colour-index 1·27, white cells 2200 per c.mm., a normal differential count, and platelets 120,000 per c.mm. The sternal marrow showed a predominantly megaloblastic erythropoiesis, though normoblasts were present as well; giant metamyelocytes were seen.

Fourteen days after admission her red-cell count was 600,000 per c.mm. and Hb 2·4 g. per 100 ml. She was given 100 µg. of vitamin B_{12} intramuscularly. As the table shows, there was no response, and five days later she was transfused with a pint of concentrated red cells; she was also given 120 mg. of pteroyltriglutamic acid ('Teropterin') intravenously. Next day the Hb was 5·3 g. per 100 ml., six days later the reticulocytes, previously below 5%, reached a peak of 37%, and the patient's clinical condition was immensely improved. Further progress can be seen in the table; the marrow changed to normoblastic, and there was a steady increase in red cells and hæmoglobin. Treatment with teropterin was resumed, 40 mg. being given twice weekly intramuscularly. Progress was slow for a time; so 150 mg. of folic acid was given intravenously. The blood-count then improved and on the seventy-second day after admission her Hb reached 12·2 g. per 100 ml. She was then discharged from hospital and ordered 20 mg. of folic acid daily by mouth as a maintenance dose.

Case 4.—A male cinema manager, aged 61. This man was seen at the outpatient clinic on May 23, 1949. Four years previously he had had troublesome flatulence and abdominal distension for four weeks; there was no diarrhœa and the symptoms subsided with simple treatment. In 1947 he began to have attacks of slight diarrhœa every four or five days lasting two or three days, with 3–4 motions daily of normal colour, formed, but soft. About this time he again had postprandial flatulence. These symptoms responded to alkalis, but returned when he had diarrhœa. For the past year he had noted undue fatigue, and for seven months he had had increasing dyspnœa and palpitation on exertion. In February, 1949, he began to take a kaolin mixture for his bowel symptoms, and to this he attributed a change in his stools, which became pale and buttery, contained some mucus, and were unusually offensive. At this time too he had a sore mouth and tongue, which became fiery red for about ten days; there was also slight œdema of the ankles in the evening. His doctor now diagnosed pernicious anæmia and gave him weekly injections of 'Hepastab' 2 ml. together with desiccated stomach $^{1}/_{3}$ oz. daily. This treatment was not taken regularly; his symptoms improved but did not remit. No paræsthesiæ or other neurological signs appeared. He was therefore sent for further advice. Nothing relevant was elicited from his early medical or family history.

On examination in May, 1949, the patient was pale and thin; his skin was dry, and there was a faint brown pigmentation of hands and feet. His tongue was red, with some papillary atrophy. Moderate clubbing of the fingers was present. No other abnormality was found except slight œdema of the ankles, and a moderate anæmia (for blood-counts see table). Barium-meal radiography showed a normal stomach and duodenum, but an unusually coarse pattern was seen in most of the jejunum, without any clumping of barium or undue delay in passage. Treatment was changed to 'Examen' (Glaxo), a purified liver extract, 2 ml. weekly, but there was no response. The patient was therefore admitted to hospital on Aug. 31, 1949.

On admission his sternal marrow showed a hyperplastic pattern; the erythroblasts were mostly normoblasts, but some typical megaloblasts and "transitional" megaloblasts, and the giant metamyelocytes as seen in pernicious anæmia were present. Fractional gastric analysis showed that free HCl was present. Serum-bilirubin 0·4 mg. per 100 ml. A six-day fat-balance test showed only 57% absorption on 70 g. of fat daily. A high-protein low-fat low-starch diet was now given, and after some days' constipation the patient began to pass one or two semi-solid pale motions daily. On Sept. 13, 14, and 15, he was given 20 µg. of vitamin B_{12} intramuscularly, but there was no response. Fourteen days later, folic acid 20 mg. by mouth daily was started. The hæmatological response was slow but definite (see table). The sternal marrow five days after the reticulocyte peak showed completely normoblastic erythropoiesis. The patient's general condition improved with the blood-count; he still had two stools daily, usually formed.

Case 5.—A housewife, aged 29. This young woman has been under observation at the Royal Infirmary since 1940 with a refractory macrocytic anæmia, flatulent dyspepsia, recurrent sore tongue, repeated attacks of pyelitis, and, later, watery diarrhœa with some mucus in the stools. Details of her early history have been reported elsewhere (Wilkinson 1948); a summary with progress notes is given here because she now clearly fits into the group of cases under discussion.

Late in 1945 she began to have pains in the limbs and trunk, the diarrhœa became more severe, and she lost some weight. In April, 1946, the diagnosis of steatorrhœa was established when the fat in the stools was found to be 74% of dried weight. For her anæmia she received many parenteral and oral liver preparations, desiccated stomach, yeast, and B vitamins, and though there sometimes seemed to be a response—particularly with one crude oral liver preparation—relapse invariably occurred while the treatment was still being taken, and blood-transfusion became necessary on 11 occasions. In 1942, after she had received adequate doses of an active parenteral liver extract the sternal-marrow showed a mixed megaloblastic and normoblastic erythropoiesis. Free HCl was found in the gastric juice at this time.

In November, 1946, when the blood-count showed red cells 1,970,000 per c.mm., Hb 7·4 g. per 100 ml., colour-index 1·28, and white cells 3200 per c.mm., folic acid was given by mouth in doses of 20 mg. daily, and all other vitamin treatment was stopped. There was a good hæmatological response; after two weeks her red-cell count was 2,440,000 per c.mm. and Hb 9·2 g. per 100 ml., and after four weeks the red cells numbered 4,100,000 per c.mm. and the Hb was 14·5 g. per 100 ml. After two months the folic acid was reduced to 10 mg. daily, and a normal blood-count was maintained for nine months; the red-cell count was then 5,370,000 per c.mm. and Hb 16·0 g. per 100 ml. Folic acid was now discontinued; for three months her blood-count remained normal but after five months without treatment the red-cell count had fallen to 2,940,000 per c.mm. and the Hb to 11·4 g. per 100 ml. The bone-marrow at this time again showed a mixed megaloblastic and normoblastic picture. Folic acid was given again, 10 mg. daily by mouth, and two weeks later the blood-count was back to reasonable figures: red cells

4,620,000 per c.mm. and Hb 14·8 g. per 100 ml. The patient has since kept up a normal blood-count and has been satisfactorily carried through a pregnancy without relapse, a full-term child being born in July, 1949. More details of her blood-counts are given in the table.

DISCUSSION

The syndrome described here is characterised by (1) a progressive and often severe anæmia; (2) infantilism, mild finger clubbing, and skin rashes of a deficiency type; (3) megaloblastic change in the bone-marrow; (4) usually free hydrochloric acid in the gastric juice; and (5) defective absorption of fat from the bowel. This syndrome has often been described but only a few patients have been treated with the newer hæmatinics.

The defective fat-absorption may be very difficult to detect and may well be missed unless specially looked for. If it is missed, the diagnosis is likely to be "refractory megaloblastic anæmia." The difficulty is well illustrated by the history of a patient described by Davidson (1948); this man's condition was originally diagnosed as idiopathic refractory megaloblastic anæmia and it responded satisfactorily to folic acid; a year later the patient relapsed, and this time he had fatty bulky stools and his fat-absorption was only 59%; the diagnosis was changed to idiopathic steatorrhœa. In our case 5 the original diagnosis was achrestic anæmia, and it was five years before fatty diarrhœa disclosed the true diagnosis. Clearly, if special attention is paid to fat-absorption, the correct diagnosis may be reached at an earlier stage, and proper treatment will then be started earlier too.

The patients described here illustrate various degrees of difficulty in diagnosis. In case 4 there were alimentary-tract symptoms from the first, and a single four-day fat-balance test revealed the true diagnosis; diagnosis was delayed because originally the patient was thought to have pernicious anæmia on "clinical" grounds, without proper investigation, and because, in view of his age, malignancy had to be excluded. In case 1 a history of abnormal stools was only obtained by direct questioning after our suspicions had been aroused by seeing the stool which the patient regarded as normal; here again, a fat-balance test revealed gross abnormality of absorption. In this case too the infantilism must be emphasised, since it is an important clue. Case 3 presented as a case of infantilism thought to be due to tabes mesenterica. In case 2 there was hardly any overt evidence of steatorrhœa, and a twelve-day fat-balance test was needed to provide the evidence.

The question of what constitutes an adequate fat-balance test was discussed by Fourman et al. (1948); they contended that a twelve-day test is essential for accurate assessment of quantitative changes in fat-absorption. Our experience with case 2 confirms this opinion. A twelve-day test is not easy to arrange, and the technique of daily estimation of fatty-acid excretion, described by Van de Kamer et al. (1949), may perhaps enable the necessary information to be obtained more simply.

The response of these patients to liver extracts, vitamin B_{12}, and folic acids is highly important, not only to the patients themselves but also because of its bearing on the ætiology of megaloblastic anæmias. The current textbook view is that all megaloblastic anæmias are caused by disturbances of the extrinsic-intrinsic factor reaction and the absorption or utilisation of the liver principle so formed. The macrocytic anæmia of tropical and non-tropical steatorrhœa was thought to be brought about by failure of absorption of the liver principle.

There is now sufficient evidence to say that there is a group of cases of megaloblastic anæmia in which the blood picture responds well to liver extracts, vitamin B_{12}, and folic acids; and there is a second group that responds properly to folic acids but not to parenteral liver extracts or to vitamin B_{12} in doses suitable for the first group. Addisonian pernicious anæmia, and nutritional macrocytic anæmia as seen in America and the West Indies, fall into the first group; the second group comprises tropical and non-tropical sprue, "pernicious anæmia" of pregnancy, and possibly most of the patients with nutritional megaloblastic anæmia in other parts of the world. We include tropical sprue because the reports so far published of the action of vitamin B_{12} in tropical sprue, even in West Indian form, are not impressive. For example, Suarez et al. (1949) gave doses of the order of 200 µg. in four or five months, and it was two or three months before the patients' hæmoglobin reached a level of 9 g. per 100 ml.; these are much more like the suboptimal responses to liver extracts than the truly dramatic response often recorded by Spies et al. (1948, 1949a and b) with folic acid.

There is not yet sufficient evidence for a firm explanation to be given of this division of the megaloblastic anæmias, or of the relative parts played by liver factor, vitamin B_{12}, and folic acid in the maintenance of normal erythropoiesis. And there may yet be other factors, because Davidson and Girdwood (1946) and Davidson et al. (1947) have shown that, in some patients with steatorrhœa, the hæmatological response to folic acid, though excellent at first, stops short of normal levels, and then a further rise can be obtained by giving an oral proteolysed liver preparation. Three of our patients have reached reasonable blood levels with folic acid alone, and one needed ascorbic acid as well.

Whatever the explanation, the consequences of this division for the patients are clear. It is more necessary than ever that patients with a suspected "pernicious anæmia" should be properly investigated—by blood-count, bone-marrow study, and fractional test-meal—*before* any treatment with liver, folic acid, or vitamin B_{12}, alone or in combination, is given. If megaloblastic marrow is present and free acid is found in the gastric juice, the next step, irrespective of the gross appearance of the stools or normal values for the fat-content of a single fæcal specimen, should be a fat-balance test. This caution must be extended to those young patients aged 20 or less who have a megaloblastic anæmia with achlorhydria, since true pernicious anæmia is exceedingly rare in this age-group. Only in this way can the best results be achieved and the not very common case detected for which folic acid is the treatment of choice.

SUMMARY

Five cases of idiopathic steatorrhœa (non-tropical sprue) with megaloblastic anæmia are described.

The diagnostic difficulties, particularly the fact that the fat-absorption defect may be missed, are discussed.

The patients were refractory to parenteral liver treatment and showed no response to a dose of vitamin B_{12} sufficient to produce a full remission in pernicious anæmia.

All the patients responded promptly and fully to folic acid given by mouth or parenterally, and so far reasonable blood-counts have been maintained.

One of these patients received the folic acid in the form of a synthetic conjugate, pteroyltriglutamic acid, and the initial response was similar to that of patients who received pteroylglutamic acid itself.

Folic acid will relieve much of the infantilism, and amenorrhœa when this is present, without supplemental endocrine treatment.

The megaloblastic anæmia of non-tropical sprue belongs to the group of liver-resistant folic-acid-responsive anæmias that now includes most of the megaloblastic anæmias apart from addisonian pernicious anæmia.

These investigations were made on patients under the care of Dr. John F. Wilkinson, director of the department, for whose help and criticism we are grateful. We are indebted to Dr. A. H. Holmes for facilities for studying case 3; to Miss A. M. Hain for endocrine estimations: to Mr. H. Varley for fat-estimations; to the nursing staff; and to Messrs. Lederle Ltd. for supplies of folic acid and teropterin.

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VITAMIN B_{12} IN IDIOPATHIC STEATORRHŒA

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SINCE the introduction of pure substances into the therapy of anæmias with a megaloblastic bone-marrow considerable interest has been taken in the response of cases to them. Cartwright and Wintrobe (1949) have divided the various macrocytic megaloblastic anæmias into two types: (1) those which respond to the anti-pernicious-anæmia factor in purified liver extracts and to pteroyl-γ-glutamic or folic acid; and (2) those which respond to folic acid alone. The first group comprises Addison's anæmia, sprue, non-tropical nutritional macrocytic anæmia, macrocytic anæmia associated with gastro-intestinal resections, megaloblastic anæmia of infancy, and macrocytic anæmia caused by *Diphyllobothrium latum*. The second includes achrestic anæmia, megaloblastic anæmia of pregnancy, tropical macrocytic anæmia, and refractory megaloblastic anæmia.

Ungley (1949) distinguishes between megaloblastic anæmias which are associated with gastric atrophy and those which are not. In cases with gastric atrophy vitamin B_{12} is as effective as liver extract, and folic acid is only temporarily or partially effective; whereas in cases with no gastric atrophy folic acid is effective in small doses and vitamin B_{12} is ineffective.

The following cases of idiopathic steatorrhœa are reported because they did not respond to adequate dosage of a preparation of vitamin B_{12} known to be active in cases of Addison's anæmia but they recovered promptly with ordinary doses of folic acid. It is of interest that the commercial preparations of vitamin B_{12} are advertised as effective in the anæmia of the related condition, sprue.

CASE-RECORDS

Case 1.—A housewife, aged 25, in her third pregnancy, was admitted to the North Middlesex Hospital eight days before the expected date of delivery because albumin was found in her urine. The first pregnancy had produced a living child at forty weeks, but her second baby had died two months after delivery at thirty-six weeks. The mother's blood was group A, rhesus-positive. She said she had always been anæmic and had taken 'Fersolate' tablets as a routine in all three pregnancies, though apparently laboratory tests of her blood were not done during the pregnancies or at other times. She had *never noticed* any diarrhœa.

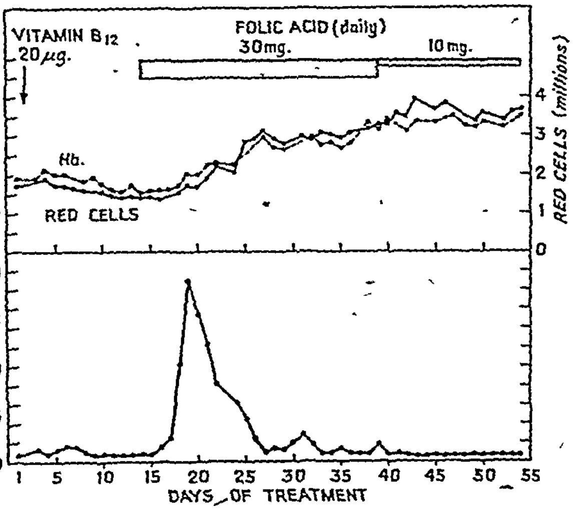

Fig. 1—Blood picture and results of treatment in case 1.

Labour was induced, on the day after admission, by artificial rupture of the membranes, and the placenta was expressed from the cervix under thiopentone anæsthesia. Labour lasted three and a half hours, and 48 oz. of blood was estimated to have been lost. The first blood-count, two days after delivery, showed 1,560,000 red cells per c.mm., Hb 34% (Haldane), colour-index (C.I.) 1·1, mean cell diameter (M.C.D.) 7·8 μ, mean cell volume (M.C.V.) 92 c.μ, and mean corpuscular hæmoglobin concentration (M.C.H.C.) 25%; 6300 white cells per c.mm. (polymorphs 84%, lymphocytes 16%). A transfusion of the packed cells from 880 ml. of compatible blood of group A was given, but three days later the Hb was only 40%. Ten days later it was 38%, though the patient had been receiving gr. 135 of iron and ammonium citrate daily by mouth. Her temperature was 102·4°F seven hours after transfusion, and this was thought to be a transfusion reaction, but neither jaundice nor hæmoglobinuria was found. The sternal marrow was megaloblastic (Israëls 1939), and free hydrochloric acid was found in the gastric juice without histamine stimulation. At this stage no physical signs were present except a sore and smooth tongue.

Treatment and Progress.—The patient was given vitamin B_{12} 20 μg. intramuscularly, but at the end of thirteen days there was no reticulocytosis and no rise in the cell-count or Hb and the bone-marrow was still megaloblastic. The patient remarked that her tongue was no longer sore. At this stage a blood-count showed 1,310,000 red cells per c.mm. and Hb 31%. The reticulocytes had been counted daily and were never more than 1%. The patient was then given folic acid 30 mg. daily by mouth. On the fifth day she had a peak reticulocytosis of 18·8%, and after twenty-four days of this treatment a blood-count showed 3,240,000 red cells per c.mm. and Hb 64%. The bone-marrow was normoblastic fourteen days after the start of the folic acid. On the twenty-fourth day the dose of folic acid was reduced to 10 mg. daily by mouth, and the patient was discharged thirteen days later with Hb 70% and 3,690,000 red cells per c.mm. A four-day fat-absorption test showed only 88·2% absorption. The blood-sugar curve was low and flat. The blood picture and results of treatment are shown in fig. 1.

Case 2.—A married woman, aged 30, was first seen in the outpatient department of the North Middlesex Hospital in August, 1948, when she was complaining of five or six months' pallor and two weeks' soreness of the tongue. She also had dyspepsia, which began soon after meals, and she had lost weight. Her bowels were regular, and there was no diarrhœa. Her menstrual periods were also regular, lasting 4–5 days every 28 days. She had had one child six years previously and no miscarriages. She said she had always been anæmic since adolescence. A blood-count showed 3,780,000 red cells per c.mm., Hb 64%, and C.I. 0·85. Of three stools examined for occult blood the first gave a weak positive and the others were negative. She was given fersolate gr. 6 t.d.s. and one 'Multivite' tablet t.d.s. and asked to return, but she did not keep the appointment. She attended her private doctor

4,620,000 per c.mm. and Hb 14·8 g. per 100 ml. The patient has since kept up a normal blood-count and has been satisfactorily carried through a pregnancy without relapse, a full-term child being born in July, 1949. More details of her blood-counts are given in the table.

DISCUSSION

The syndrome described here is characterised by (1) a progressive and often severe anæmia; (2) infantilism, mild finger clubbing, and skin rashes of a deficiency type; (3) megaloblastic change in the bone-marrow; (4) usually free hydrochloric acid in the gastric juice; and (5) defective absorption of fat from the bowel. This syndrome has often been described but only a few patients have been treated with the newer hæmatinics.

The defective fat-absorption may be very difficult to detect and may well be missed unless specially looked for. If it is missed, the diagnosis is likely to be "refractory megaloblastic anæmia." The difficulty is well illustrated by the history of a patient described by Davidson (1948); this man's condition was originally diagnosed as idiopathic refractory megaloblastic anæmia and it responded satisfactorily to folic acid; a year later the patient relapsed, and this time he had fatty bulky stools and his fat-absorption was only 59%; the diagnosis was changed to idiopathic steatorrhœa. In our case 5 the original diagnosis was achrestic anæmia, and it was five years before fatty diarrhœa disclosed the true diagnosis. Clearly, if special attention is paid to fat-absorption, the correct diagnosis may be reached at an earlier stage, and proper treatment will then be started earlier too.

The patients described here illustrate various degrees of difficulty in diagnosis. In case 4 there were alimentary-tract symptoms from the first, and a single four-day fat-balance test revealed the true diagnosis; diagnosis was delayed because originally the patient was thought to have pernicious anæmia on "clinical" grounds, without proper investigation, and because, in view of his age, malignancy had to be excluded. In case 1 a history of abnormal stools was only obtained by direct questioning after our suspicions had been aroused by seeing the stool which the patient regarded as normal; here again, a fat-balance test revealed gross abnormality of absorption. In this case too the infantilism must be emphasised, since it is an important clue. Case 3 presented as a case of infantilism thought to be due to tabes mesenterica. In case 2 there was hardly any overt evidence of steatorrhœa, and a twelve-day fat-balance test was needed to provide the evidence.

The question of what constitutes an adequate fat-balance test was discussed by Fourman et al. (1948); they contended that a twelve-day test is essential for accurate assessment of quantitative changes in fat-absorption. Our experience with case 2 confirms this opinion. A twelve-day test is not easy to arrange, and the technique of daily estimation of fatty-acid excretion, described by Van de Kamer et al. (1949), may perhaps enable the necessary information to be obtained more simply.

The response of these patients to liver extracts, vitamin B_{12}, and folic acids is highly important, not only to the patients themselves but also because of its bearing on the ætiology of megaloblastic anæmias. The current textbook view is that all megaloblastic anæmias are caused by disturbances of the extrinsic-intrinsic factor reaction and the absorption or utilisation of the liver principle so formed. The macrocytic anæmia of tropical and non-tropical steatorrhœa was thought to be brought about by failure of absorption of the liver principle.

There is now sufficient evidence to say that there is a group of cases of megaloblastic anæmia in which the blood picture responds well to liver extracts, vitamin B_{12}, and folic acids; and there is a second group that responds properly to folic acids but not to parenteral liver extracts or to vitamin B_{12} in doses suitable for the first group. Addisonian pernicious anæmia, and nutritional macrocytic anæmia as seen in America and the West Indies, fall into the first group; the second group comprises tropical and non-tropical sprue, "pernicious anæmia" of pregnancy, and possibly most of the patients with nutritional megaloblastic anæmia in other parts of the world. We include tropical sprue because the reports so far published of the action of vitamin B_{12} in tropical sprue, even in West Indian form, are not impressive. For example, Suarez et al. (1949) gave doses of the order of 200 µg. in four or five months, and it was two or three months before the patients' hæmoglobin reached a level of 9 g. per 100 ml.; these are much more like the suboptimal responses to liver extracts than the truly dramatic response often recorded by Spies et al. (1948, 1949a and b) with folic acid.

There is not yet sufficient evidence for a firm explanation to be given of this division of the megaloblastic anæmias, or of the relative parts played by liver factor, vitamin B_{12}, and folic acid in the maintenance of normal erythropoiesis. And there may yet be other factors, because Davidson and Girdwood (1946) and Davidson et al. (1947) have shown that, in some patients with steatorrhœa, the hæmatological response to folic acid, though excellent at first, stops short of normal levels, and then a further rise can be obtained by giving an oral proteolysed liver preparation. Three of our patients have reached reasonable blood levels with folic acid alone, and one needed ascorbic acid as well.

Whatever the explanation, the consequences of this division for the patients are clear. It is more necessary than ever that patients with a suspected "pernicious anæmia" should be properly investigated—by blood-count, bone-marrow study, and fractional test-meal—*before* any treatment with liver, folic acid, or vitamin B_{12}, alone or in combination, is given. If megaloblastic marrow is present and free acid is found in the gastric juice, the next step, irrespective of the gross appearance of the stools or normal values for the fat-content of a single fæcal specimen, should be a fat-balance test. This caution must be extended to those young patients aged 20 or less who have a megaloblastic anæmia with achlorhydria, since true pernicious anæmia is exceedingly rare in this age-group. Only in this way can the best results be achieved and the not very common case detected for which folic acid is the treatment of choice.

SUMMARY

Five cases of idiopathic steatorrhœa (non-tropical sprue) with megaloblastic anæmia are described.

The diagnostic difficulties, particularly the fact that the fat-absorption defect may be missed, are discussed.

The patients were refractory to parenteral liver treatment and showed no response to a dose of vitamin B_{12} sufficient to produce a full remission in pernicious anæmia.

All the patients responded promptly and fully to folic acid given by mouth or parenterally, and so far reasonable blood-counts have been maintained.

One of these patients received the folic acid in the form of a synthetic conjugate, pteroyltriglutamic acid, and the initial response was similar to that of patients who received pteroylglutamic acid itself.

Folic acid will relieve much of the infantilism, and amenorrhœa when this is present, without supplemental endocrine treatment.

The megaloblastic anæmia of non-tropical sprue belongs to the group of liver-resistant folic-acid-responsive anæmias that now includes most of the megaloblastic anæmias apart from addisonian pernicious anæmia.

These investigations were made on patients under the care of Dr. John F. Wilkinson, director of the department, for

From a review of reported cases it appears that cases of megaloblastic anæmias of pregnancy and refractory cases of megaloblastic anæmia with free gastric hydrochloric acid have not been generally investigated for the presence of idiopathic steatorrhœa.

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THE ACTION OF BENZODIOXANE IN MAN

AN EXPERIMENTAL INVESTIGATION

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With a note on negative benzodioxane test

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In 1947 Goldenberg et al. described a test for hypertension due to circulating adrenaline, based on the reversal of the adrenaline pressor effect by the adrenolytic benzodioxanes (Fourneau and Bovet 1933). They found that the intravenous injection of '933F,' 2-(1-piperidylmethyl)-1 : 4-benzodioxane, abolished or significantly decreased the pressor effect observed during infusions of adrenaline in normal subjects. The blood-pressure usually returned to the "pre-dioxane" level in 10–15 minutes. This effect was also found in patients with phæochromocytoma and hypertension. However, the blood-pressure rose when 933F was given to patients with so-called essential hypertension. These opposite responses differentiate the rare phæochromocytoma from the common essential hypertension, and the intravenous injection of 933F has been applied as a clinical test for phæochromocytoma by Goldenberg and his colleagues and by Cahill (1948). Dana and Calkins (1949) report two "positive reactions"—i.e., a fall in blood-pressure—in 67 patients with sustained hypertension. One of these positive reactions was obtained in a patient with phæochromocytoma, but the other occurred in a patient with a neuroblastoma of the adrenal gland, and this was considered to be a false positive.

From our experience with intravenous infusions of adrenaline it appeared to us, as it had to Goldenberg and Aranow (1949), that their pressor effect was not comparable with the hypertension resulting from phæochromocytoma. We found it unusual for circulating adrenaline to raise the diastolic pressure, much less to raise it to levels commonly seen in paroxysmal hypertension due to adrenal tumours. Holton (1949) and Goldenberg et al. (1949) extracted noradrenaline from cases of adrenal medullary tumour, and it therefore seemed that noradrenaline rather than adrenaline might perhaps be the cause of the hypertension in this condition. Hence it became necessary to investigate the effect of dioxane 933F on noradrenaline hypertension, which consists of a rise in systolic and diastolic pressures due to increased peripheral resistance (Goldenberg et al. 1948) and is very similar to that seen in paroxysmal hypertension due to phæochromocytoma.

The experiments described here were planned to contrast the effect of the dioxane on hypertension produced by adrenaline in normal subjects with that produced by noradrenaline, and to observe the resultant circulatory changes by measuring the flow of blood in the calf and the hand by venous-occlusion plethysmography. One might expect to find, perhaps, a vasodilatation in muscle or skin accompanying the fall in blood-pressure.

EXPERIMENTAL

The subjects were men between the ages of 22–45 and were, so far as is known, normal in every respect. They came to the laboratory and rested for an hour before any experimental procedure was undertaken.

An air-filled plethysmograph was then applied to the right calf and another to the right hand. A sphygmomanometer cuff was fitted to the left forearm. A 16-gauge needle was inserted into a vein in the right forearm, and an infusion of physiological saline was started through 'Polythene' tubing sealed to the needle. The capacity of the tubing was about 1·5 ml. Basal estimations of blood-pressure, pulse-rate, and blood-flow in hand and calf were then made while the saline infusion was running. When reasonable stability had been achieved, the required drug (adrenaline or noradrenaline) was continuously infused through the same tubing and needle. The concentration required was delivered in 4 ml. of saline solution per minute. After 20 minutes, by which time the circulatory effects were usually reasonably stable, 933F 0·25 mg. per kg. of body-weight was administered. In 5 cases the injection was made into a small rubber tube interposed between the syringe and the polythene tubing. In 2 cases (subjects 1 and 6) the injection was made directly into another vein in the same arm. The injection was made slowly, being completed in 2 minutes. The changes in blood-pressure and pulse-rate were observed at $^1/_2$-minute intervals, and the changes in limb blood-flow were estimated at $^1/_4$-minute intervals for the next few minutes. Observations were then made at minute intervals for about 15 minutes, after which the infusion of adrenaline or noradrenaline was stopped.

We are indebted to Mr. A. J. Ewins, D.SC., F.R.S., of May & Baker Ltd., for the supply of 933F and for investigating its properties after sterilisation by various methods. He reports that the batch from which our sample was supplied fulfilled the known properties of 933F. Autoclaving at 120°C for half an hour neither caused chemical changes in the compound nor affected its spasmolytic properties.

RESULTS OF INJECTING 933F INTRAVENOUSLY IN PERSONS RECEIVING INFUSIONS OF ADRENALINE OR NORADRENALINE

Subject no.	Age (yr.)	Drug	Blood-pressure (mm. Hg) and pulse-rate (per min.)					
				Basal	3 min. before 933F	1 min. after 933F	3 min. after 933F	10 min. after 933F
1	45	Adr.	B.P.	130/72	152/74	138/72	160/76	168/80
			Pulse	88	110	152	132	120
2	23	Adr.	B.P.	130/80	158/72	158/40	170/55	175/68
			Pulse	80	90	120	128	120
3	22	Adr.	B.P.	125/80	155/56	145/45	158/65	175/68
			Pulse	80	88	104	112	104
4	23	Adr.	B.P.	140/80	155/62	155/40	190/60	175/68
			Pulse	56	72	112	100	96
5	23	Nor.	B.P.	125/75	145/106	145/98	145/108	150/108
			Pulse	76	64	96	68	66
6	27	Nor.	B.P.	135/75	184/104	200/75	190/80	180/95*
			Pulse	82	66	140	108	92
7	35	Nor.	B.P.	120/80	156/105	150/70	170/90	165/85*
			Pulse	68	56	76	104	78

* Noradrenaline infusion discontinued just after the dioxane injection.

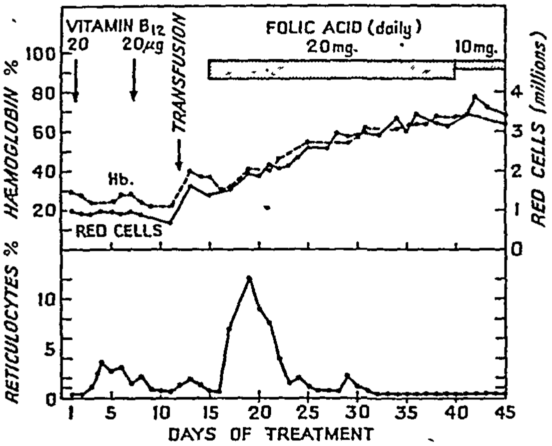

Fig. 2—Blood picture and results of treatment in case 2.

and was given several short courses of iron tablets, but this treatment had been discontinued for about six months before she again came to hospital in October, 1949, fourteen months after the first attendance. She now complained of two months' increasing shortness of breath with tiredness and weakness of the legs.

A blood-count (Oct. 10) now showed 1,080,000 red cells per c.mm., Hb 34%, C.I. 1·5, P.C.V. 17%, M.C.D. 8·4 μ, M.C.V. 140 c.μ, and M.C.H.C. 28%. The patient was pale, with a yellowish tinge of the skin and sclerotics and pallor of the mucosæ. Her nails were brittle but not spoon-shaped, and her tongue was pale and smooth. There was no œdema, and the liver and spleen were not enlarged. The central nervous system showed no abnormality beyond sluggish knee-jerks. The sternal marrow was megaloblastic, with the granulocyte series showing the changes associated with pernicious anæmia. A fractional test-meal gave a normal free-acid curve, and histamine provoked a well-marked response.

Treatment and Progress.—On Oct. 19 (day 1 in fig. 2) a blood-count showed 930,000 red cells per c.mm., Hb 29%, and reticulocytes less than 1%. The patient was given 20 μg. of vitamin B_{12} intramuscularly, and though there was a slight reticulocyte rise on the fourth day (3·5%) there was no appreciable change in the hæmoglobin or red cells. On the seventh day she was given a further 20 μg. of vitamin B_{12} of proved potency, but no response was obtained, and since on the thirteenth day a blood-count showed only 730,000 red cells per c.mm., Hb 22%, and less than 1% reticulocytes it was concluded that none could be expected.

At this time there was some filling of the neck veins, and transfusion was thought necessary. Packed cells from 2 pints of blood were given slowly over eight hours, and next day the red-cell count was 2,100,000 per c.mm. and Hb 40%. A course of folic acid 20 mg. daily by mouth was started, and the reticulocytes reached a peak of 12·5% on the fifth day. This dose was maintained for twenty-five days, by which time the red-cell count had risen to 3,320,000 per c.mm. and Hb to 66%. The patient was discharged six days later on a maintenance dose of 10 mg. of folic acid daily and with a normoblastic marrow.

In view of the findings in case 1, a four-day fat-absorption test was done, which showed only 80% absorption. The blood-sugar curve was flat. The blood-calcium was 9·2 mg. per 100 ml.

DISCUSSION

Idiopathic steatorrhœa was diagnosed in both of these cases although neither patient had ever had diarrhœa. The fat-balance test in both cases was carried out on an intake of 70 g. of fat daily, and the fæces were collected over a four-day period. Cooke et al. (1946) regard absorption of less than 95% as definitely abnormal. They gave 50 g. of fat daily and collected the fæces over a four-day period. Of their 29 cases of idiopathic steatorrhœa 4 had fat-absorption figures of about 90% (cf. case 1, in which the figure was 88·2%). Fourman et al. (1948), giving 70 g. of fat daily, state that fat-excretion over a period of four days has a coefficient of variation of about 30%, but they agree that such a technique is sufficiently accurate for the diagnosis of idiopathic steatorrhœa. The glucose-tolerance curves in cases 1 and 2 strongly support this diagnosis.

Before these tests were done, case 1 was regarded as pernicious anæmia of pregnancy occurring post partum. Since the diagnosis of pernicious anæmia of pregnancy was put on a firm basis by the introduction of sternal puncture, several workers have noticed that some cases are refractory to massive liver therapy (Ungley 1938, Ritter and Crocker 1939, Nielsen 1941). Davidson et al. (1942) reported 16 cases, of which 10 were refractory to liver, and Fullerton (1943) found that 2 cases, out of 3 which gave a reticulocyte response to parenteral liver extracts, showed no improvement in their blood-counts until whole liver or oral extracts were given, and then there was a second reticulocytosis. He drew an analogy with cases of idiopathic steatorrhœa. Davidson et al. (1948) described 3 cases of pernicious anæmia of pregnancy and 1 of Addison's anæmia which relapsed in pregnancy, and of these the case of Addison's anæmia and 2 of the cases of pernicious anæmia of pregnancy gave no response to parenteral liver extract but responded promptly to folic acid. Since then 2 cases of pernicious anæmia of pregnancy have been described in America by Bethell et al. (1948) and Day et al. (1949) which did not respond to intramuscular vitamin B_{12} but recovered promptly with small doses of folic acid by mouth. In this country Ungley (1950) has reported 6 cases which did not respond to vitamin B_{12}; they were given 65–80 μg. of vitamin B_{12} without effect but recovered with 2·5 mg. of folic acid by mouth daily.

The possible rôle of malabsorption in the ætiology of pernicious anæmia of pregnancy has been emphasised by Davidson et al. (1948), who mentioned such a case which subsequently turned out to have idiopathic steatorrhœa though diarrhœa had been absent throughout the period of investigation. In the cases published by Davidson et al. (1942) and Callender (1944) this point was not investigated, and the number of cases of idiopathic steatorrhœa among them must remain a matter for speculation. The additional burden of pregnancy would clearly tend to unmask such cases if they were previously latent.

Case 2 had undoubted idiopathic steatorrhœa. From the clinical point of view this diagnosis is insufficiently considered in refractory megaloblastic anæmias and in ostensible cases of Addison's anæmia in which free acid is found in the gastric juice. We have not discovered any published cases similar to ours treated with vitamin B_{12}. Spies et al. (1949) have treated cases of tropical sprue and non-tropical sprue with vitamin B_{12} both parenterally and by mouth. The dosage given has varied, but they state that 100 μg. may be required to give the greatest hæmatological response. The details of absorption of fat and carbohydrate are not reported in their cases, and the relationship to ours remains problematical. Our own samples of vitamin B_{12} were fully active in Addison's anæmia in the dosage given to the present cases—i.e., 20 and 40 μg.

These cases fall into Ungley's second class (see above), gastric atrophy being absent. It would be interesting to examine the response to vitamin B_{12} of cases of idiopathic steatorrhœa with achlorhydria. Cooke et al. (1946) have shown that cases of Addison's anæmia have a normal fat-balance, and it would therefore be possible to distinguish them from idiopathic steatorrhœa even if the other features of Addison's anæmia were absent.

SUMMARY

Two cases of megaloblastic anæmia associated with idiopathic steatorrhœa are described. One of the cases was first diagnosed post partum.

Both cases failed to respond to therapeutic doses of vitamin B_{12} but recovered promptly with folic acid.

From a review of reported cases it appears that cases of megaloblastic anæmias of pregnancy and refractory cases of megaloblastic anæmia with free gastric hydrochloric acid have not been generally investigated for the presence of idiopathic steatorrhœa.

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In 1947 Goldenberg et al. described a test for hypertension due to circulating adrenaline, based on the reversal of the adrenaline pressor effect by the adrenolytic benzodioxanes (Fourneau and Bovet 1933). They found that the intravenous injection of '933F,' 2-(1-piperidylmethyl)-1 : 4-benzodioxane, abolished or significantly decreased the pressor effect observed during infusions of adrenaline in normal subjects. The blood-pressure usually returned to the "pre-dioxane" level in 10–15 minutes. This effect was also found in patients with phæochromocytoma and hypertension. However, the blood-pressure rose when 933F was given to patients with so-called essential hypertension. These opposite responses differentiate the rare phæochromocytoma from the common essential hypertension, and the intravenous injection of 933F has been applied as a clinical test for phæochromocytoma by Goldenberg and his colleagues and by Cahill (1948). Dana and Calkins (1949) report two "positive reactions"—i.e., a fall in blood-pressure—in 67 patients with sustained hypertension. One of these positive reactions was obtained in a patient with phæochromocytoma, but the other occurred in a patient with a neuroblastoma of the adrenal gland, and this was considered to be a false positive.

From our experience with intravenous infusions of adrenaline it appeared to us, as it had to Goldenberg and Aranow (1949), that their pressor effect was not comparable with the hypertension resulting from phæochromocytoma. We found it unusual for circulating adrenaline to raise the diastolic pressure, much less to raise it to levels commonly seen in paroxysmal hypertension due to adrenal tumours. Holton (1949) and Goldenberg et al. (1949) extracted noradrenaline from cases of adrenal medullary tumour, and it therefore seemed that noradrenaline rather than adrenaline might perhaps be the cause of the hypertension in this condition. Hence it became necessary to investigate the effect of dioxane 933F on noradrenaline hypertension, which consists of a rise in systolic and diastolic pressures due to increased peripheral resistance (Goldenberg et al. 1948) and is very similar to that seen in paroxysmal hypertension due to phæochromocytoma.

The experiments described here were planned to contrast the effect of the dioxane on hypertension produced by adrenaline in normal subjects with that produced by noradrenaline, and to observe the resultant circulatory changes by measuring the flow of blood in the calf and the hand by venous-occlusion plethysmography. One might expect to find, perhaps, a vasodilatation in muscle or skin accompanying the fall in blood-pressure.

EXPERIMENTAL

The subjects were men between the ages of 22–45 and were, so far as is known, normal in every respect. They came to the laboratory and rested for an hour before any experimental procedure was undertaken.

An air-filled plethysmograph was then applied to the right calf and another to the right hand. A sphygmomanometer cuff was fitted to the left forearm. A 16-gauge needle was inserted into a vein in the right forearm, and an infusion of physiological saline was started through 'Polythene' tubing sealed to the needle. The capacity of the tubing was about 1·5 ml. Basal estimations of blood-pressure, pulse-rate, and blood-flow in hand and calf were then made while the saline infusion was running. When reasonable stability had been achieved, the required drug (adrenaline or noradrenaline) was continuously infused through the same tubing and needle. The concentration required was delivered in 4 ml. of saline solution per minute. After 20 minutes, by which time the circulatory effects were usually reasonably stable, 933F 0·25 mg. per kg. of body-weight was administered. In 5 cases the injection was made into a small rubber tube interposed between the syringe and the polythene tubing. In 2 cases (subjects 1 and 6) the injection was made directly into another vein in the same arm. The injection was made slowly, being completed in 2 minutes. The changes in blood-pressure and pulse-rate were observed at $^1/_2$-minute intervals, and the changes in limb blood-flow were estimated at $^1/_4$-minute intervals for the next few minutes. Observations were then made at minute intervals for about 15 minutes, after which the infusion of adrenaline or noradrenaline was stopped.

We are indebted to Mr. A. J. Ewins, D.SC., F.R.S., of May & Baker Ltd., for the supply of 933F and for investigating its properties after sterilisation by various methods. He reports that the batch from which our sample was supplied fulfilled the known properties of 933F. Autoclaving at 120°C for half an hour neither caused chemical changes in the compound nor affected its spasmolytic properties.

RESULTS OF INJECTING 933F INTRAVENOUSLY IN PERSONS RECEIVING INFUSIONS OF ADRENALINE OR NORADRENALINE

Subject no.	Age (yr.)	Drug		Blood-pressure (mm. Hg) and pulse-rate (per min.)				
				Basal	3 min. before 933F	1 min. after 933F	3 min. after 933F	10 min. after 933F
1	45	Adr.	B.P.	130/72	152/74	138/72	160/76	168/80
			Pulse	88	110	152	132	120
2	23	Adr.	B.P.	130/80	158/72	158/40	170/55	175/68
			Pulse	80	90	120	128	120
3	22	Adr.	B.P.	125/80	155/56	145/45	158/65	175/68
			Pulse	60	88	104	112	104
4	23	Adr.	B.P.	140/80	155/62	155/40	190/60	175/68
			Pulse	56	72	112	100	96
5	23	Nor.	B.P.	125/75	145/106	145/98	145/108	150/108
			Pulse	76	64	96	68	66
6	27	Nor.	B.P.	135/75	184/104	200/75	190/80	180/95*
			Pulse	82	66	140	108	92
7	35	Nor.	B.P.	120/80	156/105	150/70	170/90	165/85*
			Pulse	68	56	76	104	78

* Noradrenaline infusion discontinued just after the dioxane injection.

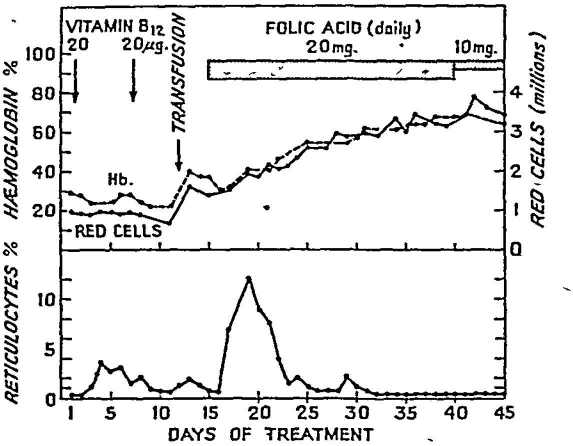

Fig. 2—Blood picture and results of treatment in case 2.

and was given several short courses of iron tablets, but this treatment had been discontinued for about six months before she again came to hospital in October, 1949, fourteen months after the first attendance. She now complained of two months' increasing shortness of breath with tiredness and weakness of the legs.

A blood-count (Oct. 10) now showed 1,080,000 red cells per c.mm., Hb 34%, C.I. 1·5, P.C.V. 17%, M.C.D. 8·4 μ, M.C.V. 140 c.μ, and M.C.H.C. 28%. The patient was pale, with a yellowish tinge of the skin and sclerotics and pallor of the mucosæ. Her nails were brittle but not spoon-shaped, and her tongue was pale and smooth. There was no œdema, and the liver and spleen were not enlarged. The central nervous system showed no abnormality beyond sluggish knee-jerks. The sternal marrow was megaloblastic, with the granulocyte series showing the changes associated with pernicious anæmia. A fractional test-meal gave a normal free-acid curve, and histamine provoked a well-marked response.

Treatment and Progress.—On Oct. 19 (day 1 in fig. 2) a blood-count showed 930,000 red cells per c.mm., Hb 29%, and reticulocytes less than 1%. The patient was given 20 μg. of vitamin B_{12} intramuscularly, and though there was a slight reticulocyte rise on the fourth day (3·5%) there was no appreciable change in the hæmoglobin or red cells. On the seventh day she was given a further 20 μg. of vitamin B_{12} of proved potency, but no response was obtained, and since on the thirteenth day a blood-count showed only 730,000 red cells per c.mm., Hb 22%, and less than 1% reticulocytes it was concluded that none could be expected.

At this time there was some filling of the neck veins, and transfusion was thought necessary. Packed cells from 2 pints of blood were given slowly over eight hours, and next day the red-cell count was 2,100,000 per c.mm. and Hb 40%. A course of folic acid 20 mg. daily by mouth was started, and the reticulocytes reached a peak of 12·5% on the fifth day. This dose was maintained for twenty-five days, by which time the red-cell count had risen to 3,320,000 per c.mm. and Hb to 66%. The patient was discharged six days later on a maintenance dose of 10 mg. of folic acid daily and with a normoblastic marrow.

In view of the findings in case 1, a four-day fat-absorption test was done, which showed only 80% absorption. The blood-sugar curve was flat. The blood-calcium was 9·2 mg. per 100 ml.

DISCUSSION

Idiopathic steatorrhœa was diagnosed in both of these cases although neither patient had ever had diarrhœa. The fat-balance test in both cases was carried out on an intake of 70 g. of fat daily, and the fæces were collected over a four-day period. Cooke et al. (1946) regard absorption of less than 95% as definitely abnormal. They gave 50 g. of fat daily and collected the fæces over a four-day period. Of their 29 cases of idiopathic steatorrhœa 4 had fat-absorption figures of about 90% (cf. case 1, in which the figure was 88·2%). Fourman et al. (1948), giving 70 g. of fat daily, state that fat-excretion over a period of four days has a coefficient of variation of about 30%, but they agree that such a technique is sufficiently accurate for the diagnosis of idiopathic steatorrhœa. The glucose-tolerance curves in cases 1 and 2 strongly support this diagnosis.

Before these tests were done, case 1 was regarded as pernicious anæmia of pregnancy occurring post partum. Since the diagnosis of pernicious anæmia of pregnancy was put on a firm basis by the introduction of sternal puncture, several workers have noticed that some cases are refractory to massive liver therapy (Ungley 1938, Ritter and Crocker 1939, Nielsen 1941). Davidson et al. (1942) reported 16 cases, of which 10 were refractory to liver, and Fullerton (1943) found that 2 cases, out of 3 which gave a reticulocyte response to parenteral liver extracts, showed no improvement in their blood-counts until whole liver or oral extracts were given, and then there was a second reticulocytosis. He drew an analogy with cases of idiopathic steatorrhœa. Davidson et al. (1948) described 3 cases of pernicious anæmia of pregnancy and 1 of Addison's anæmia which relapsed in pregnancy, and of these the case of Addison's anæmia and 2 of the cases of pernicious anæmia of pregnancy gave no response to parenteral liver extract but responded promptly to folic acid. Since then 2 cases of pernicious anæmia of pregnancy have been described in America by Bethell et al. (1948) and Day et al. (1949) which did not respond to intramuscular vitamin B_{12} but recovered promptly with small doses of folic acid by mouth. In this country Ungley (1950) has reported 6 cases which did not respond to vitamin B_{12}; they were given 65–80 μg. of vitamin B_{12} without effect but recovered with 2·5 mg. of folic acid by mouth daily.

The possible rôle of malabsorption in the ætiology of pernicious anæmia of pregnancy has been emphasised by Davidson et al. (1948), who mentioned such a case which subsequently turned out to have idiopathic steatorrhœa though diarrhœa had been absent throughout the period of investigation. In the cases published by Davidson et al. (1942) and Callender (1944) this point was not investigated, and the number of cases of idiopathic steatorrhœa among them must remain a matter for speculation. The additional burden of pregnancy would clearly tend to unmask such cases if they were previously latent.

Case 2 had undoubted idiopathic steatorrhœa. From the clinical point of view this diagnosis is insufficiently considered in refractory megaloblastic anæmias and in ostensible cases of Addison's anæmia in which free acid is found in the gastric juice. We have not discovered any published cases similar to ours treated with vitamin B_{12}. Spies et al. (1949) have treated cases of tropical sprue and non-tropical sprue with vitamin B_{12} both parenterally and by mouth. The dosage given has varied, but they state that 100 μg. may be required to give the greatest hæmatological response. The details of absorption of fat and carbohydrate are not reported in their cases, and the relationship to ours remains problematical. Our own samples of vitamin B_{12} were fully active in Addison's anæmia in the dosage given to the present cases—i.e., 20 and 40 μg.

These cases fall into Ungley's second class (see above), gastric atrophy being absent. It would be interesting to examine the response to vitamin B_{12} of cases of idiopathic steatorrhœa with achlorhydria. Cooke et al. (1946) have shown that cases of Addison's anæmia have a normal fat-balance, and it would therefore be possible to distinguish them from idiopathic steatorrhœa even if the other features of Addison's anæmia were absent.

SUMMARY

Two cases of megaloblastic anæmia associated with idiopathic steatorrhœa are described. One of the cases was first diagnosed post partum.

Both cases failed to respond to therapeutic doses of vitamin B_{12} but recovered promptly with folic acid.

as follows. There is an initial peripheral vasodilatation, shown in skin and muscle by an increase in blood-flow in calf and hand, causing a slight fall in diastolic pressure. Associated with this change there is a tachycardia which may be responsible for a definite increase in cardiac output, restoring the blood-pressure to a level equal to or above that before its administration, despite a continued increased blood-flow in the muscles. We have no direct estimate of the cardiac output, but from the other changes recorded it seems reasonable to assume that cardiac output is increased.

Thus it appears that the injection of the dioxane 933F during an adrenaline infusion in man causes a pronounced vasodilatation, but the subsequent increase in the output of the heart per minute may lead to a further rise in arterial blood-pressure, as seen in our subjects.

In their original paper Goldenberg et al. (1947) investigated this problem in a similar way on a large series of normal people undergoing adrenaline infusions and found that 933F produced a fall in blood-pressure in these circumstances. Moreover, Dr. Goldenberg (personal communication) has recently told us that he has effected a fall in blood-pressure in 12 subjects undergoing infusions of noradrenaline by the injection of 933F. This fall is neither so great nor so sustained as that observed during adrenaline infusions. Therefore there is a considerable weight of experimental evidence to support Goldenberg's contention that 933F can be used to differentiate phæochromocytoma with hypertension from hypertension due to other causes.

In our recent series of normal subjects, however, we did not observe a sustained fall in blood-pressure in any case. Moreover, 5 of the 7 subjects reported distinctly unpleasant symptoms, and subject 6 had a severe reaction to the 933F. The matter has therefore not been pursued so fully as was intended and our series is small. Nevertheless the results are reported as factual observations, however unexpected.

In the clinical application of this test, as previously mentioned, considerable evidence of its positive value has been reported by Goldenberg (personal communication) and by Cahill (1948). However, Dr. G. M. Wilson, in an addendum to this paper, describes briefly a case of proved phæochromocytoma in which the reaction to 933F was the same as in our subjects. A "false positive" has also been reported by Dana and Calkins (1949).

The experimental findings in animals are of limited value in assessing the application of such a test to man, but in the chloralosed vagotomised dog Hermann et al. (1939) showed that infusions of adrenaline after the administration of a large dose of 933F produced a result very similar to that which we observed. On the other hand, Melville (1937) found that, in dogs, 933F reversed the adrenaline pressor effect.

It will be seen that, though there is good evidence of the value of 933F in the diagnosis of phæochromocytoma, there are still some discrepancies in the observed results. How can these be explained? The blood-pressure level is a complex end-response, in so far as it is a product of the cardiac output and the total peripheral resistance. In our subjects we feel that a probable increase in cardiac output more than balanced a pronounced vasodilatation, while in others the reverse may have held good. Further investigation on these points is needed.

SUMMARY

Benzodioxane (933F) was injected intravenously into 7 normal subjects undergoing infusions of adrenaline or noradrenaline.

A fall in blood-pressure lasting a few seconds was succeeded by a rise to a level above that observed before the dioxane was injected.

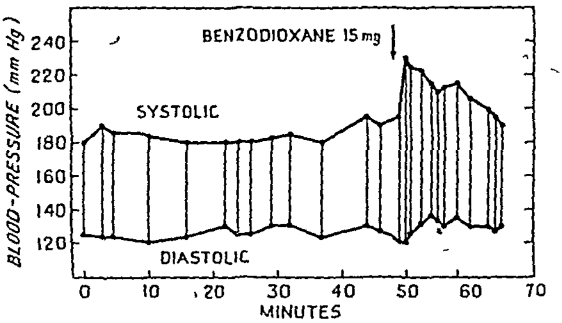

Fig. 3—Rise in systolic pressure, with little change in diastolic pressure when 933F was injected in a patient with a phæochromocytoma of the adrenal gland.

Both the fall in blood-pressure and its subsequent rise were accompanied by tachycardia and vasodilatation in the skin and skeletal muscles.

Unpleasant and alarming symptoms were at times produced.

The significance of these findings, with particular reference to the use of the dioxane effect in the diagnosis of phæochromocytoma, is discussed in relation to the findings of other workers.

ADDENDUM

Two further experiments have been performed using 'Benodaine' brand of 933F (for which we are indebted to Dr. R. C. Pogge of Messrs. Merck & Co., New Jersey). Given during an infusion of adrenaline, benodaine produced an effect in all respects similar to those described above, whereas during an infusion of noradrenaline a fall of systolic pressure of 5–10 mm. Hg occurred during a period of 20 minutes when the infusion was terminated.

Note on Negative Benzodioxane Test

(DR. G. M. WILSON)

A man, aged 38, was admitted to St. Mary's Hospital, under Prof. G. W. Pickering, with 2 years' history of recurrent attacks of pallor, trembling, and sweating. A mass felt below the right costal margin was shown radiologically to be a tumour of the adrenal gland. The blood-pressure was constantly elevated at about 180/120 mm. Hg.

The patient was given an intravenous drip-saline infusion, and his blood-pressure was recorded. After 46 minutes, 15 mg. of 933F (May & Baker) was injected into the tubing, without the patient's knowledge, over a period of 2 minutes. The injection produced a considerable rise in systolic pressure with little change in diastolic pressure (fig. 3), and conspicuous flushing of the face.

Subsequently a phæochromocytoma weighing 45 g. and 5 cm. in diameter, was removed from the patient's right adrenal gland. He has had no further paroxysmal attacks over a period of 15 months, but his arterial pressure has remained elevated.

Full details of this and two other cases of phæochrome tumours of the adrenal gland are to be published later.

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RESULTS

In all, 7 experiments were carried out: 4 on subjects undergoing adrenaline infusions and 3 on subjects undergoing noradrenaline infusions. The results are shown in the accompanying table. It was intended to extend the series further, but for reasons described below this was not done.

Adrenaline

Subject 1.—Aged 45. An infusion of 0·03 mg. of adrenaline per minute was needed to raise the systolic blood-pressure 20 mm. Hg. Administration of the dioxane caused a transient fall in systolic pressure, a well-marked tachycardia, and a rise in systolic pressure within 3 minutes of its injection. Thereafter the systolic and diastolic pressures continued to rise gradually until the adrenaline infusion was stopped. The tachycardia abated within 5 minutes but did not settle to the pre-dioxane level until the adrenaline infusion had been discontinued. The subject noticed a flushing of the face and upper chest with a feeling of great heat some 40 seconds after the start of the dioxane injection. He also developed a tremor of his right hand and complained of apprehension.

Subject 2.—Aged 23. The recorded hæmodynamic changes are shown in fig. 1. There were no untoward symptoms.

Noradrenaline

Subject 5.—Aged 23. An infusion of 0·02 mg. of noradrenaline per minute raised the diastolic pressure 15 mm. Hg and the systolic pressure 20 mm. Hg. Administration of the dioxane caused a transient fall in diastolic pressure, with a subsequent rise in systolic pressure to 10 mm. Hg above the noradrenaline level. The bradycardia was abolished, and there was a transient increase in blood-flow in the hand and calf. The major hæmodynamic changes are shown in fig. 2. There was little symptomatic discomfort.

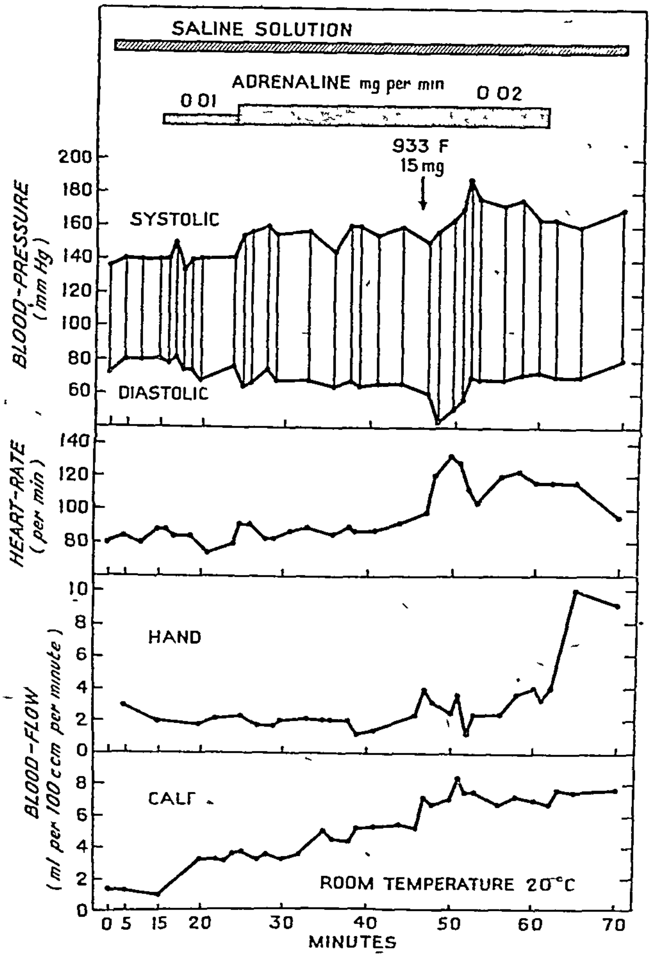

Fig. 1—Blood-pressure, heart-rate, and blood-flow in hand and calf in subject 2, receiving an infusion of adrenal[illegible] solution of adrenaline in saline was subst[illegible] This solution gave a concentration of 0·01 [illegible] later increased to 0·02 mg. per minute. A[illegible] was injected slowly, as described in the text.

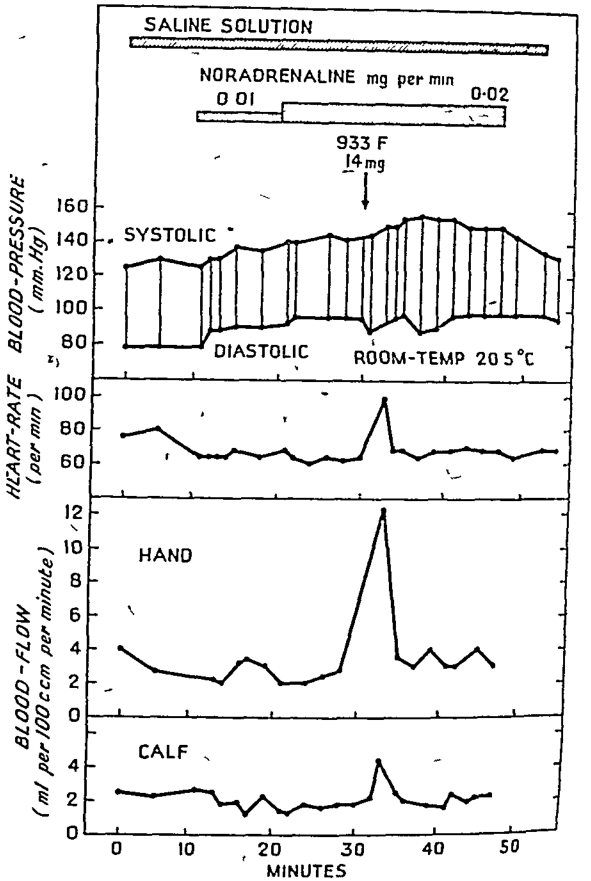

Fig. 2—Blood-pressure, heart-rate, and blood-flow in hand and calf in subject 5, receiving an infusion of noradrenaline. The figure gives the concentration of noradrenaline per minute. At the arrow 14 mg. of 933F was injected in the manner described.

Subject 6.—Aged 27. An infusion of 0·02 mg. of noradrenaline per minute produced a rise in systolic and diastolic pressures which was considered excessive, so the infusion-rate was reduced to 0·01 mg. per minute, which produced an increment of 15 mm. Hg diastolic and 30 mm. Hg systolic. There was the usual bradycardia with a decrease in blood-flow in the calf. When readings had been stabilised benzodioxane was injected slowly, and within 40 seconds the subject noted an unpleasant sensation of warmth on the chest and spreading up into the face; 30 seconds later he appeared to be very distraught (afterwards he said he had felt he was losing consciousness) and started violent involuntary movements with his legs. The injection of dioxane, then about two-thirds complete, was discontinued and the noradrenaline infusion shut off. The subject continued to move his legs for several minutes. Within 30 seconds of the start of the dioxane administration a pulse-rate of 140 per minute was recorded with a fall of diastolic pressure from 100 to 75 mm. Hg and a rise in systolic pressure from 185 to 200 mm. Hg. Owing to the movements of the subject the records of blood-flow in calf and hand at the time were useless. The hypertension persisted for an hour or more after the dioxane had been injected, and the pulse-rate remained between 80 and 90 per minute for that time.

Further investigations were made on patients without cardiovascular abnormality, and it was found that, in the absence of circulating adrenaline or noradrenaline, the injection of 933F in comparable doses produced little if any change in pulse-rate or blood-pressure.

DISCUSSION

The probable sequence of events following the dioxane injection during adrenaline or noradrenaline infusions is as follows. There is an initial peripheral vasodilatation, shown in skin and muscle by an increase in blood-flow in calf and hand, causing a slight fall in diastolic pressure. Associated with this change there is a tachycardia which may be responsible for a definite increase in cardiac output, restoring the blood-pressure to a level equal to or above that before its administration, despite a continued increased blood-flow in the muscles. We have no direct estimate of the cardiac output, but from the other changes recorded it seems reasonable to assume that cardiac output is increased.

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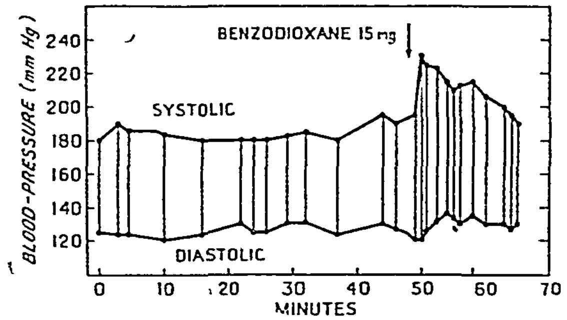

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Subject 2.—Aged 23. The recorded hæmodynamic changes are shown in fig. 1. There were no untoward symptoms.

Noradrenaline

Subject 5.—Aged 23. An infusion of 0·02 mg. of noradrenaline per minute raised the diastolic pressure 15 mm. Hg and the systolic pressure 20 mm. Hg. Administration of the dioxane caused a transient fall in diastolic pressure, with a subsequent rise in systolic pressure to 10 mm. Hg above the noradrenaline level. The bradycardia was abolished, and there was a transient increase in blood-flow in the hand and calf. The major hæmodynamic changes are shown in fig. 2. There was little symptomatic discomfort.

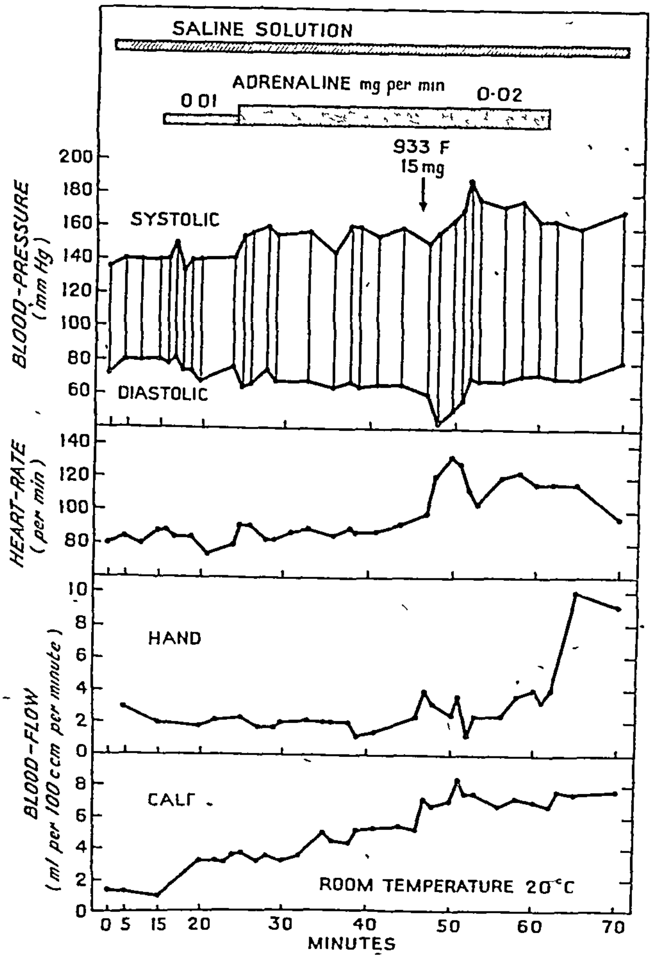

Fig. 1—Blood-pressure, heart-rate, and blood-flow in hand and calf in subject 2, receiving an infusion of adrenaline. At the point indicated a solution of adrenaline in saline was substituted for the saline infusion. This solution gave a concentration of 0·01 mg. of adrenaline per minute, later increased to 0·02 mg. per minute. At the arrow 15 mg. of 933F was injected slowly, as described in the text.

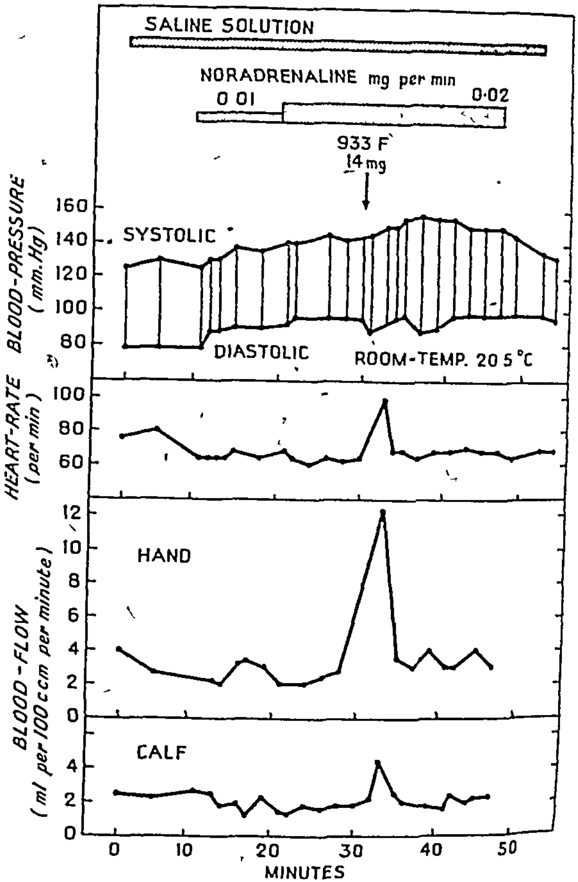

Fig. 2—Blood-pressure, heart-rate, and blood-flow in hand and calf in subject 5, receiving an infusion of noradrenaline. The figure gives the concentration of noradrenaline per minute. At the arrow 14 mg. of 933F was injected in the manner described.

Subject 6.—Aged 27. An infusion of 0·02 mg. of noradrenaline per minute produced a rise in systolic and diastolic pressures which was considered excessive, so the infusion-rate was reduced to 0·01 mg. per minute, which produced an increment of 15 mm. Hg diastolic and 30 mm. Hg systolic. There was the usual bradycardia with a decrease in blood-flow in the calf. When readings had been stabilised benzodioxane was injected slowly, and within 40 seconds the subject noted an unpleasant sensation of warmth on the chest and spreading up into the face; 30 seconds later he appeared to be very distraught (afterwards he said he had felt he was losing consciousness) and started violent involuntary movements with his legs. The injection of dioxane, then about two-thirds complete, was discontinued and the noradrenaline infusion shut off. The subject continued to move his legs for several minutes. Within 30 seconds of the start of the dioxane administration a pulse-rate of 140 per minute was recorded with a fall of diastolic pressure from 100 to 75 mm. Hg and a rise in systolic pressure from 185 to 200 mm. Hg. Owing to the movements of the subject the records of blood-flow in calf and hand at the time were useless. The hypertension persisted for an hour or more after the dioxane had been injected, and the pulse-rate remained between 80 and 90 per minute for that time.

Further investigations were made on patients without cardiovascular abnormality, and it was found that, in the absence of circulating adrenaline or noradrenaline, the injection of 933F in comparable doses produced little if any change in pulse-rate or blood-pressure.

DISCUSSION

The probable sequence of events following the dioxane injection during adrenaline or noradrenaline infusions is

TABLE III—EFFECT OF IODINE TREATMENT ON LACTATION IN FIRST THREE MONTHS

—	Primiparæ		Multiparæ	
	Controls	Experimental	Controls	Experimental
Number in group	24	24	32	32
Average age of mother (years)	24·1	24·3	32 6	32·3
Average birth weight of child (kg.)..	3·14	3·21	3 44	3·44
Average amount of milk taken on 5th day.. ..	200	200	190	193
Breast-feeding twice or more daily:				
No. of mothers feeding for				
3 months	19	22	28	21
2 months	4	1	2	4
1 month	1	0	2	6
Less than 1 month ..	0	1	0	1
Full breast-feeding:				
No. of mothers feeding for				
3 months	7	10	7	3
2 months	6	8	6	7
1 month	4	3	4	5
Less than 1 month ..	7	3	15	17

mother was used only if a "control" mother matching almost perfectly in all respects had been investigated. For this reason a considerable number of records had to be discarded, and the final comparisons were made on about half the women studied. Where possible, the same women were used for all three comparisons. Many mothers went home on the ninth day; hence fewer records were available for the milk yield on that day.

RESULTS

The amounts of milk given by 50 "experimental" mothers on the eighth day and by 23 of them on the ninth day were not significantly different from the amounts given by a like number of controls (tables I and II). The small increases shown by the primiparous women on the eighth and ninth days are not statistically significant (from the fifth to the eighth day: $t = 0{\cdot}30$, $p = 0{\cdot}8\text{–}0{\cdot}7$; from the fifth to the ninth day: $t = 2{\cdot}02$, $p = 0{\cdot}1\text{–}0{\cdot}05$). The multiparous women were inconsistent, the eighth day showing a small increase with iodine treatment which is not significant ($t = 0\ 82$, $p = 0{\cdot}5\text{–}0{\cdot}4$) but the ninth day a decrease.

The later lactation of 56 of the mothers has been analysed to show (1) the number of mothers who could provide two or more feeds a day for periods up to three months, and (2) the number of these mothers who were fully breast-feeding their babies over these periods. The lactation was not affected by the iodine treatment, the apparent improvement shown by the primiparous women being without statistical significance (feeding twice or more per day: no difference between groups; full feeding: $\chi^2 = 1{\cdot}21$, $p = 0{\cdot}3\text{–}0{\cdot}2$). The multiparous women who received iodine did not lactate so well as the controls.

It therefore seems that, under the conditions of this investigation, iodine did not improve lactation.

DISCUSSION

It was unfortunate that the period of iodine treatment had to be so short, but this should have been offset to some extent by the large dosage used. On Robinson's showing some result of the iodine treatment should have been visible by the eighth and ninth days, and it is obvious that a short term of effective treatment would have great advantages. In Robinson's series the average yield of milk, which was 140 g. on the fifth day, rose during iodine treatment to about 310 g. on the eighth day and 340 g. on the ninth; in the present series the average rise in control and experimental groups was from 190–200 g. on the fifth day to about 290 g. on the eighth day and 330 g. on the ninth. This comparison suggests that the effect observed by Robinson might conceivably have been due to chance. If that were so, however, some explanation would really be needed for the very bad lactation in her controls.

Differences in race, physique, state of nutrition, or normal intake of iodine could hardly have been responsible for the different results obtained with English and German mothers. The experience of Nicholson (1948), added to our own, brings us reluctantly to the conclusion that the improvement in lactation reported by Robinson was not caused merely by the administration of iodine.

Our thanks are due to Professor Anselmino, director of the Landesfrauenklinik, for giving us facilities for the investigation. Two members of the staff of the Klinik, Dr. R. A. von Finck and Dr. R. Stewens, helped to examine the women and complete the records.

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TRANSILLUMINATION OF WHITLOWS OF THE TERMINAL PHALANX

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THE diagnosis of infection in the distal part of a finger is usually simple; the difficulty is to determine the presence and precise situation of pus. Local signs, such as loss of pulp resilience and a point of exquisite tenderness, are often late and may indicate the presence of a relatively large slough.

The technique of transilluminating the infected part was developed to detect the initial appearance of pus in early infections which were being treated conservatively, and thus to avoid premature or delayed incisions. It has also proved most valuable in the examination of infected fingers of children, who could not give a precise account of their symptoms and were difficult to examine. The method is probably not original, but the writer has not seen it described in any article or textbook on surgery of the hand.

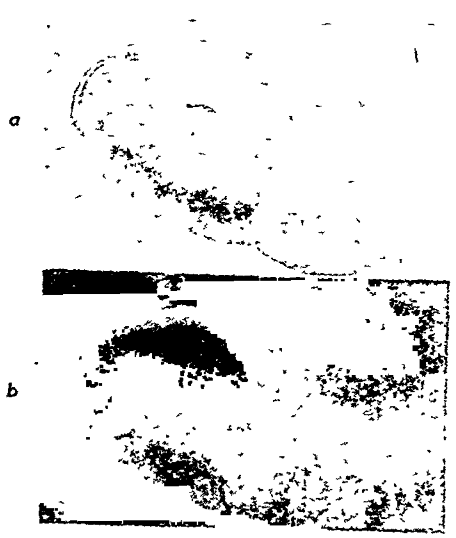

Fig. 1.—Early infection. Shadow cast by pus deeply situated in pulp: *a*, before transillumination; *b*, with transillumination.

IODINE AS AN AID TO LACTATION

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THE first systematic attempt to use an iodine-containing substance to improve lactation seems to have been made by Hertoghe (1896). According to Robertson (1946), Hertoghe observed that dried thyroid was beneficial to the lactation of women, and he therefore experimented on cows, obtaining increased milk yields. The application of this treatment to domestic animals is discussed by Young (1947).

The thyroid treatment was successfully reapplied to women by Robinson (1947a), working at St. Thomas's Hospital, London, and she later reported (Robinson 1947b) that iodine gave similar good results: 19 of 20 women who had insufficient milk on the fifth day after delivery and who were given a course of Lugol's iodine solution (6 drops twice a day from the sixth to the twelfth day of the puerperium) were able at the end of the course to provide enough milk for unsupplemented feeding; control groups given massage, saline injections, or no treatment gave much less milk. Of the 19 mothers, 8 were seen when their children were aged four weeks, and they were judged, on the basis of two test feeds, to be lactating well. Robinson concluded that one of the causes of failure to establish a satisfactory milk output was a deficiency of iodine. She did not, however, explain how the deficiency arose, or offer any other evidence of its existence.

An attempt to confirm Robinson's claim for iodine treatment was made at Farnborough, in Kent, by Nicholson (1948). He gave Lugol's solution to 19 women but did not find any improvement in their milk yield by the tenth day. He pointed out that the women were receiving other treatment designed to stimulate lactation, and he could not follow their later lactation.

The present investigation was undertaken in the Landesfrauenklinik, Wuppertal, Germany, in 1948. There had been food shortages in the previous years, but conditions had improved and the women were not obviously undernourished. The general standard of lactation was, however, unsatisfactory, and there seemed to be an excellent opportunity to test the value of iodine as a galactagogue.

METHOD

The Landesfrauenklinik was a well-run modern hospital. The importance of breast-feeding was recognised, and a special staff of nurses was maintained to teach the mothers the art of breast-feeding and to care for their breasts. The mothers were strongly encouraged to nurse their babies, but were not given œstrogens or any other medical or physical treatment if the milk-supply was inadequate. The children were always weighed before and after every feed, and the daily yields of milk were obtained in this way.

TABLE I—EFFECT OF IODINE TREATMENT ON MILK YIELD ON EIGHTH DAY

—	Primiparæ		Multiparæ	
	Controls	Experimental	Controls	Experimental
Number in group	22	22	28	28
Average age of mother (years)	26·1	24·0	32·4	32·2
Average birth weight of child (kg.)	3·18	3·20	3·44	3·44
Average amount of milk yield on 5th day (g.) ..	188	185	191	196
Average amount of milk yield on 8th day (g.) ..	302	303	280	297
Average increase in milk yield (g.)	114	118	89	101

Robinson (1947b) showed that successful lactation was unlikely if the milk yield on the fifth day was less than about 280 g., and this criterion was used in the selection of women for the present investigation. Each woman who failed to give 280 g. of milk on the fifth day was interviewed forthwith, and she and her child were examined. A mother was only admitted to the investigation if her home was in the town of Wuppertal and she was hoping to breast-feed the child, if her menstrual history suggested that she had no endocrine abnormality, if the pregnancy had been free from illness, if the delivery had been at full term and unassisted, if the puerperium had been uneventful, and if she and her child were apparently in good health. Half the women so selected were placed in the group for iodine treatment, and the others made up the control group. In 5 women there was a moderate enlargement of the thyroid, but no sign of thyrotoxicosis; 2 of these were given iodine, and the 3 others received no treatment.

It was known that few of the women would stay in the clinic more than eight or nine days after the birth of their children, and that it would be impossible to supervise treatment for the full time advised by Robinson. It was therefore decided to give 12 drops of the iodine solution twice a day—i.e., twice Robinson's dosage—in milk for four days, starting on the morning of the sixth day. If the woman left the clinic before the end of the four days she took the appropriate doses with her. The solution was made by dissolving 10 g. of potassium iodide in 100 ml. distilled water, and then adding 5 g. iodine (both 'Analar' preparations). At first the women in the control groups were given "dummy" milk drinks containing no iodine, but later this practice was discontinued, and nothing was done to balance the psychological stimulus of the iodine treatment.

TABLE II—EFFECT OF IODINE TREATMENT ON MILK YIELD ON NINTH DAY

—	Primiparæ		Multiparæ	
	Controls	Experimental	Controls	Experimental
Number in group	9	9	14	14
Average age of mother (years)	24·2	24·0	32·0	32 8
Average birth weight of child (kg.)	3 09	3·10	3·48	3·53
Average amount of milk yield on 5th day (g.) ..	213	208	184	200
Average amount of milk yield on 9th day (g.) ..	351	366	324	300
Average increase in milk yield (g.)	138	158	140	100

About 100 women were given iodine, and about 100 served as controls. The numbers were greatly reduced, however, before the final analysis of the results.

Three months after the birth of her child each woman in both groups was visited at home and asked about the way in which the child had been fed. The health of the mother and child was also investigated, and the case was discarded if any illness or abnormality was disclosed.

The data have been analysed under three headings: (1) increase in milk yield from the fifth to the eighth day; (2) increase in milk yield from the fifth to the ninth day; and (3) the number of women able to provide full or supplemented breast-feeding at the end of one, two, or three months. For each comparison the "experimental" and "control" mothers were paired as regards the parity and age of the mother, the sex and birth weight of the child, and the amount of milk taken on the fifth day, since all of these might be expected to affect lactation. An "experimental"

SUMMARY

A method of transilluminating terminal whitlows is described which enables the course of the infection to be estimated more accurately than is possible by other means. In this way pus can be precisely located at its earliest appearance, so that a timely and accurate incision can be made.

I wish to thank Mr. P. G. McEvedy, senior surgeon, Ancoats Hospital, and Prof. G. A. G. Mitchell, director of the anatomical laboratories, Manchester University, for their advice, and Miss J. Perry for the illustrations.

Reviews of Books

Happy Toil

Fifty-five Years of Tropical Medicine. Major-General Sir LEONARD ROGERS, K.C.S.I., C.I.E., LL.D., M.D., F.R.C.P., F.R.C.S., F.R.S., I.M.S. retd. London: Frederick Muller. 1950. Pp. 271. 18s.

Sir Leonard Rogers is the doyen of workers in tropical medicine, in the succession of such great figures as Manson, Ross, and Bruce. His activity has been phenomenal and his personal contributions to medical knowledge over a large field have been momentous; indeed, it has been given to few to exert so much influence on the physical welfare of mankind in the torrid climates. Sir Leonard's autobiography, therefore, besides giving an intimate account of the career and personal achievements of a remarkable man, broadly recounts the history of the successful campaign conducted against disease in the tropics for more than half a century. It details the origin of the now world-famous Calcutta School of Tropical Medicine, which owes its inception and subsequent birth to him. If only for these reasons the volume is well worth reading; in addition there is an entertaining account of the conditions of medical education and of professional work of a generation rapidly passing, and of the difficulties that were surmounted by the pioneers of medicine as we now know it

Guide to Diagnosis of Occupational Diseases

Compiled by the staffs of the Industrial Health Division, Department of National Health and Welfare, and the Division of Industrial Hygiene, Department of Health for Ontario. Ottawa: The King's Printer. 1949. Pp. 317. $1.

THE clearness and simplicity of this carefully written Canadian book come from first hand knowledge, hard work, and much revision. It has been compiled by officials of the health departments of the Federal Government and of the State of Ontario, and the authors mainly responsible are Dr. R. B. Sutherland, Dr. E. A. Watkinson, and Mr. H. N. Acker. Their modest intention was "to present only a brief summary of current knowledge of the diagnostic features relevant to occupational diseases," but the result is an outstanding book. They stress, among other things, the importance of taking a full occupational history and of knowing intimately the industrial processes concerned. A list of occupations and their "potential hazards," based on Bulletin No. 41 of the United States Department of Labor, is perhaps the least satisfactory part of the book: it would have been better to indicate the main health risks of each occupation rather than to give long lists of substances, some of them of negligible toxicity, with which the worker might come into contact. But the third and longest chapter, on harmful conditions and substances, is packed full of authoritative and carefully selected information, on which it would be difficult to improve. Nearly all that is worth knowing about industrial medicine and toxicology is adequately and systematically dealt with in 200 pages. The occupational dermatoses are discussed in a short fourth chapter while the fifth and last deals with the Canadian compensation laws. The book will be given free of charge to any doctor in Canada who wishes to have a copy; and doctors in this country may well envy this opportunity. A French edition is also being prepared.

Physiology in Diseases of the Heart and Lungs

M. D. ALTSCHULE, assistant professor of medicine, Harvard Medical School. Cambridge, Mass.: Harvard University Press. London: Oxford University Press. 1949. Pp 368. 40s.

Professor Altschule's team of physicians, surgeons, and radiologists analyse more than 100 cases of cyanotic congenital heart-disease, each dealing with the sections he is best qualified to write on. The embryological survey, though said to be a summary, is a detailed account of the development of the bulb and its adjacent structures, and one of the most comprehensive reviews of this subject so far published. The clinical material is classified into groups, and the symptomatology carefully studied. There are obvious objections to an attempt to group or classify patients' exercise tolerance in relation to the cardiac condition; but the authors try to give an estimate of the severity of the disability. The detailed radiological study is highly instructive, dealing not only with the classical type of Fallot tetralogy but with other associated conditions which have to be distinguished from it. Angiocardiography was freely used, and gave information of great value, as the reproductions of angiocardiograms show. Figures are given showing how cardiac catheterisation may help in diagnosis. Surgical treatment was undertaken in some of the 114 cases investigated, and the difficulties, results, and complications encountered in this series correspond with those described already in larger series from the United States. The detailed case-reports of conditions which do not exactly follow the classical Fallot tetralogy are well worth study by those whose work takes them into this branch.

Diseases of the Aorta

NATHANIEL W. REICH, M.D., associate in medicine, Long Island College of Medicine. New York and London: Macmillan. 1949. Pp. 288. 56s.

THIS monograph appears at an opportune time. The newer methods of investigation of cardiac disease have helped to make surgical treatment possible for some forms of congenital heart-disease, and have roused fresh interest in diseases of the aorta. Dr. Reich has produced a comprehensive and instructive book which will be welcomed by cardiologists as well as general physicians. His style is clear and concise and the numerous illustrations are good, almost without exception. He describes the history, anatomy, embryology, and developmental abnormalities of the aorta, and gives successive chapters to the various aortic diseases, with their symptomatology, diagnosis, and treatment. The last two chapters, on antibiotics and anticoagulants, bring the subject up to the present state of knowledge, and the account of diagnostic procedures strikingly illustrates the progress in scientific methods during recent decades. Some of the methods are treated somewhat perfunctorily—for example, the special tests for determination of the total pulmonary blood-flow, used in the diagnosis of congenital lesions; the early chapters describing congenital abnormalities involving the aorta are by contrast very full, and are particularly well done. It is almost as great a pleasure to handle this book as it is to read it.

Sexual Deviations

L. S. LONDON, M.D.; F. S. CAPRIO, M.D. Washington, D.C.: Linacre Press. 1950. Pp. 702. $10.

THIS is a discussion, illustrated with case-histories, of a number of the classical forms of paraphilia. The approach to psychodynamics and to treatment is strictly psycho-analytical, and the treatment of each recorded case is outlined. The authors summarise the history and some aspects of the social significance of sexual deviation, but without reference to its comparative physiology and psychology. The cases are frequently very instructive, but the proportion which responded to analysis seems high, in terms of British experience; and non-psychiatric readers should perhaps be warned against assuming that all paraphilic symptoms of a given type necessarily arise from the same background as that of the specimen cases. The very wide variety and prevalence of paraphilias in apparently well-adjusted subjects is already

METHOD

The pulp of the finger is transilluminated with the naked bulb of an auriscope. The finger should be cleaned, and, if the patient is a manual worker with thickened epithelium, it can be painted with cedar-wood oil to increase the translucency of the tissues. The bulb is pressed lightly against the finger, which is viewed on the side opposite to the point of illumination. The examination, conducted in a darkened room if possible, is begun on the palmar aspect away from the tender area, the bulb being pressed into the sides and tip of the pulp, and finally against the nail while the pulp is inspected from its palmar aspect. By sliding the light over the finger one can transilluminate each point in turn.

APPEARANCES ON TRANSILLUMINATION

Normal Finger.—The normal pulp on transillumination has a homogenous blood-red appearance, the lunula appearing as a slightly darker area at the base of the nail.

Early Infection.—*In the early stages of infection*, when the patient complains of a pricking or throbbing pain in the finger, it is essential to decide whether the infection is in the pulp tissue, with the possible presence of pus, or a superficial lymphangitis. When the finger is transilluminated in a pulp infection, deep red shadows are visible spreading across the nail which fade and intensify coincidentally with the throbbing experienced by the patient. In a pure lymphangitis, however, the pulsation and the variations in the shadows are less apparent. (Care should be taken not to hold the affected digit too tightly, or the pressure obliterates the digital vessels and the pulsation ceases.) If the treatment adopted is effective and the finger is examined daily, the pulsation shadows diminish in intensity as the inflammation abates, and disappear when the finger returns to normal; but in the event of the infection's proving refractory transillumination reveals the formation of pus as a constant dark shadow (fig. 1) visible against the pulsating background. Pus in the central part of the pulp space is most easily detected if the source of illumination is placed against the nail and the finger-tip is examined from the palmar aspect. Although the clinical signs may be equivocal—i.e., there is no definite point tenderness and the tissues are still resilient—incision into the affected area will demonstrate the presence of pus; should the preliminary incision be unsuccessful, it should be deepened, for pus will be found if its shadow has been seen. In a lymphangitis a constant shadow is never seen.

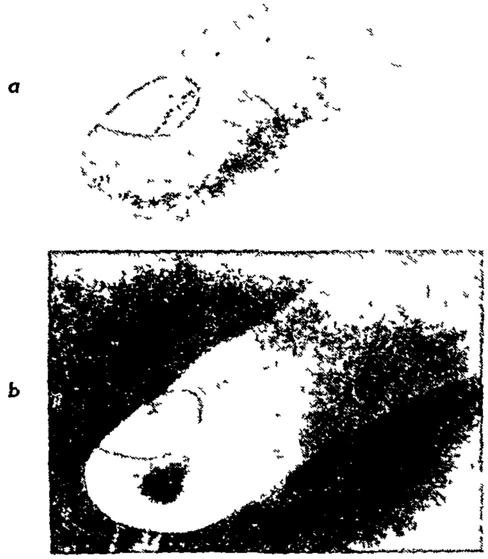

Fig. 2.—Late infection. Sharply demarcated shadow of slough, whose limits can be determined by transillumination: *a*, before transillumination; *b*, with transillumination.

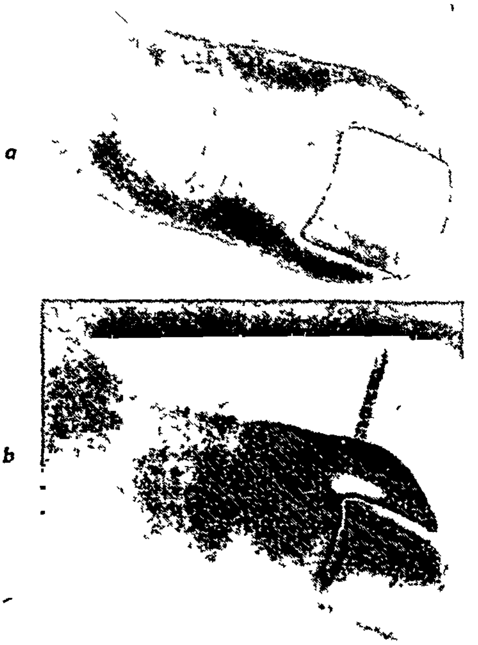

Fig. 3.—Early paronychia developing at side of nail from deep pulp infection: *a*, before transillumination; *b*, with transillumination

Late Infection.—Though pus is obvious clinically, transillumination can be used to demonstrate the precise location and extent of the slough (fig. 2). *If a purulent* blister is present, however, it must be removed *before* transillumination, since its shadow tends to obscure that formed by the deeply situated infection. With the information thus obtained an exact local excision can be made with the minimal trauma and infection of unaffected tissue; this leads to more rapid healing than that which follows routine "hockey-stick" or "fish-mouth" incisions. On occasions a shadow of localised pus without any visible pulsations is observed, indicating the belated success of the patient's defensive mechanism. These lesions heal very quickly when the pus is evacuated.

Paronychia.—To locate subungual pus in a paronychia, any superficial blister should be excised; transillumination will then reveal the subungual pus as an irregular shadow at the base of the nail and possibly extending beyond the lunula, indicating that a further radical procedure is required. When an early paronychia is associated with a concomitant pulp infection, the latter can be seen as a dark shadow extending into the pulp when there is little clinical evidence to suggest its presence (fig. 3). In a child with a neglected paronychia and tender swollen finger it is almost impossible, without transillumination, to ascertain whether a pulp infection is present or not; if the pulp is not infected it is clear and without pulsation, but the paronychia throws a deep horse-shoe shadow round the nail. Treatment may then be given in the knowledge that a pulp infection is not being inadvertently missed. A subungual infection at the tip of the finger may clinically simulate a terminal pulp infection, but transillumination reveals a local slough beneath the nail before its presence is demonstrable as a point of maximal tenderness. This makes possible its earliest eradication.

THE LANCET

LONDON: SATURDAY, APRIL 22, 1950

The Megaloblastic Anæmias

UNTIL lately it was assumed that all cases of megaloblastic anæmia—that is, anæmia with classical megaloblastic changes in the bone-marrow—were caused by some disturbance in the supply, absorption, or utilisation of the anti-anæmic principle found in liver extracts. Much ingenuity was expended in fitting the various anæmias into this unitarian plan. Thus tropical megaloblastic anæmias were due, in the main, to actual shortage of the " extrinsic factor " in the food, which, when acted on by the " intrinsic factor " of the gastric juice, formed the liver principle. Pernicious anæmia was caused by failure of the stomach to secrete intrinsic factor. In steatorrhœa the liver principle was formed but not absorbed. The odd cases of achrestic anæmia resulted from some disturbance between the absorption of the principle from the intestine and its utilisation in the bone-marrow. Pernicious anæmia of pregnancy was perhaps due to the demand for liver principle outrunning the supply. The properties of folic acid (pteroylglutamic acid) still supported this unitarian concept, for all megaloblastic anæmias responded to treatment with it, even though its failure to control the neurological changes in pernicious anæmia made it clear that folic acid could not completely reproduce the action of the natural anti-anæmic liver principle. But patients with megaloblastic anæmia and sprue reacted very well to folic acid; the anæmia and the other clinical signs and symptoms remitted dramatically in spite of the fact that fat absorption remained defective. It was remembered that the anæmia of sprue often reacts poorly to liver extracts, particularly to the purified liver extracts that are so useful in pernicious anæmia. The idea therefore arose that megaloblastic marrow might be transformed to normoblastic marrow by more than one agent; and perhaps that the megaloblastic anæmias themselves were due to a deficiency or failure of action of more than one factor.

This possibility that the megaloblastic anæmias are not all variations on one ætiological theme has received support from recent work on vitamin B_{12}. In this issue Dr. ISRAËLS and Dr. SHARP of Manchester describe 5 cases, and Dr. TUCK and Dr. WHITTAKER of the North Middlesex Hospital 2 cases, of idiopathic steatorrhœa with megaloblastic anæmia that did not respond to vitamin B_{12} but responded fully and completely to folic acid. The Manchester patients had also been refractory to the parenteral liver extracts used for pernicious anæmia, and one had relapsed while being treated with an oral proteolysed liver preparation; it was shown that these patients could be kept in normal health by the regular administration of folic acid, without any other factor. A similar failure to respond to vitamin B_{12} and success with folic acid has been reported in " pernicious anæmia of pregnancy." Furthermore, as we have noted before, the response of tropical sprue to vitamin B_{12} has not been in any way so striking as its response to folic acid. Reviewing what little has been written on this subject, ISRAËLS and SHARP conclude that there is enough evidence to divide the megaloblastic anæmias into two groups. The first group is typified by addisonian pernicious anæmia, and the reports of SPIES and his co-workers place the nutritional megaloblastic anæmias of the southern U.S.A. and the West Indies in this group; the anæmia of these patients responds well to parenteral or oral liver preparations, vitamin B_{12}, and folic acid. The second group includes pernicious anæmia of pregnancy, the megaloblastic anæmia of non-tropical sprue (idiopathic steatorrhœa), and probably tropical sprue as well; these patients respond sharply to folic acid, but not at all, or disappointingly and with large doses only, to liver preparations and vitamin B_{12}. Reports on nutritional megaloblastic anæmia from parts of the world other than America are not yet clear, but it seems likely that they too will fall into the second group. The theoretical implications of this division are difficult to foresee until we have more evidence. Why cannot vitamin B_{12} transform the megaloblastic hyperplasia of idiopathic steatorrhœa to normoblastic, when it can produce this effect on the seemingly morphologically identical megaloblasts of pernicious anæmia? It is far from clear that patients with steatorrhœa have any deficiency of folic acid in their diet; and, since the folic acid is active by mouth in free or conjugated form, defective absorption is unlikely to be the only factor. Is it possible that the action of folic acid on megaloblasts is really non-specific and fortuitous? No new evidence has been brought forward to support the view that deficiency of folic acid plays any part in the ætiology of pernicious anæmia: it may be that in steatorrhœa, too, folic acid is producing the desired effect but that the real defect concerns some other factor.

The classification of the megaloblastic anæmias is in the melting-pot. But fortunately the practical therapeutic lessons of these new observations are quite clear. For true pernicious anæmia, liver extracts, or vitamin B_{12} are the proper materials for treatment; for pernicious anæmia of pregnancy and idiopathic steatorrhœa with megaloblastic (but not with normoblastic) marrow, folic acid is the treatment of choice. The case-records from Manchester and from the North Middlesex Hospital show, however, that the diagnosis of idiopathic steatorrhœa is not easily made and is likely to be missed in these cases unless specifically looked for. The truly heartening results obtained with the correct treatment in these young patients repay all the trouble taken in diagnosis. The distinguishing of these treatable syndromes makes diagnosis before treatment even more essential. The doctor who gives liver, folic acid, or vitamin B_{12} to an uninvestigated case of anæmia may delay proper diagnosis for years; and, since steatorrhœa often affects patients about puberty, the consequences of delay may be irreparable. The doctor will be safer too if in treating anæmias he avoids the blunderbuss remedy, which may have almost as unpredictable an effect as the firearm of the same name.

becoming recognised, and further information about their significance as tokens of neurosis is badly needed: in all the cases here cited there was either manifest conflict in other fields, or some measure of sexual disability. In many the presenting symptom was anxiety about the deviant compulsion. It is therefore still difficult to evaluate the relative importance of the process which produced the deviation and the guilt arising from its existence. In the view of the authors, the underlying conflict is the psychotherapist's main concern; and in the absence of accurate statistical data on the prevalence of the various patterns of deviant mating behaviour, the psycho-analytical approach is certainly useful, though the authors' prognoses, particularly in homosexual cases, are rather optimistic. They make sensible suggestions about prophylaxis, medicolegal problems, and the question of sex in prisons. The book is a careful and well-documented contribution to the psycho-analytical treatment of deviation, which workers in this country will welcome. It presents a picture of paraphilia in psychiatry which has yet to be reconciled with the wider biological aspects.

Advances in Surgery

Vol. II. Editor: W. DEW. ANDRUS. New York and London: Interscience Publishers. 1949. Pp. 587. 88*s*.

IN the second volume of this series, Dr. DeWitt Andrus is helped by such people as Hugh Cairns, Clarence Crafoord, and Gordon Murray, as well as a team of distinguished American authors. They consider, among other things, the advances made in surgery of the œsophagus, the heart and great vessels, hypertension, and brain injuries. There is a very good contribution on tumours of the testis by Lloyd G. Lewis, and the place of streptomycin in the treatment of surgical infections is discussed. Other sections are devoted to skin-grafting, the surgery of the pancreas, and tumours of peripheral nerves. Nor is the physiological background forgotten: Riley and Cournand in particular relate the study of pulmonary function to chest surgery. A reasonably comprehensive view is thus given of the development and present position of surgery in these specialised subjects, and no better refresher course on them could be recommended. Even if the specialist surgeon does not find much new in the section dealing with his own interest, there are references in plenty to current work which may add to his knowledge. More explanatory illustrations would be welcome in the next edition.

Histopathology of the Skin

WALTER F. LEVER, M.D., instructor in dermatology, Harvard Medical School. London and Philadelphia: J. B. Lippincott. 1949. Pp. 449. 75*s*.

IN recent years several good handbooks on the histopathology of the skin have been published; but this new one will certainly be useful, especially to those dermatologists who are not also expert pathologists, and to pathologists who have only limited experience of dermatology. The text is lucid, and the illustrations (nearly all in black-and-white) are clear. Dr. Lever knows the limitations of his subject, and insists that histopathological examination can often be only an aid to diagnosis, and will not always give the final answer to a diagnostic problem. Short concise clinical descriptions of the diseases considered are included, and references are full.

Die chemotherapeutische Tamponade der Lungenkavernen

GUSTAV MAURER, Schatzalp/Davos. Stuttgart: Thieme. 1950. Pp. 114. D.M. 18.

IN a comparatively short but well-produced monograph, written in German, Gustav Maurer introduces and shows the results of a technique which he has used in the treatment of certain lung cavities. His principle is an elaboration of cavity drainage, but instead of depending on a fine tube of the Monaldi type he steadily dilates the opening into the cavity up to the size of a finger by means of laminaria tents; through this opening a tube can be introduced, and so can chemotherapeutic agents, notably streptomycin or *p*-aminosalicylic acid. He believes that the action of these agents on the disease in the walls of the cavity helps to eliminate tuberculous infection and favours closure. The cavities chosen for this form of treatment are approached from in front, usually below the level of the clavicle, and some very good results are illustrated. Dr. Maurer sometimes finds it necessary to assist closure of the cavity by a small upper thoracoplastic operation. The bibliography is unduly short and very far from comprehensive.

Hospital Administration for Women (2nd ed. London: Faber. 1950. Pp. 342. 35*s*.).—The first edition of Miss Emily MacManus's book proved of such value to hospital administrators that it is disappointing to find the second edition out of date. Much of the advice given would certainly not do today. The preface is excellent, the principles of administration remain as sound as before, and the care and welfare of the patients are kept before the reader all the time; but the details would be of little value to a newly appointed matron, and the reader cannot help feeling that an opportunity has been lost.

Oxidation-Reduction Potentials in Bacteriology and Biochemistry (6th ed. Edinburgh: E. & S. Livingstone. 1950. Pp. 215. 20*s*.).—The sixth edition of this book follows within two years of the fifth; even so, as Mr. L. F. Hewitt, PH.D., notes in his preface, it has been extensively revised, and three new chapters have been added—on pH determinations, metabolic cycles, and chemotherapeutic agents and antibiotics. The early chapters are still introductory, but encouraged by widely scattered correspondents Dr. Hewitt has broadened his scope, and the later chapters in succeeding editions have dealt increasingly with "the implications and effects of oxidation-reduction conditions in metabolic processes."

Mitchell-Nelson Textbook of Pediatrics (5th ed. Philadelphia and London: W. B. Saunders. 1950. Pp. 1658. 63*s*.).—This outstanding textbook renews itself regularly every four or five years. Prof. Waldo E. Nelson, successor in editorship to the late Dr. Mitchell, has kept his team of contributors hard at it, and Mrs. Nelson has shared in the editing. There are several new, and many rewritten, sections, and the book covers the whole body of pædiatrics which in the last twenty years has grown as inevitably as, but a great deal faster than, a coral island. The accretions do not perhaps receive equal treatment: it is a little startling to find emotional growth and development discussed in less than a page, but some like the mind and some the body, and those editors who remember that the two are one are as rare as cases of phocomelia and ectrodactylia, depicted here. The body receives a handsome tribute throughout.

Diseases Commonly met with in Melanesia (*3rd ed.* New Zealand: Melanesian Mission, Shortland Street, Auckland. 1949. Pp. 100. 7*s*. 6*d*.).—In large print and small compass Dr. Clifford S. James deals with the prevention and treatment of the disease which field workers of the Melanesian Mission—and also residents living beyond the care of a doctor—may encounter. To bring the book up to date on new methods of chemotherapy he has enlisted the help of Dr. A. G. Rutter. He starts each section with the differential diagnosis of a given symptom, displayed clearly on a single page. "If your patient complains especially of fever," the first of these begins, "think of—" and then follows a list, headed by malaria, the most common causes appearing first in black type, the rarer things below in ordinary type. Language throughout is simple and sentences short, and the book must often have done yeoman service in far-off places.

Casualty Faking (British Red Cross Society. 1949. Pp. 36. 4*s*.).—Half the fun of first-aid training comes in learning how to deal with the serious casualty; and however rare the opportunities for doing this may be in ordinary life, vaulting ambition still hopes for the worst. Imagination and a willing friend will do much to prepare the first-aid student for his great opportunity; but a few life-like injuries will add greatly to the sobriety with which he approaches his task. In this little book, Mr. Ernest James Ward, an enthusiast if ever there was one, describes and elegantly illustrates the ways in which horrible injuries may be successfully counterfeited. He teaches the tyro to handle putty, soft paraffin, grease-paints, and mock-blood in a way to curdle the ordinary kind, and ingeniously produces eggshell crackling with *real* eggshell—surely a case of art improving on nature. A most attractive and instructive book, as Sir Harold Whittingham says in a foreword.

hopeless.[14] Their vision is often greatly improved by sympathectomy. Stock[15] and Evans[16] have drawn attention to the particular suitability for sympathectomy of women with hypertension following toxæmia of pregnancy. The difficulty of devising a reliable method of assessing prognosis and the likely response to sympathectomy is stressed by Hinton and Lord.[17] From their experience in 375 cases, with 38 deaths at or within six months of operation, they have drawn up a set of rules for selecting patients for operation. Briefly, they reject patients with renal failure, persistent congestive cardiac failure, recent coronary thrombosis or strokes, mental confusion due to cerebral changes, or less serious vascular damage in several organs. If they had applied these rules they would have rejected 30 of the 38 patients who died, but they would also have turned down 25 patients who in fact did well. The selection of patients is discussed on p. 787 by Professor Wells and Mr. Welbourn and by Mr. Shucksmith, who are impressed by the symptomatic relief which many of the severe cases experience, and by the possibility of complete cure in the early cases.

One defect stands out clearly in all discussions of the treatment of hypertension—our lack of knowledge of the prognosis of cases not treated surgically. Useful surveys have been made[18] but no large series of cases has been published in which the patients have been investigated so completely and followed for so long as those in the surgical series. More data are needed, and it is to be hoped that all physicians and surgeons concerned with the management of hypertensive patients will assess them as completely as possible, make careful follow-up studies, and publish their observations.

Treatment of Herpes Zoster

Zoster is a self-limiting disorder ranging in intensity from a banal painless rash, calling for no treatment other than a shake lotion, to a gangrenous secondarily infected eruption with pain severe and persistent enough to call for the most powerful anodynes. For this reason the assessment of different treatments is even more tricky than in disorders with more uniform natural histories. Even with a controlled series a large number of cases is necessary to eliminate chance, and the statistical study of intensity of pain offers another difficulty. The fairest series for a controlled study in this particular malady would probably be one confined to patients of comparable age-groups with zoster affecting the ophthalmic division of the fifth nerve, a site often severely involved as regards both pain and local reaction.

In the circumstances, it is not to be wondered at that many drugs and physiotherapeutic measures have been reputed to relieve zoster. X-ray therapy to the skin lesions and to the affected dorsal-root ganglia has its advocates. Keichline[19] treated 62 cases in this way, using 148 r through a 3 mm. aluminium filter at a distance of 30 cm.; nine-tenths of his patients were relieved by one exposure, the others requiring one or two additional exposures. Posterior pituitary extract in a daily dose of 1 ml. subcutaneously has been reported[20] to relieve pain and shorten the course, but it cannot be given during pregnancy, and the fact that it is also contra-indicated in patients with cardiovascular disease reduces its scope since many of the worst cases of zoster are in elderly people. The same claim is made for sodium iodide in 20 ml. doses of a 10% solution intravenously on the first, second, fourth, and seventh days of the eruption.[21] Intramuscular injections of contramine (0·125 g.) or of crude liver extract (4 ml.) have seemed to alleviate the pain, and diphtheria antitoxin has been recommended[22] for the resistant ophthalmic type, 5000 units being given and repeated two days later if necessary. More exotic remedies include moccasin venom[23] and cobra venom with sulphanilamide,[24] and even the more homely autohæmotherapy has been credited with good results. Where they are not purely due to suggestion, the effects of many of these remedies may be based on the initiation of a nonspecific foreign-protein reaction. In a different category may be the favourable reports[25] on blood-transfusions from convalescent donors, three weeks to two years after the infection, first advocated by Gunderson.[26]

Lately Finland and his colleagues[27] have treated 24 cases with 'Aureomycin,' starting with 1 g. four times a day and halving the dose if there was definite improvement or if nausea or vomiting were troublesome. Their total dosage varied from 7·5 to 54 g. given over periods ranging from three to seventeen days. There were 19 patients in their series over 50 years of age, but the response to treatment seemed to bear no relation to age. The best results were in patients treated before the middle of the second week, after the first appearance of symptoms or lesions. Rapid evolution and clearing of the eruption usually began within or shortly after the first 24 hours of aureomycin therapy. Even patients with ophthalmic zoster responded favourably. The immediate effect on the pain is said to have been striking, great relief being noted within 24 hours and the relief usually being complete in four or five days. Postherpetic pain occurred in 6 of the patients. Fresh lesions did not develop during aureomycin therapy except in the first day or so, though such lesions might appear if treatment was interrupted too soon. Nevertheless, herpes zoster has first appeared in the course of aureomycin treatment for other infections,[28] and this perhaps suggests that the ætiology of the lesions is not always the same, or that there are differences in the susceptibility of various strains of zoster virus to aureomycin. A similar apparent paradox has been noted with vitamin B in zoster. Given subcutaneously in a dose of 3000 I.U. (1 mg. = 320 I.U.)

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Sympathectomy for Hypertension

Sympathectomy has been widely practised in recent years as a treatment for hypertension, and the American clinics have reported results in many hundreds of cases; yet there is little agreement among the authorities on the indications for the operation. With a few exceptions British surgeons have only turned their attention to the treatment of hypertension since the late war, and the 80 cases reported by Professor Platt and Dr. Stanbury [1] from Manchester a fortnight ago is the largest series so far published in this country.

There are three ways in which it is thought that sympathectomy may benefit hypertension. First, it dilates the blood-vessels in the splanchnic area (and, in some operations, in the legs) and so reduces the peripheral resistance. The importance of this factor in any given case can be judged by the fall in blood-pressure which occurs when the patient changes from the lying to the erect posture—that is, by the degree of postural hypotension. Secondly, sympathectomy denervates the kidneys, and in animals prevents the Trueta "shunt" mechanism from operating.[2] The evidence is far from conclusive, but the renal cortical ischæmia produced by this mechanism may be responsible for essential hypertension in man. Thirdly, sympathectomy denervates the suprarenal glands and prevents them forming adrenaline. This was formerly thought to be important, but it is doubtful whether adrenaline plays much part in hypertension except in the rare cases of tumours of the suprarenal medulla. Various types of operation have been performed. The one which Peet [3] introduced in 1933 consists in a supradiaphragmatic resection of both sympathetic chains from T 10 to T 12 and of the splanchnic nerves. Other surgeons have extended the operation to remove more of the thoracic chains, and Peet himself [4] often went as high as T 6 or T 5. The subdiaphragmatic operations of Craig and Adson [5] and of Crile [6] have now been largely abandoned. Smithwick introduced the operation which most surgeons are now doing. Being dissatisfied with the results of both supradiaphragmatic and subdiaphragmatic approaches he combined the two in his thoracolumbar sympathectomy,[7] in which the sympathetic chains from T 9 to L 2 or lower and the splanchnic nerves are resected. Various extensions of this procedure have been practised by Smithwick and others,[8] including A. M. Boyd [1] in England; and Grimson [9] has advocated a "total" bilateral sympathectomy in which both sympathetic chains are removed from the stellate ganglion to L 3. Owing to the increased morbidity and mortality which accompany them, the more extensive procedures are not justified except in special circumstances, and Smithwick's original operation is now the standard procedure.

Peet and Isberg [10] and Smithwick [11] have published their results in large series of cases which have been very fully investigated and followed over at least five years. In Smithwick's 256 cases with continued hypertension the mortality was 2·2% per operation, and 31% were dead nine years later. The diastolic blood-pressure fell at first in 84% of cases, and in 35% it fell to below 90 mm. Hg. In those who survived from five to nine years, however, the corresponding figures were 47% and 21%. Sympathectomy apparently slows the progress of the cardiovascular disease, especially in those cases which show the greatest fall in blood-pressure. Actual improvement is often seen in the retinæ, in the heart-size and electrocardiograms, and in renal function. In spite of the late deterioration in blood-pressure, Smithwick claims that the survival-rate of the patients operated on, compared with that of hypertensives treated medically, is improved to a degree which is statistically highly significant in all except the mildest cases. The effect of the sympathectomy on symptoms is variable. Many of the patients are capable of more work than they were before operation. Headache is nearly always relieved even when the blood-pressure is not lowered. Platt and Stanbury [1] agree with Fishberg [12] that this is probably the result of a compensatory increase in vasomotor tone in the upper part of the body, which protects the capillaries in the head from the increased blood-pressure. The same mechanism often produces Raynaud's phenomena in the hands after thoracolumbar sympathectomy. Other symptoms are relieved less constantly, and some, especially angina pectoris and dyspnœa, may be increased. Chest complications and intercostal neuralgia are occasionally serious after the operation, and cerebral thrombosis may be precipitated by it.

The selection of patients for operation is not easy. Few would deny that a man or woman aged 40 to 50 with established hypertension, severe headaches, and other symptoms, a good myocardium, no permanent central nervous changes, and good renal function, should be given the benefit of sympathectomy. The more advanced cases, where the patients have had one or more strokes, are having anginal pain, and show retinal hæmorrhages and exudates and a renal function which is beginning to fail, are less promising material for surgery. Some of these die at operation or within a few months, but many do unexpectedly well and are completely relieved from their headaches. The surgeon needs more courage to operate on young patients with mild symptoms and a blood-pressure which fluctuates and is sometimes within normal limits. Platt and Stanbury consider that sympathectomy is too serious an operation to be justified in these patients, and they contend that there is no evidence that it prolongs their lives. De Takats et al.,[13] on the other hand, believe that there is a clear-cut indication for operation in this group, and that only in such patients is there a hope of cure. Patients with malignant hypertension should probably be operated on unless they are dying, because some will be saved, and without operation the prognosis is

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11. Smithwick, R. H. *Brit. med. J.* 1948, ii, 237.
12. Fishberg, A. M. *J. Amer. med. Ass.* 1948, 137, 670.
13. De Takats, G., Graupner, G. W., Fowler, E. F., Jensik, R. J. *Arch. Surg.* 1946, 53, 111.

very near to the iron atom of one or more of the hæms. so that when the iron is combined with oxygen or carbon monoxide the "complementariness" of the region is much diminished. When the oxygen tension is low the complementary regions can react with one another; this results in a new alignment of the molecules in the cell so that they become relatively rigid and the cell membrane becomes distorted to accommodate them: hence the sickling. The distortion would be a quantitative affair depending on the number of sites released by lowering the oxygen tension, and on the proportion of abnormal hæmoglobin present; this view fits in with the observed facts. The genetics of sickle-cell disease will also fit in with these observations. Neel[4] suggests that the gene responsible for sickling is heterozygous in persons with the sickle-cell trait, and homozygous in people with sickle-cell anæmia. This would fit the finding that people may have 100% normal hæmoglobin, 100% sickle-cell hæmoglobin, or 40% sickle-cell and 60% normal hæmoglobin; there are several possible explanations for the ratio in the mixed cases being 40 : 60 rather than 50 : 50. There does in fact seem little doubt that this is "a clear case of a change produced in a protein molecule by an allelic change in a single gene involved in synthesis."

The implications of this work are considerable. It may be that sickle-cell disease is a unique example of a disease due to abnormal hæmoglobin. But the fact is that here is an abnormal hæmoglobin which leads to a great shortening of the life of the containing red-cells, and so to anæmia in the patient with all the accompanying signs of in-vivo hæmolysis. There are other anæmias of this type that have not been satisfactorily explained, and in which the search for hæmolysins, in spite of some enthusiastic reports, has become more and more like a wild-goose chase. Pauling and his team propose to examine the hæmoglobin of other hereditary hæmolytic anæmias. Their results will not, we hope, be confined to hereditary cases only; there are equally anomalous and inadequately explained anæmias of this type which, on the surface at least, are not inherited; and the methods of investigation needed are quite beyond the resources of the purely medical departments.

PSYCHIATRY AND SKIN DISEASE

THE discussion on April 11 by the psychiatric section of the Royal Society of Medicine was concerned with the relation of psychiatry to dermatology, but many of the issues raised are applicable to a wider field of clinical medicine. Dr. R. M. B. MacKenna based his opening remarks on the classification of neurodermatoses adopted by Becker and Obermayer[5] and pointed out that the types of cutaneous reaction which have been attributed to emotional disturbance range from rosacea, which is characterised by chronic vasodilatation in a limited area, to alopecia areata, in which the skin is soft and white with no palpable change except loss of hair; and from pompholyx, which is characterised by considerable vesiculation with minimal vasodilatation, to various forms of lichen characterised by papule formation. He suggested that these highly selective mechanisms of response, which may be due to mental stress, require the elucidation not only of psychiatrists and dermatologists but also of physiologists, biochemists, and endocrinologists; for, though the cause of these maladies may be psychological, their appearance must be due to physiological and chemical changes in the skin. Until this basic scientific work is done the views of psychiatrists must largely be speculative. A second major issue which Dr. MacKenna raised was that once certain skin eruptions have been produced by psychological causes the symptoms can be perpetuated by mechanisms of infection, auto-sensitisation, and superimposed contact dermatoses which the patient's mind cannot control: and if these are not dealt with at the same time as the primary psychological cause the patient's condition is unlikely to improve. Here there is a particular need for team-work, since often the skeletons found in the patient's mental cupboard are not the sole cause of the perpetuation of his cutaneous symptoms. Dr. MacKenna's views were largely supported by Dr. W. J. O'Donovan, and Dr. H. J. Wallace made a plea for the use of controls in psychiatric investigations. That, in brief, was the case for the dermatologists, and analogous views could no doubt be advanced in regard to most branches of medicine.

For the psychiatrists, Dr. E. Wittkower, who has studied the psychosomatic aspects of dermatology in the Army and at St. Bartholomew's Hospital, classified skin diseases associated with emotional conflicts in two groups, according to whether skin sensations are paramount (e.g., pruritus ani and pruritus vulvæ) or skin manifestations are predominant (e.g., rosacea and some forms of endogenous eczema). Dr. E. B. Strauss emphasised the importance, in dealing with all psychosomatic problems, of distinguishing between the terms "psychic" and "psychogenic." Teleologically, psychic processes do not necessarily involve a logical chain of cause and effect. Psychogenesis, on the other hand, presupposes such a purposive element, which is usually unconscious, and assumes that the processes can be consciously appreciated and modified by the use of psycho-analytical techniques. He suggested that there is a factor interposed between psyche and soma—this may be the "schema" as elaborated by Russell Brain in *Perspectives in Neuropsychiatry*—and that many psychodermatological problems might perhaps be formulated and solved in conceptual terms of that nature. Dr. H. J. Shorvon claimed that abreactive techniques will benefit several pruritic and some other eruptions which are unlikely to respond to routine dermatological treatment.

The discussion illustrated clearly the division existing today between psychiatrists and other clinicians. The clinicians, though sympathetic to many psychiatric views, would like more tangible evidence of the mechanisms whereby emotional agitation produces the physical disturbance which is visible—as in the skin—or demonstrable in other organs. Theories of ætiology based on the results of treatment have often proved fallacious in the past. It is not sufficient to say "I can cure this case by convulsion therapy, by abreaction with ether, by leucotomy, or by psycho-analysis," as the case may be, and "therefore its cause lies in the mind"; for similar ailments will often be cured, or at any rate relieved, by rest in bed and suitable applications. There is a cogent analogy in the work of William Withering[6] on the value of foxglove in dropsy. He recognised that digitalis had an action on the heart, but it remained for John Ferrier[6] to ascribe the diuresis of digitalis to a secondary effect of its primary action on the heart. The psychiatrists may well believe that in many cases such convincing evidence may be accumulated linking psychiatric cause with somatic effect that anyone who questions their conclusions is an iconoclast with whom argument is useless. And they are entitled to argue that since the clinician's job is to relieve human suffering they cannot wait for the slow elaboration of laboratory techniques to justify their beliefs. The psychiatrists may be congratulated on having achieved so much in the short time since the pioneers of modern psychiatry began their work. But the present babel of psychiatric opinion, and the recent for six to ten injections it has been reported[29] to relieve pain, and yet in large doses it apparently may initiate zoster.[30] For the moment the best hope seems to lie in aureomycin, though chloramphenicol[31] has also been favourably reported on.

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[4] Neel, J. V. *Science*, 1949, 110, 64.

[5] Becker, S. W., Obermayer, M. E. Modern Dermatology and Syphilology. Philadelphia, 1947.

[6] Goodman, L., Gilman, A. The Pharmacological Basis of Therapeutics. New York, 1946; p. 500.

Annotations

SICKNESS-RATES UNDER THE ACT

MANY foretold that the National Health Service would lead people to consult their doctors needlessly; and the greater demands made on medical services since the Act came into force are held by some to fulfil the prophecy. But it is hard to say how far the increased load is due to valetudinarianism or the desire to get something for nothing, and how far it comes from people who formerly could not afford to seek help as often as they should. Nor has it ever been made clear how great the increase has been.

In our present issue Dr. W. P. D. Logan gives figures derived from the continuous survey of sickness carried out for the Registrar-General. In this survey some 4000 people over the age of 16, living in various parts of England and Wales, were asked about their health for the two months preceding the inquiry—a period which is short enough to make recall easy. Dr. Logan compares the results in the first year of the health service—from July, 1948, to June, 1949—with those of the previous year, July, 1947 to June, 1948. In 1948–49, the number of people over 16 who complained of illness (the sickness-rate) was 5% higher, and the number of illnesses 8% higher, than in 1947–48. The number of days spent away from work or confined to the house (the incapacity-rate) rose by 22%, mainly owing to a great increase among women. The incapacity-rates for men went up by 8–9%, but women in the younger age-groups showed an increase of 32% more days of incapacity, and older women an increase of 41%—which, Dr. Logan says, are increases "far beyond what would be expected from the increase in illness that they suffered."

The average increase in medical consultation rates was 13%. The records show that women complain of illness much more often than men; and, since they are now in a position to consult their doctors more freely than they did, many of them are no doubt advised to stay at home for disorders which they would formerly have neglected. In other words the higher sickness-rates and absenteeism among women during 1948–49 may give a more accurate idea of the state of their health than the lower rates of the preceding year. It is interesting that while consultation-rates rose among men and women with incomes below £10 a week, they fell among those with incomes above that level.

As Dr. Logan points out, there are dangers in comparing rates over two years only: such things as an influenza epidemic or a hard winter can weight the scales unduly. If the rates for 1948–49 are compared, not with those of the preceding year, but with those of 1946–47, there are increases, certainly, but they are much smaller: the sickness-rate is higher by only 2%, the incapacity-rate by 5%, and the medical consultation rate by 8%. Time will show how much epidemics and infections can influence the picture: in 1946–47 there was a moderate amount of influenza but a very hard winter; in 1947–48 there was a mild winter and very little influenza; and in 1948–49 there was a moderate winter and a considerable influenza epidemic. The rates for 1947–48 may therefore be somewhat below the usual average, and those for 1948–49 higher. At all events the use made of the National Health Service by no means resembles a run on the bank, and can probably be largely explained by epidemic fluctuations and by the fact that some who formerly lacked necessary care are now getting it.

ABNORMAL HÆMOGLOBINS IN ANÆMIA

THE idea that the hæmoglobin in human red cells may not always be the same has been put forward from time to time. Jonxis,[1] for instance, showed that there are physicochemical differences between fœtal and adult hæmoglobins. But the possibility that the properties of an abnormal hæmoglobin might be primarily responsible for a blood disease had not been seriously considered. Now, however, Pauling and colleagues[2] have convincingly shown that sickle-cell disease is primarily due to the presence of an abnormal hæmoglobin and that this abnormality will explain the curious features of the disease.

In sickle-cell disease the red cells change their shape when exposed to a low partial pressure of oxygen; the normal biconcave disc becomes crescent-shaped or otherwise irregular, and these distorted cells are unusually fragile and are soon broken up. Sickle-cell disease exists in two forms: the sickle-cell trait and sickle-cell anæmia. People with the trait normally have about 1% of sickle-cells in the red cells of their venous blood: whereas in sickle-cell anæmia, on the other hand, 30–60% of the red-cells are sickled, even with no oxygen deprivation; and about 1 in 40 of people with the sickle-cell trait have the anæmia. It should be noted that at sufficiently low oxygen pressures *all* the red cells, whether from a person with the anæmia or with only the trait, can be made to sickle. Pauling and colleagues noted that in sickle-cell erythrocytes the hæmoglobin appears to be physically normal when combined with oxygen or carbon monoxide. But when the oxygen or carbon monoxide is removed, and the cell becomes sickled, the hæmoglobin seems to gather itself into one or more foci in the cell and the cell membrane collapses; the cell then becomes birefringent and rigid. Apparently these changes depend on the state of the hæmoglobin inside the cell and probably not at all on changes in the cell membrane. The next step therefore was to examine this hæmoglobin in detail by physicochemical methods such as electrophoretic mobility. The results, stripped of detail, show clearly that the hæmoglobin in the sickle-cell erythrocytes is abnormal. In sickle-cell anæmia the cells contain only sickle-cell hæmoglobin; in sickle-cell trait some elaborate measurements showed that each red cell contains a mixture of about 40% of sickle-cell hæmoglobin and 60% of normal hæmoglobin. The results so far also suggest that the proportion of sickle-cell hæmoglobin in the red cells of a person with sickle-cell trait is fairly constant.

What is the reason for the difference between these two hæmoglobins? Enough work on this point has already been done to show that the difference is in the globins; the hæm part of the molecule appears to be identical in each form. Within the limits of experimental error, say Pauling and his co-workers, "sickle-cell anæmia hæmoglobin has 2–4 more net charges per molecule than normal hæmoglobin." For the actual sickling process they propose the following hypothesis. They suppose that there is a surface region on the globin of the sickle-cell hæmoglobin molecule which is absent in the normal molecule and which is complementary to a different region on the surface of the hæmoglobin molecule. Such a situation probably exists in the antigen-antibody reactions.[3] This complementary region must be situated

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[29] Goodman, M. J. *California West Med.* 1939, 51, 105.
[30] Steinberg, C. L. *Amer. J. Digest. Dis.* 1938, 5, 680.
[31] Dawson, L. M., Simon, H. E. *Sth. med. J.* 1949, 42, 696.

[1] Jonxis, J. H. P., in Hæmoglobin, edited by F. J. W. Roughton and J. C. Kendrew. London, 1949; p. 261.
[2] Pauling, L., Itano, H. A., Singer, S. J., Wells, I. C. *Science*, 1949, 110, 543.
[3] Pauling, L., Pressman, L., Campbell, D. H. *Physiol. Rev.* 1943, 23, 203.

Special Articles

ILLNESS, INCAPACITY, AND MEDICAL ATTENTION AMONG ADULTS, 1947–49

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THE number of times that people are ill, the length their illnesses, and how often they consult their doctor e matters of some concern to the medical profession. ie purpose here is to compare the prevalence of illness nong adults, the duration of incapacity, and the equency of consultations between patients and doctors uring the twelve months from July, 1948, to June, 1949, id the previous twelve months from July, 1947, to une, 1948.

The information has been obtained from the conuous Survey of Sickness carried out on behalf of the egistrar-General. Each month trained interviewers the Government Social Survey visit a different sample some 4000 persons, aged 16 and over, living in various arts of England and Wales, the samples being so lected as to represent the whole adult population. he selected individuals are asked about their health uring the two previous months, the illnesses and injuries ey suffered, how long they were kept off work or revented from going out of doors, and how often they onsulted a doctor. After tabulation at the General Register Office the results of the interviews are published in the Registrar-General's Quarterly Returns.[1] The return for the first quarter of 1949 (no. 401) included a note on the prevalence of sickness, incapacity, and medical consultations during July–December, 1948, compared with corresponding months in the two previous years. Descriptions of the methods used in the Survey of Sickness since it began in October, 1943, and of some of the results have been given by Stocks,[2] Box and Thomas,[3] and Slater,[4] in Ministry of Health reports,[5] and in the *Monthly Bulletin of the Ministry of Health.*[6]

ABLE I—MEAN MONTHLY SICKNESS, PREVALENCE, INCAPACITY, AND MEDICAL CONSULTATION RATES PER 100 PERSONS INTERVIEWED: JULY–JUNE, 1947–48 AND 1948–49

	Male		Female		Persons
	16–64 years	65 years and over	16–64 years	65 years and over	16 years and over
ickness-rates:					
1947–48	58	76	68	85	66
1948–49	61	79	72	87	69
ercentage difference	+6	+4	+6	+3	+5
revalence-rates:					
1947–48	105	166	150	218	139
1948–49	115	175	164	230	151
ercentage difference	+9	+5	+9	+5	+8
ncapacity-rates:					
1947–48	89	148	72	159	90
1948–49	96	162	94	223	110
ercentage difference	+8	+9	+32	+41	+22
ledical consultation rates:					
1947–48	35	60	38	57	40
1948–49	37	65	45	69	45
Percentage difference	+6	+9	+18	+22	+13

The fullest report on results is that by Stocks,[7] who proposed definitions for morbidity statistics, studied the effect on recorded sickness of such factors as memory, sex, age, and season, and compared the prevalence of a few important diseases, as indicated independently by the survey and by special food allowance statistics (derived from form R.G. 50) and found these two sources to be in close agreement.

DEFINITIONS

Here the periods 1947–48 and 1948–49 are the twelve-month periods from July, 1947, to June, 1948, and from July, 1948, to June, 1949, the latter period being of course the first twelve months of the National Health Service. Tables II and IV, however, also include periods from July, 1946, onwards. The rates in the tables are mean monthly rates—that is, they refer to the average monthly experience of the periods stated. It must be emphasised that the records relate only to persons aged 16 years and over.

In general morbidity studies it is essential to distinguish between the number of persons ill and the number of illnesses reported, because patients are liable to suffer from more than one illness or injury in a month. Sickness-rates are defined as the number of persons per 100 interviewed who report at least one illness or injury during the month. It follows that each person can contribute no more than one unit to the sickness-rate for the month, and that the rate can never exceed 100. Prevalence-rates, on the other hand, are defined as the total number of illnesses and injuries reported per 100 persons interviewed, whether these occur simultaneously or consecutively during the month; and theoretically there is no limit to the number of illnesses that may be reported. Incapacity-rates are the number of days away from work on account of illness during the month per 100 persons interviewed; or, for persons not going out to work, the number of days on which they were prevented by illness from going out of doors. Medical consultation rates are the number of visits during the month made to, or by, a doctor (including medically qualified ophthalmic or other specialists, but excluding dentistry and attention whilst an inpatient in a hospital) per 100 persons interviewed.

RESULTS

In 1948–49 the number of people, aged 16 and over, who complained of illness (the sickness-rate) increased

TABLE II—MEAN MONTHLY SICKNESS, PREVALENCE, INCAPACITY, AND MEDICAL CONSULTATION RATES PER 100 PERSONS INTERVIEWED: JULY–JUNE 1946–47 AND 1948–49

	Male		Female		Persons
	16–64 years	65 years and over	16–64 years	65 years and over	16 years and over
Sickness-rates:					
1946–47	60	78	70	86	68
1948–49	61	79	72	87	69
Percentage difference	+1	+1	+3	+1	+2
Prevalence-rates:					
1946–47	113	170	155	224	145
1948–49	115	175	164	230	151
Percentage difference	+2	+3	+5	+3	+4
Incapacity-rates:					
1946–47	107	153	89	157	105
1948–49	96	162	94	223	110
Percentage difference	−10	+6	+6	+42	+5
Medical consultation rates:					
1946–47	37	59	40	65	42
1948–49	37	65	45	69	45
Percentage difference	..	+9	+13	+7	+8

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1. Quarterly Returns of the Registrar-General: nos. 393–403, tables A–H; no. 401, p. 29. H.M. Stationery Office.
2. Stocks, P. *Proc. R. Soc. Med.* 1944, 37, 593.
3. Box, K., Thomas, G. *J. roy. statist. Soc.* 1944, 107, 151.
4. Slater, P. The Social Survey: Survey of Sickness, October, 1943, to December, 1945. London: Central Office of Information.
5. Ministry of Health: Report of the Chief Medical Officer for the years 1939–45 (p. 229), 1946 (p. 102), 1947 (p. 105), 1948 (p. 141). H.M. Stationery Office.
6. *Mon. Bull. Min. Hlth, P.H.L.S.* 1944, 3, 46, 70, 93, 194; 1945, 4, 30, 80, 119, 198, 244; 1946, 5, 60, 131, 201; 1947, 6, 4, 123, 194; 1948, 7, 11, 79, 169, 213; 1949, 8, 9, 77, 148, 232.
7. Stocks, P. Studies on Medical and Population Subjects, no. 2, General Register Office: Sickness in the Population of England and Wales in 1944–47. H.M. Stationery Office, 1949.

discovery that widely diverse techniques, which would seem likely to have very different effects on the brain, can cure or ameliorate somatic symptoms, tend to confuse their well-wishers and give ammunition to their opponents. We must be content to wait for those who are striving to establish a new branch of medicine to set their house in order, remembering that philosophical speculation without solid scientific foundations has often proved to be the path of error. There is a need for laboratory investigation and team-work with scientists and clinicians to be more widely incorporated in psychiatric work, and in the study of psychosomatic medicine dermatology seems to offer the most accessible avenue for research.

ERADICATION OF VENEREAL DISEASE ?

THAT endemic diseases can be speedily eliminated has been shown by the eradication of malaria from large areas and even (as in the case of Cyprus [1]) whole countries. An eradication attempt of a different sort—more ambitious because its aim is to remove the source of infection in man rather than eliminate an insect vector—is to be made in Haiti, where penicillin is to be applied to the extinction of venereal disease. In this island republic about 25% of the $3^1/_2$ million population are said to have venereal disease; and some 85% have yaws, which it is hoped to eradicate at the same time. Ten mobile units will tour the island giving injections of penicillin to all inhabitants. The campaign, which is being undertaken by the World Health Organisation along with the government of Haiti and the United National International Children's Emergency Fund, is expected to take two years to complete.

This bold undertaking will be watched with close attention ; for if the attempt succeeds here it may also succeed elsewhere. Much will depend on convincing populations that the effort is worth making.

REMUNERATION OF MEDICAL CIVIL SERVANTS

THE Chancellor of the Exchequer has rejected a claim for improved remuneration of medical civil servants, but proposes to set up a committee to investigate the question. The joint committee which submitted the claim decided at a meeting last Monday to seek a further interview with the Chancellor. It objected that the proposed committee was inappropriately constituted to consider medical salaries (perhaps because medical members would be in a minority) ; and it decided to ask the British Medical Association to reject advertisements of civil-service appointments.

In submitting its claim last summer, the committee (comprising representatives of the Institution of Professional Civil Servants, the British Medical Association, and the Ministry of Health Medical Staff Association) urged that remuneration in the civil service should be aligned with that in the National Health Service—a change that would involve raising salaries at the Ministry of Health by £2000 in the case of the chief medical officer, and by close on £2000 in certain other grades. The Treasury reply states that the Chancellor

> "fully recognises the need for maintaining the efficiency of medical establishments, and, indeed, of other important establishments which are at present below strength. But in his view it is even more important to maintain the policy of wages stabilisation and he thinks that the success of that policy would be gravely jeopardised if he attempted exceptions to the general rule. However satisfactory to the claimants concerned the arguments justifying an exception in their favour might be, a concession made at the present time would be bound to cause misunderstanding and resentment among the rest of the community who would regard it as preferential treatment. He is also unable to agree that settlement of a claim by Civil Service doctors can be considered except as a Civil Service claim to be dealt with on the basis of the policy applied to the Civil Service generally."

The Treasury's difficulty is clear ; but the justification for the committee's claim is equally clear, for even in 1939, as we have pointed out,[1] the remuneration of medical civil servants was out of harmony with the times. Furthermore, the joint committee can protest that in offering disproportionate rates in the National Health Service and in the various Departments, the Government is being neither fair nor wise ; and the result will be continued weakening where strength should be greatest. Nor can the committee be blamed if it views with some reserve the proposal to set up a fresh committee. Apart from the fact that the deferment of the Chorley Committee's recommendations does not encourage faith in prompt action through any further body, the Treasury is known itself to have been investigating the difficulties of recruiting medical men to Government Departments. What, then, can another committee offer except time to the Treasury ?

THE BUDGET

TEMPORARILY at least, the economic crisis has receded, and Sir Stafford Cripps on Tuesday found it unnecessary to make his new Budget greatly different from the last. There has been enough industrial recovery, he thinks, to prove that " we are not being crushed by taxation." On the other hand, any further increase of Government expenditure would be difficult : " we have taken on, by way of social services and benefits during the last four years all we can possibly afford until such time as there is a large increase in our national production. And even then I have no doubt that the individual will want to retain a very considerable portion of that increase for his own spending." The largest addition for the coming year is another £133 million for the National Health Service, and the Chancellor made it plain that no excuse would be accepted for exceeding the estimate : any expansion in one part of the service must in future be made by economies, or if necessary contraction, in others. In exercising this essential control in total health expenditure regard will be paid to priorities of service, and if the Health Departments have difficulty in carrying out such priorities an amending Act can be passed. The proposal to charge patients 1*s.* on each prescription is to be held in reserve, for it is hoped that administrative methods of economising in this branch more easily can shortly be introduced. Food subsidies are to be held at their present level, but the rate of house-building is to go back to what it was before last autumn's cuts. The first £50 of taxable income is to be taxed at 2*s.* 6*d.* instead of 3*s.*, and the next £200 at 5*s.* instead of 6*s.* ; but, what the Notes on Allowances cheerlessly call " the balance, if any," will still attract tax at 9*s.* in the £, or more. Doctors will have less reason than most to rejoice that the standard ration of petrol is to be doubled—and more reason than most to regret that the price is to be raised by 9*d.* a gallon. What the Chancellor is proposing, as he said, is " the increase of an indirect tax which is very broadly spread in order to give proportionately more relief in direct taxation to the lower-income groups, although all income-tax payers will get some benefit."

DR. F. M. BURNET, F.R.S., professor of experimental medicine in the University of Melbourne, will give a lecture at the London School of Hygiene, Keppel Street, W.C.1, on Tuesday, May 9, at 5.30 P.M. He is to speak on the General Pathology of Virus Infection.

THE council of the British Medical Association decided on April 5 to establish a committee for the purpose of reviewing general practice after the first two years of the National Health Service. The council also agreed to publish the report of the committee which was set up, under the chairmanship of Sir Henry Cohen, to consider the postgraduate education of general practitioners.

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[1] *Lancet*, Jan. 14, p. 81.

[1] *Leading article*, *Lancet*, Jan. 14, p. 75.

1946–47, practically none in 1947–48, and quite a severe epidemic in 1948–49 between February and April, 1949. This epidemic was responsible for some of the increased incidence of sickness, incapacity, and medical consultations during the last period.

Table III gives rates for the two twelve-month periods 1947–48 and 1948–49 with greater detail of age. A noteworthy feature about these rates is the tendency for practically all of them to increase uniformly with advancing age. Probably the only real exception is in the incapacity indices among women where the rate at ages 16–24 was higher than at ages 25–34. The reason presumably is that there are many more housewives in the older age-group, and housewives are a class of women who are less readily incapacitated for their work by illness than younger women in other occupations.

Table IV gives monthly rates for all adults by separate quarters from July, 1946. More detailed rates by sex, age, and single months have been given in the Registrar-General's Quarterly Returns nos. 401 (with special note), 402, and 403 (table A). The highest sickness, prevalence, and medical consultation rates, and the *second* highest incapacity-rate for any quarter were recorded in January to March, 1949, during the influenza epidemic.

Tables V and VI show the proportions of people who had different numbers of days of incapacity and medical consultations per month. In each sex-age group the proportion with no days of incapacity and the proportion with no medical consultations decreased, the reduction being greater among women than men, and greater among the elderly than among younger adults. The greatest relative increases in days of incapacity were among the proportions who had 4–10 days and 11 or more days of incapacity. For medical consultations the proportions having 1, 2, and 3 or more consultations all increased, but the increase was greatest among those women aged 16–64 who saw their doctor once in the month.

TABLE VII—PERCENTAGE DISTRIBUTION OF ILLNESSES BY CATEGORY OF SEVERITY (SEXES COMBINED): JULY–JUNE, 1947–48 AND 1948–49

—	Serious	Moderate or mild	Minor	Ill-defined.	Total
Aged 16–64 years:					
1947–48	2 2	5 4	70 8	21 6	100
1948–49	2 3	6 0	65 1	26 6	100
Aged 65 and over:					
1947–48	12 1	4 5	67 6	15·8	100
1948–49	11 4	5 2	63 3	20 1	100

The number of illnesses reported by all adults increased by 8% (table I). It may be asked whether this was an increase in illness of all grades of severity, or whether it consisted predominantly of minor and relatively trivial conditions. Table VII supplies the answer, showing that though there was an increase in "ill-defined" illness this was at the expense of "minor" illness. Thus there was no great redistribution in the severity of reported illness, and there is nothing to suggest that the increase has been due to illness of a trivial nature.

Tables VIII and IX analyse the results by occupation and by income; but to avoid having very small numbers [illegible] different classes, only very wide occupational [illegible]come groupings have been made. Table VIII [illegible] rates for four large occupational groups [illegible]ishing men from women): (*a*) professional, [illegible]al, and clerical occupations; (*b*) operatives [illegible] grades, including persons engaged in manu[illegible] transport and public services, mining and [illegible] building, agriculture and fishing, distribu[illegible]ther specified employment; (*c*) retired, part-time, and unoccupied persons and those whose occupation was not stated; and (*d*) housewives. To some extent the experiences of the different occupational groups depend upon their age structure, but it has not been possible to make any adjustment for this. The high rates in the group of retired and other persons arise from this cause. Housewives, it will be observed, had high sickness, prevalence, and medical consultation rates compared with women in other occupations. Their incapacity-rate in 1947–48 was not proportionately high, but it underwent an increase of 40% in the next twelve months. By contrast, there was a reduction of 1% in incapacity among men in the group of miscellaneous trades. Medical consultations for women in professional, managerial, and clerical occupations diminished by 3%, while those for women in miscellaneous employment increased by 23% and for housewives by 20%.

TABLE VIII—MEAN MONTHLY SICKNESS, PREVALENCE, INCAPACITY, AND MEDICAL CONSULTATION RATES PER 100 PERSONS AGED 16 YEARS AND OVER, BY OCCUPATIONAL GROUPS: JULY–JUNE, 1947–48 AND 1948–49

—	Professional, managerial, and clerical		Operatives and other grades		Retired, part-time, unoccupied or unstated		Housewives
	M	F	M	F	M	F	F
Sickness-rates:							
1947–48	56	58	58	62	79	78	73
1948–49	59	61	61	66	82	82	77
Percentage difference	+5	+5	+5	+6	+4	+5	+5
Prevalence-rates:							
1947–48	98	116	104	126	178	191	170
1948–49	110	118	113	142	189	203	185
Percentage difference	+12	+2	+9	+13	+6	+6	+9
Incapacity-rates:							
1947–48	49	70	87	79	212	184	73
1948–49	61	78	86	96	266	267	102
Percentage difference	+24	+11	−1	+22	+25	+45	+40
Medical consultation rates:							
1947–48	29	34	32	31	80	64	41
1948–49	31	33	34	38	89	81	49
Percentage difference	+7	−3	+6	+23	+11	+27	+20

Table IX gives separate rates according to the income of the chief wage-earner of the family. Again no adjustment has been made for age differences between the income groups. For this reason rates are very high in

TABLE IX—MEAN MONTHLY SICKNESS, PREVALENCE, INCAPACITY, AND MEDICAL CONSULTATION RATES PER 100 PERSONS AGED 16 YEARS AND OVER, BY WEEKLY INCOME OF CHIEF WAGE-EARNER OF THE FAMILY: JULY–JUNE, 1947–48 AND 1948–49

—	Under £3		£3–£4		£4–£5 10*s.*		£5 10*s.*–£10		£10 and over	
	M	F	M	F	M	F	M	F	M	F
Sickness-rates:										
1947–48 ..	81	81	64	70	60	69	56	68	60	67
1948–49 ..	82	83	69	74	62	74	62	73	60	72
Percentage difference ..	+1	+2	+8	+6	+3	+7	+11	+7	..	+7
Prevalence-rates:										
1947–48 ..	189	207	127	159	109	154	101	149	111	149
1948–49 ..	197	217	145	173	118	170	114	165	115	159
Percentage difference ..	+4	+5	+14	+9	+8	+13	+14	+11	+4	+7
Incapacity-rates:										
1947–48 ..	193	130	105	93	104	76	78	74	52	82
1948–49 ..	262	180	129	112	105	113	85	96	67	90
Percentage difference ..	+36	+38	+23	+20	+1	+49	+9	+30	+29	+10
Medical consultation rates:										
1947–48 ..	79	52	39	37	37	38	32	40	38	49
1948–49 ..	88	63	55	52	40	46	33	46	35	46
Percentage difference ..	+11	+21	+41	+41	+8	+21	+3	+15	−8	−6

by 5%, and the number of illnesses increased by 8%, compared with 1947–48 (table I). The increases were greater among those aged under 65 than among older people. The number of days away from work or confined to the house (the incapacity-rate) increased by 22%, but there was a great difference between men and women. Younger men showed an increase of 8% and older men of 9%. Younger women, on the other hand, reported 32% more days of incapacity and older women 41% more—increases that are far beyond what would be expected from the additional illness that they suffered.

Medical consultation rates increased by 13%. This is a measure of the average increase, over the whole country, in the number of consultations between *adult* patients and doctors during 1948–49, compared with 1947–48. In many practices the increase was no doubt well above this average figure, but in others it would be much less, depending largely, as will be seen, upon the proportion of women patients in the practice, and their age and general income level. The average increases for men were 6% for those under 65, and 9% for those aged 65 and over. For women the increases were much greater—18% among the younger and 22% among the older women. There can be little doubt that before the start of the new National Health Service many women—especially, but not exclusively, elderly women—were deterred from seeking medical advice by economic reasons. Now that the financial barrier has been removed, women, who, as the records show, complain of illness considerably more often than men, are able to consult their doctor more often than they did before.

TABLE III—MEAN MONTHLY SICKNESS, PREVALENCE, INCAPACITY, AND MEDICAL CONSULTATION RATES PER 100 PERSONS INTERVIEWED, BY SEX AND AGE: JULY–JUNE 1947–48 AND 1948–49

—	Age (years)							All ages
	16 –	25 –	35 –	45 –	55 –	65 –	75 +	
Sickness-rates:								
Male—1947–48 ..	48	54	57	63	66	74	81	60
1948–49 ..	52	59	60	65	70	76	85	63
Female—1947–48 ..	56	64	69	74	77	83	88	70
1948–49 ..	61	68	73	77	82	86	89	74
Prevalence-rates:								
Male—1947–48 ..	80	94	103	120	128	157	186	113
1948–49 ..	87	106	111	126	147	165	197	123
Female—1947–48 ..	106	133	153	174	187	211	234	160
1948–49 ..	121	142	165	187	209	226	239	174
Incapacity-rates:								
Male—1947–48 ..	71	70	82	105	126	135	180	97
1948–49 ..	64	77	82	108	166	144	206	105
Female—1947–48 ..	67	65	61	77	96	132	212	85
1948–49 ..	78	77	80	112	136	198	274	114
Medical consultation rates:								
Male—1947–48 ..	27	30	34	40	46	57	65	38
1948–49 ..	26	34	34	42	52	61	73	41
Female—1947–48 ..	30	33	36	46	48	52	67	41
1948–49 ..	35	38	41	56	59	63	82	49

TABLE IV—MEAN MONTHLY SICKNESS, PREVALENCE, INCAPACITY, AND MEDICAL CONSULTATION RATES PER 100 PERSONS AGED 16 AND OVER, BY QUARTERS: JULY, 1946, TO JUNE, 1949

Quarter		Sickness	Prevalence	Incapacity	Medical consultations
1946:	July–Sept. ..	67	143	72	38
	Oct.–Dec. ..	72	159	102	44
1947:	Jan.–March ..	70	147	158	47
	April–June ..	64	132	84	38
	July–Sept. ..	62	129	65	35
	Oct.–Dec. ..	70	149	100	41
1948:	Jan.–March ..	67	143	114	44
	April–June ..	64	135	82	39
	July–Sept. ..	64	135	84	38
	Oct.–Dec. ..	71	153	126	46
1949:	Jan.–March ..	73	163	136	52
	April–June ..	68	147	90	43

TABLE V—PERCENTAGE DISTRIBUTION OF PERSONS INTERVIEWED BY DAYS OF INCAPACITY PER MONTH: JULY–JUNE, 1947–48, AND 1948–49

—	No. of days of incapacity									
	Male					Female				
	0	1–3	4–10	11 +	Total	0	1–3	4–10	11 +	Total
Aged 16–64 years:										
1947–48	92·0	2·5	2·5	3·0	100	92·6	2·6	2·5	2·3	100
1948–49	91·2	2·8	2·7	3·3	100	90·7	2·9	3·2	3·2	100
Aged 65 years and over:										
1947–48	90·1	1·8	3·1	5·0	100	90·1	1·4	3·1	5·4	100
1948–49	88·7	2·1	3·7	5·5	100	86·8	1·7	3·5	8·0	100

It seems likely that the increased number of days of incapacity reported by women has been a direct consequence of more frequent medical attention. Since July, 1948, some of the women who have seen their doctor about complaints that they would previously have neglected or treated themselves have been ordered to bed or advised to stay indoors until they recovered. Among men, both young and old, the increase in incapacity and in medical consultations was no more than would result from their slightly increased rates of illness.

There are certain dangers in comparing the experience of one twelve-month period with only the previous twelve months, and it would be more satisfactory to make comparisons with similar periods over a number of previous years. Unfortunately the tabulations of the Survey of Sickness, in their present form, go back only as far as July, 1946 (and have been published only since October, 1946), so that no more than one additional twelve-month period can be studied—from July, 1946, to June, 1947. Table II compares rates for this period with those for 1948–49; and from this table, in conjunction with table I, it can be seen that the increases in 1948–49 compared with 1946–47 were smaller than those for 1948–49 compared with 1947–48, especially with regard to incapacity. It will be recalled, however, that the winter of 1946–47 included a protracted period of exceptionally weather—the coldest in fifty years or more—and that time sickness, consultation and, most incapacity rates were very high. The period Jul to June, 1947, fails, therefore, to provide an al satisfactory gauge against which to set su experience.

TABLE VI—PERCENTAGE DISTRIBUTION OF PERSONS INTERVIEWED BY NUMBER OF MEDICAL CONSULTATIONS PER MONTH: JULY–JUNE, 1947–48, AND 1948–49

—	No of medical consultations									
	Male					Female				
	0	1	2	3 +	Total	0	1	2	3 +	Total
Aged 16–64 years:										
1947–48	87·5	5·0	3·1	4·4	100	85·4	6·2	3·5	4·9	100
1948–49	86·1	5·9	3·1	4·9	100	81·8	8·4	4·2	5·6	100
Aged 65 years and over:										
1947–48	78·7	9·4	4·6	7·3	100	77·7	9·9	5·8	6 6	100
1948–49	75·9	10·2	5·9	8·0	100	73·0	12·0	6·5	8·5	100

In addition to weather, a further factor to the presence or absence of epidemic influen was a moderate amount of influenza in th

New members: C. E. Clarke; The Rev. Arthur Perry; J. E. Roberts; Councillor F. Mansell (until March 31, 1952); one appointment outstanding.

MANCHESTER REGION

Reappointed: Sir **John Stopford,** F.R.S. (chairman); Alderman G. D. Hastwell; William Onions, J.P.; Prof. **H. S. Raper,** C.B.E., F.R.C.P., F.R.S.; C. M. Skinner, F.C.A.; **J. D. Silverston,** M.B.; J. T. Waite; Mrs. Edith Watson, J.P.

New members: Mrs. Marjorie Bayes; W. Barnes.

LIVERPOOL REGION

Reappointed: Thomas Keeling, J.P. (chairman); Miss A. L. Bulley; Sir **Henry Cohen,** F.R.C.P.; H. O. Ellis, J.P.; **A. A. Gemmell,** F.R.C.O.G.; T. W. Harley, M.B.E., M.C.; **J. E. Nicole,** O.B.E., L.M.S.S.A.

New member: Alderman Hugh Platt.

The Secretary of State for Scotland has made the following appointments to the five Scottish boards. Out of 40 appointments, 27 are reappointments of retiring members. Those now appointed will hold office until March 31, 1953.

NORTHERN REGION

Reappointed Miss M. B. Clyne, S.R.N., C.M.B.; J. A. Farley; **I. H. Maciver,** M.B., J.P.; the Rev. Father Neil MacKellaig.

New members: J. A. McDonald, J.P.; J. Munro; Norman Robertson (until March 31, 1951).

NORTH-EASTERN REGION

Reappointed: **A. Greig Anderson,** F.R.C.P.; Provost **W. J. Lyon Dean,** M.B.; James Hay; Miss Bell Jobson; Bailie H. J. Milne, M.C. Robert Ollason.

New members: Mrs. J. Wolrige-Gordon; **A. C. Macdonald,** M.C., M.B. (until March 31, 1952).

EASTERN REGION

Reappointed: **W. L. Burgess,** C.B.E., F.R.C.P.E.; Councillor J. R. Christie; **James Lawson,** M.D.; Mrs. A. L. Matthew; Councillor **J. D. Saggar,** M.B.

New members: Miss M. C. Cameron, S.R.N.; **W. D. Chambers,** F.R.C.P.E.; J. J. Duffy (until March 31, 1952).

SOUTH-EASTERN REGION

Reappointed: James Black, J.P.; Mrs. I. McNeill; Prof. W. Oliver, B.SC., A.M.I.C.E.; **Andrew Simpson,** M.B.; Sir **Henry Wade,** C.M.G., D.S.O., F.R.C.S.E

New members: **William Boyd,** M.B.; Councillor Mrs. Jane Dowie; Councillor W. M. Inglis; Bailie D. R. Matheson, LL.B.

WESTERN REGION

Reappointed: **J. Bruce Dewar,** F.R.C.O.G., J.P.; J. Finlay; S. McLaren; the Hon. Mrs. Maclean of Ardgour; **Angus McNiven,** F.R.C.P.E.; Councillor J. Stewart, J.P.; **J. H. Wright,** M.D.

New members: **T. Anderson,** M.D.; Prof. I. W. Macdonald, C.A.; Mrs. C. M. Matheson; Bailie W. Muir; J. Forde, J.P. (until March 31, 1951); J. Aitchison, L.D.S., Councillor F. Gormill, and **Benjamin Hutchison,** M.C., M.B., J.P. (all until March 31, 1952).

Parliament

Medical Officers in the Forces

IN the course of a debate on defence in the House of Lords on April 5 Lord WEBB-JOHNSON said that in 1948, in pointing out the shortage and lack of quality of medical officers in the Forces, particularly in the Army, he had agreed that it was necessary to have a higher age for the call-up of medical and dental officers than for other conscripts. But at the same time he had warned them that even by raising the age to 30 there might still be a shortage. He had then advised integration, particularly with the National Health Service. The position was now worse, and it would grow steadily worse during the next two years. In 1952 the shortage of medical officers for the Army alone would be about 500, because 800 of the men leaving medical schools in that year would have finished their military training; and there would be no improvement until 1954. The shortage of specialists, he continued, was really alarming. Our young men were being sent to distant garrisons, and responsible members of the medical profession were certainly not satisfied—nor was the Director-General of Army Medical Services—that there was an adequate supply of specialists to care for them. The R.A.M.C. could not from its regular officers undertake to provide the requisite number of specialists, who nowadays had to have long training and wide experience. In some of the specialties the Service could not provide any. A young general-duty officer in the R.A.M.C., who aspired to be a specialist in surgery, could not secure adequate experience in the Corps. At present the R.A.M.C. required 114 specialists for the half year. Of these, 24 were surgeons. But the number available to fill the requirement of 114 was only 12. The position was not a temporary one; there was going to be a permanent shortage. The regular R.A.M.C., even with its full establishment of regular officers, could not provide the specialists in peace-time; there would be a shortage of 280. With the short-term commissions granted for a period of years, and including a proportion of specialists, the shortage would still be 142; and with the call-up of young men with some experience in the specialties, the shortage again was 122. To bring in civilian specialists and give them higher pay than officers of the same rank, as had been done, was a frightful and frightening experience. It was unsatisfactory, it was unfair, it was expensive, and it did not provide a permanent solution. Some of the remedies suggested were palliative—for instance, an adequate supply of transport to enable a specialist to cover more cases, or that the Services should accept a lower physical standard for specialists, particularly those who were not serving under war conditions. But the fundamental point was dealt with in paragraph 23 of the statement on defence, which said: "A high level of recruitment cannot be expected unless Service conditions compete in attractiveness with those of civilian life."

The first requirement was that the pay of the regular officers should be advanced. Some regular officers serving now were anxious to retire. There was a ban on retirement. Would that policy lead to a contented Service? In fact there was considerable discontent. The regular and short-term establishments could be increased, but that was no solution. The only way to get a specialist service for the Army under the present National Service Act was by obtaining civilians. There was a suggestion that the civilian age for recruitment should be raised to 45 years. It would be a serious matter if the specialist section of the population should have legislation levelled against them that might interfere with their careers up to the age of 45.

Lord Webb-Johnson still thought the right solution was some integration with the National Health Service. Those who held whole-time posts in that service should be appointed with a definite obligation to accept from time to time secondment to the Forces, and they should be able to return to the civilian service without loss of seniority and promotion. The integration of the Forces' medical services with the National Health Service and with the Colonial medical services would do much to enhance the reputation of the Commonwealth and Empire. It was a matter of extreme urgency, and if the hold-up had been at the Treasury it was time that pressure was brought upon that Department to permit of a solution being obtained.

Lord HADEN-GUEST said that as chairman of the Medical Priority Committee, he agreed that the situation in respect of recruitment to the Service was grave as regards both general-duty officers and specialists. The fact that during the next two years so many men who would normally be called up for 18 months' duty would not be available, because they had exhausted their military service obligations before becoming qualified, was temporary. But it did not make the situation at the moment any less serious. In his view the final solution was to regard the National Health Service as the mother and father of all the medical services, including the Colonies and the Services. It should be regarded the under-£3 group, which contains a large proportion of elderly pensioners. In both sexes there is a general tendency for illness to decline as income rises. The increase in the sickness and prevalence rates in 1948–49 compared with 1947–48 was not concentrated at any particular income level, and there was little difference between men and women. More days of incapacity were reported at every income level but in the groups from £4 up to £10 the increase among women was much greater than among men. Medical consultations also increased unequally in the two sexes at incomes under £3 and from £4 to £10. The greatest increase in consultations was at £3–4—a 41% rise for men and for women. Standing out in very sharp contrast, men and women in the group with incomes of £10 and over saw their doctor *less* often after July, 1948, than in the previous twelve months, despite a slight increase in illness. That section of the population who could best afford to pay for medical attention under the old system appear to have taken least advantage of the new; whilst people with more limited incomes, especially women, who formerly saw their doctor less often than they should have done—or at any rate less often than those with more money—have found it possible since July, 1948, to have medical attention more in keeping with the amount of illness of which they complain.

SUMMARY

A study of the results of the Survey of Sickness for the twelve-month period July, 1948, to June, 1949, compared with the previous twelve months, has shown that 5% more adults aged 16 and over had some illness, and that the number of individual illnesses increased by 8%. The number of days of incapacity (days away from work or kept indoors on account of illness) increased by 22%, and the number of consultations with doctors increased by 13%.

The increase in incapacity and in medical consultations was greater among women than men and greater among elderly than young adults.

Persons whose chief wage-earner had a small income, especially women, formerly had less frequent medical attention than those who could better afford to pay for it. Since July, 1948, the number of medical consultations among those in the small-income groups has greatly increased, but among those with large incomes they have become less.

REGIONAL HOSPITAL BOARDS

THE Minister of Health has made the following appointments mainly to fill vacancies caused by the retirement of a third of the members of the 14 boards in England and Wales. Out of 131 appointments, 93 are reappointments of retiring members; 1 appointment is still outstanding. Those now appointed will hold office till March 31, 1953. The names of the medical profession are shown in bold type.

NEWCASTLE REGION

Reappointed: Sir Walter Thompson, J.P. (chairman); Miss D. R. Gibson, S.R.N.; Prof. **R. Bramble Green,** F.R.C.S.; Prof. **W. E. Hume,** C.M.G., F.R.C.P.; **J. R. Murray,** M.D.; Lord Eustace Percy, P.C.; Viscountess Ridley; T. C. Squance, O.B.E.

New members: John Lisle, J.P.; Mrs. A. E. Venables.

LEEDS REGION

Reappointed: Alderman David Beevers, J.P.; **G. W. Black,** F.R.C.S.; B. Hazell, M.B.E.; W. L. Lawton, C.B.E., J.P.; **J. Ivison Russell,** M.D.; F. Stuart.

New members: C. R. Morris; H. J. Edwards; Miss A. Whalley, M.B.E., S.R.N. (until March 31, 1952).

SHEFFIELD REGION

Reappointed: Sir Basil Gibson, J.P. (chairman); Miss **Margaret Bott,** F.R.C.O.G., J.P.; **K. K. Drury,** M.C., M.D.; A. R. Martin; Theophilus Pearson, J.P.; Prof. **G. L. Roberts,** M.B., B.D.S.; E. W. Scorer, O.B.E.

New members: **Hugh Barber,** F.R.C.P.; Alderman Mrs. F. L. Green, J.P.; Councillor J. E. Worrall; Alderman A. E. McVie, J.P.

EAST ANGLIAN REGION

Reappointed: Earl of Cranbrook (chairman); **M. W. B. Bulman,** F.R.C.S.; **R. B. Fawkes,** D.S.O., M.C., M.R.C.P.; James Grantham; Alderman Sam Peel, J.P.; E. W. Plumpton, J.P.; G. T. Vawser.

New members: Alderman H. S. Matthes; Alderman E. G. Gooch, C.B.E., M.P., J.P.; Prof. **A. L. Banks,** F.R.C.P. (until March 31, 1951).

NORTH-WEST METROPOLITAN REGION

Reappointed: Fred Messer, C.B.E., M.P., J.P. (chairman); Prof. **S. J. Cowell,** F.R.C.P.; **A. Stavely Gough,** F.R.C.S.; Henry Lesser, O.B.E.; Prof. **James Mackintosh,** F.R.C.P.; Miss M. Marriott, S.R.N.; Sir Owen Morshead, K.C.V.O., D.S.O., M.C., D.L.; Miss **Esther Rickards,** F.R.C.S.; Prof. **H. W. C. Vines,** M.D.

New members: **S. A. Mackeith,** M.R.C.S.; Mrs. M. E. Burns.

NORTH-EAST METROPOLITAN REGION

Reappointed: J. W. Bowen, C.B.E., J.P. (chairman); **Louis Comyns,** L.R.C.P.E.; Lieut.-Commander Horace Denton; Major R. P. Woodhouse.

New members: Prof. **Victor Dix,** F.R.C.S.; T. R. Haggarty, L.D.S.; Mrs. R. Rees-Thomas.

SOUTH-EAST METROPOLITAN REGION

Reappointed: K. I. Julian, C.B.E. (chairman); **E. R. Boland,** C.B.E., F.R.C.P.; Lord Cunliffe; *The Very Rev.* T. Crick, C.B.E., M.V.O.; **A. Talbot Rogers,** M.R.C.S.; E. C. Sherwood.

New members: C. F. Bowes; R. J. Mellish, M.P.

SOUTH-WEST METROPOLITAN REGION

Reappointed: F. H. Elliott, D.L., J.P. (chairman); Mrs. Helga Feiling; **C. B. S. Fuller,** M.C., M.R.C.P.; Miss P. Loe, M.B.E., S.R.N.; **M. F. Nicholls,** C.B.E., F.R.C.S.

New members: Miss M. O'Conor; **Louis Minski,** F.R.C.P. S. R. Thorogood; Mrs. E. Hailstone.

OXFORD REGION

Reappointed: **A. R. Banham,** F.R.C.S.; Prof. **T. Pomfret Kilner,** C.B.E., F.R.C.S.; Colonel C. B. Krabbé, O.B.E., D.L.; *Miss Rosemary Spooner;* ***J. A. Stallworthy,*** F.R.C.O.G.

New members: Captain F. Gardiner, M.C., J.P.; J. R. Cole; J. W. W.-Cripps; Mrs. Lilian Davies (until March 31, 1952).

Chairman: Dr. **Janet Vaughan,** F.R.C.P., has been appointed chairman until her term of membership expires on March 31, 1951.

SOUTH-WESTERN REGION

Reappointed: H. G. Tanner, J.P. (chairman); Sir Philip Morris, C.B.E.; **C. T. Andrews,** F.R.C.P.; Colonel H. Bland Stokes, M.B.E.; Mrs. K. A. Goddard, J.P.; P. E. Russell; Brigadier J. Morrison, M.B.E.

New members: Alderman V. J. Ross; H. M. Medland; Mrs. M. Ball.

WELSH REGION

Reappointed: Sir Frederick Alban, C.B.E., J.P. (chairman); Alderman William Casey, J.P.; T. P. Davies; Alderman W. C. Davies; Alderman Joseph Dicks; Alderman J. J. Panes, O.B.E.; Alderman **D. H. Pennant,** D.S.O., M.D.; Prof. **O. H. Williams,** F.R.C.S.

New members: Sir Ivor Thomas, J.P., D.L.; Eddie Jones.

BIRMINGHAM REGION

Reappointed: R. R. Adam (chairman); **J. A. Brown,** M.D.; Alderman W. Hutson, J.P.; Alderman J. Latham, J.P.; Alderman Leonard Whitehouse, J.P.; Alderman Percy Williams, J.P.

In England Now

A Running Commentary by Peripatetic Correspondents

SPRING is the proper time for picture shows, for then the eye and mind are eager for refreshment, and respond sympathetically to the other fellow's vision. The Medical Art Society now exhibiting at Walker's Galleries, are good company this year, whether you follow A. C. Dalzell to Africa or Sir Philip Manson-Bahr to Suva, loiter round Newlyn with C. Branwell, or even stay at home and cook kippers with Dorothy Hare. Dalzell's "African Landscape" is big and sinister, with grey banyan roots writhing down into water (does African water not refract?), while beyond them the soft quality of palm trees contrasts with the hard sturdy green of their colour. Never a gleam on land or sea for Dalzell; his "Jungle Cock," gloriously confident in the thick tropical forest, has no sheen on his feathers, and the leaves about him are as mat as felt. This strange practice gives his pictures a sorrowful exactness, shared by A. B. Hewlett's "Tree" and "Boathouse." The tree—a neatly riven willow—grows beside a new brick byre of a pleasant pinkish colour; I liked it better than the boathouse, which somehow failed to evoke the smell of varnish, the trembling light, and the interminable clink of water proper to such places. Sir Philip's banana trees, lying beside the light-filled bay, are delicately lively; and this is the more to his credit since he was using water-colours while the others used oils. Another water-colour of great charm was "Bartholomew the Less," by Keith Vartan, in which the sunshine cuts slantwise across the tower, so dividing the colours that the buildings below make a warm foundation to the tower, floating in light.

Many of the water-colour landscapes showed a high level of technical competence without stirring my blood; but perhaps it runs sluggish these days, even in spring. I did notice with pleasure "Anemones" by Emanuel Miller, because the flowers—which were just going off, as he very honestly and skilfully showed—were so pleasantly grouped with a little glass-and-gilt dish and a matchbox. There were of course one or two deliberate shockers: "Sussex Fantasy," by R. H. Dale, showed a cartoonist's view of an operating-theatre; and S. D. Cudjoe depicted "Hallucinations of an Engine-Room Boy" as a turbaned figure rising from whorls of coloured cushions (perhaps), minutely rounded out in lines of coloured ink—a sort of doodle in excelsis.

But the French doctors, members of the Salon des Medicins, struck the authentic note of spring. They had contributed a whole wall of spirited paintings, and took their inspiration from the impressionists, the primitives, or the surrealists, according to temperament, or possibly mood. Pierre Masquin's harbour at La Ciotat, full of sunny blues, with a rust-red boat pulled up in dry dock, was balanced by Lucien de Gennes's more sober water-colour of St. Tropez harbour. Then there was a plate of shining mackerel and some agreeable pink fish lying beside a lemon and a jar of pink and yellow flowers, by François de Hérain, which I found unreasonably refreshing. How much gayer are these fish of France than Dorothy Hare's kippers, though she had done her best with the lively iris which gleams about the gills. Malespine had done two "compositions" which would make a suitable background for a ballet of the "Inferno": they were full of melting shapes, strange colours, and shafts of light, and invited interpretation as insidiously as a Rorschach test.

All this, and more, you may see for yourselves between 10 A.M. and 5 P.M. on weekdays and 10 A.M. and 1 P.M. on Saturdays till April 29.

* * *

☞ Now that the first holiday spasm is relaxing I find myself having to order in some bismuth again. My grateful N.H.S. patients will keep sending me highly coloured postcards from distant parts of the earth to enable me to share their joys. A very nice time they must be having, tossing their liras, francs, escudos, pfennigs, and other inaudible currencies from hand to hand, and no doubt hoisting a well-laden fork from plate to mouth. With Bibendum ogling beside them, disdaining a mere *pot de vin*, they shamelessly tuck a gleaming napkin into corsage or collar and battle on regardless. But not quite regardless. The postprandial twinges of Gaster remind them of me. They lick a stamp, perhaps moisten it with wine, scrawl a languid line, and a few days later my injured pylorus registers frustration. I reflect that they have spent as much money on the trip as I get in a quarter from them and their flock. But, bless them all! If it sets them up for the next few months, should I worry and will they worry me? The cynical reader will remark that they are certain to be back for some more phenobarbitone to help them face the rigours here. I merely reach for my beaker of bismuth and pick up the next card. "We are setting off on our Easter Mediterranean Cruise. As you see from the photo, the ship is pretty comfortable. . . ." Anyway, I shall be able to confirm or refute the above-mentioned cynic soon. I can't afford to go away for a holiday at all.

* * *

The *Journal of the American Medical Association* for March 11 has an editorial note (p. 732) on the disposal of unwanted medical samples, based on a suggestion received by the U.S. Post Office Department:

> May I suggest a notice to all professional men, especially of the medical group, not to throw unwanted samples, especially liquid mediums and laxatives, in lobby waste baskets? Many times youngsters delve through these baskets to find pictures or old stamps, and might sample the medicine with fatal results.

The same can no doubt be said of the British youngster, and even the dustbin is not a completely safe disposal place; I still come out in a cold sweat at the memory of my friend Jones's little boys, then aged 4 and 3 years, toddling cheerfully across the High Street of their home village, each grasping in one hand a sample bottle of shining silvery tablets and in the other a cobwebbed bottle obviously containing a stale sample of urine. And how they yelled when their just spoils from the surgery dustbin were taken from them!

Then there is the parallel problem of the patient who swallows a sample of some nostrum or other which distorts the clinical picture. When I was a resident, many years ago, I admitted a stalwart policeman for gastric investigation, and that evening the night nurse told me with some alarm that the patient's urine was bright blue. When I asked him what he had been taking he swore vehemently that he had had nothing unusual. I was then young enough to believe at least most of what a patient told me. I spent quite a while on that urine, but in view of his denial I did not get very far. I ordered a strict watch to be kept on the patient and next morning his urine was green. In the afternoon it was blue again. By this time it was dawning on me that I had not been told the whole truth; so sending the policeman off for a bath I searched his locker. This produced nothing, but under the bed I discovered a free sample of "kidney pills," containing methylene-blue. When I confronted the patient with this evidence he sheepishly admitted that he had found the pills in his letter-box the day before he came into hospital, and he "didn't like to waste them." (Yes, he *was* a Scot.)

* * *

When I borrowed a book from the B.M.A. library the other day, a piece of paper fell from the pages. It proved to be a filled-up football-pool coupon. I wonder, might it have lifted its owner, at one swoop, far higher than the highest consultant range (plus merit award)? Anyway, I am keeping it as a model; there's not much to be made as a peripatetic correspondent.

* * *

The accession of a ruler is traditionally marked by a general amnesty. Here is an obvious way for the new P.R.C.P. to celebrate his election: let all the most chronic Membership candidates—say those who have served a term of more than ten entries—be admitted without further prolongation of their suffering. The enactment of their release (including, of course, a symbolic casting away of cheque-books and examination papers) would be an unusually moving ceremony.

as part of the duty of those taking service in the National Health Service that part of their time should be given to one or other of the Fighting Services. It would not matter at what age that service was given and the time could be adjusted according to the medical officer's own work and the needs of the Service. At present the development of the National Health Service was only at the beginning. It was not at all certain at the moment whether the hospitals in this country were not employing more people than they required. For instance, about 82 medical officers were registrars at one large hospital in London. That was possibly at least four times too many. All doctors should be regarded as being in one pool to serve the national interest, whatever it might be and in whatever part of the world the service might be given.

Replying to the debate, Viscount ALEXANDER OF HILLSBOROUGH, Chancellor of the Duchy of Lancaster, did not specifically mention the medical points raised, but he gave a general assurance that there would be opportunities for further discussion during the forthcoming debates on the individual Services.

Midwives (Amendment) Bill

On April 5 in the House of Lords the Bill was read the third time and passed.

QUESTION TIME

Peckham Health Centre

Mr. JOHN COOPER asked the Minister of Health whether his attention had been drawn to the financial difficulties which threatened the closing down of the Pioneer Health Centre, Peckham; and if financial assistance would be forthcoming from his department to enable this centre to continue as a research institute under section 16 of the National Health Service Act, 1946.—Mr. ANEURIN BEVAN replied: As I understand that the centre is closed, the question of grants for research does not at present arise. The governing body of the centre have placed proposals for the centre's future before the London County Council and I am in touch with the council on the research aspect of these proposals.

Mr. I. N. MACLEOD: Whatever the London County Council propose, is the Minister aware that he has a direct responsibility to this House for the encouragement of research? Is he aware that those people best qualified to judge consider that the Peckham experiment was one of the most worth-while and exciting research experiments in the world? Mr. BEVAN: My officers will be delighted to receive from those who were in charge of the centre any conclusions on the research aspect of the experiment which they are likely to put before us. So far we have not received them.

Mr. OLIVER STANLEY: Is the Minister right in saying that there have been no discussions, even of an informal character, between those responsible for the centre and his officials? Is his Ministry not in possession of the new plans for research? Mr. BEVAN: What I said was that we would be very delighted to examine any conclusions reached on the research aspects of the centre, which has been in existence for many years. I will again make inquiries, but I do not think that we have had any concrete conclusions put before us.

Mr. WOODROW WYATT: Will the Minister act with some speed in this matter because the work of the centre is suspended for only three months? If it cannot reopen at the end of that period it will have to close for good. It is not sufficient to leave the matter to be settled by the L.C.C. Mr. BEVAN: There are two aspects of this matter. There is the health-centre aspect which first must be discussed by the local authority concerned, and there are the research aspects which are the concern of the Ministry of Health and the Medical Research Council. Both these aspects have to be considered together.

Major W. F. VERNON: In view of the fact that the research aspect of this work goes beyond the strictly medical field, will the Minister consider discussing it with the Advisory Council on Scientific Policy? Mr. BEVAN: It is because it goes directly beyond the medical field that it has some very interesting features about it. That is the claim it makes, that it is as much a social as a medical experiment. What we are trying to do is to assess the social significance of the centre as far as we can.

Advice on Contraception

Mr. ERNEST THURTLE asked the Minister under what National Health Service regulations doctors in the service were precluded from giving patients who applied for it information and advice about methods of contraception.—Mr. BEVAN replied: There is nothing whatever in the regulations to preclude this. Nor, however, is there any obligation on the doctor to do it unless he considers it necessary for purposes o medical treatment. Mr. THURTLE: Can the Minister say whether a N.H.S. doctor is justified in refusing to give this information on conscientious grounds? Mr. BEVAN: It is not my practice to interfere with the advice the doctor considers he should give his patient. I think it would be most unfortunate if we tried to intervene between doctors and patients in matters of this sort.

Private Importation of Streptomycin

Mr. JOHN GRIMSTON asked the Minister why special instructions had been given to the officers of H.M. Customs to prevent the private importation of streptomycin.—Mr. BEVAN replied: No substance to which the Therapeutic Substances Act, 1925, applies may be imported except under licence of my department. No licences to import streptomycin are being issued as British supplies are adequate for all home requirements, with a margin for export.

Ophthalmic Opticians and the N.H.S.

Mr. ANTHONY MARLOWE asked the Minister whether he proposed to employ ophthalmic opticians who were not ophthalmic medical practitioners in the National Health Service; whether he was aware of the concern among ophthalmic opticians that they were in danger of losing their livelihood; and if he would make a statement.—Mr. BEVAN replied: I assume the hon. Member has in mind the hospital eye service. 48 ophthalmic opticians are already employed whole or part time, and others will be engaged as the service develops. The ophthalmic opticians are aware of the situation. They know that what is in existence is a supplementary optical service. It is hoped that eventually the whole optical service of the country will be articulated through the hospitals where in the first place patients can be examined by ophthalmic surgeons.

Medicine and the Law

Wrong Labels in the Drug Cupboard

AT a recent inquest at Ramsgate upon the death of a six-week-old child, the evidence indicated that a fatal mistake had been caused by the unfortunate use of a drug carton. The doctor had prescribed 'Chloromycetin' in liquid form. A night nurse found three capsules in a packet marked "chloromycetin"; she took them to the night sister, who read the directions on the packet and handed her one of the capsules; she made it up into liquid form and administered the dose to the child. Next morning, she told the coroner, she was shown a flat white box containing chloromycetin in powder form which was also in the drug cupboard.

Another nurse explained at the inquest that, a few days earlier, she had found that the supply of 'Nembutal' capsules was getting low; she took out the three that were left in the bottle, in case they were required in an emergency, and sent the bottle to the dispensary; she put the three capsules in a carton marked "chloromycetin" and hid it at the back of the cupboard in a place different from that in which it was usually kept. The night nurse said she thought it rather strange when a yellow capsule came out of the carton; she asked if there was another box in the cupboard and was told that no other was visible and that the chloromycetin in powder form had been in that box before.

The incident was doubtless exceptional, but any fatality due to causes of this kind is one death too many. The hospital rule that drugs should be properly labelled when moved from one box to another must have been overlooked. The coroner, who recorded a verdict of death by misadventure, added the recommendation that the hospital staff should "brush up" their knowledge of fresh drugs.

and trial expeditions based on them, before we will be in a position to communicate fully to the people the benefits of medical knowledge.

General practice has raised itself a prophet, though how it will treat him remains to be seen. This is perhaps the most important aspect of the report, for rarely have I seen or heard anything like this reasoned statement of faith in general practice. It goes far to outweigh the brief consideration given to hospitals and specialists; for, while what we want in the end is a comprehensive and balanced view of our total task, this prophet will tell us that the specialists have many of his colleagues in their service already, and do not lack prophetic fire to help them. Nevertheless he is not free from a haunting longing for the "good" disciplines of hospital and medical school.

But are these so very "good" for general practice? Is not the almost total emphasis, from prevocational and even school days, upon the physical sciences, and the tangible realities of hospital practice, to the exclusion of the humanities and the social sciences, largely responsible? And must he not in the end, or better still in the beginning, win over those who control medical education, if he is going to save general practice? May not his improved conditions of practice (which should certainly be aimed at) remain a shallow expedient (like his refresher courses for G.P.S) in the face of an earlier and more fundamental error? Or is our society as a whole too hopelessly lost in materialism?

In considering his novel idea of locating specialist consultation services and facilities alongside the G.P.S in their health centres, one must be fair to the specialists. Can they be grouped in sufficient concentration to provide *their* optimum conditions in a series of necessarily very discrete centres designed for the welfare of the patient seeking general help?

Where also do we look for an army of general practitioners of the calibre indicated? Many men these days seek specialist practice as an escape from the more comprehensive discipline of general practice, and are not necessarily of higher calibre than those who might or do remain. It is more a matter of human capability, and unless things change greatly, I foresee great difficulty in securing, under any conditions, sufficient men to play the high part called for in his revived general practice.

As far as New Zealand goes, we are glad to accept the compliment of "good" practice even if with a wry face. I think the important words lie in his penultimate line—"within the existing concept of that service." The truth is that much of general practice is undertaken for financial reasons, without any special liking for or belief in it, and with the idea of as early an escape from it as possible. Certainly there has been no conscious thought or planning as to lines of demarcation between G.P. and specialist work in either urban or rural areas despite vast sums of public money being paid away in both fields. If the "gap" between G.P. and specialist is too wide in the U.K. it may well be too narrow in New Zealand.

These caveats should be regarded more as growls of pleasure on coming upon a more than usually meaty bone. I sincerely hope that both in the U.K. and in New Zealand this report will lead to the serious study of its subject-matter, and the devising of pilot plants for the solution of the problems. Lines of demarcation must be at least pencilled in, in the interests of function as well as of economy. They may well be found to lie in different positions in different countries and in different parts of the same country, and should be drawn by those who believe in G.P.S and also in specialists, and who seek to give both parties their best chance to serve the people in their different but both excellent ways.

Auckland, New Zealand. DOUGLAS ROBB.

SIR,—Most young general practitioners leave hospital with a good academic training and moderately high ideals. But we all know too well that twenty years of general practice brings far too many of us down to the level described by Dr. Collings. I hope that his cases were not really representative of the state of general practice in this country, but there is no doubt that there are far too many examples such as he describes, and it is a disgrace to our profession that any should exist at all.

To my mind the root of the matter lies in the width of the gulf between the conditions under which the medical student is prepared for general practice, and the actual conditions he finds there. I have argued this point a great deal with the staff in teaching hospitals, and their very sound point is that general practice cannot be taught, and that the best preparation for it is to give the student a thorough training in sound medical and surgical procedure; and it is then for *him* to apply it. This argument asks too much of the newly qualified doctor; he finds older men, apparently successful and respected, doing all the things he has been taught to avoid; he sees that they are sketchy and careless in their technique; and yet he finds that any effort on his own part to retain the high standard of skill that he has acquired is looked on as either cranky or presumptuous and often is not appreciated by the very patients he is trying to help. And because a good standard of medicine is expensive and does not bring in quick returns, his young enthusiasm gradually wanes, and he finds himself descending to the level of his predecessors and colleagues.

The remedy is threefold:

1. The teaching of general practice should be of primary importance in the medical schools. The attitude of the teachers must alter so that they feel their personal success or failure will be judged by the standard of the men who have been their students.

2. In order to teach general practice with real understanding, clinical teachers must at some point have been in general practice themselves for a sufficient time to understand the conditions under which the ordinary doctor works.

3. The student must be so prepared for general practice, and for the difference between what he is taught to expect and what he actually finds, that he will adopt a fighting attitude against poor medicine—that is to say, against hopeless conditions for the practice of good medicine. The young man must be taught to be sufficiently courageous, so that when he arrives at the converted shop with the drab battered furniture, the couch littered with dusty bottles, and the few rusty antiquated instruments, he will make a firm stand and say "I will not practise under these conditions; I will have more room, more light, more ancillary help, and better equipment." This is a battle which some of us have fought in our early days; and the harder the fight is to start with, the more worth while is the victory when it comes.

All this means that much more attention has got to be paid in the teaching schools to the advice of experienced general practitioners. At the same time, the Ministry would find it a good investment if they were to provide a scheme for financing young men who want to improve their premises and equipment; for there is no doubt that the cheapest and most effective way of dealing with patients *should* be by their family doctor in their own homes. It ought to be possible for domiciliary medicine to compete favourably with treatment in hospital for many conditions which nowadays are thought of as the sole prerogative of the specialists; but this will be possible only if the general practitioner is well trained and equally well equipped, and if—most important of all—he is able to devote adequate time to his patients. This of course means a smaller number on his list, and a correspondingly increased capitation-fee. And even then the Ministry guardians-of-the-money-bags would still find that cash spent on general practice could save more than its equivalent in hospital expenditure.

Great Dunmow, Essex. GEOFFREY BARBER.

Letters to the Editor

GENERAL PRACTICE TODAY

SIR,—Dr. Collings, as I read him, does not attack or decry general practice or general practitioners—far from it. What he says, in effect, is that the art and profession of general practice is sick and will die if something is not done to save *it*. His report makes bitter but, I believe, salutary reading; and I, at least, am grateful to him for making and to you for publishing it.

I hope and believe there is more good practice going on than he thinks, and a few of his implied suggestions perhaps savour of perfectionism, but the report rings true. Those parts I can check *are* true, and unless he is writing fiction we must accept as facts what he says he has seen. If we do that, we have no choice but to conclude that within the service set up by the State good general practice is suffering every possible discouragement while bad general practice is not only tolerated but is often an almost inevitable consequence of the conditions in which it is carried on.

Dr. Collings seems to have found the dysgenic effect of the meagre and almost uniform capitation fee less than might have been expected, but he describes how it cripples a man determined to do really good work and he gives ample evidence to show that the range of general practice is being steadily and, it would seem, deliberately narrowed. The G.P. is being excluded from the hospitals, and the trench dividing him from the specialist is being rapidly widened and deepened. Saddest, perhaps, of all, in a profession one of whose chief glories was what the Minister called "inbreeding," fathers are now discouraging their sons from following in their footsteps.

The *causæ morbis* are many and not all are recent. Some are no-one's fault but arise from increase of knowledge and elaboration of techniques; for some we are all to blame, but the apathy, cynicism, and dull-mindedness of the State—its indifference for nearly forty years to the quality of the service whose sponsor and paymaster it was—"stand out a mile." It cannot plead ignorance. Every F.M.R. and "continuation card" is marked "the property of the Minister of Health," so that successive Ministers had access to every panel doctor's clinical notes, and for years the Ministry's regional medical officers visited practitioners' surgeries. Either what Dr. Collings found is new and is peculiar to the N.H.S. or it is old and must have been reported. The fact is, I am sure, that the State, like Gallio, "cares for none of these things."

I myself heard Mr. Lloyd George in 1911 belauding the panel service he was creating and picturing the family doctor bringing hope, comfort, and help into the sickroom. Yet at that moment he was, as I now read, proposing to pay this son of Æsculapius and disciple of Hippocrates a capitation fee of four and sixpence.

The Ethiopian has not changed his skin. The State still protests that the family doctor is the backbone, keystone, or what-not of its health service; but, as Dr. Collings shows, the whole emphasis of the N.H.S. is on hospital and specialist services, with the local authorities' "personal health services" second and general practice nowhere.

I myself believe that general medicine is medicine at its highest, and that general practice is, or should be, practice at its best, but this is an article of faith. What I *know*, from daily experience, is that the patient or family treated by specialists, of whatever eminence and skill, without a general medical adviser come to grief. Specialists, whether in hospital or consulting-room, are no substitute for family doctors, and, if travellers can be trusted, countries in which a specialist iatrocracy has been established and G.P.s are counted an anachronism provide a really fearful warning. When, therefore, Dr. Collings concludes that "if the present trend . . . continues it must result in the elimination of general practice as an effective agency of medical care" he foretells, to my mind, both a medical and a national calamity. A crisis—and an irreversible crisis—is upon us. General practice, once destroyed, will not be re-created.

What can be done? Dr. Collings and others suggest apposite remedies, but who is to apply them? Can anyone suppose, does Dr. Collings himself seriously believe, that general practitioners, individually or collectively, can, in their present plight, apply them for themselves? The iron has entered into their souls. All too literally, I fear, "they haven't a hope." Besides, in the matter of organisation we have completely lost our freedom. Or are the local authorities or the present Ministry of Health to play *deus ex machina*? In current phraseology, "they haven't a clue."

I, at least, can see no hope save in a change of heart and a clearing of the mind in those who now control our destinies—press, Parliament, and Cabinet. What hope of that? I think there is a gleam. Linked to the crisis of general practice are two others—the crisis of the competing, unemployed, would-be specialists, fleeing from downgraded general practice, and the financial crisis of the N.H.S.

Bad general practice is expensive. It costs unnecessary medicines in unnecessary quantities, undeserved certificates of unfitness for work, and needless reference to costly hospitals. All this Dr. Collings makes clear. It also spreads demoralisation and chronic invalidism and destroys any hope that the citizen will, in the words of the Beveridge report, "accept the duty to be well."

For general practice and the practitioner the State cares nothing; for the specialist it does care a little; for its own pocket it is becoming quite anxious. The three linked crises are cumulative and must soon reach a climax. When they do it is just possible that the State will, for the first time, seek professional advice. We may have one more chance. If we do, might we not demand, what we have so long needed, a Minister of Medical Services? Much of our trouble comes from the confused thinking symbolised by misuse of the word "health" Dr. Collings shows clearly how that foolish, ambiguous term "health centre" is preventing the medical centre, which might save the situation, from taking shape; and it is surely obvious that public health, housing, and the National Medical Service are at least as distinct as Army, Navy, and Air Force, which have a Minister apiece.

Is it beyond hope that there might be found and appointed as first Minister of Medical Services a *statesman*—a man with good will to citizens of every class, with some understanding of the nature, functions, and limitations of medicine, some reverence for the art, and some understanding of the outlook, of the profession? No-one can restore to us "the years that the locusts have eaten," but such a man could at once give first-aid and could then begin, even now, to preserve and encourage the good, to discourage the bad, to supply what is lacking. He could set out to gain, by word and deed, the respect and trust of our humiliated and divided profession; he could abrogate some of his despotic powers and restore some at least of our freedom and our pride. Building carefully on such foundations as remain, he could construct by slow degrees the medical service the country ought to have, and he could leave for himself a name that would endure for generations.

London, N.W.3. LINDSEY W. BATTEN.

SIR,—Let us hope that Dr. Collings's unique report will begin a new era in our thinking about medical affairs in relation to public welfare. The strange thing is that we have proceeded so far and so fast without such essential information as is provided by this reconnaissance. Many more such reconnaissances will be needed, convictions for robbery with violence. For the war years only a summary of the criminal statistics was published, in which the number of convictions in regard to this crime were not distinguished from other forms of violent crime for which flogging cannot be ordered. I was therefore obliged to estimate the annual number of convictions for 1939 to 1945 on the assumption that they formed annually 37·32% of the number of such crimes known to the police—the average percentage during the fifteen years 1920–34. (This percentage must not be taken to mean that the guilty party is found in only 37% of the crimes annually committed; the apprehension and conviction of one guilty person very frequently brings to a conclusion the police investigation of *several* crimes.) Because this is only a " best estimate " the number of floggings in relation to the estimated convictions is of doubtful accuracy for the war period. But the *precise* flogging rates for 1946, 1947, and 1948 (the last relating to only 9 months but expressed on an annual basis) of 11, 16, and 7% of convictions conform to the pattern for the earlier part of the century which indicates that the amount of flogging ordered was independent of the volume of crime in the country.

To sum up, it is clear that the vast increase in robbery with violence during and since the 1939–45 war had no counterpart during or after the 1914–18 war. The recent increase is in fact something entirely outside the experience of the last 80 years. These are the facts as shown by the statistics. It is outside my sphere to attempt to specify to what cause or causes the increase is due. I suppose no-one can doubt that not one but many factors are contributory. But those who maintain that the upward trend can be reversed by the re-institution of corporal punishment as a deterrent must seek for justification of their beliefs elsewhere than in a study of the past relations between the extent of corporal punishment for robbery with violence and the prevalence of the crime. The recorded facts for the period 1860 to 1937 contain nothing to assist them.

Department of Preventive Medicine,
Welsh National School of Medicine,
Cardiff.
E. LEWIS-FANING.

PROPHYLACTIC INOCULATIONS AND POLIOMYELITIS

SIR,—The studies of Dr. McCloskey, published in your issue of April 8, and Dr. Geffen's article in the *Medical Officer* of the same date, are of outstanding importance; but their significance is more psychological than epidemiological.

One's first impression on reading the two articles is that evidence is given that poliomyelitis may be produced, or its risk increased, by anti-pertussis vaccination within the previous few weeks, but a careful reading of the figures shows that there is no shred of evidence for this assumption. They clearly show that persons who are inoculated with anti-pertussis vaccine and who subsequently develop poliomyelitis are very much more likely to have the paralysis show itself in the limb in which the injection has been made. They do not show that the injections produce poliomyelitis.

The psychological effects of the publication of these papers are, however, arresting, and excerpts have been quoted in the national press. The impression may be gained by the public that our immunisation campaigns are likely to be followed by an increased incidence of poliomyelitis. This may or may not be so. There is no information either for or against this view except the general impression, which is not a new one, that trauma, and in particular trauma due to tonsillectomy, may be an exciting cause. Dr. Geffen was certainly wise in giving publicity to the facts which he found, since the public are likely to react very unfavourably to any suggestion that facts adverse to immunisation are being withheld from them, and frank information on the ascertained facts is always useful.

The next step, however, is to carry out a statistical inquiry into the incidence of poliomyelitis in epidemic areas and at epidemic times in two groups of persons: (*a*) those who have not been inoculated within, say, the last three months against diphtheria or pertussis; and (*b*) those who have. Such an inquiry may present difficulties, and one cannot disguise the very great practical obstacles in the way of obtaining two large groups which are statistically capable of being contrasted. Nevertheless the importance of the subject demands that such investigations should be carried out.

This experiment might prove whether immunisation against diphtheria and pertussis was responsible for an increased incidence of poliomyelitis; but even if it did, it would not necessarily follow that immunisation campaigns should be either abandoned or modified. In the light of the new information one would have to assess whether the known risks of an increased incidence of poliomyelitis were or were not counterbalanced by reduction, or even eradication, of these two diseases, which between them are responsible for a heavy yearly mortality—a mortality greatly in excess of the death-rate from poliomyelitis.

The numbers of deaths from poliomyelitis and whooping-cough during the nine years 1940–48 were:

Poliomyelitis	1307
Whooping-cough	8508

Smethwick, Staffs.
HUGH PAUL
Medical Officer of Health.

THE HEART OF THE MATTER

SIR,—The " first Bevan lecture " in last week's issue contains much that is timely and pertinent, but the author is mistaken when he states that no medical school gives instruction to its students in the management of a general practice. A course for final-year students has been in the curriculum of the Manchester school for more than twenty years. This lectureship in medical ethics and conditions of medical practice was founded by the faculty at my suggestion, and has been held by such well-known G.P.s as L. Kilroe, of Rochdale, and the late T. A. Goodfellow, of West Didsbury. I know that it has been greatly valued by many men about to enter general practice.

Prestatyn, Flintshire.
E. D. TELFORD.

A CODE OF ETHICS

SIR,—As you mentioned on March 18 (p. 524), the British Medical Association has recently circulated a pamphlet on *Ethics and Members of the Medical Profession*. Primarily it is prepared for the information of practitioners who have qualified within the last ten years; but, although the pamphlet is dated 1949, the compilers seem to be unaware of the passage of the National Health Service Act, 1946. The initial paragraphs are excellent, pointing out the position of privilege which the doctor occupies in society and stating that " the justification for the freedom of medicine lies in the hands of those who practise it." But instead of applying these principles to the problems of today, the pamphlet then passes to the Hippocratic Oath, which may possibly have been written by Hippocrates 400 years before the birth of Christ. It is in its way admirable, but it is limited in its scope as a guide to conduct in 1950.

The need for a revised code of ethics is obvious, but perhaps the British Medical Association is no longer the most suitable body to sponsor it. I venture to suggest as one item an expansion of the Eighth Commandment of the Decalogue: " Thou shalt not acquire purchasing power without making an equivalent return in service to the community."

Liverpool.
HENRY H. MACWILLIAM.

CRIMES OF VIOLENCE

SIR,—Your comment on the article I wrote in 1938 revived my interest in the subject, and I have now attempted to bring up to date the statistical data originally analysed. The diagram gives a picture of the course of events between 1864 and 1948, during which period corporal punishment could be ordered by the courts to male adults found guilty of "robbery with personal violence."

The index obtained by relating the annual number of such crimes "known to the police"[1] to that section of the community who perpetrate them (i.e., to the number of males aged 15–54 in the population)[2] provides a measure of the annual volume of such type of crime more accurate than one in which the numerator is either the number of persons brought *to trial (some of whom will be found innocent)* or the numbers *found guilty (which would exclude some crimes for which no-one was punished)*. The best measure of the extent to which flogging was imposed each year as a penalty for this type of crime is the index obtained by relating the number of floggings ordered in any year to the number of persons convicted[1] in that year (i.e., the ratio of persons *ordered* to be flogged to the total number of persons that the courts *could* have flogged for robbery with violence).

These are the two indices depicted graphically, and I do not think the study of their relationship can be greatly objected to by reason of the known facts (*a*) that a small proportion of the convictions were quashed on appeal, and (*b*) that on health grounds some of the floggings ordered were not carried out. The ratio of floggings ordered to the number of convictions measures the extent to which the country's judges as a whole imposed corporal punishment.

The continuous line indicates that the volume of robbery with violence steadily declined from 140 crimes per million of the male population (aged 15–54) in 1868, to 10·4 per million in 1915. *During* the 1914–18 war the index rose to a peak of 21 per million in 1917, and *after* the war to 23 per million in 1921; but it declined to the lowest it has ever been (10·0 per million) in 1927.

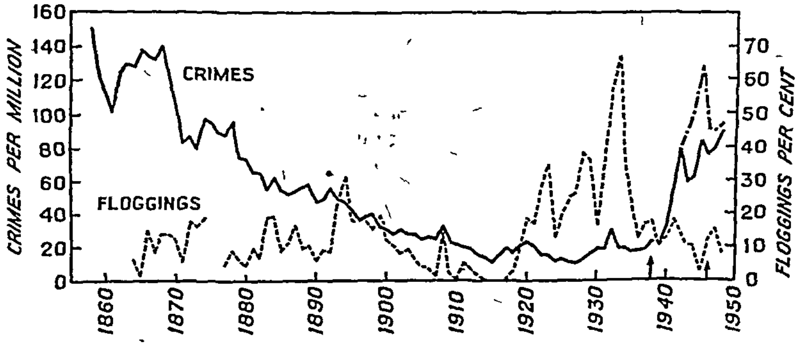
Now consider, in relation to this trend in the volume of crime, the dotted line showing the extent to which flogging was imposed. If flogging was imposed as a deterrent, then the logical sequence of events would be *a rise in the volume of crime, accompanied in the same year, or followed in the next, by an increase in the amount of corporal punishment ordered and with a fall in the volume of crime as a consequent.* Although an occasional instance of this sequence does occur, as in 1907–09, such instances are rare over the whole period. On the other hand if one takes, for example, the run of the figures over the last 20 years of the nineteenth century, it will be seen that the trend of the crime-rate was reasonably smooth and decreasing while the flogging rate fluctuated wildly and independently of the crime rate. During the 1920s or '30s when—apart from some increase associated with the trade depression—the crime rate was at a low level, flogging reached levels unprecedented in the previous 50 years. In 1933, 66% of those convicted were ordered to be flogged, but by 1936 the proportion had fallen to 12%. My original conclusion that flogging had been imposed more as a retributive than as a deterrent measure was based on a statistical treatment of such facts.

Now let us consider recent years. It has been suggested *that the current increase in robbery with violence originated during the trade depression of the early '30s.* The index I have adopted shows, however, that in 1935, '36, and '37 the rates were below the 1931 level of 18 per million, and that it was not until 1938 that a level above 20 per million appeared. Since that year the increase, although dramatic, needs to be carefully examined.

If for the war years the number of known crimes are expressed per million of the male *civilian* population (aged 15–54) a peak figure of 128 per 1000—as high as the 1864 level—is obtained for 1945. This, however, is fallacious since men in the Armed Forces *in this country* could also have been concerned in crimes of violence. The denominators of the ratios are too low and the rates consequently artificially high. The decline shown in 1946, when the civilian population only is used, is also fallacious and arises from the re inclusion in the denominator of those discharged from the Services. On the other hand, if the known crimes are related to the "*total* population"—civilian and non-civilian—the *denominator is* too high by the numbers of Armed Forces on *foreign soil*, and the rates therefore are artificially low. To some extent this is compensated for by the presence in the country of Allied troops who are not included in the "total population." But in spite of the doubt regarding the precise rates for the *war* years, it is clear that the level attained in 1948 of 95 per million of the population is matched only by rates which prevailed as far back as the 1870s. It took over 50 years to reduce the volume of crime from 95 to 10 per million. Yet it *has taken only 20 years to retrace the course*, and most of the deterioration has occurred in the eleven years 1938–48.

The crime rate of 89 per million shown on the graph for 1948 (or 94·6 if based only on the civilian population) was calculated from the figure of 1101 crimes of robbery with violence known to the police as recorded in the official volume of Criminal Statistics for that year.[3] The Lord Chancellor in the House of Lords stated on March 23 that in the first 9 months of the year 711, and in the last 3 months 267, *crimes* of robbery for which flogging could be ordered were known to the police. This is a total for the year of only 978. The difference of 123 between the quoted and published figures is doubtless capable of a simple explanation but cannot be ascertained from *publications* generally available. The figure of 1101 for 1948 is on all fours with the series *from which the diagram* was constructed. The Lord Chancellor's figure of 978 would give a rate of 79·1 per million of the total male population aged 15–54, whilst the figure of 806 which he added as the number known to the police for 1949 gives a rate of 69·4 for the following year. His figures therefore indicate a fall in the rate for 1949; but this may be but a chance annual fluctuation and it will be a few years yet before any conclusion can be drawn as to whether the peak of this wave of robbery with violence was reached in 1948.

The extent to which *flogging* was ordered attained its peak in 1933 when it was ordered in respect of 66% of



——— Number of crimes known to the police per million of the total male population aged 15-54.

-·-·- Number of crimes known to the police per million of the male civilian population aged 15-54.

.... Floggings ordered as a percentage of the number of convictions.

Note.—The figures for flogging between the two arrows are based on the assumption that the proportion of convictions to the number of crimes known to the police was constant at the average figure for the 15 years, 1920-34—namely, 37·32%.

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1. Annual Criminal Statistics, published by the Home Office.
2. Annual Reports of the Registrar-General of England and Wales.
3. Criminal Statistics 1948. Table D, p. 13. Class II. Offences against property with violence, subheading 34. Robbery 1101.

This is further illustrated by the investigations of Blackburn and Burke[3] who found that treatment with deoxycortone plus ascorbic acid did not result in a decrease of the circulating eosinophils, which would be expected if deoxycortone was oxidised to 'Cortisone' by ascorbic acid.

In order to throw further light on this problem, I suggest that it would be profitable to investigate the effect of other antioxidants chemically not related to ascorbic acid, such as glutathione,[4] cysteine, and *p*-aminosalicylic acid, and *p*-aminobenzoic acid, on the physiological action of deoxycortone. Glutathione is known to be intimately linked up with the functioning of the suprarenals. Moreover, all these substances have some properties in common with ascorbic acid. Their toxicity is extremely low. They inhibit the oxidation of adrenaline; they have a detoxifying action on a variety of noxious agents. *p*-Aminobenzoic acid is also capable of modifying the physiological response to hormones—e.g., combined stilbœstrol and *p*-aminobenzoic-acid therapy can result in anovulatory menses. In addition, improvement or alleviation in rheumatic conditions, asthma, chronic alcoholism, and morphine withdrawal syndrome have been reported as a result of *p*-aminobenzoic-acid therapy.[5]

The fact that improvement in all these conditions has also been obtained with A.C.T.H. would support the idea that *p*-aminobenzoic acid may act by exerting a favourable influence upon the disturbed endocrine equilibrium associated with the above diseases,[6] possibly by inhibition or activation of an enzyme associated with the metabolism of suprarenal hormones. The slight but undoubted improvement observed by Dr. Hallberg after administration of ascorbic acid or methylene-blue alone in patients with rheumatoid arthritis, as well as favourable effects obtained with cysteine, could be explained similarly.

California Institute of Technology,
Pasadena. H. RINDERKNECHT.

CERVICAL RIB AND SHOULDER-GIRDLE

SIR,—In his article of April 1, Professor Stammers mentioned d'Abreu's[7] case of a girl with a cervical rib, in whom symptoms were precipitated by the falling of the shoulder-girdle after thoracoplasty. The following case shows the importance of the muscular support of the shoulder-girdle in preventing symptoms in an individual with cervical ribs.

A woman, aged 72, had a dissection of the glands of the neck done on the left side for a malignant growth. This resulted in damage to the spinal accessory nerve and paralysis of the trapezius. About two months later she began to get pain down the left arm, and after a further month noticed some weakness of the hand and impairment of fine finger movements. When seen three and a half months after the onset of symptoms, the left shoulder-girdle was definitely depressed, and the trapezius paralysed. There was moderate wasting and diminished power of the muscles of the thenar and hypothenar eminences, with some flexion deformity of the proximal interphalangeal joint of the 5th finger. Light touch and pin-prick were diminished over the ulnar margin of the hand and over the little finger. There were no vascular changes. Traction on the limb did not obliterate the radial pulse. A cervical rib was plainly palpable on the *right* side, but not on the left. There were no abnormal symptoms or signs in the right upper extremity. X-ray examination of the root of the neck showed well-developed cervical ribs on *both* sides.

In this case, the paralysis of the trapezius, with resulting depression of the shoulder-girdle, was the factor responsible for the onset of symptoms and signs of traction on the brachial plexus over a cervical rib.

The Radcliffe Infirmary, Oxford. ANDREW ZINOVIEFF.

CONGENITAL ŒSOPHAGEAL ATRESIA

SIR,—I was most interested in Dr. Donnelly's article of April 8. I think the most encouraging part is the evidence it affords that congenital œsophageal atresia is now exciting more interest than it has hitherto.

My own successful cases have now reached the total of 7, the first patient being now over three years old. The last successful case was in a premature infant who weighed 5 lb. 1 oz. at birth. In all of these infants primary anastomosis was carried out, and in all of them feeding is now normal, although in 2 there was a period when coughing on feeding was a complication.

Dr. Donnelly rightly gives prominence to the importance of early diagnosis, but I think this is not a difficult matter if the possibility of the condition is remembered, and for this purpose it is essential that pædiatricians and obstetricians should make a point of instructing the sisters and nurses under their charge to regard all cases of vomiting and cyanosis in infants as being due to this condition, until the contrary is proved. This preliminary diagnosis is best carried out with a soft rubber catheter passed through the mouth. If it is constantly held up at a distance of 10 cm. from the alveolar margin, the presence of an atresia is almost certain. The X-ray confirmation may well be postponed until the infant can be taken to a centre where facilities exist for experienced X-ray diagnosis and any subsequent operation. In fact, in the first two or three days the urgency is negative rather than positive. The great thing is to avoid persisting in attempts at feeding and keep the pharynx aspirated, to change the position constantly in order to aerate the lungs, and in addition to give penicillin. Fluid loss is not as a rule a feature at this stage, but should it be necessary to give fluid it is best to do so by the subcutaneous route.

With regard to the associated abnormalities, just as in congenital œsophageal atresia where other anomalies may be present, so also the converse may be true. This is illustrated by one of my successful cases, which must have been diagnosed earlier than any on record. One of my late house-surgeons, Mr. D. C. Perry, was called to see a newborn infant with an imperforate anus. With great acumen he thought that if the child had an imperforate anus it might also have an œsophageal atresia. He passed a rubber catheter in the way in which I had taught him and found that his suspicions were justified. He brought the child to me and we were able to confirm the diagnosis radiologically; and I carried out an operation successfully twelve hours after birth, and before any attempt at feeding had been made. The child's recovery was uneventful. I feel that this illustrates the fact that early diagnosis can be achieved if the possibility of the lesion is brought widely to the notice of those concerned with the care of infants soon after birth.

Department of Surgery,
Postgraduate Medical School of London. R. H. FRANKLIN.

SIR,—In his article on congenital œsophageal atresia Dr. Donnelly does well to draw attention to the great difficulties in successfully treating these infants, particularly those whose entry into hospital has been delayed.

We rely on the general practitioner and the midwife to bring the patients to our notice early, and they need to know the earliest signs. In advocating "very early diagnosis" Dr. Donnelly mentions first that "signs of dehydration are usually evident soon after birth," but if we present this sign to the general practitioner as the criterion for admission we are going to defeat our purpose. It is *not* an early sign; it is a late one.

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[3] Blackburn, E. K., Burke, J. B. *Ibid*, p. 376.
[4] Conn, J. W., Louis, L. H., Johnston, M. W. *Science*, 1949, 109, 279.
[5] Vitamins and Hormones. Edited by R. S. Harris and K. V. Thimann. New York, 1944; vol. II, p. 215.
[6] Selye, H. *Brit. med. J.* Jan. 28, p. 203.
[7] d'Abreu, A. L. *Brit. J. Surg.* 1943, 31, 185.

COPIES OF APPLICATIONS

SIR,—May I ask that the regional boards be more modest in their demands for copies of applications for appointments. I am convinced that no "short-listing" subcommittee could possibly require more than three copies of an application in the first instance, and that no candidate would begrudge the balance of ten or fifteen should he be selected to appear for interview. I am engaged at present with twenty-six copies of applications for three appointments.

CANDIDATE.

ŒSTROGEN THERAPY IN MENSTRUAL AND PREGNANCY DISORDERS

SIR,—Your leading article of April 1, adopts a welcome tone of scepticism. It is, however, a pity that this scepticism has so closely approached obsession as to have led to misrepresentation and misquotation of my paper [1] to which you refer in some detail.

There are two main reasons why the daily dose of stilbœstrol advised for the control of prolonged uterine bleeding is given as 2–5 mg. In the first place, this has proved sufficient in most of my patients, and experience since the above-mentioned report was written has not changed my view; in the second place, by using the minimal effective dose the incidence of toxic reactions to stilbœstrol is kept to a low figure. Parenthetically, I have not found that ethinyl œstradiol, in effective doses, is much less liable than stilbœstrol to produce toxic effects. Moreover—and this you omitted—the further advice is given that the dosage should be doubled if (and here I quote verbatim from my paper) "after 48 hours there is no sign of improvement." This expedient has seldom proved necessary, and when used has seldom failed.

It is stated that I have claimed 100% success for the treatment advocated in cases of prolonged and excessive irregular uterine bleeding. Such a claim would clearly be ridiculous and the statement, as well as the sentence preceding it, is a gross misrepresentation. In point of fact, no claims of any sort were made, and in this particular group of patients evidence for the occurrence of ovulation following treatment was reported in 8 out of 19 *patients, not 8 out of 8 as is suggested.*

I did not find "secretory endometrium in all of . . . 8 cases in which initial biopsy showed a proliferative endometrium or cystic glandular hyperplasia." In case 1, for example, which is reported in detail, an initial proliferative biopsy was found in the 13-year-old subject of puberal menorrhagia, but no post-treatment biopsy was taken and it was quite obvious that ovulation was *not* occurring after treatment. In case 9, aged 27, also reported in detail, a proliferative endometrium was obtained after treatment which had followed the original Hamblen technique and relapse soon occurred; a second course following the modification I have described was, however, succeeded by a secretory endometrial biopsy and the patient remains well.

It is also deprecated that the ages of the patients and the interval between pre-treatment and post-treatment biopsies were not given. Actually, the ages and certain summarised details of all the cases mentioned in the report are given in tables, which, as was explained in a footnote to the paper, could not be published on account of restriction of space but which are available on application to anyone interested. The interests of accuracy might have prompted you to inquire for a copy of these tables.

Finally, it is suggested that puberty bleeding and the "metropathic" type of maturity bleeding are likely to undergo spontaneous remission, the inference being that such an occurrence could explain the apparently successful results of treatment. Certainly spontaneous remissions occur; an example is described in my paper. But in my experience this has been exceptional possibly because the majority of the patients referred to me have already had symptoms extending over many months or years (4 months to 15 years in the group of cases reported) and have already failed to respond to treatment at the hands of other doctors. In cases such as these it seems at least as reasonable to suggest that a course of treatment (which, incidentally, relieves the patient of her symptoms at once) followed by apparent cure has played some part in producing the cure as to claim that the "cure" is no more than a spontaneous remission.

University College Hospital,
Obstetric Hospital,
London, W.C.1.

G. I. M. SWYER.

*** We were confining our comment to the 8 cases in which (we believed) biopsy was performed both before and after treatment. That there were 8 cases of this kind was suggested by the following passage in Dr. Swyer's paper:

> "Endometrial biopsies were taken before treatment in nine cases; they showed a proliferative type of endometrium in seven cases and cystic glandular hyperplasia in two. In no case, therefore, was evidence of ovulation obtained. Biopsies were taken after treatment in eight instances (excluding a case of spontaneous cure) and showed secretory changes in seven of them. The single instance of a post-treatment proliferative biopsy . . . followed a 'C.D.' (constant dosage) course of treatment, and relapse occurred three months afterwards; a 'D.S.—I.E.' (diminishing stilbœstrol and increasing ethisterone dosages) course of treatment was then used, and three months after the end of this second course the endometrium was found to be secretory."

It is now clear, however, that the before-treatment and after-treatment biopsies were not all performed on the same patients, and our suggestion of 100% success in this series therefore falls to the ground. Our misinterpretation of the passage in question was, we think, excusable; but we regret the wrong impression given.—ED. L.

RESEARCH ON ARTHRITIS TREATMENT

SIR,—The successful treatment of rheumatoid arthritis with deoxycortone plus ascorbic acid, introduced by Lewin and Wassén,[1] raises at once the question as to the mechanism by which ascorbic acid is able to modify the physiological response to deoxycortone so profoundly. Although there is little doubt that ascorbic acid plays an important part in steroid metabolism, it appeared to me unlikely—especially in view of the high dose required to produce clinical improvement—that this effect could be entirely specific to ascorbic acid.

The paper by Hallberg [2] has confirmed my opinion. Objections may be raised, however, against the rôle of a biological oxidising agent assigned to ascorbic acid in this article, unless it is assumed that oxidation of ascorbic acid preceded that of deoxycortone. In this case therapy with deoxycortone plus dehydroascorbic acid should give equally good results. Moreover, a much smaller dose of dehydroascorbic acid would probably be required, since it can hardly be postulated that all the ascorbic acid used in the Lewin and Wassén therapy is oxidised. An alternative hypothesis would be that ascorbic acid acts by suppressing heavy metal inhibition of an oxidase involved in steroid metabolism.

The fact that identical clinical results have been obtained with a reducing agent (ascorbic acid) and an oxidising agent (methylene-blue) seems to indicate that the biological reactions involved in the modification of the physiological response to deoxycortone are complex.

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[1] Swyer, G. I. M. *Brit. med. J.* 1950, i, 626.

[1] Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.
[2] Hallberg, L. *Ibid*, Feb. 25, p. 351.

unfortunately largely maintained and spread among the population because of this feature, which is too often overlooked. The gonococcus "hibernates" in the uterus and adnexa, and therefore penicillin by itself does not usually cure women.

Treatment by dilatation of the cervix and a glycerin drain, followed by systemic penicillin, allows the infected discharge to pass out from the uterus and adnexa; and it is usually possible in such cases to find or culture the organism at the same time. These methods of treatment of course necessitate the provision of trained personnel and facilities, which are not at present available at some local clinics.

London, W.1. G. M. SANDES.

SYMPATHECTOMY IN HYPERTENSION

SIR,—In their article of April 8, Professor Platt and Dr. Stanbury express the belief that "the majority of cases of essential hypertension can . . . be divided into two classes—namely, those which are too mild to warrant the use of this serious operation, and those which are too severe, too old, or too arteriosclerotic to benefit from it." They conclude that "sympathectomy should very rarely be advised in hypertensive disease."

Our conclusions are very different. They are based on a preliminary survey of the first 56 patients who have undergone thoracolumbar sympathectomy for hypertension in the surgical professorial unit at Liverpool. These have been followed up for periods varying from 6 months to 3 years. A further 40 operations have been performed on 27 patients who have been followed for shorter periods. We have also had access to the records of 23 patients on whom Mr. Ronald Edwards has performed an extended form of Peet operation.

For the sake of comparison with the article quoted, we may conveniently think of three groups, representing three stages in the development of the syndrome.[1] Concerning the intermediate group, we agree that operation offers the only hope of relief and may sometimes prove curative. In the advanced group, which Platt and Stanbury would turn down, we have found some of our most grateful patients. Their lives may not have been prolonged much, if at all, but their lives have at least been made worth living. In the early group, in which we have picked up all too few patients, we hope that surgery may in an appreciable percentage of cases arrest the disease in its labile developing stage. Whatever else may be in dispute, it must be agreed that no other remedy is available and that the disease is progressive. If the late cases must be denied because they are too late, it seems a little hard to refuse the early ones because they are too early!

Platt and Stanbury state that Bechgaard[2] and Burgess[3] have shown that moderate hypertension may be associated with no significant increase in mortality. This statement is true when applied to Bechgaard's group as a whole, but it is not true of the patients who are under 50 years of age. In these the mortality-rate was $2^1/_2$ times the normal in women, and 9 times the normal in men. (The figure in men is so high because the group includes some patients with glomerulonephritis, all of whom died; but even if these are excluded the figure is still high.) Burgess states that in hypertensive patients below 50 the average length of life is over 15 years, which is 11 years below their normal expectancy, and that "the younger the patient at the time when the hypertension develops, the less likely he is to live out his full life's span."

We no longer regard the operation as being unduly serious. In our series of 56 cases (which includes *all* those operated on in the period of review) there have been 3 operative deaths. The first was known to be a desperate chance, which was deliberately accepted. The second was early in the series, when we failed, from lack of experience, to recognise acute cardiac failure beginning just before the operation. Both cases were in the advanced group. The third was a girl, dying from chronic nephritis, who had a blood-urea of 400 mg. per 100 ml. at the time of operation. Before death it was not clear whether she had nephritis or malignant hypertension, and the grave risk was taken because it was believed that she would not live many days as she was. In the last 40 operations (performed in the last six months) there has been no operative death.

Although we should like to see a significant fall in blood-pressure in all our cases, we do not, at present, expect it or even necessarily regard it as desirable. We certainly do not regard it as the sole objective or criterion of success of the operation. In the early cases it should be so, but in the intermediate and late we should be grateful for, and content with, symptomatic relief.

We believe that the main contra-indications to operation are: (1) mental confusion, indicative of cerebral vascular changes; (2) grossly impaired renal function; (3) certain forms of cardiac failure; and (4) age. There is no benefit to be obtained from operating on patients over 55 unless they have severe incapacitating headaches. With certain further reservations we believe that all other cases of essential hypertension should be accepted for thoracolumbar sympathectomy.

Department of Surgery, CHARLES WELLS
University of Liverpool. RICHARD WELBOURN.

SIR,—Professor Platt and Dr. Stanbury, in their excellent paper, state: "*it will thus be seen that our series is difficult or impossible to compare with that of any so far published.*"

In a paper of ours published some ten months ago,[1] in which the case material was very similar but the number of cases smaller and follow-up shorter, the results of sympathectomy were of the same nature as those of Platt and Stanbury.

Westminster Hospital, London, S.W.1. J. C. HARLAND.

SIR,—The important problem in the surgical treatment of hypertension is the selection of patients in whom sympathectomy will give not only symptomatic relief but also a significant fall in blood-pressure. So far the effect of sympathectomy on the blood-pressure cannot be prejudged: there is no correlation between preoperative pressor and depressor tests and the post-operative blood-pressure, and while it is likely that the best results will be obtained in patients under 50 years of age, yet sometimes an excellent result is produced in an older patient (56 years).

The conclusion of Professor Platt and Dr. Stanbury that sympathectomy should very rarely be advised in hypertensive disease is an overstatement. Even accepting the fact that the blood-pressure will be reduced in only 10–20% of patients over a period of years (a higher degree of success than in the surgery of cancer of the stomach), symptomatic improvement is so frequent that these patients are a very satisfied group. Relief of headache can be promised and in some cases protection from blindness, yet Platt and Stanbury seem almost to grudge the favourable report of their patient in an oxygen tent.

The operative mortality, if a recent stroke or a recent coronary thrombosis be excluded, is small. The Adson's sympathectomy, which upsets the patients no more than an interval appendicectomy, is adequate for the relief of headache and operation on one side may be sufficient for this purpose. When a wide removal of the sympathetic system is made in an attempt to lower the blood-pressure, this can be done with the same morbidity

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1. de Takats, G., Graupner, G. W., Fowler, E. F., Jensik, R. J. *Arch. Surg.* 1946, **53**, 111.
2. Bechgaard, P. *Acta med. scand.* 1946, suppl. 172.
3. Burgess, A. M. *New Engl. J. Med.* 1948, **239**, 75.

1. Harland, J. C., d'Abreu, F. *Brit. med. J.* 1949, i, 1019.

I feel that in Dr. Donnelly's article the emphasis is misplaced, and that attention should be given first to the drooling of saliva, which is almost diagnostic of the condition. Secondly, many of the infants have a cyanotic tinge, quite apart from cyanotic attacks, which may be infrequent. Thirdly, they often have a feeble, spluttering cough as the mucus spills over into the trachea. These are the features that should lead us to suspect atresia of the œsophagus even before the first feed. This suspicion is confirmed when the infant is offered a little glucose and water, causing regurgitation and a cough. It is at this stage, within twelve hours of birth, that the child should be sent to hospital.

With regard to the multiple-stage operation, I think that, in fairness to Swenson, it should be made clear that he abandoned this method at the beginning of 1947 and now has well over 30 survivors to his credit by the one-stage operation.

The Children's Hospital, Sheffield. R. B. ZACHARY.

SIR,—Dr. Donnelly's plea for early diagnosis of congenital atresia of the œsophagus will have the support of everyone who has either made or missed the diagnosis. As a resident at the pediatric department of the University of Minnesota I had the privilege of looking after some of Dr. M. L. Leven's cases, and I have seen a few examples of the condition since. This experience prompts me to comment on Dr. Donnelly's paper.

He opens with the statement that "the prognosis . . . is now exceedingly bad," and his experience illustrates this point. But it should be remembered that until recently the common form of this disorder (to which his five cases belong) was incompatible with life. Advances in pædiatric surgery now offer a fair chance of survival (57 survivors out of 113 cases operated on at the Boston Children's Hospital in the past eight years[1]). In this chance of survival lies the justification for what is still very hazardous major surgery. The prognosis is very much better than it was.

I must disagree with Dr. Donnelly's statement that "signs of dehydration are usually evident soon after birth." In my experience dehydration is not a conspicuous feature, nor is it to be expected in the first day or two of life in these circumstances. Dehydration was noted in only one of Dr. Donnelly's cases (case 1, aged 5 days, weight loss 5 oz. from birth weight of 6 lb.). If the diagnosis is made early it will be made before significant dehydration has developed.

The diagnosis can be made with some certainty on clinical grounds alone. In addition to the features mentioned by Dr. Donnelly, a direct question to the nurse will usually elicit the information that she has noticed an uncommonly large amount of regurgitated mucus and saliva in the cot. This suggestion of failure of swallowing can be tested by attempting to pass a stomach tube: arrest of the catheter at a point short of the stomach and at the same distance each time the passage is attempted, is presumptive evidence of œsophageal atresia. The resonance of gas in the abdomen adds support, for commonly the atresia is associated with fistulous communication between the trachea and the lower œsophageal segment.

The diagnosis is confirmed, as Dr. Donnelly states, by radiology, though I would hesitate to use more than 1 ml. of iodised oil; 0·5 ml. is usually sufficient, and a good lateral film and the good fortune to find air present in the upper segment *may* make even this unnecessary. The preference for iodised oil as the contrast medium might have been emphasised by stressing the danger of aspirating barium into the lungs.

In my experience, postural drainage is preferable to repeated intermittent pharyngeal suction; all too soon the latter is followed by blood tingeing the mucus. I prefer to raise the foot of the cot and to nurse these babies on their sides (the prone position recommended by Dr. Donnelly seems to me to rest too much of the child's weight upon his thoracic cage); suction is only needed as a first-aid measure when drainage fails. I feel happier if these patients are in some simple type of oxygen tent, provided it does not impede first-aid measures for cyanotic attacks. Not all the atelectasis is necessarily due to aspiration pneumonia, for some of the radio-opaque areas in the lungs may never have expanded; I favour the use of 5% carbon dioxide in oxygen for 5 minutes every hour or so when the airway is clear, believing that these "breathing exercises" have value.

Finally, Sir, the diagnosis having been made, and postural drainage and parenteral fluids having been started, may I, too, utter a plea for these children? It is that the next step should be to transfer them to a surgeon who has already some experience of the operation or who has at least familiarised himself with descriptions of the technique and practised it upon the cadaver. (Dr. Donnelly's cases had the benefit of such a surgeon.) When the diagnosis is made early, extra time can be well spent on preparing for the operation. In an oxygen tent, with a sensible nurse in attendance, these babies travel well; they arrived in Minneapolis in good condition after journeys of five hundred miles or more. Even in the most skilled hands there is a surgical mortality of some 50%. Often in deciding to operate at all there will be some special feature in the case —the first child of an elderly mother, for instance— to make that infant's life more valuable than most. As in a comparable field of surgery—that of congenital heart-disease—opportunities to acquire this particular skill are not common and it would seem well to concentrate that skill in the hands of a few.

Ipswich. R. M. MAYON-WHITE.

PENICILLIN FOR GONORRHŒA

SIR,—Your leading article last week and the paper by Mr. King and his colleagues are most timely. They underline what has been suspected by many workers in this field and has been causing anxiety. The general public have been deceived by writings in the lay press and elsewhere. Those unfortunate people who acquire gonorrhœa or other pyogenic infections are convinced that these diseases are trivial and easily cured.

It is interesting that apparently 1788 infected men attended the Whitechapel Clinic, while only 481 women were dealt with over a similar period of time; this means that 3–4 times as many men as women sought advice. Probably most areas would report similar findings. Twenty-five years ago a corresponding ratio was observed at the London Lock Hospital: the inference obviously being that more women are untreated than men.

In many smaller departments an adequate pelvic examination in women is not carried out, owing mainly to the fact that clinic officers are often not trained in proper methods of gynæcological examination. The initial symptoms and signs of infection are less obvious in women, and furthermore many women refer any deviation from the normal to some alteration in menstruation. Thus it is very rare for a woman to seek advice until the infecting organism has spread upwards to at least the lining membrane of the uterus and tubes. By this time external manifestations may have practically disappeared, and smears and cultures from endocervical exudates will show no diagnostic features. The woman, if she seeks advice at all, may be reassured after somewhat cursory examination, and she remains potentially infective. Gonorrhœa and other pyogenic infections are tuberculosis do not suggest that the effect of pregnancy on the group as a whole is adverse." But the group belongs to the decades of child-bearing, in which the mortality and morbidity rates for females are highest. In his stimulating paper, he discusses the complication of pregnancy by pulmonary tuberculosis; and preventive medicine is not part of such an investigation. But his findings, unqualified by a reminder of the infectious nature of tuberculosis, are dangerous. On the day of publication, one of the daily papers with a wide circulation was quoting him and almost inviting the tuberculous to forget their fears and raise a family.

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[1] Swenson, O. *Pediatrics*, 1948, 1 195.

Killingbeck Hospital,
Leeds.

W. SANTON GILMOUR
Medical Superintendent.

Public Health

Suspected Smallpox on a Vessel

WHEN the S.S. *Cilicia* arrived at Liverpool from Bombay on April 16, a suspected case of smallpox was removed to the port isolation hospital. The patient, a boy, aged five years, who was travelling with his mother in a first-class cabin, developed a rash on April 10 and was at once isolated in the ship's hospital as a suspected case of smallpox. The 320 passengers, who had all been vaccinated, were medically examined and allowed to proceed to their destinations under surveillance, the medical officers of health of the areas to which they were going being informed. The diagnosis has not yet been confirmed, but all precautions have been taken as though the case were one of smallpox.

Smallpox in Glasgow

Glasgow was declared free of smallpox last Monday.

Influenza in the U.S.A.

During the 11th week of this year (March 12–18) 29,036 cases of influenza were reported in the U.S.A.; the corresponding figure for 1949 was 3780. The cumulative total of cases in the first 11 weeks was 144,982, compared with 49,087 in 1949 and 169,936 in 1946—the year with the heaviest incidence in the last quinquennium. Texas and Virginia are the States most seriously affected. The disease is, however, not especially severe. Laboratory reports suggest that some of the cases are due to A-prime, or a closely related, virus.

Statistics for Scotland in 1949

According to provisional figures,[1] the birth-rate in Scotland during 1949 was 18·5 per 1000; this is 0·9 below the rate for 1948 and also 0·9 below the average for the five preceding years. The stillbirth-rate was 27 per 1000 live and still births, compared with 29 in 1948. The death-rate was 12·3 per 1000. The infant-mortality rate was 41 per 1000 live births—the lowest ever recorded in Scotland. The neonatal death-rate was 23 per 1000—also the lowest recorded. The maternal-mortality rate was 1·3 per 1000 total births—only half that experienced as recently as 1945. The death-rate from tuberculosis (all forms) was 67 per 100,000, which was 9 below the average of the preceding five years, and was approximately the same as that for the years immediately before the late war. The death-rate from respiratory tuberculosis was 59 per 100,000 (3 below the five-year average), and from non-respiratory tuberculosis 8 per 100,000 (7 below the five-year average).

THE FOURTH QUARTER

The birth-rate in the fourth quarter was 17·4 per 1000 of the population—a lower rate than any experienced since the year 1945, but higher than for any fourth quarter in the five years before the late war. The death-rate was 12·2 per 1000. The infant-mortality rate was 44 per 1000 live births; and the death-rate from tuberculosis (all forms) 63 per 100,000.

Obituary

THOMAS WILSON

M.D. LOND., CH.M. BIRM., F.R.C.S.

Dr. Thomas Wilson, emeritus professor of obstetrics and gynæcology in Birmingham University, died at Malvern on March 23. Though he was on the eve of his 90th year, his activity of mind was unimpaired, and on the previous day he took his customary walk.

Born at Cumnock in Ayrshire in 1861, Wilson went to Wolverhampton School. In 1878 he entered University College, London, and he completed his medical education at University College Hospital. After receiving medals in pathology and hygiene, he took his M.B. in 1883 and his M.D. two years later. As resident medical officer at the National Hospital for Nervous Diseases, Queen Square, in 1886, he worked under Hughlings Jackson, Ferrier, and Horsley; indeed, only financial considerations appear to have prevented him from taking up neurology as his life's work. However, after a year as ship's surgeon with the P. & O., he settled in general practice at Cannock.

In 1890 he was appointed gynæcological surgeon at the Wolverhampton General Hospital, and while attending to his duties there and to his general practice, he passed the primary F.R.C.S. In 1893, after election as honorary assistant obstetric officer at the General Hospital, Birmingham, he passed the final F.R.C.S. and entered consulting practice in Birmingham. In midwifery Wilson had already had considerable experience in London, at the Rotunda Hospital in Dublin, in general practice, and at Wolverhampton. Operative gynæcology at this time was the field in which Lawson Tait had already achieved fame through his work in Birmingham, and Wilson took a keen interest in developing this department at the General Hospital under his more obstetrically minded senior, Edward Malins. When Wilson, in his turn, retired in 1921 the department came under the care of his brilliant junior, Beckwith Whitehouse.

In the teaching of practical midwifery and the treatment of difficult labour Wilson rendered great service to patients, medical students, and midwives in Birmingham. When the Midwives Act was passed in 1902, requiring that all midwives should be qualified by proper training and examination, he seized the opportunity to urge the establishment of a maternity hospital where cases of difficult labour could be treated as inpatients and in association with which student midwives, and medical students, could be trained. The Birmingham Lying-in Charity, which provided district midwives for attendance on poor women in labour in their homes, and upon whose staff Wilson had served as a consultant for some years, was reconstituted largely through his influence, and, with the enthusiastic support of generous citizens, the Birmingham Maternity Hospital was opened in 1907. Wilson served as senior surgeon for the first 15 years of its existence, and the high standard of obstetric practice and teaching which the hospital at once achieved was largely due to his guidance.

In 1903 he was elected honorary obstetric officer at the General Hospital, and he was also consultant to many hospitals in Midland towns. From 1912 until 1924 he was professor of obstetrics and gynæcology in Birmingham University, and at various times he served as examiner at London, Manchester, Bristol, Leeds, and Birmingham universities. As a teacher he was a clear and careful lecturer and a frank and honest exponent of the difference between that which was proven and that which was a guess. In days when the utterances of distinguished clinicians, based upon their investigations at the bedside or upon the operating-table, received possibly more ready acceptance than the findings of workers in laboratories and post-mortem rooms, Wilson never forgot his pathological training; he maintained a pathological laboratory near his hospital department and a small laboratory at his home, where he regarded pathology as his hobby. He contributed many articles and chapters to medical journals and textbooks, and his work on pelvic inflammation in the female, described in either transpleurally or retropleurally. The development of Raynaud's phenomena in the hands will be avoided if the third thoracic ganglion is removed. In my series of about 200 cases subjected to the Smithwick, Adson, or Grimson procedure or removal of the thoracic ganglia and splanchnics, the same immediate fall of blood-pressure has been produced—sometimes the diastolic has been as low as 70 mm. Hg for 3 days, and no complication has arisen from this sudden drop—and there are more sustained falls of blood-pressure when the denervation has been from the sixth thoracic to the third lumbar ganglia, including the splanchnics. The adverse effects which Platt and Stanbury describe occur in only some patients, and the patient will always say he would rather have the temporary disability than his previous symptoms.

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[1] Quarterly Return of the Registrar-General, Scotland: Births, Deaths, and Marriages Registered in the Quarter ended 31st December, 1949; also Preliminary Return for the Year 1949. H.M. Stationery Office. Pp. 32. 1s.

Whether to recommend sympathectomy for hypertension depends on what is expected of the treatment. If it be accepted that sympathectomy will not yield Cato's pleasant old age but that it may allow many, with Horace, to enjoy the fleeting hour before boarding Charon's skiff, then operation will be advised not infrequently. The following two examples show excellent and encouraging results:

A hypertensive man, aged 42, unconscious and having fits unless given 'Sodium amytal,' improved dramatically after an Adson-type sympathectomy carried out at the relatives' request, and 14 days later withstood a Smithwick-type operation on the other side. He returned to work free of headaches and with well-marked regression of retinal changes.

A hypertensive woman, aged 52, incapacitated by severe headaches, had to lie in bed since dizziness developed as soon as she sat up. After a bilateral Adson operation she was able to return to an active public life, free of symptoms.

Leeds. H. S. Shucksmith.

WAR

Sir,—We cannot, and need not try to, find culpability for war to be "equally shared." But does this matter? What we have to do is to prevent it.

The discovery of positive law has shown mankind a practical way out of this sort of difficulty. And now, as Dr. Stewart well has it, "Force within Law" must become "Force within World Law."

Is it not our duty, as world citizens that would be, to try to set aside German "guilt" (and Russian, or American, or British) in facing that harder, finer task of creating a great Unity? This will mean fighting for the right, but it will be a World Right and not a national "right."

A properly constituted World Order System will be capable of combating any -ism (of Left or Right) that might wish to threaten it. This means peace instead of war.

Edinburgh. Rantyard West.

PREGNANCY AND PULMONARY TUBERCULOSIS

Sir,—Dr. Midgley Turner's excellent article of April 15 calls for a reminder to all of us that there is a public-health problem also in the relationship of the child and the tuberculous mother.

The implication of his investigation is that active pulmonary tuberculosis should no longer be considered a contra-indication to full-term pregnancy. That is the clinical view. But the very important question of the future health of the baby must also be considered. Statistics show that tuberculosis develops in contacts in a significantly higher proportion than in non-contacts; and what closer contact is there than that of mother and child? Is it right to decide to expose a potential child to this known high risk?

There is evidence that there is a personal or inherited factor of poor resistance—that there are family strains with weak resistance to tuberculosis. That this lower resistance is not necessarily apparent in every child of a family should not fog the main issue. It is surely undesirable to perpetuate a strain with evident poor resistance.

Preventive medicine and social and economic problems meet in the home, and it is there that the tuberculous mother and her up-to-now uninfected infant face years of difficulties, worry, and risk.

There are two kinds of tuberculous mothers: the first are those unfortunate women, at best only improved by sanatorium treatment, whose sputum remains positive; the second are those whose disease can be apparently arrested by modern treatment. In the first, surely there is no problem of decision; it cannot be desirable for her to have a child. So often the tragedy is that she already has one or more children, or is pregnant, when she first comes to clinical notice. If the pregnancy is terminable in these cases, in which pregnancy is a risk to life, early termination is indicated. If the patient is allowed to go to term, the ideal is foster-parenthood—not a source of joy to the mother, or an ideal plan for the child. Otherwise, if the parent with a positive sputum is to live at home with her child, all the education and conscientious observation of the rules of personal hygiene must inevitably fail from time to time; it takes few enough virulent bacilli to do the damage. The controlled households in tuberculosis colonies may suggest that this breakdown is infrequent; but most households are not in colonies, and the incidence of tuberculosis in families proves that there is a breakdown.

It is in the second type of case that controversy may arise. Such a woman, after treatment of open disease, may have arrived at the stage of quiescence. This, however, is always a vague state, and modern methods in the culture of the bacillus have proved how difficult it is to achieve true quiescence. Clinically there is still a significant proportion of subsequent breakdowns in cases apparently proved quiescent. In the present position of treatment, it is not possible to say to a woman that she is permanently and irrevocably cured and can live a full life. Instead, she is to be told that, whilst she is not to be a hypochondriacal invalid, her life must be disciplined and planned—no easy task in the industrial worker's homes or those of the middle classes. Personal hygiene will have been taught to her, and even if she is apparently sputum-negative on leaving sanatorium, her baby (if she has one) will be a potential guineapig all the time. If she is a sincere woman we are putting a great burden of worry on her shoulders; she will watch that child, and perhaps subsequent children, for the stigmata of her own infection.

The second worry of the mother is the avoidance of doing too much. The care of a baby, and more so that of a growing child, is a day's work and sometimes a night's work. Added to this is the maintenance of her home, and as a wife, her desire to enter as much as she can into the full enjoyment of a normal and social life with her husband—all a strain on quiescent tuberculosis.

The recently published findings on the state of the population in this country indicate the need of more children, of healthy stock; but it is very doubtful whether it is desirable to increase the population from known tuberculous stock at continued tuberculous risk. There are still fortunately a majority of healthy young people as potential parents.

Clinically, like my colleagues, I get great personal satisfaction when a pregnancy has to go to term for good reasons, and the mother comes through with a healthy baby and apparently quiescent lung lesions. The inevitable has been met with success; but should the risk be run again? Ideally the procedure is not complete unless the mother has been voluntarily sterilised to avoid a second crisis.

To return to Dr. Turner's series. He says that "survival-rates for the groups with active pulmonary

University of London

Dr. M. L. Rosenheim has been appointed to the chair of medicine at University College Hospital Medical School.

Dr. Rosenheim, who is 42 years of age, was educated at Shrewsbury School and St. John's College, Cambridge, where, in 1929, he took a first-class in part I of the natural sciences tripos and was elected to a foundation scholarship. At University College Hospital he held Goldsmid and Filliter exhibitions and he was awarded the Fellows and Tuke medals. After taking his B.CHIR. in 1932, he held house-appointments at U.C.H., and spent a year in research in the departments of bacteriology and pathological chemistry and in the obstetric unit before he was [illegible] cal registrar at Westminster Hospital [illegible] l registrar, [illegible] ır working [illegible] Hospital, Boston. On his return h [illegible] unit at U.C.H. During [illegible] as officer in charge of a [illegible] and Italy. Later, with the local rank of brigadier, he was consulting physician to Allied Land Forces in South East Asia. In 1946 he became deputy director of the medical unit at U.C.H., when he was also elected to the staff as assistant physician. In 1935 he introduced, through our columns, the use of mandelic acid in the treatment of urinary infections, and much of his work has been concerned with the urinary tract. He has also written on alimentary dysfunction, including steatorrhœa, and latterly on problems of hypertension. In 1938 he was awarded the Raymond Horton-Smith prize for his M.D. thesis and in 1941 he was elected F.R.C.P.

On May 12, 15, and 22, at University College, Dr. G. B. Wislocki, professor of anatomy at Harvard University, will lecture on the Cytology and Histochemistry of the Uterus and Placenta. On Tuesday, May 23, at St. Mary's Hospital Medical School, Dr. Perrin H. Long, F.R.C.P., professor of preventive medicine at the Johns Hopkins University School of Medicine, will speak on the Use of Antibiotics in the Treatment of Infectious Diseases with special reference to the Effects of 'Aureomycin' and 'Chloramphenicol.' On June 8, at King's College, Dr. L. S. Stone, professor of comparative anatomy at Yale University, will describe the Development of Normal and Abnormal Vision Observed in Animals with Transplanted Eyes. All the lectures will take place at 5.30 P.M.

Dr. F. Bremer, professor of general pathology, University of Brussels, will lecture at University College on May 17, 19, and 23, at 5.15 P.M. on the Physiology of the Central Nervous System.

University of Dublin

On Thursday, May 4, at 4.30 P.M. at the School of Physic, Trinity College, Prof. E. C. Dodds, F.R.S., will deliver the John Mallet Purser lecture. He has chosen as his subject Synthetic Œstrogens in Treatment with special reference to Malignant Disease.

Royal College of Physicians of London

Dr. A. E. Clark-Kennedy will deliver the Croonian lectures at the college, Pall Mall East, S.W.1, on Tuesday and Thursday, May 9 and 11, at 5 P.M. He is to speak on the Patient and his Disease.

Heberden Society

On Friday, June 2, at 5 P.M. and on Saturday, June 3, at 10 A.M., at B.M.A. House, Tavistock Square, London, W.C.1, Prof. Hans Selye of Montreal will give the Heberden oration for 1950 on the Rheumatic Diseases as Diseases of Adaptation.

Conference on Tuberculosis

The Socialist Medical Association is holding a conference at Denison House, Vauxhall Bridge Road, London, S.W.1, on Saturday, April 22. At the afternoon session at 2.15 P.M. on the Shortage of Hospital Beds for Tuberculous Patients, Dr. Horace Joules and Dr. H. J. Trenchard will speak, and at the evening session at 5.30 P.M. on Social Implications of the Breakdown of the Tuberculosis Service Dr. C. K. Cullen will speak.

Editorship of Popular Health Journal

Dr. I. Harvey Flack, who is at present assistant editor of the *British Medical Journal*, has been appointed editor of the British Medical Association's new popular health journal.

Secretaryship of B.M.A.

The British Medical Association has granted to its secretary, Dr. Charles Hill, M.P. for Luton, "such leave of absence as is necessary for the full and efficient performance of his Parliamentary duties." In his absence, Dr. Angus Macrae, one of the deputy secretaries, will act in his stead.

Royal College of Surgeons of England

At a meeting of the council on April 13, with Sir Cecil Wakeley, the president, in the chair, Jacksonian prizes for 1949 were awarded to F. Masina, F.R.C.S., and F. G. Hollands, M.R.C.S., for their essays on Malignant Disease of the Urinary Bladder. The subject for essays in 1951 will be Neoplasm, Innocent and Malignant, of the Pancreas.

Mr. R. S. Corbett and Mr. N. C. Lake were elected members of the court of examiners. Dr. Walter Briggs, Dr. Leonard Colebrook, Dr. Cuthbert Dukes, and Dr. A. B. Beresford-Jones were elected to the fellowship without examination as medical practitioners of at least 20 years' standing. Dr. Arthur W. Allen, chairman of the board of regents of the American College of Surgeons, was elected a Hunterian professor for 1950. Prof. A. B. P. Amies of Melbourne was appointed Charles Tomes lecturer on the recommendation of the Faculty of Dental Surgery.

A Leverhulme scholarship was awarded to Mr. D. I. Williams, F.R.C.S., for his research on congenital hydroureter in childhood. Dr. H. D. Ross was appointed Bland-Sutton scholar.

The following diplomas were granted jointly with the Royal College of Physicians:

D.L.O.—Stanislaw Arcizewski.

D. Phys. Med.—T. K. Davidson, K. A. Sowden, H. T. van Diggelen, E. F. C. Wadge.

D.T.M. & H.—Adegboyega Folaranmi Adedoyin, Amirah [illegible] endar Paul Bector, Harry Binysh, Robert [illegible] abhji Doshi, Alexander Douglas, Simeon [illegible] M. T. Gillies, W. H. Grant, Jayaratnam [illegible] zzul Husain, J. A. Hyde, S. W. Hynd, Pet [illegible] Balawant Mahadeo Kher, P. H. Lomax, [illegible] erzy Marek Nowakowski, Hassan Omer, [illegible] arlos Sanmartin-Barberi, Yahia Aly Shaheen, Betty E. Shortland, Bin Mohamed Attas Salaiman, E. J. Talbott, Edith M. Waterhouse, J. W. Weston.

D.O.M. & S.—Mahmood Ali, Mohammad Husain Alvi, Bamandas Bandyopadhyay, D. G. Bisset, John Burns-Brown, P. T. Clover, Le R. C. Cody, Alvin Cohen, Timothy Daly, J. B. Dancer, Than Dok, Catherine M. Fitzpatrick, H. G. Frampton, John Gloster, E. C. Glover, Indu Bhushan Goel, E. J. Hanley, S. A. Heath, Enid A. Hughes, J. B. Hutten, H. B. Jacobs, Annie M. Jones, Iris Kane, Sunawar Ali Lashkor, David Lyen, H. M. Lyons, F. D. McAuley, Margeret E. McClelland, C. [illegible] ar, J. M. D. Meyer, Shree Mohan Mishr [illegible] stry, E. L. Moore, N. S. Moores, K. S. [illegible] J. C. Parr, James Pendergast, T. B. Rankin[illegible] G. J. Romanes, Amal Kumar Sen, Mossa Hu[illegible] Dip Sinha, J. J. Teeuwen, R. S. Thubron, [illegible] D. J. K. Wilkie.

D.O.—T. H. Bassett, Agnes M. Brogan, G. C. T. Burfitt-Williams, F. J. Curtis, D. W. Ellis-Jones, Elizabeth M. M. Fisher, Anant Mahadeo Gokhale, J. L. Kyle, Dalachant Harripersad Sinanan, R. J. H. Smith.

D.C.H.—W. F. Allan, N. G. Anderson, Amiya Kumar Basu, Kathleen N. Berger, T. B. Binns, Dorothy J. Blake, Mary M. M. Boyd, R. St. J. Buxton, I. J. Carré, Patricia J. Chapman, Phyllis M. E. Cook, Anne L. Craig, Evelyn M. Crawford, B. A. D. Curtin, A. R. Darlow, Errington Ellis, Harriet E. Faris, A. W. Ferguson, Margaret J. W. Finlayson, D. M. Flanagan, Mary E. Forrester, Margeret F. Fry, J. M. Gooch, Mary Goodyear, D. A. I. Grewar, G. E. Griffiths, Mohamed Haniffa Mohamed Hamza, Mohammad Zeaul Hasan, Margaret Heller, Robert High, Mary Hobson, Gillian M. Hunt, J. A. Irwin, Margaret J. Jackson, R. J. Kernohan, Gladys A. Kitching, S. J. Koegler, Pashupati Nath Laha, Margaret S. B. Langton, Isabel J. K. Ledger, J. A. Loveless, Elizabeth Lucey, Joseph Luder, J [illegible] E. C. McIntosh, John McLuskie, N. K. [illegible] Winifred Marson, Sheila Martin, Diana M. [illegible] dani, Mary Montgomery Campbell, J. R. [illegible] y, Phyllis M. Neil, Barbara A. Neville, C. [illegible] W. Panton, D. S. Parken, T. J. Parkinson [illegible] Manohar Waman Phadke, Audrey K. Raistrick, [illegible] Rickham, A. T. Rogers, H. S. Samuel, Vivienne Simmons, G. S. Stable, D. G. H. Stone, Isabel F. Sutherland, P. E. Sylvester, W. C. Ta[illegible] bert Wall, Norma M. Whalley, Robert [illegible] D. Wigley, Patricia H. Will, Sheila G. W[illegible]

The Physical Basis of Mind

The Third Programme series of talks on this subject is to be repeated, starting on April 17, for those who could not hear the talks last year or who may wish to hear them again. Sir Henry Dale, O.M., F.R.S., in introducing the series, will pay a tribute to Sir Charles Sherrington, now well over 90 years of age, and Prof. E. D. Adrian, O.M., F.R.S., will follow with a talk, on What Happens When We Think. In the second talk, on April 19, Prof. W. E. Le Gros Clark, F.R.S., will discuss the Anatomical Background of Mental Processes, and on April 25, Prof. S. Zuckerman, F.R.S., will speak on Self-organisation. On April 28 and May 4 two physicians will discuss Consciousness and Speed and Thought. On May 6 Prof. Wilder Penfield, F.R.S., will talk about Evidence from Brain Operations, and Lord Samuel, Prof. A. J. Ayer, and Prof. Gilbert Ryle will join in a philosopher's symposium. The series is to be published in book form later.

his Ingleby lecture in 1907, and on the operative treatment of malignant disease of the uterus was early and important.

A colleague writes: "Doctor Thomas Wilson, as he was called by generations of Birmingham people, began his professional life in 1878, when medicine was almost entirely a clinical art and surgeons still spoke of laudable pus. The natural sciences had barely developed beyond the state of providing hobbies for enthusiastic amateurs. The lives of ordinary folk had not changed greatly during several centuries. He lived to behold and to read of marvels and of horrors in science and in the actions of nations of which those of his own contemporaries who lived only to the allotted span of three score and ten would not have dreamed. He did not dwell in the past but at each moment of his life he acted with a keen and balanced attention to the present. He was a sound and careful surgeon whose technique, though deliberate, produced results of a uniformly high quality; many will recall his association with his surgical colleague, Sir Gilbert Barling, in their nursing-home in Cornwall Street, and it may be remarked that in his hands the Pfannenstiel transverse incision for opening the lower abdomen yielded excellent results—incisional hernias did not occur and hæmatoma of the abdominal wall, the chief fault of the method, was rare.

"Sturdy in appearance and in character, Wilson will live long in the memories of those who knew him; for his common sense and his cheerful and frank manner left an abiding impression of kindliness, of sincerity, and of a personality which was direct in work and action. Brought up in days when professional people had little leisure or liking for games or hobbies, nevertheless he was a skilful and enthusiastic gardener and in later years he enjoyed field geology."

He retired in 1927 and with his wife, formerly Miss Loxton of Cannock, who died in 1947, he settled happily among the Malvern Hills. They had no children.

Diary of the Week

APRIL 23 TO 29

Monday, 24th

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
9.30 A.M. Mr. F. C. W. CAPPS: Tumours of the Postnasal Space.
MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Mr. N. R. Barrett, Mr. R. H. Franklin: Non-malignant Affections of the Œsophagus.

Tuesday, 25th

UNIVERSITY OF LONDON
5 P.M. (Guy's Hospital Medical School, S.E.1.) Prof. G. Westin (Stockholm): Histological Aspects of Gingival Disease.

Wednesday, 26th

INSTITUTE OF PSYCHIATRY, Maudsley Hospital, Denmark Hill, S.E.5
4.30 P.M. Dr. E. Stengel: Psychiatry lecture-demonstration.
HARVEIAN SOCIETY OF LONDON
8.15 P.M. (26, Portland Place, W.1.) Dr. H. R. Vickers: The Dermatitis-eczema Problem as a Guide to Future Trends in Medicine.

Thursday, 27th

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Anthony Feiling: Neurology demonstration.
MEDICO-LEGAL SOCIETY
8.15 P.M. (*26, Portland Place, W.1.*) *Dr. F. E. Camps*: Carbon Monoxide Poisoning—Suicide, Accident, and Murder.
HONYMAN GILLESPIE LECTURE
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Prof. R. C. Walmsley: Comparative Anatomy of the Heart.

Friday, 28th

ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS, 58, Queen Anne Street, W.1
NOON Dr. A. M. Sutherland: Functional Uterine Hæmorrhage.
3 P.M. Mr. Bryan Jeaffreson: Management of the Occipito-posterior Position.
5 P.M. Prof. Hilda Lloyd, Mr. Jeaffreson, Mr. Charles Read, Dr. David Shaw, Dr. A. J. Wrigley: Any Questions?
EMPIRE RHEUMATISM COUNCIL
4.30 P.M. (Apothecaries' Hall, Blackfriars Lane, E.C.4.) Sir Adolphe Abrahams: Differential Diagnosis of Rheumatism. (First lecture of a weekend postgraduate course.)
MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES, 11, Chandos Street, W.1
8 P.M. Dr. C. S. Nicol: Cardiovascular Syphilis.

Saturday, 29th

ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS
9.45 A.M. Mr. H. I. McClure: Heart-disease in Pregnancy.
11.30 A.M. Mr. A. Briant Evans: Operative Treatment of Advanced Carcinoma of the Cervix.

Notes and News

PUBLIC HEALTH LABORATORY SERVICE

SINCE the Public Health Laboratory Service was placed on a permanent basis after the war, the Medical Research Council have continued to administer it as agents for the Ministry of Health. It has been decided that the council will, with certain reservations on matters of broad policy, now delegate this function to a Public Health Laboratory Service Board, composed in the first instance as follows: Mr. A. Landsborough Thomson, D.SC. (chairman), Prof. S. P. Bedson, F.R.S., Dr. C. Metcalfe Brown, Dr. A. N. Drury, F.R.S., Sir Percival Hartley, F.R.S., Sir Wilson Jameson (ex officio), and Dr. A. A. Miles, with Dr. W. H. Bradley as observer from the Ministry of Health.

The Emergency Public Health Laboratory Service in England and Wales was organised by the Medical Research Council before the war, at the request of the Government, and was brought into being in 1939. Statutory authority for continuing it on a permanent basis was given by section 17 of the National Health Service Act, 1946. The director of the service is Prof. G. S. Wilson.

THE MEDICAL DIRECTORY

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Junior hospital medical officer.—[B1].

When the new terminology has become familiar to all concerned with the appointment and recruitment of junior hospital staff the old classification of posts as A, B2, and B1 will be discontinued; and it is hoped that this stage can be reached by Sept. 30.

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[1] London: J. & A. Churchill. 1950. Pp. 2676. £3 3s.

University of London

Dr. M. L. Rosenheim has been appointed to the chair of medicine at University College Hospital Medical School.

Dr. Rosenheim, who is 42 years of age, was educated at Shrewsbury School and St. John's College, Cambridge, where, in 1929, he took a first-class in part I of the natural sciences tripos and was elected to a foundation scholarship. At University College Hospital he held Goldsmid and Filliter exhibitions and he was awarded the Fellows and Tuke medals. After taking his B.CHIR. in 1932, he held house-appointments at U.C.H., and spent a year in research in the departments of bacteriology and pathological chemistry and in the obstetric unit before he was appointed assistant medical registrar at Westminster Hospital in 1934. Two years later he returned to U.C.H. as medical registrar, and in 1939, with a Bilton Pollard fellowship, he spent a year working under Dr. Fuller Albright at the Massachusetts General Hospital, Boston. On his return he was appointed first assistant in the medical unit at U.C.H. *During the late war he served with the R.A.M.C.* as officer in charge of a medical division in Palestine, Sicily, Algiers, and Italy. Later, with the local rank of brigadier, he was consulting physician to Allied Land Forces in South East Asia. In 1946 he became deputy director of the medical unit at U.C.H., when he was also elected to the staff as assistant physician. In 1935 he introduced, through our columns, the use of mandelic acid in the treatment of urinary infections, and much of his work has been concerned with the urinary tract. He has also written on alimentary dysfunction, including steatorrhœa, and latterly on problems of hypertension. In 1938 he was awarded the Raymond Horton-Smith prize for his M.D. thesis and in 1941 he was elected F.R.C.P.

On May 12, 15, and 22, at University College, Dr. G. B. Wislocki, professor of anatomy at Harvard University, will lecture on the Cytology and Histochemistry of the Uterus and Placenta. On Tuesday, May 23, at St. Mary's Hospital Medical School, Dr. Perrin H. Long, F.R.C.P., professor of preventive medicine at the Johns Hopkins University School of Medicine, will speak on the Use of Antibiotics in the Treatment of Infectious Diseases with special reference to the Effects of 'Aureomycin' and 'Chloramphenicol.' On June 8, at King's College, Dr. L. S. Stone, professor of comparative anatomy at Yale University, will describe the Development of Normal and Abnormal Vision Observed in Animals with Transplanted Eyes. All the lectures will take place at 5.30 P.M.

Dr. F. Bremer, professor of general pathology, University of Brussels, will lecture at University College on May 17, 19, and 23, at 5.15 P.M. on the Physiology of the Central Nervous System.

University of Dublin

On Thursday, May 4, at 4.30 P.M. at the School of Physic, Trinity College, Prof. E. C. Dodds, F.R.S., will deliver the John Mallet Purser lecture. He has chosen as his subject Synthetic Œstrogens in Treatment with special reference to Malignant Disease.

Royal College of Physicians of London

Dr. A. E. Clark-Kennedy will deliver the Croonian lectures at the college, Pall Mall East, S.W.1, on Tuesday and Thursday, May 9 and 11, at 5 P.M. He is to speak on the Patient and his Disease.

Heberden Society

On Friday, June 2, at 5 P.M. and on Saturday, June 3, at 10 A.M., at B.M.A. House, Tavistock Square, London, W.C.1, Prof. Hans Selye of Montreal will give the Heberden oration for 1950 on the Rheumatic Diseases as Diseases of Adaptation.

Conference on Tuberculosis

The Socialist Medical Association is holding a conference at Denison House, Vauxhall Bridge Road, London, S.W.1, on Saturday, April 22. At the afternoon session at 2.15 P.M. on the Shortage of Hospital Beds for Tuberculous Patients, Dr. Horace Joules and Dr. H. J. Trenchard will speak, and at the evening session at 5.30 P.M. on Social Implications of the Breakdown of the Tuberculosis Service Dr. C. K. Cullen will speak.

Editorship of Popular Health Journal

Dr. I. Harvey Flack, who is at present assistant editor of the *British Medical Journal*, has been appointed editor of the British Medical Association's new popular health journal.

Secretaryship of B.M.A.

The British Medical Association has granted to its secretary, Dr. Charles Hill, M.P. for Luton, "such leave of absence as is necessary for the full and efficient performance of his Parliamentary duties." In his absence, Dr. Angus Macrae, one of the deputy secretaries, will act in his stead.

Royal College of Surgeons of England

At a meeting of the council on April 13, with Sir Cecil Wakeley, the president, in the chair, Jacksonian prizes for 1949 were awarded to F. Masina, F.R.C.S., and F. G. Hollands, M.R.C.S., for their essays on Malignant Disease of the Urinary Bladder. The subject for essays in 1951 will be Neoplasm, Innocent and Malignant, of the Pancreas.

Mr. R. S. Corbett and Mr. N. C. Lake were elected members of the court of examiners. Dr. Walter Briggs, Dr. Leonard Colebrook, Dr. Cuthbert Dukes, and Dr. A. B. Beresford-Jones were elected to the fellowship without examination as medical practitioners of at least 20 years' standing. Dr. Arthur W. Allen, chairman of the board of regents of the American College of Surgeons, was elected a Hunterian professor for 1950. Prof. A. B. P. Amies of Melbourne was appointed Charles Tomes lecturer on the recommendation of the Faculty of Dental Surgery.

A Leverhulme scholarship was awarded to Mr. D. I. Williams, F.R.C.S., for his research on congenital hydro-ureter in childhood. Dr. H. D. Ross was appointed Bland-Sutton scholar.

The following diplomas were granted jointly with the Royal College of Physicians:

D.L.O.—Stanislaw Arcizewski.

D. Phys. Med.—T. K. Davidson, K. A. Sowden, H. T. van Diggelen, E. F. C. Wadge.

D.T.M. & H.—Adegboyega Folaranmi Adedoyin, Amirali Abdulkarim Alidina, Narendar Paul Bector, Harry Binysh, Robert Bradley, Dhirubhai Vallabhji Doshi, Alexander Douglas, Simeon Fernando, H. B. Gibson, M. T. Gillies, W. H. Grant, Jayaratnam Gulasekharam, C. W. J. Hingston, Tafazzul Husain, J. A. Hyde, S. W. Hynd, Peter Jordan, Ahmad Kabir, Balawant Mahadeo Kher, P. H. Lomax, Behman Sorab Moos, Jerzy Marek Nowakowski, Hassan Omer, George Ou Ta Wei, Carlos Sanmartin-Barberi, Yahia Aly Shaheen, Betty E. Shortland, Bin Mohamed Attas Sulaiman, E. J. Talbott, Edith M. Waterhouse, J. W. Weston.

D.O.M. & S.—Mahmood Ali, Mohammad Husain Alvi, Bamandas Bandyopadhyay, D. G. Bisset, John Burns-Brown, P. T. Clover, Le R. C. Cody, Alvin Cohen, Timothy Daly, J. B. Dancer, Than Dok, Catherine M. Fitzpatrick, H. G. Frampton, John Gloster, E. C. Glover, Indu Bhushan Goel, E. J. Hanley, S. A. Heath, Enid A. Hughes, J. B. Hutten, H. B. Jacobs, Annie M. Jones, Iris Kane, Sunawar Ali Lashkor, David Lyen, H. M. Lyons, F. D. McAuley, Margeret E. McClelland, C. M. McLean, Mohamed Mazhar, J. M. D. Meyer, Shree Mohan Mishra, Khurshed Bomanji Mistry, E. L. Moore, N. S. Moores, K. S. Murray, Mungo Park Ross, J. C. Parr, James Pendergast, T. B. Rankin[illegible], [illegible], G. J. Romanes, Amal Kumar Sen, Mossa Hussa[illegible] [illegible] Dip Sinha, J. J. Teenwen, R. S. Thubron, [illegible], [illegible], D. J. K. Wilkie.

D.O.—T. H. Bassett, Agnes M. Brogan, G. C. T. Burfitt-Williams, F. J. Curtis, D. W. Ellis-Jones, Elizabeth M. M. Fisher, Anant Mahadeo Gokhale, J. L. Kyle, Dalachant Harripersad Sinanan, R. J. H. Smith.

D.C.H.—W. F. Allan, N. G. Anderson, Amiya Kumar Basu, Kathleen N. Berger, T. B. Binns, Dorothy J. Blake, Mary M. M. Boyd, R. St. J. Buxton, I. J. Carré, Patricia J. Chapman, Phyllis M. E. Cook, Anne L. Craig, Evelyn M. Crawford, B. A. D. Gurtin, A. R. Darlow, Errington Ellis, Harriet E. Faris, A. W. Ferguson, Margaret J. W. Finlayson, D. M. Flanagan, Mary E. Forrester, Margeret F. Fry, J. M. Gooch, Mary Goodyear, D. A. I. Grewar, G. E. Griffiths, Mohamed Haniffa Mohamed Hamza, Mohammad Zeaul Hasan, Margaret Heller, Robert High, Mary Hobson, Gillian M. Hunt, J. A. Irwin, Margaret J. Jackson, R. J. Kernohan, Gladys A. Kitching, S. J. Koegler, Pashupati Nath Laha, Margaret S. B. Langton, Isabel J. K. Ledger, J. A. Loveless, Elizabeth Lucey, Joseph Luder, J. C. Macauley, Martha E. C. McIntosh, John McLuskie, N. K. Macrae-Gibson, Beryl Winifred Marson, Sheila Martin, Diana M. Mason, Leila Mirchandani, Mary Montgomery Campbell, J. R. Murdock, E. G. Murphy, Phyllis M. Neil, Barbara A. Neville, C. H. Neville-Smith, R. W. Panton, D. S. Parken, T. J. Parkinson, Isaac Yahuda Peress, Manohar Waman Phadke, Audrey K. Raistrick, P. P. Rickham, A. T. Rogers, H. S. Samuel, Vivienne Simmons, G. S. Stable, D. G. H. Stone, Isabel F. Sutherland, P. E. Sylvester, W. C. Tay[illegible], G. H. Va[illegible], Robert Wall, Norma M. Whalley, Robert W[illegible], [illegible] D. Wigley, Patricia H. Will, Sheila G. W[illegible], [illegible].

The Physical Basis of Mind

The Third Programme series of talks on this subject is to be repeated, starting on April 17, for those who could not hear the talks last year or who may wish to hear them again. Sir Henry Dale, O.M., F.R.S., in introducing the series, will pay a tribute to Sir Charles Sherrington, now well over 90 years of age, and Prof. E. D. Adrian, O.M., F.R.S., will follow with a talk, on What Happens When We Think. In the second talk, on April 19, Prof. W. E. Le Gros Clark, F.R.S., will discuss the Anatomical Background of Mental Processes, and on April 25, Prof. S. Zuckerman, F.R.S., will speak on Self-organisation. On April 28 and May 4 two physicians will discuss Consciousness and Speed and Thought. On May 6 Prof. Wilder Penfield, F.R.S., will talk about Evidence from Brain Operations, and Lord Samuel, Prof. A. J. Ayer, and Prof. Gilbert Ryle will join in a philosopher's symposium. The series is to be published in book form later.

his Ingleby lecture in 1907, and on the operative treatment of malignant disease of the uterus was early and important.

A colleague writes: "Doctor Thomas Wilson, as he was called by generations of Birmingham people, began his professional life in 1878, when medicine was almost entirely a clinical art and surgeons still spoke of laudable pus. The natural sciences had barely developed beyond the state of providing hobbies for enthusiastic amateurs. The lives of ordinary folk had not changed greatly during several centuries. He lived to behold and to read of marvels and of horrors in science and in the actions of nations of which those of his own contemporaries who lived only to the allotted span of three score and ten would not have dreamed. He did not dwell in the past but at each moment of his life he acted with a keen and balanced attention to the present. He was a sound and careful surgeon whose technique, though deliberate, produced results of a uniformly high quality; many will recall his association with his surgical colleague, Sir Gilbert Barling, in their nursing-home in Cornwall Street, and it may be remarked that in his hands the Pfannenstiel transverse incision for opening the lower abdomen yielded excellent results—incisional hernias did not occur and hæmatoma of the abdominal wall, the chief fault of the method, was rare.

"Sturdy in appearance and in character, Wilson will live long in the memories of those who knew him; for his common sense and his cheerful and frank manner left an abiding impression of kindliness, of sincerity, and of a personality which was direct in work and action. Brought up in days when professional people had little leisure or liking for games or hobbies, nevertheless he was a skilful and enthusiastic gardener and in later years he enjoyed field geology."

He retired in 1927 and with his wife, formerly Miss Loxton of Cannock, who died in 1947, he settled happily among the Malvern Hills. They had no children.

Diary of the Week

APRIL 23 TO 29

Monday, 24th

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
9.30 A.M. Mr. F. C. W. CAPPS: Tumours of the Postnasal Space.
MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Mr. N. R. Barrett, Mr. R. H. Franklin: Non-malignant Affections of the Œsophagus.

Tuesday, 25th

UNIVERSITY OF LONDON
5 P.M. (Guy's Hospital Medical School, S.E.1.) Prof. G. Westin (Stockholm): *Histological Aspects of Gingival Disease.*

Wednesday, 26th

INSTITUTE OF PSYCHIATRY, Maudsley Hospital, Denmark Hill, S.E.5
4.30 P.M. Dr. E. Stengel: Psychiatry lecture-demonstration.
HARVEIAN SOCIETY OF LONDON
8.15 P.M. (26, Portland Place, W.1.) Dr. H. R. Vickers: The Dermatitis-eczema Problem as a Guide to Future Trends in Medicine.

Thursday, 27th

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Anthony Feiling: Neurology demonstration.
MEDICO-LEGAL SOCIETY
8.15 P.M. (26, Portland Place, W.1.) Dr. F. E. Camps: Carbon Monoxide Poisoning—Suicide, Accident, and Murder.
HONYMAN GILLESPIE LECTURE
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Prof. R. C. Walmsley: Comparative Anatomy of the Heart.

Friday, 28th

ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS, 58, Queen Anne Street, W.1
NOON Dr. A. M. Sutherland: Functional Uterine Hæmorrhage.
3 P.M. Mr. Bryan Jeaffreson: Management of the Occipito-posterior Position.
5 P.M. Prof. Hilda Lloyd, Mr. Jeaffreson, Mr. Charles Read, Dr. David Shaw, Dr. A. J. Wrigley: Any Questions?
EMPIRE RHEUMATISM COUNCIL
4.30 P.M. (Apothecaries' Hall, Blackfriars Lane, E.C.4.) Sir Adolphe Abrahams: Differential Diagnosis of Rheumatism. (First lecture of a weekend postgraduate course.)
MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES, 11, Chandos Street, W.1
8 P.M. Dr. C. S. Nicol: Cardiovascular Syphilis.

Saturday, 29th

ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS
9.45 A.M. Mr. H. I. McClure: Heart-disease in Pregnancy.
11.30 A.M. Mr. A. Briant Evans: Operative Treatment of Advanced Carcinoma of the Cervix.

Notes and News

PUBLIC HEALTH LABORATORY SERVICE

SINCE the Public Health Laboratory Service was plac on a permanent basis after the war, the Medical Rese Council have continued to administer it as agents for t Ministry of Health. It has been decided that the counc will, with certain reservations on matters of broad polic now delegate this function to a Public Health Laborato Service Board, composed in the first instance as follows Mr. A. Landsborough Thomson, D.SC. (chairman), Prof. S. P Bedson, F.R.S., Dr. C. Metcalfe Brown, Dr. A. N. Drury F.R.S., Sir Percival Hartley, F.R.S., Sir Wilson Jameson (e officio), and Dr. A. A. Miles, with Dr. W. H. Bradley as observer from the Ministry of Health.

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SOME LIMITATIONS OF PSYCHIATRY*

F. P. HALDANE
M.B. Glasg., D.P.M.
PSYCHIATRIST TO THE WEST MIDDLESEX HOSPITAL

THE expectations with which cases of psychoneurosis are referred to the psychiatrist have often seemed to me to be a little unrealistic. In the hope of approaching a more balanced view of the therapeutic possibilities, I shall first deal briefly with two factors which seem liable to distort one's judgment of the matter, and shall then try to show where, in my opinion, the real problem lies.

ATTITUDE TO PSYCHOTHERAPY

Psychiatry means "mind-healing," and from this we derive not only the treatment *of* mind, which includes, for example, such procedures as the arrest of luetic processes in the brain, but also treatment *by* mind, which is what we principally use in dealing with psychoneurosis.

Now treatment by mind must largely mean treatment by thoughts and their emotional accompaniments, and as such can only be applied through the use of words as a vehicle. Can such a mode of treatment escape comparison with the ancient practices of sorcery, spells, incantations, faith-healing, and miraculous cures? Of course it cannot, and the consequences of this connection cannot be completely avoided. We adults have consciously outgrown our infantile beliefs in the omnipotence of thoughts and words; but these beliefs still stir from time to time in the less self-conscious regions of our minds, influencing our conscious judgments, now tempting us to credulity, now calling forth contemptuous repudiation. Such a state of affairs is bound to influence our attitude to the psychiatrist, who stands inevitably and almost by definition associated with ideas of magic. Thus he appears now as a useless charlatan, now as one possessed of some mysterious power, in virtue of which a few talks with him may cure a severe neurosis. I do not suggest that such opinions are commonly consciously avowed, but only that a latent tendency in this direction often exists and plays its ambiguous part in distorting the opinions we may form when we are deciding what we may expect a psychiatrist to do for one or other of our patients. There is not a great deal that one can do about this, but a partial awareness of the tendency may to some small extent reduce its effects.

APPROACH TO ILLNESS

There is a second and more accessible source of error in the expectations that may be formed of what a psychiatrist should be able to do for a particular patient, and of how long he should take to do it. I refer to your clinical experience with your own medical, surgical, and obstetrical patients.

I know, of course, that nowadays increasing stress is laid upon treating the patient as a whole organism and even as a whole human being. I know, too, that all progressive physicians, and many surgeons also, pay lip-service to this ideal. But in practice, and particularly in one's ætiological and pathological assessments, I doubt if one is often successful, in face of one's raw clinical experience, in avoiding slipping into the attitude that the patient's condition is essentially due to a defect or disorder of this or that or the other bodily organ or system. This patient is ill because of occlusion of a coronary artery, that one because of the formation of stones in the gall-bladder, a third because of changes in the tissues around the joints and so on.

And after all, from an immediately practical point of view, why not? Einstein has no doubt helped the physicists to get a little closer to the truth of the matters in which they are engaged, but there are still many little practical occasions when Euclid is all we need. Certainly this approach may involve us in producing immensely expensive adrenocortical extracts for the relief of rheumatoid sufferers, that *might* be produced much more cheaply and efficiently by the patient himself were he free from chronic emotional stress; but, even should this turn out to be so, an indispensable job of research will have been done. At all events, the actual conditions of our work are such that, for practical purposes, we often have to regard the patient's illness as due to some accidental noxious influence on one or more of his organs or systems, and if we are able to remove or neutralise or arrest this noxious influence or its results we can often count upon a reasonable therapeutic success without ever attempting any interference with the patient on the level of his individual human personality.

The approach to illness that I have discussed as reasonably practical in the fields of medicine, surgery, and obstetrics, if applied to psychiatry, leads inevitably to error and to disappointment. Whereas in these fields the study of the patient as an individual personality is an ultimate desideratum, in psychiatry it is a first essential; indeed, for a fuller understanding, it must ultimately be extended to embrace a study of the dynamic laws of the particular human social system of which he forms a part.

When we transfer the more restricted attitude to disease from general medicine to psychiatry, it is liable to give rise to misleading notions, to naïve psychopathologies and inadequate therapies based upon them. We may, for example, think that a patient's symptoms are due to an idea that has entered his mind—let us say the idea that he has cancer. He got this idea because his father died of cancer, and he has recently heard that cancer is hereditary. As a result he has become worried about his health. He has lost his appetite, lost weight, and begun to brood about some obscure minor discomfort, some slight dyspepsia. From this our course seems quite clear: we have to take this idea out of his head and put in a better one as antidote; for example, that he is fortunate in the enjoyment of absolutely first-rate health. This theory is plausible; but our medical theories must be more than plausible; they must also approach the truth, and there is too little truth in this one. Of course, in many cases there may be nothing better that we can do for the patient. Then we must be quite clear that we are simply administering a psychiatric placebo, and we will not require to call in a specialist to administer a placebo, though it may be desirable to obtain his opinion that this is all that is possible.

A less naive approach is based upon the common notion that the neurosis is due to an accidental traumatic experience. The patient has had a bad shock. This shock has gone straight down into his unconscious and has been playing havoc there ever since. Well, we have to probe around until we touch it. We shall know when we do this by the way the patient jumps. Then we have to put the patient into light hypnosis and bring the shock up into his consciousness, where it will explode in tears and terror. The patient, shaken but relieved, will go home and write to the Ministry to stop his pension. This sort of thing may happen often enough in Hollywood, but in ordinary practice it is seldom like that. Now and again, especially in war-time, one has a clinical experience that seems to resemble this just enough to make the theory stick, but as a basis for understanding and treating the psychoneurosis we meet in daily practice it is quite misleading.

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[*] Paper read at a West Middlesex Hospital clinical meeting on Jan. 24.

6609

Medical Bequest

The widow of Sir Humphry Rolleston has left the residue of her £42,000 estate, "as my late husband wished," to the master and fellows of St. John's College, Cambridge, to help medical students at the college.

Joint Consultative Committees

Boards of governors and management committees are being asked by the Ministry of Health to set up joint consultative committees of managements and workers. These committees will consider matters affecting the efficiency of the hospital service and the welfare of staffs, but not wages and hours.

West London Medico-Chirurgical Society

On Monday, May 15, at 8.30 P.M., at 1, Wimpole Street, W.1, Admiral Lord Mountevans will deliver the Cavendish lecture on Antarctic Exploration. The annual banquet will be held on Friday, June 2, at the Royal College of Surgeons. Further information may be had from the hon. secretaries, Mr. J. R. C. Hindenach, 81, Harley Street, W.1, and Dr. D. Hector-Jones, D.M.R.D., West London Hospital, W.6.

Guernsey and U.C.H.

University College Hospital, London, has arranged with the Guernsey States Board of Health to send a limited number of its tuberculous patients to the King Edward Hospital Sanatorium in Guernsey. This hospitality is offered in return for the thoracic surgery which has been performed since the start of National Health Service at the hospital on patients from Guernsey without cost to the island authority.

Births, Marriages, and Deaths

BIRTHS

AYLETT.—On April 12, in London, the wife of Mr. Stanley Aylett, F.R.C.S.—a son.

BROADHEAD.—On April 9, the wife of Dr. D. L. Broadhead—a son.

DICKSON.—On April 14, the wife of Dr. A. M. Dickson—a son.

ELMHIRST.—On April 9, in London, the wife of Mr. Edward Elmhirst, F.R.C.S.—a daughter.

HAWES.—On March 29, at Ewhurst, the wife of Dr. E. I. B. Hawes —a son.

HAYES.—On April 8, at Woking, the wife of Dr. Stuart Hayes —a son.

HELM.—On April 11, at Devonport, the wife of Dr. Cyril Helm —a daughter.

HUGGILL.—On April 11, in London, the wife of Mr. P. H. Huggill, F.R.C.S.—a son.

MACKINNON.—On April 3, the wife of Dr. Donald Mackinnon —a daughter.

METCALFE.—On April 8, in London, the wife of Dr. J. B. Metcalfe —a daughter.

NELLEN.—On April 12, in Cape Town, the wife of Dr. Maurice Nellen—a son.

NEVIN.—On April 5, in London, the wife of Mr. R. W. Nevin, F.R.C.S.—a son.

OLDHAM.—On April 13, at Shrewsbury, the wife of Dr. J. S. Oldham —a daughter.

ORFORD SMITH.—*On April 11, in Birmingham, the wife of Dr.* E. S. Orford Smith—a daughter.

ROBERTSON.—On April 12, in Salisbury, Southern Rhodesia, the *wife of Dr. John Robertson—a son.*

SMITH.—On April 3, at Oxford, the wife of Dr. F. H. N. Smith —a son.

STODDART.—On April 10, in London, the wife of Dr. I. W. Stoddart —a son.

SYKES.—On April 5, at Newcastle upon Tyne, the wife of Dr. R. G. Sykes—a daughter.

THOMSON.—On April 10, at Hereford, the wife of Dr. R. T. Thomson —a daughter.

TOBER.—On April 6, at Reigate, the wife of Dr. Archibald Tober —a son.

MARRIAGES

ALTMANN—CROWDER.—On March 25, at East Molesey, Surrey, Rolf Altmann, M.D., to Helen Evelyn Crowder.

PERROTT—HODGSON.—On March 30, at Darlington, John William Perrott, M.R.C.S., to Nancy Hodgson, S.R.N., S.C.M.

DEATHS

CARSLAW.—On April 14, in Glasgow, James Carslaw, M.A., M.B. Glasg.

FEAVER.—On April 6, at Hove, Lewis Feaver, M.R.C.S., aged 79.

GILMORE.—On April 10, in London, Owen Gilmore, M.D. Brux., F.R.C.S.E., aged 87.

GREEN.—On April 10, at Guildford, Charles Robert Mortimer Green, M.D. Durh., F.R.C.S., D.P.H., colonel, I.M.S., retd, aged 86.

JENNINGS.—On April 3, at Bath, Arthur Richard Jennings, M.A., M.B. Camb., D.T.M.

MAURICE.—On March 8, at Marlborough, George Thelwall Kindersley Maurice, C.M.G., C.B.E., M.R.C.S., aged 83.

NORRINGTON.—On April 11, Henry Lawrence Weekes Norrington, D.S.O., lieut.-colonel, R.A.M.C. retd.

PALMER.—On April 6, at Bournemouth, Francis James Palmer, F.R.C.S.I., lieut.-colonel, R.A.M.C. retd.

SAVAGE.—On March 30, Herbert Nibbs Savage, M.R.C.S., aged 53.

STARLING.—On April 10, at Norwich, Hubert John Starling, M.D. Lond., D.P.H., aged 76.

Lebanon Hospital for Mental Diseases

The 51st annual meeting of this hospital, which is a Asfuriyeh, near Beirut, will be held at Manson House, 26 Portland Place, London, W.1, at 3 P.M. on Friday, April 28 Sir Ronald Storrs will preside and the speakers will includ Dr. Alexander Kennedy, professor of psychological medicin in the University of Durham. The London office of the hospital is at Drayton House, Gordon Street, W.C.1.

Dr. Jessie Macgregor Prize for Medical Women

An award of this prize (£50) will be made in July for the best record of original work in the science of medicine. It is open to women who are graduates in medicine of the University of Edinburgh or who have taken the Scottish triple qualification. Applications must reach the convener of trustees, 9, Queen Street, Edinburgh, 2, not later than June 30.

Dr. J. L. Lovibond is visiting Cyprus on behalf of the British Council to inspect hospitals and to give demonstrations on the use of the cardiograph.

Appointments

BOURDILLON, J. F., B.M. Oxfd, F.R.C.S.: cons. orthopædic surgeon, North Gloucestershire clinical area.

BURN, MATTHEW, M.C., F.R.C.P.E., D.P.H., D.T.M. & H.: M.O.H., *Birmingham.*

COWEN, E. D. H., B.A., M.D. Camb., M.R.C.P.: physician, St. Albans City Hospital and Lister, Chalkdell and North Herts and South Beds hospitals.

DOBNEY, G. H., M.B. Lond., D.PHYS.MED.: physician i.c. physical medicine, Whittington Hospital.

DOUGHTY, A. G., M.B. Lond., D.A.: cons. anæsthetist, Kingston group of hospitals, Surrey.

EVANS, C. C., M.A., M.R.C.S.: consultant in electro-encephalography, Central Middlesex Hospital.

FENTON, ELIZABETH, M.B. Lpool, D.A.: cons. anæsthetist, Cheshire Joint Sanatorium, Market Drayton.

GILLET, J. A., M.B. Lpool, D.P.H.: senior school M.O. and deputy M.O.H., Rotherham.

GORKA, A. M., MED.DIP. Cracow: anæsthetist, Stirling Royal Infirmary.

HARRISON, G. A., B.A., M.D. Camb.: cons. pathologist, Royal West Sussex, St. Richard's, and Graylingwell Hospitals.

HUNTER, R. M. M., M.B., B.SC. Edin., M.R.C.P.E., D.P.H., D.P.M.: cons. psychiatrist, Pastures Hospital, Mickleover.

JACKSON, MARGARET, M.B. Lond., D.OBST.: clinical assistant, obstetric and gynæcological department, Royal Devon and Exeter Hospital.

JACKSON, THOMAS, F.R.F.P.S.: dental surgeon, North Gloucestershire clinical area.

LANGLEY, D. A., F.R.C.S., D.O.M.S.: ophthalmic surgeon, Hounslow Hospital.

MACPHAIL, D. S., M.B., B.SC. St. And., D.P.M.: psychotherapist, St. Bernard's Hospital, Southall, Middx.

MALCOLM, MARION, M.B., B.SC.: asst. pathologist and bacteriologist, Stobhill Hospital, Glasgow.

MILNE, JAMES, M.B., B.SC. Glasg., D.P.M.: physician-superintendent, Hawkhead Mental Hospital, Glasgow.

PALSER, J. E. J., M.R.C.S.: asst. school M.O., Blackpool.

PRETOR [illegible]: asst. M.O., maternity and [illegible]

ROBINSO [illegible] L.C.P.I., D.P.M.: medical supe [illegible] Belfast.

SPENCE-SALES, DOROTHY, M.B. N.Z., D.A.: cons. anæsthetist, *Kingston group of hospitals, Surrey.*

STRINGER, P. R., M.B. Lond., F.R.C.S.: cons. surgeon, St. Albans City Hospital.

TATTERSALL, R. N., O.B.E., M.D. Lond., M.R.C.P.: asst. physician, United Leeds Hospitals.

WHITTLE, C. H., M.A., M.D. Camb., F.R.C.P.: cons. dermatologist, Bedford County Hospital and St. Peter's Hospital.

WOLFE, H. R. I., M.S. Lond., F.R.C.S.: cons. surgeon, National Temperance Hospital.

WRIDE, FANNY, M.B. Lond., D.P.M., D.C.H.: cons. psychiatrist, child-guidance clinic, West End Hospital for Nervous Diseases.

Colonial Service:

BAIRD, D. A., M.B., B.SC. Edin.: director of medical services, Somaliland Protectorate.

BERRIE, J. R. H., M.B. Glasg.: M.O., Nigeria.

CHALMERS, ISABELLA, M.B. Lond.: lady M.O., Federation of Malaya.

CHILTON, NOEL, B.A., D.M. Oxfd, D.T.M. & H.: regional asst. director of medical services, Tanganyika.

CLAPHAM, L. J., M.B. Lond., D.T.M. & H.: deputy director, medical and health services, Sarawak.

COCHEMÉ, M. A. X., B.A., M.B. Camb., D.P.M., D.T.M. & H.: superscale grade-B specialist officer, Federation of Malaya.

EVANS, W. J. M., M.B. Lond., D.P.H.: regional asst. director of medical services, Tanganyika.

HOPKIN, D. A. B., M.B. Lond., D.T.M. & H.: superscale grade-B specialist officer, Federation of Malaya.

HUGHES, W. G. J., B.A. Oxfd, M.R.C.S.: M.O., Zanzibar.

KEEVILL, A. J., M.B.E., M.B. Brist., D.T.M. & H.: regional asst. director of medical services, Tanganyika.

MICHIE, CHARLES, M.B. Aberd., D.T.M. & H.: M.O., Tanganyika.

REIDY, J., M.B., D.P.H.: M.O., Kenya.

SPICER, J. R. C., M.B. Lond., D.T.M. & H.: regional asst. director of medical services, Tanganyika.

SPRINGETT, V. G., F.R.C.S.E.: surgeon specialist, Nigeria.

She enters my office with a brightly smiling face and a sort of challengingly semi-flirtatious manner. She is rather tense, and eyes me keenly as a fencer might his adversary, ready to parry an awaited thrust, determined not to be caught off her guard. I invite her to tell me about herself, but this does not suit her. She tries to make me ask the questions. It has to be a sort of contest, in which I should try to find out what I can about her, a sort of "twenty questions" game. But I point out to her the defensive nature of this attitude, and tell her this is not the best way to set about our business, and I urge her just to tell me, if she can, what troubles her. She then begins, "My husband told me to ask you if I should stop reading books about psychoanalysis and psychology." Thus she again avoids the initiative. I point this out to her and suggest that she must have some reason of her own for coming to see me. She then says that she has come because the doctors have assured her that there is "nothing whatever organically wrong" with her, and that her pains are entirely due to emotional disturbances. As she has been unable to track down the cause of these for herself, and "as the doctors must understand such matters better" than she, she has come for help. I point out to her that there appears to be a discrepancy here; her medical records show that a duodenal ulcer has been present and has been demonstrated radiologically; therefore it is unlikely that the doctors have said there is nothing whatever organically wrong. She agrees that this is so, that she has exaggerated, and I point out the tendency to try to score a debating point by extending her opponent's premise, and so to set a trap for later use. This elicits a somewhat abashed and deprecatory laugh. With some difficulty I manage to lead the conversation around over various relevant topics, but the atmosphere is never really easy. All the time there is the underlying feeling that one is engaged in a sort of verbal sparring or fencing match.

While talking of her psychological reading, she had used the phrase "amateur psychoanalysis." When we later returned to the topic she tried to develop the argument that her interest in such literature was merely a part of her wide interest in books. She had many literary interests and this was just one of them. When I said, "But you call this amateur psychoanalysis," she thought that I was referring not to her book reading but to our interview, and hastened to assure me that I had misunderstood her meaning. Throughout the interview she was hypocritically respectful, in such a way that the irony was almost directly apparent. She asked to be placed on our waiting-list for treatment, and departed, still wearing her brightly smiling mask.

III

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The patient is a married man of 44, who was originally referred to the surgical specialist on account of pain in the site of an old hernia repair operation, carried out 20 years previously.

I shall omit most of his history and symptoms for my present purpose is only to describe to you some of his behaviour during interviews. There are a few points however that may make his attitude a little more understandable. He was brought up in a strict patriarchal type of family, and evidently stood in considerable awe of his father, whose word was law. He was born with undescended testicles and claims to have been unaware of this until the age of 17, when he was operated upon for bilateral inguinal hernia. He was then told that he would be sterile, and discovered that he had no apparent testicles. For this he blames the doctors, saying that "medical science" has stopped him from having kids.

At first he was very resentful because the surgeons had refused to operate upon him and had sent him to me. Once this difficulty had been overcome he revealed himself as a rather bluff, jovial type of fellow, if anything rather over-familiar. But what most struck me, during the several interviews I had with him, was that, behind this outward mask of friendly familiarity, he was obviously abnormally afraid of me and deeply distrustful of my intentions. Apart from minor and more subtle indications of this, which cannot be readily recorded and reproduced, two little episodes during his second interview showed his attitude quite blatantly. While interviewing him, I opened the drawer of my desk and reached in for a sheet of paper. He immediately wisecracked, "What are you doing, Doctor? Getting out your revolver to shoot me?" Later he became increasingly preoccupied with the steel filing cabinet that stands in the corner of my office. He remarked that his firm made such articles and speculated upon whether mine was a good one. Suddenly he jumped up and, going over to it, started to pull open the drawers and to look inside. He tried to cover up his behaviour with a stream of patter to the effect that he was only interested in the mechanism and the workmanship because he was himself a craftsman. At his next interview he again displayed his distrustful attitude. On coming in, he looked all round and remarked that I had new chairs since his last visit. He then evinced great interest in the hospital outpatient department time-table that stood on my mantelpiece. He studied this most carefully, ignoring my repeated requests to him to be seated.

When he at length sat down, I tried to draw his attention to his suspicious attitude. I reviewed its various manifestations and told him that apparently he felt distrustful of me. But he would have none of it. He scouted the idea as ridiculous. His remark about the revolver was "just a joke." He was only interested in my filing cabinet as a craftsman, and so on. He further said it would be absurd not to trust a doctor, since medical men were only concerned to help their patients. He then changed the conversation and began to speak of my new chairs, saying jokingly that apparently the medical profession was doing quite well out of the National Health Service—buying new chairs out of working men's money. I pointed out that in this remark he again showed his distrust, but he simply laughed this off as ridiculous and told me that I twisted things round. He went straight on to tell a long story about a workmate who had collected funds for an outing for the men. Unknown to his workmates, this man had lost all the money on gambling. When the day of the outing drew near he tried to borrow money from my patient, who was treasurer of the share club. But my patient was cautious and refused. Later it all came out. As my patient remarked, he would have been "on the spot" if he hadn't been so cautious. Thus, by this narrative, he again indicated his cautious distrustful attitude by justifying it from his experience.

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In short, whereas in ordinary practice you can often regard an illness as something foreign to the patient, something from outside that happened to him and can treat him successfully upon this basis, in dealing with a psychoneurotic illness this is very seldom the case. It is commonly said that a psychoneurosis always has its roots deeply buried in the patient's most intimate personality. It would be more correct to say that the psychoneurosis is only one manifestation, one outward expression, of his whole personality.

THREE CASES

In order to show more concretely what I mean, I shall now give some brief clinical extracts from three cases.

I

My first patient is a married woman of 30 with one child, a daughter 3 years of age. Her leading complaint is of attacks in which she feels as though she can get no air into her lungs, though there is no obstruction, and in which she feels she is about to die. The second symptom of which she complains is sexual frigidity: she finds sexual intercourse completely pleasureless and distasteful, and this is leading to serious difficulties with her husband. She also complains of inability to settle down contentedly to the rôle of housewife, and of periodic explosive outbursts of fury against her husband. She feels very sorry for him but she can go just so long and then she has to explode again.

She is a lean muscular girl, with a rather masterful, competent, and self-confident manner, who began her interview with me by stating that she had only come because of pressure from her husband and her family doctor. She said that she had always regarded "nerves" as something that one could and should deal with oneself by will-power.

She gave the following account of her history. She is an only child whose parents were divorced when she was about 14. Her mother is a quiet depressive submissive woman, quite unable to stand up for herself. Her father is a radio engineer, whom she describes as "brilliantly clever." He is a man of violent temper with a need to domineer. He likes people to tremble before him, she says, as her mother always did. The only way to deal with him is to stand up to him. This the patient early learned to do, but her mother never could. Violent rows between the parents were frequent in the patient's childhood, and she says that she used to stand up to her father on her mother's behalf; but I got the impression that she felt fonder of her father, whom she obviously greatly admires, than of her mother, though she keeps on friendly terms with both.

The patient herself feels that she takes after her father temperamentally, especially as regards his general aggressiveness and urge to dominate and his temper outbursts. At school she was very clever and in advance of her age—but, significantly perhaps, only in subjects outside her father's range, such as literature and history which he looked down upon, and not in mathematics and science which he regarded as the only true learning. She is intellectually ambitious. For some time she worked for an organisation concerned with political research, and during the war she was employed on intelligence and propaganda duties. Later she wanted to take up work connected with broadcasting, thus entering a domain connected with that of her father, the radio engineer. She had to give this up because of her domestic ties. As an attempt to compensate for the lack of a career, she has taken up part-time lecturing to evening classes.

At one time she was engaged to be married to a Roman Catholic, but she broke this off because, as she put it, she was "unable to accept doctrinal domination." Her husband she describes as a quiet long-suffering pessimistic type, who is very upset by her temper outbursts. Her marital situation, therefore, so far as temperament goes, presents a sort of reversed image of that of her parents.

I do not wish to go into much further detail in this case, but there is one other item of the history to be recorded. At the age of 17, while coming along a lonely lane across a common in the dusk, she was attacked by a man who ran at her, with exposed penis erect, and seized her by the throat. In this situation the memory of the father's ju-jutsu instructions came to her aid. She freed herself and ran.

Without entering into any deep discussion of the psychopathological possibilities in this case, I think the material presented should be sufficient to suggest to you that this girl's character has been moulded from an early age by her experience of her family interpersonal relationships along lines that make it excessively difficult for her now to adjust adequately to the rôle of housewife, wife, and mother. You may, perhaps, also feel that this is probably not just a question of a child consciously modelling herself after the pattern of her loved and admired father, but that, on the contrary, the more feminine position, as exemplified by her overwhelmed mother, may well have represented a position, not merely inferior but terrifyingly dangerous. From this fear-laden situation she is protected by her identification with her father. She will not readily give up this protection, and not without anguish. Against this background, I shall leave you to assess the significance of her "shock"—the abortive sexual assault when she was 17.

II

If my first case has given you some idea of the personal historical background of a psychoneurosis and of the psychic precipitation of such history in the form of character drives, I hope that my next will suggest to you how a patient may be expected to react to the threat of treatment.

This case is again a married woman. She is 29 and she has one child. She complains of abdominal pains and discomfort, headaches, giddiness, double vision, and impaired concentration. A duodenal ulcer has been demonstrated radiologically, but her other symptoms are regarded as hysterical (during testing her vision is sometimes not merely double, but even triple!) I saw her briefly in a medical ward and I told her that I had no doubt some of her symptoms were due to emotional stresses and that these might even have some bearing upon her duodenal ulceration, and that if she felt she wanted help in understanding and dealing with these troubles she might consider getting in touch with my department.

A month later she presented herself for an outpatient consultation. She is a very small brunette woman, who has been pretty and is still not unattractive. She describes herself as having been treated by her family as a spoilt and pretty little doll, and this is probably a fair enough description. She is the youngest of four and is the only girl. Her three brothers are much senior to her, the eldest by 14 years. She has always resented her status in the family, and felt this particularly bitterly when she was about 11 years old. At that time her mother had to go away for a while to hospital. The patient expected, during her absence, to play the part of mother, but was frustrated in this, because the family did not take her so seriously as she wished. She is an intellectually ambitious person, who chafes at not having a career and dreams of taking various courses of training, if her health permits and if she can find enough spare time.

She enters my office with a brightly smiling face and a sort of challengingly semi-flirtatious manner. She is rather tense, and eyes me keenly as a fencer might his adversary, ready to parry an awaited thrust, determined not to be caught off her guard. I invite her to tell me about herself, but this does not suit her. She tries to make me ask the questions. It has to be a sort of contest, in which I should try to find out what I can about her, a sort of "twenty questions" game. But I point out to her the defensive nature of this attitude, and tell her this is not the best way to set about our business, and I urge her just to tell me, if she can, what troubles her. She then begins, "My husband told me to ask you if I should stop reading books about psychoanalysis and psychology." Thus she again avoids the initiative. I point this out to her and suggest that she must have some reason of her own for coming to see me. She then says that she has come because the doctors have assured her that there is "nothing whatever organically wrong" with her, and that her pains are entirely due to emotional disturbances. As she has been unable to track down the cause of these for herself, and "as the doctors must understand such matters better" than she, she has come for help. I point out to her that there appears to be a discrepancy here; her medical records show that a duodenal ulcer has been present and has been demonstrated radiologically; therefore it is unlikely that the doctors have said there is nothing whatever organically wrong. She agrees that this is so, that she has exaggerated, and I point out the tendency to try to score a debating point by extending her opponent's premise, and so to set a trap for later use. This elicits a somewhat abashed and deprecatory laugh. With some difficulty I manage to lead the conversation around over various relevant topics, but the atmosphere is never really easy. All the time there is the underlying feeling that one is engaged in a sort of verbal sparring or fencing match.

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The patient herself feels that she takes after her father temperamentally, especially as regards his general aggressiveness and urge to dominate and his temper outbursts. At school she was very clever and in advance of her age—but, significantly perhaps, only in subjects outside her father's range, such as literature and history which he looked down upon, and not in mathematics and science which he regarded as the only true learning. She is intellectually ambitious. For some time she worked for an organisation concerned with political research, and during the war she was employed on intelligence and propaganda duties. Later she wanted to take up work connected with broadcasting, thus entering a domain connected with that of her father, the radio engineer. She had to give this up because of her domestic ties. As an attempt to compensate for the lack of a career, she has taken up part-time lecturing to evening classes.

At one time she was engaged to be married to a Roman Catholic, but she broke this off because, as she put it, she was "unable to accept doctrinal domination." Her husband she describes as a quiet long-suffering pessimistic type, who is very upset by her temper outbursts. Her marital situation, therefore, so far as temperament goes, presents a sort of reversed image of that of her parents.

I do not wish to go into much further detail in this case, but there is one other item of the history to be recorded. At the age of 17, while coming along a lonely lane across a common in the dusk, she was attacked by a man who ran at her, with exposed penis erect, and seized her by the throat. In this situation the memory of the father's ju-jutsu instructions came to her aid. She freed herself and ran.

Without entering into any deep discussion of the psychopathological possibilities in this case, I think the material presented should be sufficient to suggest to you that this girl's character has been moulded from an early age by her experience of her family interpersonal relationships along lines that make it excessively difficult for her now to adjust adequately to the rôle of housewife, wife, and mother. You may, perhaps, also feel that this is probably not just a question of a child consciously modelling herself after the pattern of her loved and admired father, but that, on the contrary, the more feminine position, as exemplified by her overwhelmed mother, may well have represented a position, not merely inferior but terrifyingly dangerous. From this fear-laden situation she is protected by her identification with her father. She will not readily give up this protection, and not without anguish. Against this background, I shall leave you to assess the significance of her "shock"—the abortive sexual assault when she was 17.

II

If my first case has given you some idea of the personal historical background of a psychoneurosis and of the psychic precipitation of such history in the form of character drives, I hope that my next will suggest to you how a patient may be expected to react to the threat of treatment.

This case is again a married woman. She is 29 and she has one child. She complains of abdominal pains and discomfort, headaches, giddiness, double vision, and impaired concentration. A duodenal ulcer has been demonstrated radiologically, but her other symptoms are regarded as hysterical (during testing her vision is sometimes not merely double, but even triple!) I saw her briefly in a medical ward and I told her that I had no doubt some of her symptoms were due to emotional stresses and that these might even have some bearing upon her duodenal ulceration, and that if she felt she wanted help in understanding and dealing with these troubles she might consider getting in touch with my department.

A month later she presented herself for an outpatient consultation. She is a very small brunette woman, who has been pretty and is still not unattractive. She describes herself as having been treated by her family as a spoilt and pretty little doll, and this is probably a fair enough description. She is the youngest of four and is the only girl. Her three brothers are much senior to her, the eldest by 14 years. She has always resented her status in the family, and felt this particularly bitterly when she was about 11 years old. At that time her mother had to go away for a while to hospital. The patient expected, during her absence, to play the part of mother, but was frustrated in this, because the family did not take her so seriously as she wished. She is an intellectually ambitious person, who chafes at not having a career and dreams of taking various courses of training, if her health permits and if she can find enough spare time.

These resins are suitable for laminating and casting techniques, and workers in the United States have lately been able to produce a resin which is not air-inhibited during curing. Air-inhibition has hindered the fabrication of structures from these resins, since the surface of the moulding had to be protected from the oxygen of the air by a membrane such as 'Cellophane' or 'Polythene,' and a vacuum applied to remove any trapped pockets of air.

CASTINGS

Until recently it has been difficult to reproduce the internal structures of organs and joints. Attempts have been made with low-temperature fusible alloys, such as Wood's metal, plaster-of-paris, wax, and 'Neoprene.' Each has its advantages and disadvantages. Penetration of the organ has been difficult with alloys, plasters, and waxes, and the cast is insufficiently rigid when emulsions such as neoprene are employed. Cellulosic injection materials have been used, but in this case the difficulty has been to evaporate the solvent; and the casts so formed were shrunken and fragile.

In France, Baud and Duprez[1] have described a method of casting in which they inject poly-methyl methacrylate dissolved in acetone, and use various dyes soluble in organic solvents. With polyester resins, it is not necessary to suspend the organ in air for 24 hours, there being no solvent to evaporate; and shrinkage is consequently reduced. The polyester resin which we have found most suitable has been 'Marco 61c.'[2] The following casting mixture, which has a gelling time of about 1 hour, is satisfactory:

Resin 61c	100	Parts by weight.
Monomer C	34	
Catalyst benzoyl peroxide ..	3	

The gelling time varies according to room-temperature. and can also be modified by altering the catalyst content. The monomer and resin may be mixed and stored in a refrigerator for 36 hours if the catalyst has not been added.

The following examples are given to show how the technique may be altered to suit different organs.

In making the cast of the sheep's lung (fig. 1) the fresh specimen was suspended in a water-bath, and a glass connection was stitched into the pulmonary vessels and the trachea. To each connection a T-junction was attached, one limb of which went to a vacuum pump and the other to a length of rubber tubing connected with a funnel. Three funnels were thus necessary, each being filled with resin containing the colour desired in the system.

The height of the funnels could be varied so that if one system was found to be filling too rapidly adjustments to the gravity feed could be made. It has been found that the venous system of an organ fills most readily and the arterial supply slowly. Before running in the resin, a partial vacuum was applied to each system, so as to remove excess fluids and air. Complete evacuation of the specimen was not possible, and since the aim was only to fill the organ as far as the secondary bronchi, the remaining fluids acted as buffers to prevent the resin from reaching the terminal spaces. If the terminal spaces are completely filled, it is difficult to dissolve away the tissue by acid in such a complex organ.

The clip on feed A (fig. 2) was closed before applying the vacuum, the funnel and tube being then filled with resin. With the vacuum still applied, clip A was opened and the resin allowed to flow as far as the T-junction, when clip B was closed. By this means, the amount of air pushed into the specimen was reduced to a minimum. All three systems were manipulated in this way. The arterial resin was allowed to flow first, that for the trachea next, and finally the veins.

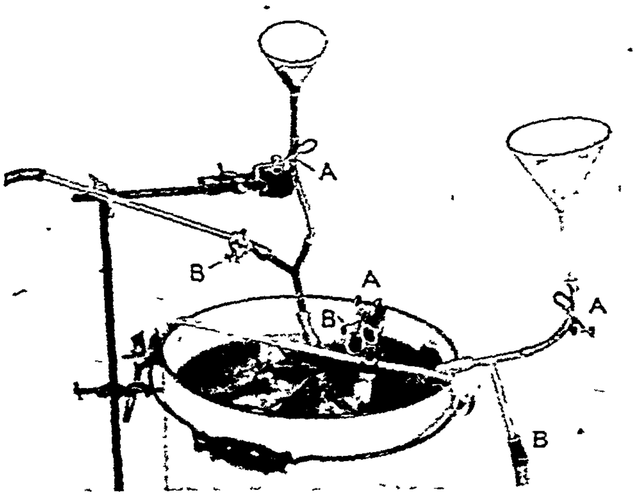

Fig. 2—Lungs floating in water, with connections sewn in place. Two filling funnels are shown.

Small organs, such as kidneys (fig. 3), can be injected with a syringe, but the pressure exerted is liable to burst the vessels and the gravity feed method has proved more satisfactory. The specimen is left to polymerise overnight and on the following day is placed in a bath of concentrated hydrochloric acid. It must be washed each day so that the acid can act on the deeper structures.

In the case of joints, such as the knee-joint, multiple injections may be needed. The resin should be injected

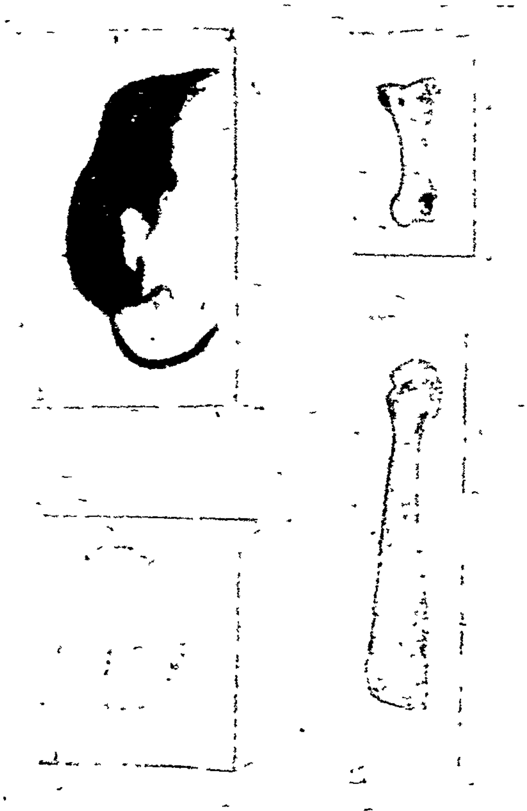

Fig. 4—Top left: vole. Top right: phalanx. Lower left: semilunar cartilage. Lower right: metatarsal.

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[1] Baud, Ch.-A., Duprez, A. *Bull. Soc. Linn. Lyon*, 1947, no. 10, p. 218.

[2] Marco Resins. Manufactured by Scott Bader & Co. Ltd., Wollaston, near Wellingborough, Northants.

referred to "medical science having stopped him having kids," thus indicating some of the grounds for his distrust of me. He also interested himself in the poker that lay in my fireplace. On his way out he opened the door and met my assistant on the landing outside. He at once started back, flinging up his hands in a defensive posture, and jokingly saying "Oh! I thought you were going to do me!" Throughout his eight interviews this patient was never able to see or to admit that he felt at all distrustful or on his guard towards me.

COMMENT

The lessons that I want to draw are these. The symptoms of a psychoneurosis are themselves of minor import relative to the underlying disorder, tormenting though they may be—just, for instance, as thirst may be in diabetes mellitus. The underlying disorder is an abnormality of character or personality leading to an inability to adjust to the life situation in which the patient finds himself. Here it should be added, though the point is not illustrated in this paper, that the particular character drives are themselves very often responsible for bringing about just those life situations which at first glance seem to be the source of the patient's distress.

Treatment therefore, if it is to be more than a placebo, must involve some readjustment in the character. Yet we have seen that character formation is a process that starts in early childhood as a protection against the various serious anxieties of that time, which anxieties it continues to contain in adult life, having by then become more or less set and resistive to change. We have seen that patients energetically defend themselves against a nearer approach to their character disorders, and that they remain blind to indications of their personal attitudes that are startlingly apparent to other people, and maintain this blindness actively in resistance to attempts to dispel it. It may also seem likely to you that, once adult years are reached, the possibility of change begins to diminish, different characters varying in the degree of their rigidity, and therefore in their susceptibility to radical psychiatric treatment.

The *general conclusion surely must be* that one or two talks with a psychiatrist are unlikely to effect any very fundamental change in a psychoneurotic patient. In the end we must put away our lingering hopes of omnipotent thought treatments, and recognise that reality requires long and painstaking and difficult work if we wish to treat those who suffer from psychoneurosis. We must also be still more realistic and realise that at present, apart from a little palliation, many cannot be treated at all.

"... The human being is born at a very early stage of development by comparison with other mammals. He is dependent on parental care for a far greater proportion of his average life than any other higher animal. During this period, his normal social and intellectual development depends almost wholly on the stability of the family, and on the dynamics of the relationships which exist within it. Failure of these produces a personality which is itself incapable of responsible social attitudes. The family is a uterus from which the child must not be expelled until gestation is over. Delinquency as we know it, whether it assumes forms of which the law takes cognisance, or whether it is of the more dangerous kind which manifests itself in aggression, the desire for dominance over others, obsessional patterns of behaviour, and irresponsible conduct through and within existing conventions of behaviour, is a form of prematurity. It is also one of our chief endemic diseases."—Dr. ALEX COMFORT, in *Sexual Behaviour in Society.* London, 1950; p. 50.

USE OF POLYESTER RESINS IN MEDICINE

JOHN T. SCALES

M.R.C.S.

PLASTICS RESEARCH UNIT, INSTITUTE OF ORTHOPÆDICS (UNIVERSITY OF LONDON), STANMORE, MIDDLESEX

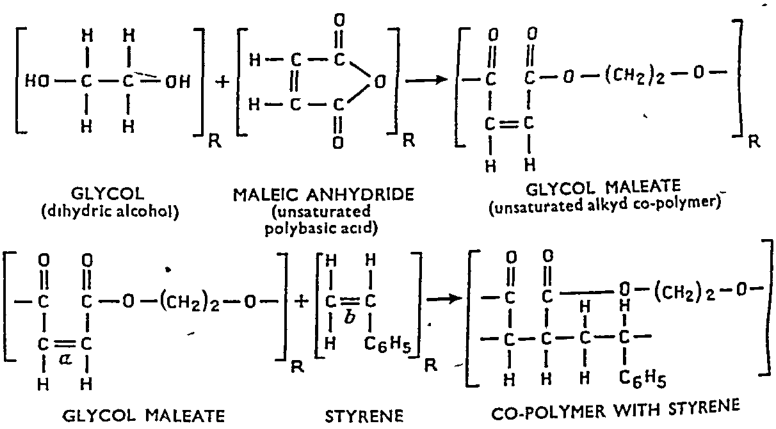
With illustrations on plate

THE use of polyester resins has been under investigation for the manufacture of orthopædic appliances. At an early stage in the experimental work however, it was realised that these synthetic materials had, in addition, possibilities in other fields of medicine. This paper deals with their use for the internal casting, embedding, and reproduction of anatomical and pathological specimens, as well as splint-making.

CHEMISTRY

These synthetic compounds are produced in industry for a number of purposes, such as the manufacture of paint, electrical insulation, the hulls of boats, and aircraft components.

The resins are esters of polybasic unsaturated organic acids (e.g., fumaric, maleic, or itaconic), or their anhydrides, with saturated dihydric alcohols such as glycol. The thermoplastic resins, primarily formed, are known as unsaturated alkyd polymers and are "cured" (or set) into a thermoset structure by co-polymerisation with unsaturated cross-linking agents such as styrene, cyclopentadiene, or methyl-methacrylate.



At points marked *a* and *b* in the accompanying formulæ the double bonds are activated, and cross-linking occurs. This reaction is brought about by the action of a catalyst such as benzoyl peroxide and in some cases with the aid of energy in the form of heat and/or ultra-violet light. The final plastics formed have a three-dimensional network structure, and the properties of a thermo-setting resin. These cross-linked polymers are characteristic in that:

During polymerisation no by-products are produced. The polymerisation can be made to occur at low temperatures. The rate of polymerisation can be varied. No positive pressures are required unless a laminating process is used.

Viscosity of the resin mixture, before polymerisation, can be varied by altering the proportions of the monomer and alkyd resin.

The plastic formed after polymerisation is a thermo-setting material. Some types of resins can be made to link with themselves so forming a network structure without the addition of a material such as styrene.

The exact chemistry of these resins is subject to industrial patents and is therefore not disclosed by industry; but the foregoing account indicates the reactions involved.

DR. SCALES: USE OF POLYESTER RESINS IN MEDICINE

Fig. 1

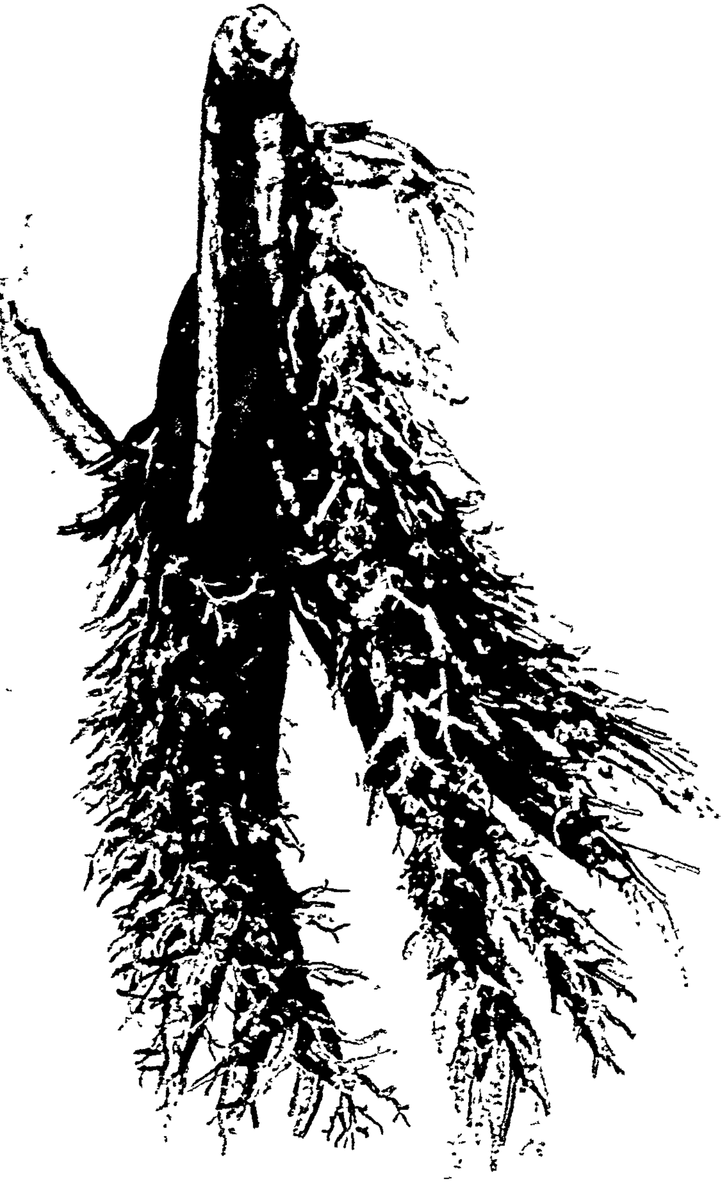
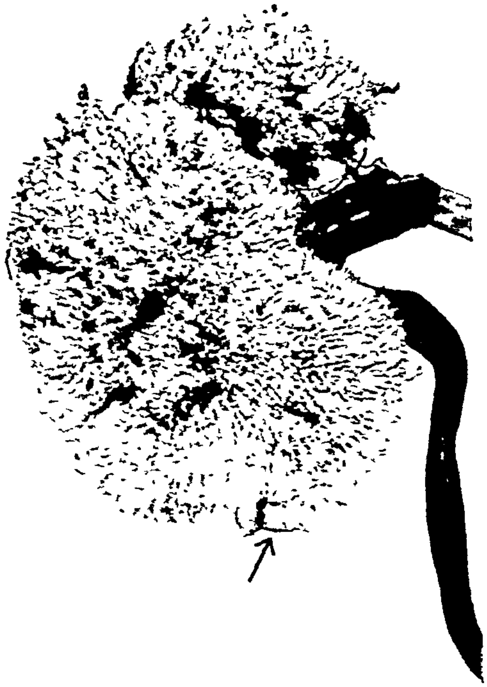
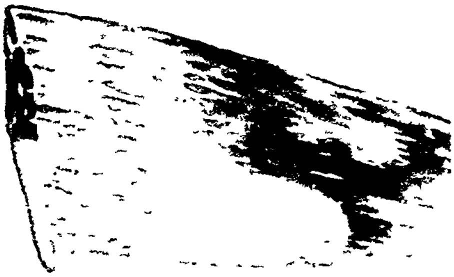


Fig. 3



DR. ROBINSON: MUSCLE NECROSES AND URÆMIA



MR. FRAENKEL, MR. NEIL: DISSECTING AORTIC ANEURYSM

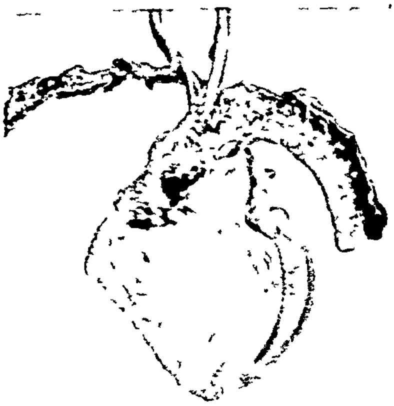


Fig. 1

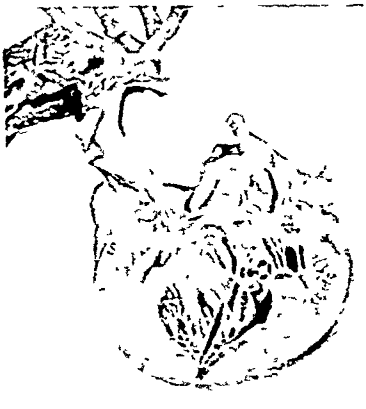


Fig. 2

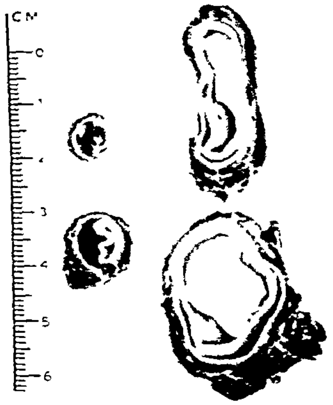


Fig. 3

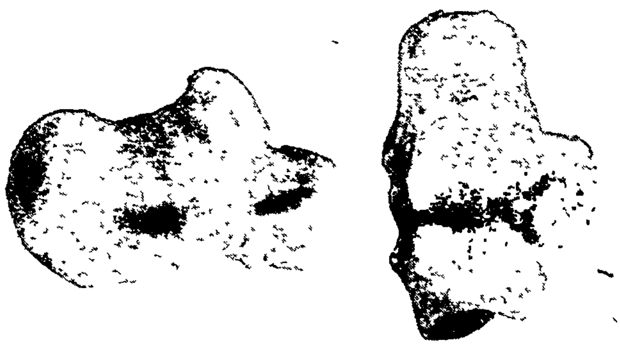


Fig. 5—Synthetic os calcis.

from the lowest point of the joint and during this procedure the joint should be moved so that the resin is able to flow into all the reflections of the synovial membrane.

An air-vent (which can be a needle, with a clip on a piece of rubber-tubing) is essential at the highest part of the joint to make complete filling possible. As soon as the resin appears through the vent, the clip is closed and a few more cubic centimetres of resin are run in, so as to ensure that the joint cavity is fully distended. Care should be taken that there is no further movement of the specimen: otherwise the resin, if it is beginning to gel, will crack. Joint cavities are most easily filled by using a syringe.

As the resin mixture is a liquid, it permeates the organ well and reproduces its structure with extreme accuracy.

EMBEDDING SPECIMENS

The usual way of mounting specimens has been to put them into preserving fluid in heavy glass jars often with poor optical properties; and by the time a large specimen is mounted it often weighs several pounds. The introduction of 'Perspex' specimen jars meant better mounting of specimens and considerable saving in weight. In the last 3–4 years many people have been trying, with varying degrees of success, to mount specimens in transparent resins so that all aspects can be equally well viewed. Resin embedding allows for considerable saving in shelf space and weight. Specimens have been embedded using Marco 26c. The method is simple and can be applied to wet specimens. The vole (fig. 4) had been preserved in 5% formalin (aqueous solution) for some weeks; before being embedded it was placed in 95% alcohol for 15 min., and then transferred to chloroform for a further 15 min.; after this it was dipped in 'Monomer C.' A base of resin was cast into a glass vessel of suitable size. The depth of such a base should not be more than $^1/_4$–$^1/_2$ in., and it is important that casting should be done in a dust-free atmosphere; otherwise, in the final result, a joint line will be visible. When the base had gelled, the specimen, having been dipped in monomer C, was placed on it and more resin added so as to give a layer above the specimen equal to that of the base.

Care must be taken during this last procedure that air-bubbles are not trapped; the chance of trapping bubbles can be greatly reduced by agitating the vessel in which the embedding is being done. Should bubbles still be present, the whole is placed in a container to which a vacuum can be applied. It may be found that during the mixing of the resin a large number of air-bubbles may appear, in which case the resin should be subjected to a vacuum, when the bubbles will disperse. The bursting of air bubbles by means of a metal or glass instrument, after the specimen has been embedded, is not advisable, even though the resin is still liquid, for lines may sometimes appear as a result.

In polymerisation reactions, the resulting polymer always contracts; and the amount of contraction with this particular resin is about 9%. Contraction produces a concave upper surface to the block, and sufficient resin should therefore be used to allow for grinding and polishing to get rid of the concavity. The exposed surface is slightly tacky after the resin has cured, owing to air-inhibition; but this surface is removed during polishing. After grinding, metal-polish or jeweller's rouge is used.

As the reaction is exothermic, the rate at which the resin mixture cures should be controlled. This can be done by altering the quantity of catalyst.

A suitable embedding mixture is as follows:

Resin 26c	100	Parts by weight.
Monomer C	40	
Catalyst HCH	0·75	
Accelerator E	1·5	

The above can be stored for 36 hours in a refrigerator, but will gel in about 12 hours if the temperature is raised to 60–70°F.

REPRODUCTION OF BONES

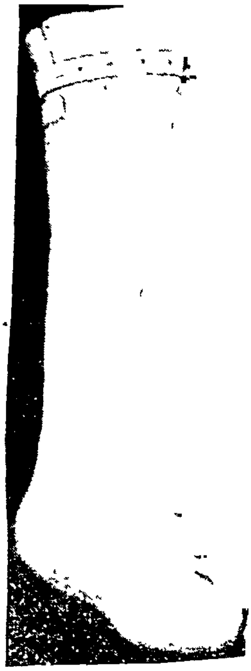


Fig. 6—Polyester resin prosthesis for Chopart's amputation.

Bones can be reproduced in resin. The bone to be copied is suspended in a suitable container which allows a minimum clearance all round of $^1/_2$ in. The container should then be placed in an oven with a regulator set at 100°C, so that as much air as possible is driven out of the bone; alternatively the bone can be dipped in hot liquid petroleum jelly. This procedure ensures that air-bubbles are not produced in the mould later. Various mould-forming materials may be used, and most require heat to make them into a flexible solid. The following have been tried and found satisfactory: polyvinyl chloride paste, 'Vinamould,'[3] and latex. We have found 'Vinamould H.M.C. 21' most satisfactory for our purpose, but if a number of castings are to be made from the same mould, latex should be used, because polyester resins attack vinyl compounds. The following

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[3] Vinamould. Manufactured by Vinyl Products, Butter Hill, Carshalton, Surrey.

LEGENDS TO ILLUSTRATIONS ON PLATE

MR. SCALES

Fig. 1—Partially oblique view of sheep's lungs, showing pulmonary artery in blue (deoxygenated blood), pulmonary vein in red (oxygenated blood), and trachea and bronchi in green.

Fig. 3—Cast of venous drainage of tuberculous kidney with ureter. Upper pole of kidney eroded. Note vessel draining subcapsular plexus.

DR. ROBINSON

From a water-colour (Captain S. B. White) of the left pectoralis minor muscle of case 1.

MR. FRAENKEL, MR. NEIL

Fig. 1—External appearance of the heart and great vessels, showing the bruising of the arteries.

Fig. 2—The interior of the left ventricle and aorta, showing the irregular transverse tear in the aortic intima, at the origin of the dissection.

Fig. 3—Cross-section of the aorta and subclavian and axillary arteries, showing the intima stripped up by blood. The smallest section shows almost complete occlusion of the lumen of the distal end of the axillary artery.

is a suitable mixture, the French chalk and wood flour acting as a filler and pigment combined.

	Parts by weight.
Resin 61c	100
Monomer C	40
Catalyst	3
French chalk and wood flour	8 (80–20 %)

The resin is left to polymerise and the finished moulding is removed (fig. 5). The point where the resin is poured in may need polishing. This method of bone reproduction is simple and requires little apparatus.

ORTHOPÆDIC APPLIANCES

For making orthopædic splints either Marco 61c or 'Nuron'[4] is used, preferably with a cheap filler such as wood flour. A plaster cast of the part is made in the usual manner and from this a plaster-of-paris male mould is formed which is then covered with a suitable "release," such as cellulose acetate solution. This is allowed to dry so as to form a film, which will prevent the laminate from adhering to the cast. These resins produce light-weight strong rigid appliances (fig. 6). In America similar resins have been used for the construction of artificial limbs by the Northrop Aircraft Company.

The resin, in combination with glass-fibre cloth, is cured in a laminating technique; cotton or paper or other materials can be used but with these strength falls considerably. The glass-fibre cloth should be tailored to the shape, and should preferably be in the form of a woven material with plenty of bias. The resin is applied to the successive layers of the cloth with a paint-brush, until the requisite thickness for the appliance is built up. With some resins (e.g., Nuron) ultraviolet light, or heat up to 100°C is required. A positive pressure can be applied to the outside of the laminate by winding round it strips of a flexible material such as cellophane or polythene. The results are then better because air-pockets are excluded and air-inhibition avoided.

In another method—the "bag" technique—rubber or latex bags which accurately fit the cast are used. With some resins (e.g., Nuron) the rubber must not be allowed to come into contact with the resin because it inhibits curing. With such resins therefore, polythene bags which cause no inhibition and transmit ultraviolet light, should be used.

Much credit is due to my assistant Mr. T. Fisher for his part in this work. I also wish to thank the industrial concerns mentioned for technical information and supply of materials, Mr. J. Nangle, F.R.C.S., for fig. 2, and Mr. R. J., W. Whitley, A.R.P.S., for figs. 5 and 6.

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[4] Nuron 100. Manufactured by Imperial Chemical Industries Ltd. (Plastics Division), Welwyn Garden City, Herts.

LEGENDS TO ILLUSTRATIONS ON PLATE

DR. HAWKINS

Fig. 5—(IV. 4) Arthrodysplasia of elbow.

Fig. 6—(III 1.) Iliac horns. Anteroposterior view.

Fig. 8—(III. 8.) Outline of rudimentary horn in centre of left ilium. Magnified.

MR. THOMAS

Fig. 6—Radiograph of a case of rheumatoid arthritis of the wrist in which operation for fusion was done nine weeks before, by the method described.

DR. GOODBODY, DR. ROBERTS

Fig. 2—Lateral view of skull showing gross Paget's changes, basilar invagination, and Bull's lines forming an angle of 17°.

DR. OELBAUM

Fig. 1—Radiogram of left side of pelvis in case 1, February, 1945.

Fig. 2—September, 1946.

Fig. 3—September, 1947.

SCATTERED MUSCLE NECROSES ASSOCIATED WITH POST-TRAUMATIC URÆMIA

G. L. ROBINSON
M.D. Camb.
PATHOLOGIST, SEAMEN'S HOSPITAL, GREENWICH

With illustration on plate

THIS article describes patches of ischæmia in the skeletal muscles of 2 soldiers who died, with high blood-urea levels, after receiving wounds in the North African campaign.[1]

CASE-HISTORIES

Case 1.—A German youth was wounded by bullets in the hand and leg on Feb. 1, 1943. He was exsanguinated when operated on next day and was transfused with plasma. Sulphonamide was applied; open fractures of the right tibia and fibula, and the left wrist, were encased in plaster. He was then transferred to a general hospital, where he showed much fear and seemed hyperæsthetic, but did not become seriously ill till Feb. 6, when examination revealed no cause for his distress either in his wounds or general condition. His respiration-rate was rapid, his blood-pressure normal, and he was tender to pressure in many places. At first restless, he soon became delirious and incontinent. Pulse and temperature were subnormal throughout. On Feb. 9, a white blood-count (capillary) showed 80,000 leucocytes per c.mm., 91% polymorphs. No malarial parasites were seen in the smear. Blood-culture next day, when intravenous plasma and saline infusion was begun, remained sterile; this venous sample contained 50,000 leucocytes per c.mm., 352 mg. urea per 100 ml., and the packed red-cell volume was judged to be about 15% after hand-centrifuging.

He died on Feb. 10, and *necropsy* was performed about twelve hours later. The body was that of a small, spare, but well-developed young man, with the left forearm and right leg in plaster. The skin was sallow. An abrasion, 5 × 3 cm., was present over the left great trochanter, another above the right anterior superior iliac spine, and numerous smaller ones over both buttocks. Removal of plasters showed a compound comminuted fracture of the right tibia and fibula with an open anterior wound exposing the interior of the leg down to the soleus. A deep gash had severed the extensor tendons over the left wrist. Both wounds were dry and clean. When the body was opened, yellowish-white areas of necrosis were seen in the pectoral muscles; 2 in. of the costal end of the left pectoralis minor had the appearance of "white meat," with a sharp line of demarcation between this and the normal tissue (see figure). The decolorised muscle was dry and friable and the fascia was adherent over it. Distally in the same muscle a band of similar change occupied the whole breadth. Other pale patches were found in the left pectoralis major, both right pectorals, both recti abdominis, left psoas, right biceps brachii (where the affected zone formed a central pencil through the muscle), left quadriceps, and in a musculo-tendinous junction exposed in the leg wound. They were not found in the right quadriceps, left biceps brachii, sacrospinalis, or hamstrings and adductors of the left thigh.

The organs generally were free from gross abnormality. There were small zones of collapse at the edges of the lung bases. The mesenteric and cervical lymph-nodes were slightly enlarged. The spleen was normal in size and its pattern clear. No abnormalities were found in arteries, veins, heart, suprarenals, or alimentary canal. The brain was œdematous, the middle ears clean. A firm ante-mortem clot, 6 cm. long by 2 cm. in diameter was found coiled in the nasopharynx. The bladder contained about $^1/_2$ pint of clear urine which showed only a trace of albumin and no casts. The kidneys (right, 11 × 5 × 4 cm., weight 157 g., left 9·5 × 6 × 4 cm., weight 128 g.) were pale with prominent stellate veins. Cortex was of normal width with yellowish-grey swollen cut surface, radially streaked by congested vessels. The pyramids were very congested but slightly depressed. The blood-urea was over 375 mg. per 100 ml. the Weil-Felix reaction negative, and *Clostridium welchii* was cultured from various muscles.

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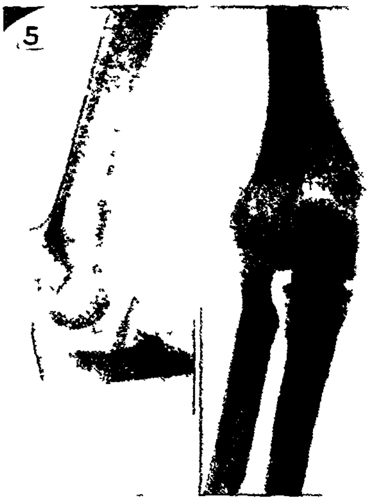
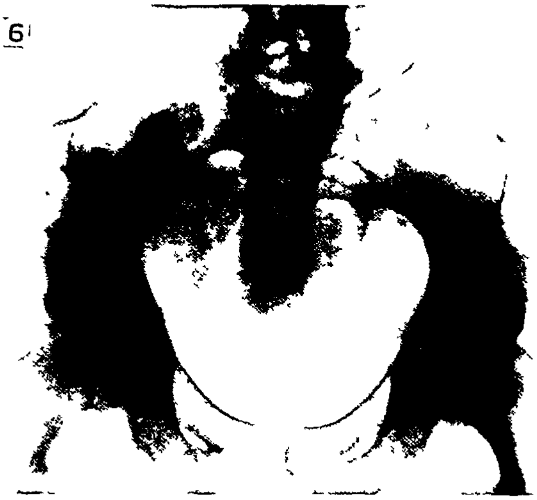
[1] A synopsis of this article appeared in *Army Pathological Notes*, no. 9, September, 1943.

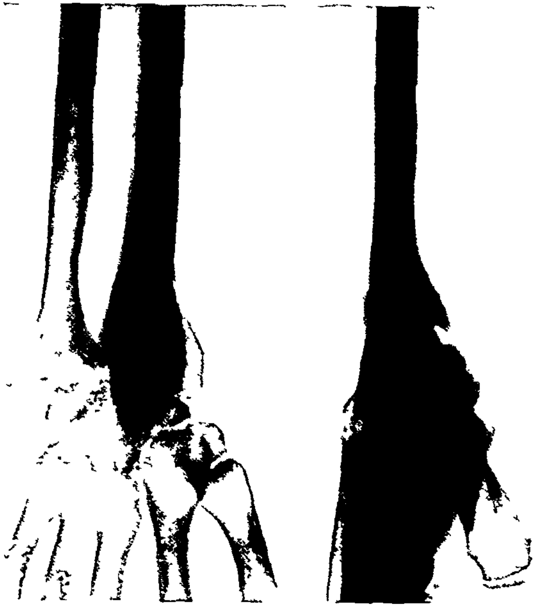
DR. HAWKINS : RENAL DYSPLASIA WITH HEREDITARY ABNORMALITIES INCLUDING ILIAC HORNS





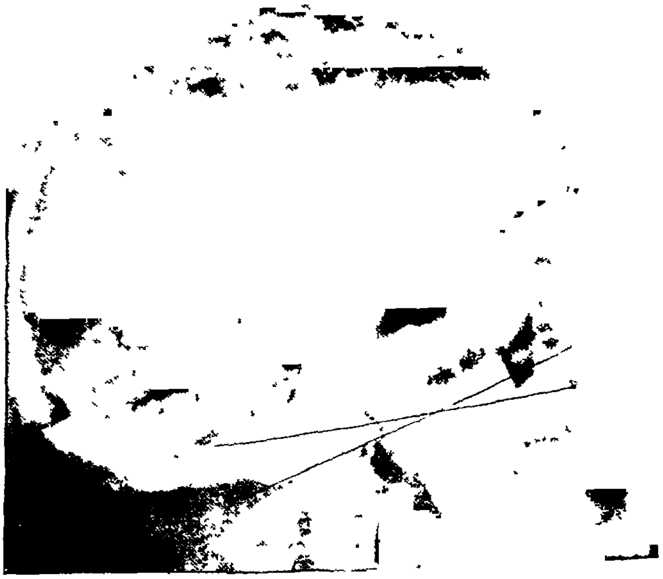
MR. THOMAS : ARTHRODESIS OF THE WRIST

Fig 6

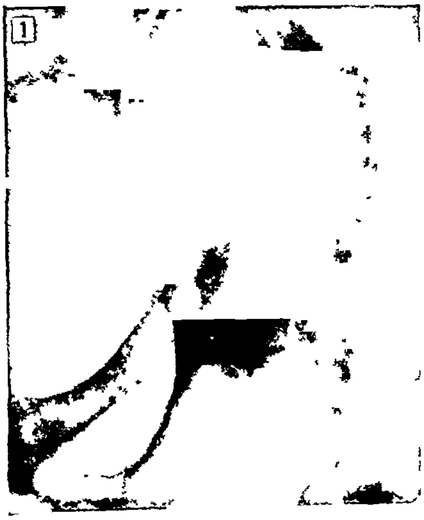


DR. GOODBODY, DR. ROBERTS : BASILAR INVAGINATION IN PAGET'S DISEASE

Fig. 2



DR. OELBAUM : CARCINOMA OF THE PROSTATE



pallid, sometimes mottled by hæmorrhage, and sharply demarcated, like an infarct, from normal muscle.

As regards the renal lesions, the only point of special interest appears to be the difference between the kidneys of the two cases. The standard features were present in both. but in case 2 were much modified by the generally congestive termination. The kidney of case 1 was the more typical "crush type," while that of case 2 rather resembled Bratton's (1941) case 7. Whether or not oliguria developed at any stage in either case is unknown.

There is little doubt that the muscle necroses in case 2 would have passed unnoticed but for the special search prompted by the finding of the striking "fish muscle" patches in the severe case 1, where anæmia and leucocytosis were also correspondingly greater. Some of the original sections from case 1 showed slight signs of intimal vascular lesions. and were picked out for further study; but this material was lost.

Anæmia. leucocytosis, and internal hæmorrhages are *peculiar features* of these cases, lying outside the renal syndrome as generally described. Hæmoglobin levels of 50% are given by Parsons (1945); but case 1 was more anæmic than this. The high concentration of intravascular inflammatory cells in the sections of most tissues recalls the similar findings of Woods (1946) in kidneys from cases of carbon tetrachloride poisoning.

SUMMARY

Two cases of post-traumatic uræmia. seen in the North African campaign of the late war. are reported because they showed patches of muscle necrosis distant from the site of trauma. No parallel reports have been found.

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DISSECTING AORTIC ANEURYSM SIMULATING ARTERIAL EMBOLISM

REPORT OF TWO CASES

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With illustrations on plate

DISSECTING aneurysm of the aorta is seldom seen in the surgical ward; but it can produce signs and symptoms, referable to the limbs and to the abdomen, which may mislead the surgeon. In the differential diagnosis of acute peripheral vascular occlusion, a dissecting aneurysm is not usually considered; but we report here two cases in which this condition caused signs and symptoms which led to a diagnosis of embolism.

Shennan (1934), in his review of the literature. found several cases in which there was paraplegia, sometimes associated with incontinence, suggesting cord involvement. but in three the evidence pointed to occlusion of the lumen of the aorta. One of these went on to gangrene of the lower limbs (Gordon 1863). In another case, the dissection was localised to the right internal iliac and femoral arteries, producing gangrene (Turner 1829).

Of Shennan's own series, case 10 is of interest. A man aged 40 was admitted with pain and loss of power in the right arm, and also severe pain across the middle of the body. An embolus was removed from the axillary artery, but next day he died. Necropsy revealed a dissecting aneurysm of the aorta; the dissection had apparently started when he complained of the pain across the body. A somewhat similar case was reported by Glendy et al. (1937). A right iliac embolus was diagnosed, and at operation a 3-inch clot was removed. but no blood flowed from the proximal segment. A dissecting aneurysm was found post mortem. A second case of aneurysm diagnosed as an iliac embolus died during an embolectomy.

Kellogg and Heald (1933) reported the case of a patient who died with gangrene of the lower limbs. Two other cases are reported by the Massachusetts General Hospital (1945) and Shucksmith and McPherson (1949), both fatal.

CASE-RECORDS

Case 1.—Mrs. A, aged 32, was admitted on Feb. 2, 1947, with a history of collapse in a shop 24 hours previously: she had found herself unable to move her right leg, and had then developed some pain at the bottom of her back and vomited. For seven years she had had "kidney trouble and high blood-pressure" and two years previously a pregnancy had been terminated and sterilisation performed. Recently she had suffered from shortness of breath, vomiting, and severe headaches relieved by venesection.

The right leg was cold, powerless, anæsthetic, and patchy blue and white below the knee. A feeble pulse was felt in the femoral artery at the inguinal ligament but no other pulsation in this leg. The left leg appeared normal with full pulses. The heart was clinically enlarged; blood-pressure 170/120 mm. Hg; pulse-rate regular at 100. There was conspicuous pulsation in the neck, a systolic thrill at the base of the heart, and an apical systolic murmur. The liver was enlarged three finger-breadths.

A diagnosis of embolus of the right femoral artery was confidently made, and in spite of the time which had already elapsed (24 hours) it was judged that there might be a chance of saving some of the limb by immediate embolectomy (after further experience of vascular occlusion the same decision might not be made now). Accordingly the femoral artery with all its branches was displayed (G. J. F.) in the femoral triangle under 2% procaine infiltration. It was not pulsating and no clot was felt. It was opened proximal to the profunda branch; no clot was found and the flow of blood was very feeble, but it was thought that this might suffice to tide the limb over. To make certain that no embolus had been forced downward during the initial manipulations, the artery was now opened lower down, with similar findings. The artery was repaired and the wound closed. Heparin was given. The patient died 12 hours after admission.

Necropsy was performed, but unfortunately purely with the object of ascertaining the cause of death for H.M. Coroner and therefore very limited. A dissecting aneurysm of the aorta was found, beginning close to the heart in the pericardium and extending as far as the diaphragm. The lower aorta appears not to have been examined. The cause of death as given to the coroner was rupture of aortic aneurysm with hæmopericardium.

We felt little doubt that the dissecting aneurysm must have extended to the neighbourhood of the bifurcation of the aorta and interfered mechanically with the flow of blood to the right iliac artery to a considerable extent.

Case 2.—A man, aged 51, was admitted on May 18, 1949, at 12 noon: 75 minutes previously, he had collapsed with sudden pain in the precordium and down the right arm. He was drowsy, rather shocked, and cyanosed. The right arm was white, cold, anæsthetic, and paralysed. No pulse could be felt at the wrist or over the brachial artery, but the subclavian pulse was present. The left radial pulse was slow, regular, and of fair volume. The heart sounds were faint, no abnormal sounds being heard. Blood-pressure 110/70. He had a history of hypertension.

Micropathology.—Sections of the basal ganglia showed a slightly unusual number of intravascular cells (many of them polymorphs); and so did sections of the suprarenal, where there was some congestion with a few extravasated red cells in the cortex. The white areas in the voluntary muscles showed an aseptic necrosis, and only that from the wound was extensively invaded by granulation tissue; but although there was practically no exudate, many vessels contained numerous inflammatory cells—sometimes up to a dozen polymorphs were compressed into Indian file by an enclosing capillary. The muscle-fibres showed various stages of degeneration: some were foamy or reticulated, some cracked transversely, some marked by wavy ribs of hæmatoxyphil granules derived apparently from the striæ, and some swollen into ill-defined hæmatoxyphil ovoid masses. There were no signs of pre-existing disease in sections of the kidney, whose main abnormality was seen to be a tubular degeneration, amounting to desquamation in places. There were scattered casts of albuminous debris, sometimes pigmented and granular in the lower nephron. Albuminous exudate was present in most of Bowman's capsules, where it tended to form hyaline globules lining the capsular membrane; and this itself showed hyaline swelling in places. The tufts did not appear abnormal, except for occasional polymorphs within their capillaries. The interstitial tissue contained lymphocytic foci. The medullary vessels were congested and many contained a rather large number of monocytes and polymorphs. A very few radially striated grey inorganic spheroids were seen in the tubules; similar formations were noted by Parsons (1945) in kidneys from cases of post-traumatic uræmia, and by Woods (1946) in those of cases of carbon tetrachloride poisoning. They could not have been sulphonamide, since they were sought for, and found, in kidney sections from patients who had received none. Stains for free iron and for organisms were negative.

Case 2.—An English corporal had his right arm shattered by a shell fragment on April 10, 1943. Surgical amputation was done after an unknown period, and he was transfused with plasma but not blood. On April 15 he became restless and distressed without obvious cause, and his respiration-rate rose. His blood-pressure was then 132/95, pulse-rate 64, and hæmoglobin 50% (Haldane). It is not remembered whether he was tender on pressure. Blood-urea on April 19 was 322 mg. per 100 ml. He received intravenous glucose-saline during the last 15 hours before his death on April 20, on which day his hæmoglobin was still 50%, red cells 2,400,000 per c.mm., white cells 25,000 per c.mm., polymorphs 79%; there was an excess of platelets in the blood-smear. The urine was clear and pale, containing a trace of albumin only.

Necropsy took place on the day of death. The body was that of a well-developed, well-nourished, muscular young man. The skin, particularly of the face, had a lemon tint, and the lips were cyanosed. The amputation site in the upper third of the right arm showed patches of yellowish-white necrotic muscle, the largest being 2 × 1 × 1 cm., with definite margins, and homogeneous on section except in one place which retained the lobulation of muscle compartments. A few small hæmorrhages, up to 0·3 cm. in diameter, bordered the necrotic patches. Otherwise the muscle surfaces of the stump appeared slightly dry but normal in colour and clean. Several patches of similar necrosis, up to 3 cm. in diameter, were present in both external oblique muscles. There was also a core of necrosis running longitudinally through the posterior part of the inferior half of the left psoas, alongside and partly enwrapped by a long hæmorrhage with crescentic cross-section up to 0·8 cm. thick—the hæmorrhage and adjacent necrosis thus forming a cylindrical zone in the interior of that part of the psoas lying over the pelvic brim. There was œdema of the skeletal muscles as of the tissues generally, and the neck muscles dripped fluid on section. No necrotic or hæmorrhagic areas were seen in sternomastoids, pectorals, recti abdominis, biceps or brachialis (left), quadriceps group (right), temporal muscles, or deltoid above amputation.

There was œdematous enlargement of cervical lymph-nodes, and an adhesion between the faucial pillars on the left side, the tonsils being absent. There was much froth in the trachea and the lungs dripped œdema on section and showed congestion of the lower lobes, but no pneumonia. Fibrous pleural adhesions were present over the left upper lobe. There were bilateral pleural effusions (4 oz. left, 12 oz. right) and slight excess of dark yellow pericardial fluid. Four ecchymoses, up to 0·25 cm. in diameter, marked the course of the coronary vessels over the left ventricle; the coronary arteries were clean and patent. There were two slight puckered depressions in the lining of the aorta just distal to the valve, each about 0·3 cm. in diameter: they were not due to atheroma, which was slight throughout the body. The heart muscle was very œdematous and the pulmonary arteries and great veins, including splenic, renals, and iliacs, were dilated by post-mortem clot. There was œdema and congestion of intestines, liver, small spleen, pancreas, and brain (excepting in the frontal lobes, which were pallid). A venous infarct, 0·2 cm. in diameter, was present in the cortex of the right suprarenal. The kidneys were swollen, with bulging cut-surfaces and great congestion and œdema of both cortex and medulla. The bladder was distended by about one pint of clear urine. A sample of serum gave a negative Kahn test and *Cl. welchii* was grown from various muscles.

Micropathology.—Sections of the affected parts of the voluntary muscles showed, like those of case 1, granular and hæmatoxyphil degeneration without exudate but with occasional intravascular collections of inflammatory cells. Sections of the kidney showed the changes described in case 1 with three differences: the cortical (including the glomerular) vessels were congested as well as those of the medulla; lymphocytic foci were absent; and a little free iron pigment was demonstrated. The brain-stem showed several small vessels packed with subacute inflammatory cells and polymorphs which had not infiltrated the parenchyma; one suprarenal had a venous infarct; the lungs showed congestion and œdema with much desquamation of epithelium and albuminous exudate in some alveoli; the liver, œdema, uniform congestion, and fatty degeneration; the spleen, a distinct septic reaction; a cervical lymph-node showed reactive hyperplasia. Gram's stain failed to show organisms in any tissue.

DISCUSSION

On the hypothesis of a common ætiology, various types of renal failure, formerly considered separate, are now being associated in one group. Such lists are furnished by Bywaters (1945), suggesting functional renal blockage as the common factor; by Maegraith et al. (1945), suggesting renal anoxia; and by Trueta et al. (1947) suggesting cortical anoxia due to an autonomically controlled vascular cut-out. The kidney of this syndrome is usually described as swollen, with pale œdematous cortex, congested medulla, tubular degeneration, eosinophil capsular exudate, normal tufts, and a variable number of casts. It has not been found possible to prove any ætiology from these changes.

Ischæmic muscle patches at sites distant from those of direct violence should strengthen the case for a spasmodically induced renal ischæmia; but no other cases seem to have been reported. Arterial spasm has often been seen by surgeons in cases of hæmorrhage (Malcolm 1893, Handler 1949); but at the symposium on crush-syndrome cases at the Royal Society of Medicine (1941) no cases were reported of necroses unassociated with local trauma to muscle or blood-vessel; nor do necroses seem to have been previously recorded (apart from local vascular damage) in cases of post-traumatic uræmia. The deaths of these two soldiers are reported because they display this phenomenon. Every possible surviving detail has been collected; but the specimens and most of the notes were lost by misfortune of war.

The sequence of events was no different from that often previously described (e.g., Darmady et al. 1944)—namely, exsanguination, resuscitation, surgery, recovery, causeless deterioration (fifth day) with subnormal temperature and pulse but normal blood-pressure and urine, azotæmia, death (tenth day), inconclusive necropsy with near-normal kidneys showing tubular degeneration histologically. The description given by Bywaters (1944) of the muscular necroses in crush-syndrome applies accurately to these two cases, where there was no crush injury; the patches were friable, opaque, sometimes

RENAL DYSPLASIA IN A FAMILY WITH MULTIPLE HEREDITARY ABNORMALITIES INCLUDING ILIAC HORNS *

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With illustrations on plate

RECORDS of families suffering from a condition indistinguishable from chronic nephritis have been published occasionally since the beginning of this century. There is little doubt that this condition is hereditary and familial, for often several successive generations of a family are affected; but opinion has differed on whether there is a "weakness" of the kidneys predisposing to postnatal infection or whether the abnormality is in fact congenital.

Unlike those previously reported, the family I have studied presents a number of associated anomalies, whose congenital nature is indisputable. The association suggests that the renal lesion is also an inherited developmental anomaly.

PREVIOUS RECORDS

Dickinson (1875) mentioned a family of three generations suffering from albuminuria, and Guthrie (1902) described a family where 12 persons out of 15 suffered from hæmaturia with recurrent back pains and pyrexia. Their urine showed a permanent albuminuria with blood casts and a specific gravity of 1015–1030. As he observed neither œdema nor cardiovascular change, he ascribed these findings to weakness of the blood-vessels of the kidney. Hurst (1923) followed up the same family over ten years. He finally reported that 4 out of 8 members were affected in one generation, 8 out of 12 in the next, and 5 out of 8 in the third. Many of the family showed a typical nephritis with albuminuria, hæmaturia, and casts of all types, developing cardiac hypertrophy and dying from uræmia. Hurst called the disease hereditary because three generations were affected, familial because several members of one family were concerned, and congenital because in one instance abnormal urine was found in a child three weeks old, in another at two years, and otherwise in early childhood.

Descriptions by other writers have confirmed Hurst's views. Aitken (1909) mentioned a father dying from uræmia, 2 of whose children had hæmaturia during the first weeks of life. In 3 others, blood was seen in the urine at twelve to eighteen months and another had microscopical hæmaturia at eleven months. One died from uræmia at three years. He, too, emphasised periodic febrile attacks associated with anæmia. Similar records are given by Attlee (1901), Osman (1927), and others. In 1924 Eason et al. reviewed the subject as well as discussing two families of their own. They suggested that there was an intrinsic weakness, or *locus minoris resistentiæ*, in the kidney, and that a possible extrinsic factor in the recurrent attacks was a streptococcal infection. There is no denying that family vulnerability to a common infecting organism may explain some instances, but it hardly seems to account for the occurrence of the disease in successive generations.

The ætiology of this so-called familial nephritis is not clarified by histological study of the kidneys; for according to Osman (1949) there may be nothing to distinguish it from acquired chronic glomerular nephritis.

It may be relevant to note that Herxheimer (1908), when studying the kidneys of infants, found minute foci with increased connective tissue and atrophic urinary tubules, which, since there were no inflammatory changes, he attributed to an error in development, classing them with the hyaline glomeruli and small cysts common in kidneys of infants. Nicholson (1931) mentioned similar structures in an embryonic kidney tumour from a stillborn fœtus, and attributed them to a local arrest of the formation of collecting tubules and metanephric vesicles. Possibly a similar though more extensive failure of development may be responsible for the condition now being discussed.

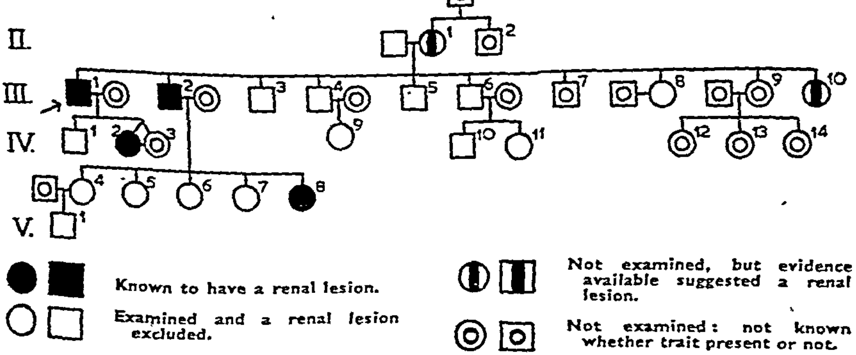
THE FAMILY

The Y family first came under observation because of their rare skeletal abnormalities, including iliac horns, which have hitherto received scant attention in the literature and have not been demonstrated as familial and hereditary.

Originating in a district which, far from being isolated, was open to the sea-routes of the world, the family had dispersed widely, as the brothers of the third generation sought employment elsewhere and brought up their own children under quite different environmental conditions. They were all of normal mental and physical development and not handicapped by their abnormalities. There was no history of consanguinity. In all, 36 members were traced or observed, and developmental anomalies of some kind were discovered in 21. Most of the latter were examined personally and no diagnosis of bony change was made except on radiological evidence. It was in the course of this study that 4 members (fig. 1) were found to be suffering from a renal lesion similar to chronic glomerular nephritis.

CASE-REPORTS

Case 1 (no. III 1).—John Y, aged 45 years, was a thin, pale, asthenic man who complained of frequency of micturition for some years but was otherwise well, apart from vague back pains, related to posture and probably originating from deformity of his spine. He was able to do heavy manual work, and there was no change in his condition during observation over three years. His previous health had been satisfactory: there was no history of renal disorder, but he had always been liable to frequent colds, nasal catarrh, and respiratory infections. He stated that his mother, who had died at the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V.
1
Known to have a renal lesion.
Examined and a renal lesion excluded.
Not examined, but evidence available suggested a renal lesion.
Not examined: not known whether trait present or not.

Fig. 1—Incidence of renal lesions.

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* Communicated to the Association of Physicians, June, 1949.

The signs and symptoms referable to the right arm were so pronounced that a diagnosis of embolism, probably from an aortic plaque, seemed obvious, and the pain in the chest (which was diminishing) was ascribed to a coronary thrombosis. Treatment with heparin and papaverine was started, and with caution 200 mg. of tetra-ethyl-ammonium bromide was given. On this régime the circulation in the arm began to improve; after 6 hours the radial pulse was just palpable and sensation and muscle power were returning. Later, the patient became very restless, and his pulse-rate began to rise. At 11.30 P.M. auricular fibrillation appeared, and the patient lost consciousness. *He died at 1.20 A.M.*

At necropsy, by Dr. E. A. Horne, the pericardium contained $^{1}/_{2}$ pint of recent blood-clot from rupture of the aorta. There was marked hypertensive hypertrophy of the left ventricle; the valves were normal.

Varying from 1·5 to 2 cm. above the aortic ring, there was a large irregular transverse tear of the intima, about 5 cm. in length, leading into a dissecting aneurysm of the thoracic aorta. There was some atheroma present (figs. 1 and 2). The innominate and carotid arteries and the right brachial and axillary arteries were dissected out and all found to be involved. In the artery to the right arm, the aneurysm stopped abruptly at the junction of the brachial and axillary artery, re-entering the vessel at this point. A cross-section of the vessel here showed almost complete obliteration of the lumen of the vessel by the inward displacement of the intima by blood (fig. 3).

The lungs showed acute pulmonary œdema.

DISCUSSION

The clinical picture produced by a dissecting aneurysm involving peripheral vessels is fairly clear cut, differing in several respects from that produced by an embolus.

Pain is of sudden onset, in the chest, back or abdomen, and is immediately maximal, causing much shock. It is due to the splitting of the aortic wall, and rupture of intercostal and lumbar arteries, and radiates or spreads into the limbs or up into the neck, depending on the course of the dissection. Embolism, on the other hand, is not necessarily associated with pain. Allen et al. (1946) state that in only 48% of cases of embolism are symptoms immediate, and when pain does occur it is usually confined to the limb involved.

In case 1 there was no clear history of pain at the commencement of the illness, but the dissection may have interfered with the blood-supply of the brain, causing loss of consciousness, and thus masking the pain.

Obliteration of Pulses.—Associated with the pain, after an interval, are the symptoms and signs of vascular occlusion, usually in the legs, but also in the viscera and brain (White 1947). There may only be a weakening of the pulse in the limb, or there may be evidence of complete arterial occlusion. This is due to the blood dissecting in the media and pressing the intima inwards. Half to three-quarters of the circumference of the vessel may be involved, and the intima displaced 0·5 to 1 cm. Vascular spasm adds to the effect of the encroachment on the lumen (fig. 3).

Associated Diseases.—Two factors are almost always associated with the production of a dissecting aneurysm —areas of medial necrosis of unknown origin, and hypertension. Atherosclerosis and syphilis as a cause are rare. The dissection is commonly initiated by a sudden strain.

Embolism usually occurs in a patient who has some obvious source for an embolus, such as mitral stenosis or auricular fibrillation, though thrombi may form on atheromatous plaques on the aorta. A dissecting aneurysm strikes down a previously healthy man, while the victim of an embolus is often in poor health. Coronary thrombosis as a cause of the pain in the chest can be excluded by the absence of the typical electrocardiographic changes.

Abnormal sounds on auscultation may give a useful lead in some cases, though in others they may be absent. Thus in case 1 the strong basal cardiac thrill should have caused us to pause and reconsider, had we not from the outset accepted the diagnosis of embolism without question. In this case the correct diagnosis was not made by us even after operation; though we were in possession of facts irresistibly pointing to the lesion, we failed from sheer ignorance to draw the proper conclusion. Subsequently, however, we have been able to diagnose abdominal aortic dissecting aneurysm masquerading as "acute surgical abdominal disease" simply from the presence of a rough murmur on auscultation.

Treatment.—It appears that when the dissection has spread to involve peripheral arteries, death follows quickly. In none of the cases which survive more than a few days is there any mention of symptoms of vascular occlusion.

The cause of death is usually rupture of the aorta into the pericardium or mediastinum, and the only treatment is absolute rest, but every effort should be made to overcome the vascular spasm present when the dissection reaches the peripheral arteries, which must contribute to the occlusion and add to the shock. Relaxation of the spasm may allow enough blood to flow into the limb to maintain its nutrition; the collateral circulation is uncertain because the origin of the vessels taking part in the anastomosis may be involved in the dissection.

Gurin et al. (1935) reported a case in which incision of the intima to allow the blood to re-enter the lumen of the vessel relieved the vascular obstruction sufficiently for the nutrition of the limb to be maintained until the patient's death six days later, but the chances of performing this operation must be rare indeed.

The modern trend in the treatment of emboli is to rely on the early application of conservative measures, with embolectomy held in reserve for the cases which do not quickly respond (Allen et al. 1946). These measures can have little adverse effect on the outcome of a dissecting aneurysm, but the result of failing to treat an embolus is disastrous, and so all cases of vascular occlusion, whatever the diagnosis, should immediately be started on conservative treatment. It is possible to diagnose an embolus as a dissecting aneurysm (Massachusetts General Hospital 1936).

The limb should be lightly covered and kept in a horizontal or very slightly dependent position, according to the presence or otherwise of œdema, at room-temperature. Opiates should be given for the pain, papaverine and/or tetra-ethyl-ammonium bromide to relieve vasospasm, and heparin to prevent intravascular thrombosis. A sympathetic block is a valuable addition to therapy. In case 2 these measures appeared definitely to benefit the circulation of the arm, and had the case been one of embolism, the limb would probably have regained normal function.

We are indebted to Mr. F. C. Hunt, under whose care these cases were admitted, for permission to publish them, to Dr. E. A. Horne for post-mortem examinations and much other valuable help, and to Mr. E. S. McLeod, M.S.R., C.T., for the photographs.

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PREVIOUS RECORDS

Dickinson (1875) mentioned a family of three generations suffering from albuminuria, and Guthrie (1902) described a family where 12 persons out of 15 suffered from hæmaturia with recurrent back pains and pyrexia. Their urine showed a permanent albuminuria with blood casts and a specific gravity of 1015–1030. As he observed neither œdema nor cardiovascular change, he ascribed these findings to weakness of the blood-vessels of the kidney. Hurst (1923) followed up the same family over ten years. He finally reported that 4 out of 8 members were affected in one generation, 8 out of 12 in the next, and 5 out of 8 in the third. Many of the family showed a typical nephritis with albuminuria, hæmaturia, and casts of all types, developing cardiac hypertrophy and dying from uræmia. Hurst called the disease hereditary because three generations were affected, familial because several members of one family were concerned, and congenital because in one instance abnormal urine was found in a child three weeks old, in another at two years, and otherwise in early childhood.

Descriptions by other writers have confirmed Hurst's views. Aitken (1909) mentioned a father dying from uræmia, 2 of whose children had hæmaturia during the first weeks of life. In 3 others, blood was seen in the urine at twelve to eighteen months and another had microscopical hæmaturia at eleven months. One died from uræmia at three years. He, too, emphasised periodic febrile attacks associated with anæmia. Similar records are given by Attlee (1901), Osman (1927), and others. In 1924 Eason et al. reviewed the subject as well as discussing two families of their own. They suggested that there was an intrinsic weakness, or *locus minoris resistentiæ*, in the kidney, and that a possible extrinsic factor in the recurrent attacks was a streptococcal infection. There is no denying that family vulnerability to a common infecting organism may explain some instances, but it hardly seems to account for the occurrence of the disease in successive generations.

The ætiology of this so-called familial nephritis is not clarified by histological study of the kidneys; for according to Osman (1949) there may be nothing to distinguish it from acquired chronic glomerular nephritis.

It may be relevant to note that Herxheimer (1908), when studying the kidneys of infants, found minute foci with increased connective tissue and atrophic urinary tubules, which, since there were no inflammatory changes, he attributed to an error in development, classing them with the hyaline glomeruli and small cysts common in kidneys of infants. Nicholson (1931) mentioned similar structures in an embryonic kidney tumour from a stillborn fœtus, and attributed them to a local arrest of the formation of collecting tubules and metanephric vesicles. Possibly a similar though more extensive failure of development may be responsible for the condition now being discussed.

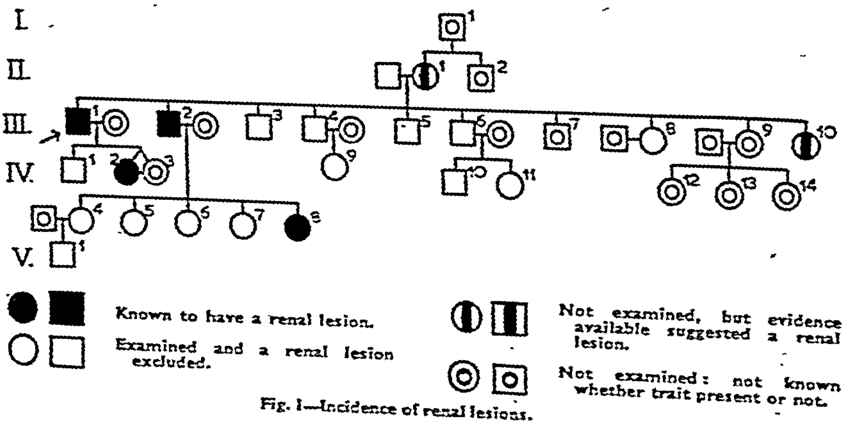
THE FAMILY

The Y family first came under observation because of their rare skeletal abnormalities, including iliac horns, which have hitherto received scant attention in the literature and have not been demonstrated as familial and hereditary.

Originating in a district which, far from being isolated, was open to the sea-routes of the world, the family had dispersed widely, as the brothers of the third generation sought employment elsewhere and brought up their own children under quite different environmental conditions. They were all of normal mental and physical development and not handicapped by their abnormalities. There was no history of consanguinity. In all, 36 members were traced or observed, and developmental anomalies of some kind were discovered in 21. Most of the latter were examined personally and no diagnosis of bony change was made except on radiological evidence. It was in the course of this study that 4 members (fig. 1) were found to be suffering from a renal lesion similar to chronic glomerular nephritis.

CASE-REPORTS

Case 1 (no. III 1).—John Y, aged 45 years, was a thin, pale, asthenic man who complained of frequency of micturition for some years but was otherwise well, apart from vague back pains, related to posture and probably originating from deformity of his spine. He was able to do heavy manual work, and there was no change in his condition during observation over three years. His previous health had been satisfactory: there was no history of renal disorder, but he had always been liable to frequent colds, nasal catarrh, and respiratory infections. He stated that his mother, who had died at the


I
II
III
IV
V
1
2
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7
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12
13
14
Known to have a renal lesion.
Examined and a renal lesion excluded.
Not examined, but evidence available suggested a renal lesion.
Not examined: not known whether trait present or not.

Fig. 1—Incidence of renal lesions.

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* Communicated to the Association of Physicians, June, 1949.

Nine members of the Y family were found to have these structures, and in each case the triad affecting the fingernails, elbow-joints, and patellæ was present as well. Unsuspected by their owners, the processes, if well developed, formed a slight visible elevation in the smooth contour of the buttock, and could otherwise be easily palpated beneath the gluteal muscles, about 8 cm. below the iliac crests and between 5 and 14 cm. from the midline according to their length. The larger ones (figs. 6 and 7) were striking features on the radiograph, whereas the rudimentary "horns" presented as a small but characteristic pattern in the centre of the ilium (fig. 8), a feature that could easily be missed unless attention was directed to the possibility of their presence. They were easily visible on the radiograph of a boy aged 9 months, and terminal epiphyses were seen on the iliac horns of a girl, aged 14 years (fig. 9).

One is impressed by the apparently purposeful nature of these structures, which are symmetrical and well shaped, unlike the irregular projections of exostoses. Stereoscopic radiography confirms their continuity with the iliac bones, with trabeculæ woven into them. The remark of Sir James Paget about congenital abnormalities is applicable; he said that "we ought not to set them aside with idle thoughts or idle words about 'curiosities' or 'chances.' Not one of them is without meaning; not one that might not become the beginning of excellent knowledge, if only we could answer the question —why is this rare? Or being rare, why did it in this instance occur?" (Paget 1882). However, ignorance concerning the mutational disorders has changed little since these words were spoken, and knowledge of the physiology and growth of bone is still slight.

MEMBERS OF THE Y FAMILY

Generation	No.	Sex	Age	History	Physical Examination *	Urine	Radiology
I	1	M	Dead	Died of old age. Said to have inherited the family triad (fingernails, elbows, patellæ) from previous generations	..	..	..
II	1	F	Dead	Died of dropsy at 64. Said to have the family triad	..	..	..
	2	M	Dead	Said to have the family triad	..	..	..
III	1	M	45	Case 1	Multiple angiomata. Pigeon-chest. Family triad. Palpable iliac horns. Thoracic kyphosis	Albumin + +. Casts of all types. Occasional red cells	Arthrodysplasia both elbows. Rudimentary patellæ. Iliac horns.† Spina bifida at *C6, 7, D1, 2, 3*. Long transverse processes C7. *Calcified disc at D10–11*
	2	M	42	Case 3	Multiple angiomata. Pigeon-chest. Family triad. Palpable iliac horns. Congenital cataract	Albumin + +. Casts of all types. Occasional red cells	Arthrodysplasia both elbows. Rudimentary patellæ. Iliac horns (small). Spina bifida C7, T1. Long transverse processes C7
	3	M	38	Rather frail. Rejected by the Army on physique	Hemidysplastic thumbnails; fingernails normal. Elbows: extension limited by 10° and supination by 40°. Patellæ small. Palpable iliac horns. Thoracic kyphosis. Short hamstrings. Lumbar spine stiff. Pes planus. Right pupil larger than left, but reactions normal; no other sign of organic disease. B.P. 155/95	Normal	Arthrodysplasia of elbows. Iliac horns. No spina bifida. Lumbar spine shows ankylosing spondylitis
	4	M	36	The most healthy man in this generation, showing excellent muscular development	Thumbnails show longitudinal split. Elbow changes moderate. Otherwise normal	Norma	Arthrodysplasia of both elbows. Both patellæ small. No spina bifida. No iliac horns
	5	M	35	Served in Regular Army, but had had a perforated duodenal ulcer and pulmonary tuberculosis	Thumbnails only were hemidysplastic. Elbows: pronation limited to 50°. Patellæ absent. Occasional angiomata on skin. Palpable iliac horns 8 cm. below iliac crest and 12 cm. from midline	Normal	Moderate degree of arthrodysplasia. Iliac horns, right larger than left (about 1 × 2 cm. on antero-posterior film). Spina bifida at C4, 5, 6, 7, T1. Long transverse processes at C7
	6	M	33	Healthy. Manual labourer	Left elbow: extension limited by 30°; flexion normal; pronation limited by 60°. Right elbow: extension limited by 10°; flexion normal; pronation limited by 50°. Left thumbnail almost absent; right thumbnail a small ridge at base of nail-bed. Fingernails normal. Patellæ just palpable. Occasional angiomata on skin. Thoracic scoliosis	Normal	Severe degree of arthrodysplasia of elbow-joints. Spina bifida at C4, 5, 6, 7. Long transverse processes at C7
	7	M	Dead	..	Born with family triad and also polydactyly. Died in infancy from hæmorrhage after removal of supernumerary little fingers	..	..
	8	F	39	Healthy, married with no family	Dysplasia of thumb and first fingernails. Elbows and patellæ almost normal	Normal	Slight arthrodysplasia of elbows. Iliac horns (rudimentary). Spina bifida at C6, D1 and 2. Long transverse processes at C7

Iliac horns might be an atavistic feature, but Fraser (1948) could not trace their occurrence in other mammals. They may be analogous to lumbar or sacral ribs. There is certainly no evidence to suggest their acting as muscle insertions, and anatomists such as Johnston (1948) think this unlikely. Apparently the most that can be said at present is that they are a rare mutational abnormality.

Genetic Aspect

The incidence of the various abnormalities found in the 36 members of the Y family who were traced was as follows:

The family triad:	
Dysplasia of fingernails Arthrodysplasia of elbow-joints Rudimentary patellæ	18
Iliac horns	9
Renal dysplasia	6
Cervical spina bifida with long transverse processes of C7	5
Cervical ribs	3
Angiomatosis of skin	3
Pigeon-chest	2
Thoracic kyphosis	2
Congenital cataract	3

The facts are set out more fully in the accompanying table, and illustrated in figs. 1–3.

There is no doubt that the commonest syndrome, the triad affecting the fingernails, elbow-joints, and patellæ —is the result of a simple heterozygous dominant gene. The occurrence of this in the third generation might suggest a sex linkage, and the incidence by chance in the sexes is on the borderline of probability, as $\chi^2 = 5{\cdot}84$ ($P = 0{\cdot}05$). However, the impression of a sex-incidence is probably due to the greater number of brothers born: in other words, it is probably incidental, for there is no known sex-linkage which could have affected *no.* II 1 (female) and come through her to the seven males of the third generation.

With one doubtful exception (III 10) the instances of iliac horns, renal dysplasia, pigeon-chest, cutaneous

MEMBERS OF THE Y FAMILY—*continued*

Generation	No.	Sex	Age	History	Physical examination *	Urine	Radiology
III	9	F	45	Said by all the siblings to be quite healthy and to have no abnormalities. She stated that her three children were unaffected by the family features	Refused examination	..	..
	10	F	Dead	Died, at 47, from dropsy. Stated by family doctor to have suffered and died from chronic nephritis. No opinion whether she had the family triad	..	..	..
IV	1	M	22	Said by his father to have the family triad. Accepted A1 by Army	Not examined	..	..
	2	F	20	Case 2. Quite well. No symptoms	Nails of thumbs and first fingers dysplastic. Deformed elbows. Small patellæ. B.P. 140/80	Albumin + +. Red cells. Sp. gr. 1020	Arthrodysplasia both elbows. No iliac horns. Spine normal. Normal renal shadows
	3	F	Dead	Twin to case 2. Said to be an identical twin and to possess family triad. Died accidentally at 18 years	..	..	..
	4	F	23	Healthy married woman well aware that she had the family triad	Nails of thumbs and first fingers [illegible] affected. [illegible] Skin [illegible] horns	Normal	Moderate arthrodysplasia both elbows. Patellæ small. Iliac horns (3 × 1·8 cm.). Bilateral cervical ribs. No spina bifida.
	5	F	19	Normal and healthy apart from congenital cataract	Family triad absent. Bilateral cataract	Normal	Elbows, patellæ, and spine normal. No iliac horns
	6	F	14	Healthy girl. Normal development. Triad present	Nails of thumbs and first fingers dysplastic. Small patellæ. Palpable horns	Normal	Slight arthrodysplasia both elbows. Iliac horns (3·2 × 2 cm.) with terminal epiphyses (fig. 9). Bilateral small cervical ribs. Spina bifida L5 and S1 only
	7	F	11	Normal and healthy apart from congenital cataract	Family triad absent. Bilateral cataract	Normal	Elbows, spine, and pelvis normal
	8	F	8	Case 4. Development normal	Nails of thumbs and first fingers dysplastic. Skin normal. Elbows deformed	Albumin + +. Casts of all types. Red cells	Slight arthrodysplasia of elbows. Renal shadows normal. Spine normal. No horns
	9	F	5	Healthy. Normal development	Thumbnails absent. Nails of first fingers rudimentary. Small patellæ. Skin normal	Normal	Slight arthrodysplasia both elbows. No iliac horns. Bilateral cervical ribs. No spina bifida. Bones of hands normal
	10	M	10	Normal apart from psoriasis	No congenital abnormalities	Normal	..
	11	F	3	Normal	No abnormalities	Normal	..
	12 13 14	F F F	.. .. ..	Three daughters said by mother to be free from defects	..	..	..
V	1	M	2	Normal healthy baby with family triad	Thumbnails hemidysplastic. Nails of first fingers dysplastic	Normal	Well-developed iliac horns. Impossible, at that age, to detect changes in elbows or spine

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* This included examination of cardiovascular system (including blood-pressure) and locomotor and central nervous systems. No comment is made when these are normal.

† Measurement of iliac horns on oblique films unless stated otherwise. Size given = length × diameter at base.

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	8	F	39	Healthy, married with no family	Dysplasia of thumb and first fingernails. Elbows and patellæ almost normal	Normal	Slight arthrodysplasia of elbows. Iliac horns (rudimentary). Spina bifida at C6, D1 and 2. Long transverse processes at C7

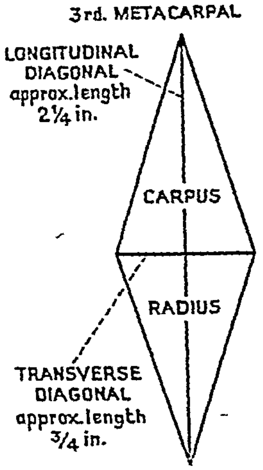
3rd. METACARPAL
LONGITUDINAL DIAGONAL approx. length 2¼ in.
CARPUS
RADIUS
TRANSVERSE DIAGONAL approx. length ¾ in.

Fig. 2—Diagram to show measurements of bed.

The bone enclosed within the diamond-shaped cut is removed by a small gouge: it includes the posterior half of almost the whole width of the lower radial articular surface and the greater part of the articular surfaces of the scaphoid, semilunar, and os magnum. The length and breadth of the diamond-shaped bed are now measured, and a graft is cut from the lower part of the medial surface of the tibia of a size to fit tightly into it. This is not difficult: the area is defined by marking out on the bone the transverse and longitudinal diagonals of the diamond so that they bisect each other at right-angles, and joining their extremities (fig. 3). If the graft is cut from the appropriate part of the tibia, its cortical surface will be concave and its cancellous surface convex (figs. 4 and 5). It should be so cut that its greatest width corresponds to the summit of the convexity.

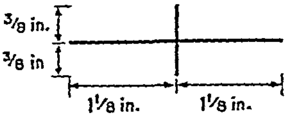

Fig. 3—Diagram to show measurements of graft.

The graft is now transferred to the wrist and punched into the bed already made for it, the proximal pointed angle being slotted under the cortical surface of the upper corner of the bed, and (traction being applied to the wrist) the lower pointed angle slotted into the third metacarpal in the manner used for Brittain's arthrodesis. It is not necessary to cut steps in the proximal and distal angles of the graft: cutting steps in the ends of a graft always weakens it. If the graft is made with pointed ends, and so can be slotted into the metacarpal and radius, the necessity for steps is avoided. With this method, in contrast to Brittain's, the graft is laid with its cancellous surface downwards and not directed to the radial or ulnar sides. I believe that any drawbacks to placing the graft in such a way are offset by the fact that the maximum width of the graft corresponds to the site of the maximum strain, and that the actual width of the graft at this site is much greater than the width of Brittain's graft. When the graft is being fitted the wrist must be put in a position of dorsiflexion neither too little nor too great; and if the long axis of the graft is made to run truly from the central axis of the radius to the base of the third metacarpal there will be neither undue radial nor undue ulnar deviation. Cancellous-bone chips taken from the donor area are packed around the graft. After the extensor retinaculum has been sutured and the wound closed, the wrist is immobilised in plaster for at least two months (fig. 6).

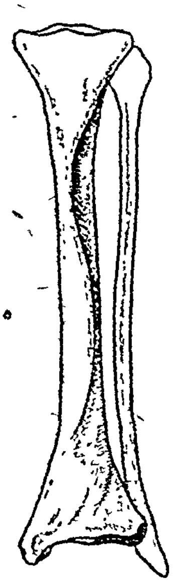

Fig. 4—The lower part of the medial surface of the tibia is concave forwards. A graft can be cut from this portion to fit the dorsiflexed wrist. Furthermore, removing the graft from this portion of the tibia makes cancellous bone chips available.

ADVANTAGES

1. Union is promoted because the greatest amount of bone is removed at the level of the joint; the greatest width of the graft is at joint level; cancellous-bone is used as well as cortical bone; and fixation is secure.

2. Stable fixation is achieved by fixing the graft at both ends by means of the method of slotting; using the inlay method when applying the graft, and having the greatest width of the graft at the site of the greatest possible movement (i.e., at the radio-carpal joint level). As the shape of the graft naturally fits dorsiflexion of the wrist, no attempt is made to strain the graft out of its normal shape (fig. 5). Being curved, the graft fits down into the bed throughout its length.

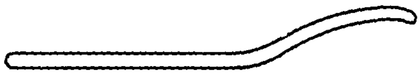

Fig. 5—Graft in profile.

3. No bulky mass is laid on the back of the radius and carpal bones. The extensor tendons will lie back evenly in place because the bony contour is little altered —except of course, that Liston's tubercle is removed when the graft bed is excised.

4. The movements of pronation and supination are preserved. In dealing with a joint in which these movements are already destroyed the lower end of the ulna can be removed in the course of operation with a view to restoring them.

I wish to thank Miss Jean Evison for her help with the illustrations and preparation of this article.

BASILAR INVAGINATION IN PAGET'S DISEASE

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With illustration on plate

Basilar invagination (*syn.* basilar impression, platybasia) is a rare craniovertebral deformity due to the foramen magnum and surrounding bone being pushed up into the posterior fossa by the atlas. The upper cervical vertebræ are thus displaced upwards, and usually forwards. In the majority of cases a congenital developmental anomaly of the basi-occiput, atlas, and axis is responsible; in the remainder the condition is almost always the result of Paget's disease. Neurological symptoms are common in the congenital but rare in the acquired type. They are significant of pressure on: (1) the hind brain and lower cranial nerves by the invaginated bone, accentuated by the correspondingly smaller posterior fossa; (2) the medulla and upper cervical cord by a narrowed foramen magnum, and distorted upper cervical canal, aggravated perhaps by the frequent, usually unequal, herniation into them of the cerebellar tonsils. Syndromes produced may simulate syringomyelia, disseminated sclerosis, tumour of the posterior fossa, motor neurone disease, and other disorders. Internal hydrocephalus is likely to complicate the severer degrees of deformity.

In only one of the cases secondary to Paget's disease so far published has involvement of the central nervous system been noted (Ray 1942). A second case is reported here.

CASE-RECORD

The patient, an obese woman of 56, was brought to hospita late one evening in a state of coma.

History.—She had developed during the preceding fortnight an unusual habit of dozing in her chair of an evening. On the previous afternoon she had fallen deeply asleep and could not angiomata, and spinal deformities all occur in members of the family bearing the characteristic triad. Congenital cataract, appearing in the eldest of the seven brothers (III 2), affects his two daughters (IV 5 and 7) who are otherwise normal; it may appear by chance, and will not be included further in the discussion of the main abnormalities.

Two explanations of the Y pedigree then seem possible.

1. That the numerous and diverse congenital anomalies are due to the action of a single, rather versatile gene, which shows variations in penetrance for particular characteristics.
2. By analogy with the recent theories concerning the blood-group genes (Fisher 1949), it is possible that several genes, closely associated on the same chromosome, may be responsible. These loci may be so near together that crossing-over hardly ever occurs and they act as a unit in inheritance.

CONCLUSION

A type of renal dysplasia is described which presents the same clinical picture as chronic glomerular nephritis. Thus there is persistent albuminuria with casts of all types and occasional red blood-cells. Renal function is slightly diminished and radiography shows kidney shadows of normal size and shape. A 'Uroselectan' (iodoxyl) study excludes polycystic disease. Four definite cases are recorded and two probable ones, both the latter having died with generalised œdema.

This form of dysplasia may account for the so-called familial congenital nephritis described by previous writers. When such families are discovered in future a careful search may reveal other hereditary anomalies. No opportunity has arisen in the present family for detailed pathological study; but, if the analogy with congenital nephritis is correct, there is probably nothing to distinguish the final picture from acquired chronic glomerular nephritis. The course of this developmental renal lesion may, however, be more benign than the acquired disease. The general condition of the patients was good and hypertension was found in only one. A child aged 8 years showed normal physical development with no sign of renal rickets. The oldest living person was 45, and the two thought to have died from the condition lived to 64 and 47 years.

The Y family also possess a great number of congenital abnormalities affecting tissues both of ectodermal and mesodermal origin. The commonest trait involves *the fingernails, elbow-joints, and patellæ and is known* by the family to have been inherited from distant ancestors.

Many who have this triad also show other changes affecting the skin, vertebral column, and pelvis. A particular study has been made of iliac horns, because these have hitherto had scant attention and have not been demonstrated as a hereditary characteristic. It is thought that the detailed analysis of so many widely scattered developmental errors may in the distant future be of some value in preparing a map of the human chromosome.

I am very grateful to Dr. F. Parkes Weber for his enthusiastic encouragement, and also to Prof. Lancelot Hogben, F.R.S., and Dr. A. A. Osman for their helpful advice. Acknowledgment is made to Dr. Harold Black for permission to reproduce the radiographs; and the investigation would not have been possible without the ready coöperation of Sister Le Gallais and the staff of the X-ray department. Grateful appreciation is expressed to Dr. A. A. Cunningham and Dr. Ian MacCallum for help with cases in their area, and I would like to thank Prof. P. C. P. Cloake for permission to study the original case which was discovered in his outpatient department.

I am indebted to the Medical Research Council for a grant to cover the expenses of this work.

References at foot of next column

A METHOD OF
ARTHRODESIS OF THE WRIST

DAVID F. THOMAS
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WAR MEMORIAL HOSPITAL AND LINDSEY COUNTY COUNCIL

With illustration on plate

THE operation described here has been designed to promote a more certain arthrodesis of the wrist in a good position than is generally achieved. It has advantages over the usual methods, and consists essentially in fusion of the joint by a diamond-shaped inlay graft.

THE METHOD

A posterior, midline incision is made from the base of the third metacarpal to a point about 2 in. proximal to the lower end of the radius. The extensor retinaculum is divided and reflected on each side, and the extensor tendons are separated between the extensor digitorum communis on the one hand and the extensor proprius indicis and longus pollicis on the other hand. The whole of the posterior surface of the lower 2 in. of the radius is cleaned, and the posterior surfaces of the semilunar, scaphoid, and os magnum, as well as the base of the third metacarpal, are also cleaned. A diamond-shaped bed is now cut (fig. 1). The wrist must be in moderate dorsiflexion when this is done. The most distal corner of the bed includes the base of the third metacarpal. The most proximal corner is the same distance from the lower margin of the radius as this margin is from the base of the third metacarpal; and the line joining the distal and proximal angles should bisect the line joining the medial and lateral angles (fig. 2). The medial angle is just lateral to the medial angle of the lower end of the radius and the outer angle a little medial to the tip of the styloid process of the radius. The saw-cut is about $^3/_8$ in. deep throughout its extent.

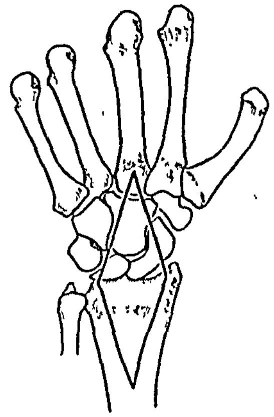

Fig. 1—The diamond-shaped bed is cut from the lower part of the radius, the greater part of the semilunar, scaphoid, and os magnum, and from the base of the third metacarpal bones. Both apices of the bed are tunnelled so as to allow for slotting of the graft after the manner of Brittain's operation. At the medial angle of the diamond care is taken to avoid encroaching on the inferior radio-ulnar joint.

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gait—the identical earliest symptoms manifested by Ray's patient. Secondly, the Paget skull and the shortened neck. And thirdly, the signs of increased intracranial pressure—papillœdema and coma (preceded by hypersomnia), later shown to be due to internal hydrocephalus of the communicating type. The hydrocephalus was undoubtedly caused by obstruction of the subarachnoid space at the incisura tentorii, and must have been present for some time to produce such advanced changes in the pituitary fossa. The sudden coma may have coincided with development of cerebellar tonsillar herniation but more probably signified that the hydrocephalus had attained a degree which the diseased skull was incapable of accommodating. Radiological findings were characteristic; they are the only certain means of diagnosis during life.

We do not think that lumbar puncture or mastoidectomy appreciably affected the fatal issue. The latter operation proved that the deafness, a common symptom in uncomplicated Paget's disease, was largely due to destruction of the ossicles by the disease process. Suboccipital decompression would have eased pressure on the hind brain, and might even have saved the patient's life.

SUMMARY

A rare case of acquired basilar invagination with involvement of the central nervous system, due to Paget's disease, is reported. A unique feature was the development of internal hydrocephalus and coma leading to a fatal termination.

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MEDICAL ASPECTS OF CARCINOMA OF THE PROSTATE WITH SECONDARY DEPOSITS IN BONE

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With illustrations on plate

THE discovery that œstrogens can be used efficiently in the treatment of prostatic carcinoma has made early and correct diagnosis of great importance. Carcinoma of the prostate may be indistinguishable clinically from simple hypertrophy, even though it may already have given rise to metastases. It is therefore very fortunate that a biochemical test—the estimation of acid phosphatase in the serum—has proved of such value in diagnosis, especially when there are osseous metastases.

DEVELOPMENT OF THE TEST

Slight increases in the serum acid phosphatase have been recorded in various non-prostatic conditions, one of the most important of which is Paget's disease of bone. This is especially to be noted, because great difficulty may be experienced in differentiating between the radiological pictures of osteoplastic metastases in the pelvis and Paget's disease. If the serum acid phosphatase is found to be very high, then there is no doubt of its significance; but if it is only slightly raised (5–10 units) then Paget's disease is not excluded (Watkinson et al. 1944, Herbert 1946).

A notable advance was made by Herbert (1944, 1945) when she demonstrated that prostatic acid phosphatase in serum is destroyed by alcohol but that acid phosphatase in normal serum (produce by extraprostatic tissues) is alcohol-stable. Thus the moderate increase in serum acid phosphatase sometimes found in Paget's disease is all alcohol-stable, whereas in metastasising prostatic carcinoma, with raised serum acid phosphatase, treatment of the serum with alcohol lowers the titre usually to normal. Occasionally even when the total serum acid phosphatase titre is not raised a significant amount of prostatic phosphatase in the serum may enable a diagnosis of prostatic carcinoma to be made. Thus out of 29 cases of prostatic carcinoma in which the total acid phosphatase was normal there was a significant fall in titre in 5 cases after alcohol treatment (Herbert 1946). In normals the drop in acid phosphatase when the serum is treated with alcohol should not be more than 1 unit, and if a suspicious fall is encountered a repetition of the test will settle the point. From Herbert's series also it can be seen that the diagnostic value of the test is limited to some extent by the fact that prostatic phosphatase is not always found in the serum in prostatic carcinoma, though it is nearly always present when there are metastases in bone. Later, Herbert (1946) found the serum acid phosphatase raised in 29 out of 35 cases of prostatic carcinoma with bone metastases; but only 12 out of 47 showed an increase in titre when there was no evidence of metastases radiologically. There is little doubt that in these 12 patients chemical evidence of metastatic spread anticipated X-ray demonstration.

LEUCO-ERYTHROBLASTIC ANÆMIA

This is a term used for an anæmia characterised by the presence in the peripheral blood of immature red cells and a few immature white cells of the myeloid series. Vaughan (1936) studied 13 patients with such an anæmia and found that carcinomatosis was the cause in 8 cases. Other conditions which have been responsible are marble-bone disease of Albers-Schönberg, myelosclerosis, multiple myelomatosis, and Hodgkin's disease.

In the adult, carcinomatosis of bone is much the most important cause of this type of anæmia; Vaughan's 8 cases were from a series of 55 carcinomatous patients of whom 24 had bone lesions. The incidence of leuco-erythroblastic anæmia in carcinomatosis did not seem to be influenced by the nature of the primary growth, the length of history, the degree of skeletal involvement, or the character of the bony change (osteolytic or osteoplastic). Nor was any relation found between the degree of anæmia and the incidence of leuco-erythroblastic anæmia. Thus one patient with a red-cell count of 5,300,000 per c.mm. had as many as 106 nucleated red cells per 200 leucocytes, while another patient with a red-cell count down to 3,400,000 per c.mm. had only 1 nucleated red cell per 200 leucocytes (Vaughan 1936).

Pathological examination by Vaughan revealed an increase of red-marrow in patients with carcinomatosis and leuco-erythroblastic anæmia, and she came to the conclusion that the blood picture was probably the result of dyshæmopoiesis due to the foreign tissue in the marrow disturbing the nutrition of the erythropoietic tissue. This anæmia, however, is non-specific, and it may be that the presence of immature cells is due to stimulation of the bone-marrow rather than to actual interference with its nutrition.

CASE-RECORDS

The 6 patients with carcinoma of the prostate and secondary bone metastases, whose histories I shall now describe, were encountered in a general medical outpatient department over a period of three years. It was not possible to verify the diagnosis histologically. The estimations of serum acid and alkaline phosphatase were done by the methods of Gutman and Gutman (1938) and King and Armstrong (1934) respectively.

be roused. The stupor persisted. About three months ago she had badly "ricked" her neck, momentarily thinking it was broken. Subsequently, to prevent or ease pain, she would clasp her hands to the back of her head and neck when coughing; and seldom did she pass a night without sitting up in bed and rubbing her neck with embrocation. Her gait had been rather unsteady for two months. She had never complained of dizziness, headache, or impaired vision. No increase in the size of her head had been remarked, nor was any head injury remembered. A purulent right aural discharge had recurred occasionally since childhood. Increasing deafness had been noted for eighteen months.

Examination.—Patient comatose, but responded to painful stimuli by opening her eyes and moving her limbs, though quite oblivious of her surroundings. General condition good. Temperature 104°, pulse-rate 120. Head abnormally large and typical of Paget's disease; any movement seemed painful. Right mastoid slightly œdematous; pressure greatly resented and evoked much grimacing. Neck very short; no retronuchal rigidity. Both eyes prominent; pupils sluggish to light; optic discs blurred, especially on right side. Deep reflexes active and equal, abdominal reflexes absent, plantar responses equivocal. Incontinence of urine. Eardrums opaque and thickened, upper part of right one inflamed. Blood-pressure 170/110 mm. Hg. Urine contained albumin +, trace of sugar, and acetone + +.

Progress and Treatment.—Next morning a mild erysipeloid eruption was apparent on the upper part of the forehead. No increase of papillœdema. Careful lumbar puncture yielded a clear and colourless fluid under pressure of 200 mm. rising to 250 mm. with right jugular compression; protein content 15 mg. per 100 ml.; one lymphocyte per c.mm. counted. Slight subsequent lessening of the coma. White-cell count 36,000 per c.mm. (polymorphs 34,560, lymphocytes 720, monocytes 720).

A provisional diagnosis of right mastoiditis and associated temporosphenoidal abscess was made, and penicillin (200,000 units intramuscularly every four hours) was started. After consultation, right radical mastoidectomy was performed: bone very spongy, antrum located at a very great depth; middle ear filled with granulations; complete absence of all ossicles except handle of malleus; dura exposed, seen to be slightly bulging and covered with granulations; brain probed and a gush of cerebrospinal fluid obtained, no pus; lateral sinus exposed, healthy; plastic flap cut and wound closed. When she recovered from the anæsthetic, general condition seen to be still good; depth of coma, if anything, lighter. About sixteen hours later, however, she became unconscious and she died soon afterwards.

Post-mortem Examination.—The appearance of the *skull* was typical of advanced Paget's disease. Maximal circumference 64 cm. Anteroposterior diameter 21·7 cm. Transverse diameter 18·0 cm. Vault very soft and vascular; thickness averaged 2·0 cm. Base grossly deformed. Floor of posterior fossa raised; lateral margins of foramen magnum level with the superior borders of petrous temporal bones. Wide pituitary fossa. Recent clean right radical mastoidectomy wound evident. The *other bones* showed no naked-eye evidence of osteitis deformans.

There was moderate flattening of the convolutions of the *brain*. Cerebellar hemispheres much flattened; tonsils herniated into spinal canal on each side of upper cervical cord, the right one more than the left (fig. 1). Anterior grooving of medulla where pressed against rim of foramen magnum. Section revealed an internal communicating hydrocephalus, with moderate dilatation of all four ventricles. No meningeal adhesions or thickening in region of incisura tentorii. The *pituitary gland* was saucer-shaped with concavity upwards; weight 1·3 g.; no histological abnormality.

No significant pathological change was seen in the *heart*; weight 420 g. The *aorta* showed a moderate degree of atheroma. Basal congestion and slight generalised œdema of the *lungs*. Cholesterosis present in the *gall-bladder*, which contained two mixed stones. The *kidneys* were slightly smaller than average; outer surfaces smooth; some relative cortical reduction; stained sections showed early hypertensive changes.

X-ray Examination (posthumous).—The appearance of the skull was that of advanced Paget's disease (fig. 2). Gross thickening, especially in frontal region and vertex, where thickness measured 3·2 cm., the average being 2 cm. Region of foramen magnum invaginated, with upward and forward displacement of atlas and axis. Angle formed by plane of hard palate and that of atlas (Bull 1946) was 17°; normally the planes are roughly parallel. Posterior fossa much narrowed. Sella turcica grossly widened (anteroposterior diameter 2·25 cm.); posterior clinoids distorted and eroded. Radiography of the other bones showed early Paget's changes in the right ilium.

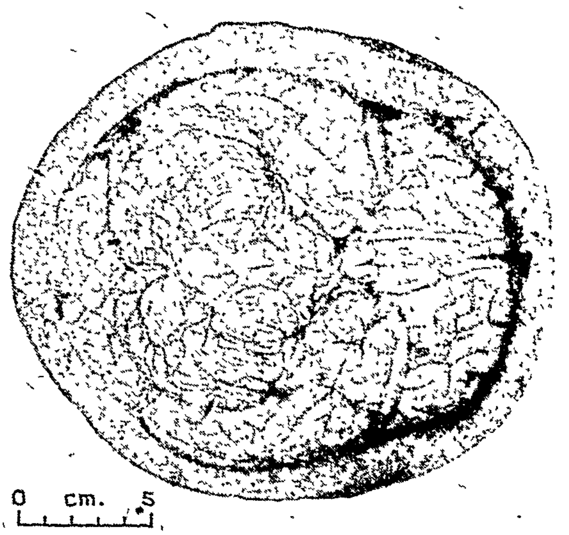

Fig. 1—Thickened vault of skull and base of brain showing flattening of cerebellar hemispheres, herniation of tonsils, and distortion of medulla.

DISCUSSION

Although platybasia was mentioned by Rokitansky as long ago as 1844 (Ebenius 1934), it has had scant attention in the literature, especially in this country. Boogard (1868) gave a detailed account of the changes in the skull, and Homén (1901) correlated neurological and pathological findings. Schüller (1911) made the first radiological diagnosis. Chamberlain (1939) aroused an interest in the subject that would doubtless have been greater but for the intervention of the war. He diagnosed "basilar impression" if the odontoid process projected above a line drawn from the dorsal lip of the foramen magnum to the dorsal margin of the hard palate. Moreton (1943), using this method, collected 139 cases, of which 41 had congenital changes in the cervical portion of the spinal column and 98 showed no such abnormality. He stated that multiple sclerosis had to be excluded in 5 of the latter cases, and that 6 of them had Paget's disease with symptoms only of the primary condition. Saunders (1943), however, showed that 35 out of a 100 normal people examined had odontoid processes projecting above Chamberlain's line. Apart from Moreton's series we have been able to find only 6 published cases of acquired basilar invagination, 5 secondary to Paget's disease—1 reported by Ray (1942), and four by Bull (1946)—and 1 due to osteogenesis imperfecta (Ray 1942). Only Ray's 2 patients showed involvement of the central nervous system.

Our case was wrongly diagnosed as mastoiditis (possibly complicated by cerebral abscess) on the history of chronic intermittent aural discharge and increasing deafness, and the demonstration of apparent mastoid tenderness and œdema, inflamed drum, fever, polymorphonuclear leucocytosis, slight papillœdema, and coma. The subsequent mild erysipeloid infection, improved incidentally by the penicillin exhibited, was considered quite inadequate to account for the symptoms (though evidently it caused the fever and leucocytosis). The possibility of basilar invagination never occurred to us.

Yet ample evidence was there. First, the history of pain in the back of the head and neck, aggravated or induced by coughing, and subsequent unsteadiness of

complain of weakness and general lethargy along with loss of weight. The prostate was diagnosed as malignant on rectal examination in four cases, but the prostate of cases 1 and 2 did not become clinically malignant until six months after the first attendance.

Cases 1, 2, and 4 showed initial serum acid phosphatase values above 10 units, but cases 3 and 5 showed only moderate elevation (5·5 and 7 units) and case 6 no rise at all. It is important to note however that cases 3 and 5 showed a significant fall in titre with alcohol treatment, and case 6 also showed a decrease but to a lesser degree. It has been pointed out above that similar slight elevations of serum acid phosphatase may occur occasionally in other conditions, especially in Paget's disease. I have examined the sera of 6 patients with Paget's disease and found the acid phosphatase normal in all except one, in whom the value was 13 units on repeated estimation. Alcohol treatment of the sera in these cases caused no lowering of the acid phosphatase even in the patient with 13 units.

Anæmia, which may be rapidly progressive (case 1), was found in all 6 patients. The initial hæmoglobin varied between 7·7 and 11·0 g. per 100 ml. and the colour-index was about 0·9 in each case. The white-cell count varied between 3700 and 11,300 per c.mm., and myelocytes were found in 3 patients while normoblasts were present in 4. In the only blood-count on case 3 no immature cells were found. This type of anæmia may be a very early feature (cases 1 and 2), so that when it is found, all possible primary sites of secondary bone metastases should be investigated. The spleen was definitely enlarged in case 5, possibly owing to myeloid metaplasia. Vaughan (1936) also noted such an enlargement in one patient with leuco-erythroblastic anæmia due to carcinoma.

From the case-histories it can be seen that interpretation of X-ray films of the pelvis can be extremely difficult; it may be almost impossible to decide whether an osteoplastic lesion is due to Paget's disease or to prostatic metastases in bone. Increase in the thickness of the bone is said to favour the former (Shanks et al. 1939). Paget's disease was actually mentioned in 4 of the cases (1, 2, 3, and 4), but after further consideration the changes found in cases 1 and 2 were said to be more suggestive of carcinoma. Case 4 was reported to have secondary bone metastases in addition to Paget's disease, but case 3 showed changes which were interpreted as solely due to Paget's disease. It may be, of course, that cases 3 and 4 have both diseases; but this is extremely difficult to prove in the absence of histological examination. Cases 1 and 6 illustrate the well-known fact that clinical symptoms of metastases may appear many months before radiological changes become apparent.

Clinically, the patients were enormously improved by treatment. In each case the bone pains were relieved in less than a week. This effect is most dramatic and can be used as a therapeutic test. Nocturia and dysuria, when present, were only slightly improved, in spite of the fact that the prostate usually decreased in size. The appetite and weight returned to normal. With stilbœstrol the serum acid phosphatase fell in each case, but normal figures were only obtained in 2 out of 5 patients (cases 3 and 5), though the amount in case 1 came down almost to normal. The method of alcohol inactivation caused almost complete disappearance of prostatic phosphatase in case 5 only. The total serum acid phosphatase of case 6 was, of course, normal even before treatment; but there was a significant amount of prostatic phosphatase, which decreased with treatment. The serum alkaline phosphatase slowly rose and later fell in cases 1 and 3 and this has been interpreted as evidence of osteoblastic activity associated with healing (Huggins and Hodges 1941). When cases 2 and 3 relapsed there was no rise in either the acid or alkaline phosphatase, but when case 1 relapsed, as he did on two occasions, there was a decided rise in the serum acid phosphatase.

A study was also made of the effect of stilbœstrol on the serum acid and alkaline phosphatase of 6 patients with Paget's disease. The acid phosphatase was not affected, and the alkaline phosphatase either remained stationary or slowly fell. Thus examination of the effect of œstrogens on the serum acid and alkaline phosphatase may help in deciding between Paget's disease and secondary prostatic metastases; moreover, as already noted, the rapid disappearance of pain in the latter and not the former will soon decide the issue.

The anæmia was not affected by iron or liver preparations. Stilbœstrol also had no effect on the hæmoglobin but the immature cells disappeared in case 1 after the start of this treatment. Stilbœstrol however had no effect on the number of immature cells in case 5.

Œstrogen therapy of carcinoma of the prostate is not a cure; it is merely palliative (Herger and Sauer 1941). Relapses do eventually occur and usually the patient is then resistant to further treatment, as is shown in cases 2 and 3.

SUMMARY

1. The serum acid and alkaline phosphatase levels were estimated in 6 patients suffering from prostatic carcinoma with metastases in bone.

2. The inactivation of prostatic phosphatase by alcohol has been shown to be of diagnostic value, especially in those cases where the total serum acid phosphatase is only slightly raised.

3. A leuco-erythroblastic type of anæmia has been noted in 4 patients.

4. The effects of stilbœstrol on the clinical course, on the serum acid and alkaline phosphatase, and on the anæmia have been observed.

5. Attention has again been directed to the similarity in the radiological appearances of the pelvis of Paget's disease and osteoplastic metastases. Differences in the behaviour of the acid phosphatase in these two conditions have been described.

I wish to thank Dr. A. H. Holmes, Dr. C. S. D. Don, and Dr. N. Kletts for permission to study their patients and for their encouragement and advice. Mr. H. Varley, M.SC., of the department of clinical pathology of the Manchester Royal Infirmary, kindly performed the phosphatase estimations. My thanks are also due to Dr. E. D. Gray and Dr. R. G. Reid for help in the interpretation of the X-ray films. For the photographs I am indebted to Mr. J. Kilshaw of the department of medical photography of the infirmary.

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"... it is clear that a new method should be introduced, by which housing subsidies are distributed only to municipal tenants who need them. The subsidies would be withdrawn from the houses to which they are at present attached and the rents fixed to cover costs. These rents would then be charged to tenants who could afford them.... Parallel to this revision of rents ... special arrangements would be made to help those families in need, by granting them a rebate on the rent."—*Planning*, April 24, p. 271. Published by P.E.P., 16, Queen Anne's Gate, London, S.W.1.

Case 1.—Aged 73; admitted February, 1946, with a history of weakness for three months, diffuse aching pains and irregular pyrexia for some weeks, loss of 1 st. in weight, and nocturia, not worse recently. On admission his temperature was 100°F, the patient appeared anæmic and there was a moderate firm enlargement of the prostate. Blood-count: red cells 3,960,000 per c.mm.; Hb 9·9 g. per 100 ml.; colour-index (C.I.) 0·91; white cells 11,300 per c.mm. (Differential count normal apart from 3·5% myelocytes.) Serum acid phosphatase 12 units (alcohol-stable fraction 2 units), alkaline phosphatase 33 units. Radiography of chest normal; pelvis and lumbar spine showed generalised osteoporosis with increased trabeculation, suggesting fibrous type of Paget's disease (fig. 1). Bone-marrow: hypoplasia without evidence of leukæmic change. Thus blood-examination showed leuco-erythroblastic anæmia on admission; but it was not until seven months later that radiography definitely confirmed the presence of metastases in the pelvis and lumbar spine (fig. 2). Stilbœstrol caused a fall in serum acid phosphatase (but a normal value was never obtained), a gradual rise (followed later by a fall) in serum alkaline phosphatase, and disappearance of immature cells from the peripheral blood. Neither iron, liver, nor stilbœstrol affected the hæmoglobin value. The patient relapsed in August, 1946, and then responded to increased dosage of stilbœstrol; but in September, 1947, when he relapsed again (fig. 3), presumably because he omitted to take the tablets, he failed to respond to stilbœstrol, dienœstrol, or orchidectomy. He lived for twenty-two months after the diagnosis was made.

The mode of presentation with irregular pyrexia and generalised pains is noteworthy. There had been no recent disturbance of micturition, and on rectal examination the surgeons considered the prostatic enlargement to be benign. Only six months later did it become definitely hard and clinically malignant.

Case 2.—Aged 62; admitted in February, 1947, with symptoms suggesting subacute intestinal obstruction. Pallor; slight enlargement of prostate. X-ray examination of colon negative; symptoms disappeared after enemata. Blood-count: red cells 3,450,000 per c.mm.; Hb 8·6 g. per 100 ml.; C.I. 0·90; white cells 4600 per c.mm. (Differential count normal apart from 2% myelocytes and 1 normoblast per 200 leucocytes.)

Readmitted in August, 1947, with four months' history of severe lumbar backache and pain in both thighs. Prostate enlarged and fairly hard. Blood-count: red cells 4,010,000 per c.mm.; Hb 10·8 g.; C.I. 0·97; white cells 4000 per c.mm. (Differential count normal and no immature cells.) Serum acid phosphatase 37 units (alcohol-stable fraction 6·3 units), alkaline phosphatase 69 units.

X-ray appearances of the pelvis suggested Paget's disease, though phosphatase values indicated secondary bony lesions from a carcinomatous prostate. The clinical response to œstrogen therapy was good, but when the patient relapsed increased dosage had no effect. He lived for thirteen months after the diagnosis was made.

The early leuco-erythroblastic anæmia should be noted; also, throughout the illness, the paucity of symptoms suggestive of prostatic disease.

Case 3.—Aged 68. In August, 1948, complained of lumbar backache and pain down front of both thighs (five weeks). Prostate enlarged, hard, and nodular. Nocturia had been present for two years but there was no recent exacerbation, and the predominant symptom was bone pain. Clinically there was no doubt that the prostate was malignant, but X-ray examination of the pelvis and lumbar spine suggested Paget's disease; no other bones affected. The initial acid phosphatase value was only 5·5 units, but of this 3·1 units were alcohol-labile. There was a good initial response to œstrogen therapy with a fall in the alcohol-labile fraction of acid phosphatase and a rise and subsequent fall in alkaline phosphatase. After seven months there was a relapse with no further response to œstrogens. The patient lived for eleven months after the diagnosis was made.

Case 4.—Aged 74. In August, 1948, he had lumbar backache and pain radiating down the front of right thigh (six weeks). In May, 1949, when I first saw him, the pain had gone into the left thigh. During the last six months there had been nocturia, and more recently dysuria with poor stream and terminal dribbling. Anæmic, with tenderness over the lumbosacral spine; prostate enlarged and hard. Blood-count: red cells 3,440,000 per c.mm.; Hb 10·1 g.; C.I. 0·99; white cells 6800 per c.mm. (Differential count normal apart from 8 normoblasts per 200 leucocytes.) Serum acid phosphatase 510 units (alcohol-stable fraction 9 units), alkaline phosphatase 91 units. This serum acid phosphatase value was the highest obtained in the series, and though œstrogen therapy failed to bring it down to normal, it caused the bone pain to disappear. Œdema was produced by the large dosage employed but subsided when the amount of œstrogen was reduced. Normoblasts were found in the first blood-count but not subsequently. The X-ray films suggested Paget's disease, this time in addition to secondary bone metastases. This patient is still under observation.

Again the first major symptom was pain in the lumbar region and thighs.

Case 5.—Aged 73. In June, 1949, complained of four months' flatulence, which had recently improved, sacral ache, and pain in both thighs together with a loss of 1 st in weight. Nocturia for several years, recently worse; now dysuria with poor stream and terminal dribbling.

He was a pale man in much pain, with hard mobile glands in both supraclavicular fossæ and left posterior triangle. Tenderness over sacral spine and outer aspect of right femur; spleen easily palpable; prostate enlarged, irregular, and hard. Blood-count: red cells 3,070,000 per c.mm.; Hb 8·3 g.; C.I. 0·92; white cells 3700 per c.mm. (Differential count normal apart from 4 normoblasts per 200 leucocytes and 7% myelocytes.) Radiography of pelvis and lumbar spine showed osteoplastic secondaries. Biopsy of a gland revealed a highly anaplastic carcinoma containing necrotic material. As in case 3, the serum acid phosphatase value was only slightly above normal but again a significant amount (3 units) was alcohol-labile. Stilbœstrol brought about a good clinical response and the acid phosphatase titre fell to normal, but there was no effect on the anæmia or the leuco-erythroblastic picture. The patient is still under observation. This was the only case in which the spleen was palpable.

Case 6.—Aged 61. In August, 1949, admitted with pain in the lower cervical spine extending down the right arm (seven months). More recently this had spread down left arm, and coughing produced paræsthesiæ in both arms. No disturbance of micturition. A mass of hard immobile glands in right supraclavicular fossa; prostate enlarged, hard, and nodular. Blood-count: red cells 3,950,000 per c.mm.; Hb 10·7 g.; C.I. 0·90; white cells 6500 per c.mm. (Differential count normal.) X-ray films of the cervical spine suggested some erosion of spinous process of the 6th cervical vertebra. After five days' treatment with stilbœstrol, 15 mg. daily, pains and paræsthesiæ much improved. The mass of glands disappeared after four weeks. Initial total serum acid phosphatase was within the normal range but inactivation by alochol showed the presence on one occasion of 1·3 units of prostatic phosphatase, and on another of 0·9 unit. These figures were not conclusive but taken in conjunction with the clinical picture indicate that the diagnosis was correct. Though the alcohol-labile fraction of serum acid phosphatase was only slightly raised before treatment, it nevertheless decreased with œstrogen administration. The patient is still under observation.

There was no disturbance of micturition and the predominant complaint was pain in the neck and down both arms. In fact the patient had been treated for a short time in the outpatient department by means of physiotherapy. The dramatic response to stilbœstrol acted as a therapeutic test.

DISCUSSION

All these patients gave a history of aching pain in the spine, usually in the lumbar region, with radiation into the limbs. When the legs were affected, as was usually the case, the pain was not of sciatic distribution and was usually bilateral, constant, and severe. The symptoms arising as a result of prostatic enlargement may be entirely absent (case 6) and when present are often of several years' duration; in 2 cases only (4 and 5) was there a recent exacerbation. The patients often

complain of weakness and general lethargy along with loss of weight. The prostate was diagnosed as malignant on rectal examination in four cases, but the prostate of cases 1 and 2 did not become clinically malignant until six months after the first attendance.

Cases 1, 2, and 4 showed initial serum acid phosphatase values above 10 units, but cases 3 and 5 showed only moderate elevation (5·5 and 7 units) and case 6 no rise at all. It is important to note however that cases 3 and 5 showed a significant fall in titre with alcohol treatment, and case 6 also showed a decrease but to a lesser degree. It has been pointed out above that similar slight elevations of serum acid phosphatase may occur occasionally in other conditions, especially in Paget's disease. I have examined the sera of 6 patients with Paget's disease and found the acid phosphatase normal in all except one, in whom the value was 13 units on repeated estimation. Alcohol treatment of the sera in these cases caused no lowering of the acid phosphatase even in the patient with 13 units.

Anæmia, which may be rapidly progressive (case 1), was found in all 6 patients. The initial hæmoglobin varied between 7·7 and 11·0 g. per 100 ml. and the colour-index was about 0·9 in each case. The white-cell count varied between 3700 and 11,300 per c.mm., and myelocytes were found in 3 patients while normoblasts were present in 4. In the only blood-count on case 3 no immature cells were found. This type of anæmia may be a very early feature (cases 1 and 2), so that when it is found, all possible primary sites of secondary bone metastases should be investigated. The spleen was definitely enlarged in case 5, possibly owing to myeloid metaplasia. Vaughan (1936) also noted such an enlargement in one patient with leuco-erythroblastic anæmia due to carcinoma.

From the case-histories it can be seen that interpretation of X-ray films of the pelvis can be extremely difficult; it may be almost impossible to decide whether an osteoplastic lesion is due to Paget's disease or to prostatic metastases in bone. Increase in the thickness of the bone is said to favour the former (Shanks et al. 1939). Paget's disease was actually mentioned in 4 of the cases (1, 2, 3, and 4), but after further consideration the changes found in cases 1 and 2 were said to be more suggestive of carcinoma. Case 4 was reported to have secondary bone metastases in addition to Paget's disease, but case 3 showed changes which were interpreted as solely due to Paget's disease. It may be, of course, that cases 3 and 4 have both diseases; but this is extremely difficult to prove in the absence of histological examination. Cases 1 and 6 illustrate the well-known fact that clinical symptoms of metastases may appear many months before radiological changes become apparent.

Clinically, the patients were enormously improved by treatment. In each case the bone pains were relieved in less than a week. This effect is most dramatic and can be used as a therapeutic test. Nocturia and dysuria, when present, were only slightly improved, in spite of the fact that the prostate usually decreased in size. The appetite and weight returned to normal. With stilbœstrol the serum acid phosphatase fell in each case, but normal figures were only obtained in 2 out of 5 patients (cases 3 and 5), though the amount in case 1 came down almost to normal. The method of alcohol inactivation caused almost complete disappearance of prostatic phosphatase in case 5 only. The total serum acid phosphatase of case 6 was, of course, normal even before treatment; but there was a significant amount of prostatic phosphatase, which decreased with treatment. The serum alkaline phosphatase slowly rose and later fell in cases 1 and 3 and this has been interpreted as evidence of osteoblastic activity associated with healing (Huggins and Hodges 1941). When cases 2 and 3 relapsed there was no rise in either the acid or alkaline phosphatase, but when case 1 relapsed, as he did on two occasions, there was a decided rise in the serum acid phosphatase.

A study was also made of the effect of stilbœstrol on the serum acid and alkaline phosphatase of 6 patients with Paget's disease. The acid phosphatase was not affected, and the alkaline phosphatase either remained stationary or slowly fell. Thus examination of the effect of œstrogens on the serum acid and alkaline phosphatase may help in deciding between Paget's disease and secondary prostatic metastases; moreover, as already noted, the rapid disappearance of pain in the latter and not the former will soon decide the issue.

The anæmia was not affected by iron or liver preparations. Stilbœstrol also had no effect on the hæmoglobin but the immature cells disappeared in case 1 after the start of this treatment. Stilbœstrol however had no effect on the number of immature cells in case 5.

Œstrogen therapy of carcinoma of the prostate is not a cure; it is merely palliative (Herger and Sauer 1941). Relapses do eventually occur and usually the patient is then resistant to further treatment, as is shown in cases 2 and 3.

SUMMARY

1. The serum acid and alkaline phosphatase levels were estimated in 6 patients suffering from prostatic carcinoma with metastases in bone.

2. The inactivation of prostatic phosphatase by alcohol has been shown to be of diagnostic value, especially in those cases where the total serum acid phosphatase is only slightly raised.

3. A leuco-erythroblastic type of anæmia has been noted in 4 patients.

4. The effects of stilbœstrol on the clinical course, on the serum acid and alkaline phosphatase, and on the anæmia have been observed.

5. Attention has again been directed to the similarity in the radiological appearances of the pelvis of Paget's disease and osteoplastic metastases. Differences in the behaviour of the acid phosphatase in these two conditions have been described.

I wish to thank Dr. A. H. Holmes, Dr. C. S. D. Don, and Dr. N. Kletts for permission to study their patients and for their encouragement and advice. Mr. H. Varley, M.SC., of the department of clinical pathology of the Manchester Royal Infirmary, kindly performed the phosphatase estimations. My thanks are also due to Dr. E. D. Gray and Dr. R. G. Reid for help in the interpretation of the X-ray films. For the photographs I am indebted to Mr. J. Kilshaw of the department of medical photography of the infirmary.

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"... it is clear that a new method should be introduced, by which housing subsidies are distributed only to municipal tenants who need them. The subsidies would be withdrawn from the houses to which they are at present attached and the rents fixed to cover costs. These rents would then be charged to tenants who could afford them.... Parallel to this revision of rents ... special arrangements would be made to help those families in need, by granting them a rebate on the rent."—*Planning*, April 24, p. 271. Published by P.E.P., 16, Queen Anne's Gate, London, S.W.1.

Case 1.—Aged 73; admitted February, 1946, with a history of weakness for three months, diffuse aching pains and irregular pyrexia for some weeks, loss of 1 st. in weight, and nocturia, not worse recently. On admission his temperature was 100°F, the patient appeared anæmic and there was a moderate firm enlargement of the prostate. Blood-count: red cells 3,960,000 per c.mm.; Hb 9·9 g. per 100 ml.; colour-index (C.I.) 0·91; white cells 11,300 per c.mm. (Differential count normal apart from 3·5% myelocytes.) *Serum acid phosphatase* 12 units (alcohol-stable fraction 2 units), alkaline phosphatase 33 units. Radiography of chest normal; pelvis and lumbar spine showed generalised osteoporosis with increased trabeculation, suggesting fibrous type of Paget's disease (fig. 1). Bone-marrow: hypoplasia without evidence of leukæmic change. Thus blood-examination showed leuco-erythroblastic anæmia on admission; but it was not until seven months later that radiography definitely confirmed the presence of metastases in the pelvis and lumbar spine (fig. 2). Stilbœstrol caused a fall in serum acid phosphatase (but a normal value was never obtained), a gradual rise (followed later by a fall) in serum alkaline phosphatase, and disappearance of immature cells from the peripheral blood. Neither iron, liver, nor stilbœstrol affected the hæmoglobin value. The patient relapsed in August, 1946, and then responded to increased dosage of stilbœstrol; but in September, 1947, when he relapsed again (fig. 3), presumably because he omitted to take the tablets, he failed to respond to stilbœstrol, dienœstrol, or orchidectomy. He lived for twenty-two months after the diagnosis was made.

The mode of presentation with irregular pyrexia and generalised pains is noteworthy. There had been no recent disturbance of micturition, and on rectal examination the surgeons considered the prostatic enlargement to be benign. Only six months later did it become definitely hard and clinically malignant.

Case 2.—Aged 62; admitted in February, 1947, with *symptoms suggesting subacute intestinal obstruction. Pallor*; slight enlargement of prostate. X-ray examination of colon negative; symptoms disappeared after enemata. Blood-count: red cells 3,450,000 per c.mm.; Hb 8·6 g. per 100 ml.; C.I. 0·90; white cells 4600 per c.mm. (Differential count normal apart from 2% myelocytes and 1 normoblast per 200 leucocytes.)

Readmitted in August, 1947, with four months' history of severe lumbar backache and pain in both thighs. Prostate enlarged and fairly hard. Blood-count: red cells 4,010,000 per c.mm.; Hb 10·8 g.; C.I. 0·97; white cells 4000 per c.mm. (Differential count normal and no immature cells.) Serum acid phosphatase 37 units (alcohol-stable fraction 6·3 units), alkaline phosphatase 69 units.

X-ray appearances of the pelvis suggested Paget's disease, though phosphatase values indicated secondary bony lesions from a carcinomatous prostate. The clinical response to œstrogen therapy was good, but when the patient relapsed increased dosage had no effect. He lived for thirteen months after the diagnosis was made.

The early leuco-erythroblastic anæmia should be noted; also, throughout the illness, the paucity of symptoms suggestive of prostatic disease.

Case 3.—Aged 68. In August, 1948, complained of lumbar backache and pain down front of both thighs (five weeks). Prostate enlarged, hard, and nodular. Nocturia had been present for two years but there was no recent exacerbation, and the predominant symptom was bone pain. Clinically there was no doubt *that the prostate was malignant*, but X-ray examination of the pelvis and lumbar spine suggested Paget's disease; no other bones affected. The *initial* acid phosphatase value was only 5·5 units, but of this 3·1 units were alcohol-labile. There was a good initial response to œstrogen therapy with a fall in the alcohol-labile fraction of acid phosphatase and a rise and subsequent fall in alkaline phosphatase. After seven months there was a relapse with no further response to œstrogens. The patient lived for eleven months after the diagnosis was made.

Case 4.—Aged 74. In August, 1948, he had lumbar backache and pain radiating down the front of right thigh (six weeks). In May, 1949, when I first saw him, the pain had gone into the left thigh. During the last six months there had been nocturia, and more recently dysuria with poor stream and terminal dribbling. Anæmic, with tenderness over the lumbosacral spine; prostate enlarged and hard. Blood-count: red cells 3,440,000 per c.mm.; Hb 10·1 g.; C.I. 0·99; white cells 6800 per c.mm. *(Differential count* normal apart from 8 normoblasts per 200 leucocytes.) Serum acid phosphatase 510 units (alcohol-stable fraction 9 units), alkaline phosphatase 91 units. This serum acid phosphatase value was the highest obtained in the series, and *though œstrogen therapy failed to bring it down to normal, it caused the bone pain to disappear.* Œdema was produced by the large dosage employed but subsided when the amount of œstrogen was reduced. *Normoblasts were found in the* first blood-count but not subsequently. The X-ray films suggested Paget's disease, this time in addition to secondary bone metastases. This patient is still under observation.

Again the first major symptom was pain in the lumbar region and thighs.

Case 5.—Aged 73. In June, 1949, complained of four months' flatulence, which had recently improved, sacral ache, and pain in both thighs together with a loss of 1 st in weight. Nocturia for several years, recently worse; now dysuria with poor stream and terminal dribbling.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

Chronic Œdema of the Leg

THE section of surgery met on April 5, with MR. DIGBY CHAMBERLAIN, the president, in the chair, to discuss the treatment of chronic œdema of the leg.

Prof. A. M. BOYD said that from analysis of 673 cases a tentative classification had been adopted: (1) venous, (2) erythrocyanoid, (3) lymphœdematous, and (4) angiomatoid. Mixtures of several types were frequently seen. Venous œdema might be complicated by lymphœdema due to spread of inflammation through the vein walls to the perivenous lymphatic vessels; or erythrocyanosis frigida might be followed later by a "white leg," which in its turn might be complicated by inflammatory œdema. The angiomatoid group were usually seen in the pure state.

Describing the routine investigation of cases at Manchester, Professor Boyd said that patients were photographed, their limb-size was measured, and angiograph and soft-tissue radiographs were taken. Venous pressures were measured by a modification of the method used by Mr. A. J. Walker, of St. Bartholomew's Hospital. There were two basic types of limb: (1) normal arterial circulation (arteries and veins of normal calibre), and (2) erythrocyanoid type (both arteries and veins small—a half or a third of the normal calibre).

The clinical manifestations of the various œdemas depended on the type of limb involved: for example, a "white leg" would show less tendency to resolve if the limb already had a poor blood-supply. The same applied to lymphœdema.

Iliofemoral thrombosis—the typical "white leg"—other than puerperal in origin, was commonly seen over 40 years of age. Apparently spontaneous iliofemoral thrombosis over the age of 60 years was indicative of malignant disease. Deep phlebitis in the calf veins was usually traumatic in origin. Fungus infection was a frequent cause of otherwise unexplained phlebitis.

Certain cases of "lymphœdema of indefinite origin" were probably venous in origin, due to progressive loss of valves in the deep veins. The contribution of the arterial, venous, and lymphatic factors must be assessed in the individual. Treatment of these œdemas consisted in ascertaining and remedying these factors.

Prof. IAN AIRD emphasised the importance, in the treatment of chronic œdema, of appreciating individual differences. He suggested that solid non-pitting œdema was the result of an original pitting œdema, but that not every case of chronic œdema developed into the non-pitting kind. Why some should proceed to the non-pitting state was not understood, but it was known that for solid œdema a high concentration of protein in the œdema fluid was necessary, and this concentration was likely to be highest when there was complete lymphatic obstruction. In the early stages of pitting œdema, conservative measures were probably sufficient. But consideration should be given at an early stage to the cause of the œdema, because some causes lent themselves to additional specific therapy.

Reviewing the types of cases, Professor Aird pointed out that congenital œdema was becoming less frequent, which raised the question whether the diagnosis had been correct. In some cases chronic œdema was associated with congenital auriculo-ventricular fistula. Œdema associated with bone injury usually improved within a year. A succession of attacks of cellulitis might proceed to chronic, non-pitting lymphœdema, which was not due to obstruction of the lymph pathways so much as to the presence of fixed local antibodies in the tissues; in these cases special treatment in the form of chemotherapy and massage had some success. Quincke's disease could also be treated by massage in the acute stage, and by sympathectomy; but recovery often took place spontaneously after a year. Lymphœdema præcox was the most progressive and intractable of all.

Professor Aird said in summary that the best hope of controlling œdema of the leg was still the elastic bandage initially and the elastic stocking later; the stocking should extend to the groin and be supported by a suspender-belt. Solid œdema could be relieved only operatively, by excision in two stages of the subcutaneous layer and the deep fascia. Amputation was much less often necessary for elephantiasis of the leg than of the arm.

Sir ARCHIBALD McINDOE said that chronic œdema had always been, for the patient, one of the most distressing and disabling conditions, and for the surgeon one of the most disappointing. In tropical climates œdema of the leg might be parasitic in origin; or it might be non-parasitic, due to lymphatic obstruction or other causes.

Listing the types of œdema, Sir Archibald doubted whether Milroy's disease ever occurred outside the famous family which Milroy described. Idiopathic lymphœdema præcox, in adolescent females, was a non-inflammatory condition, probably due to a low-grade inflammatory process. Inflammatory lymphœdema began as an inflammatory attack and spread from the nodal points in the leg, the cause being a streptococcus or a staphylococcus. Secondary lymphœdemas formed a mixed group, covering all other types of œdema. Sir Archibald explained that from his point of view cases of idiopathic lymphœdema præcox and of inflammatory œdema constituted the largest group. With regard to lymphœdema, he felt that undue attention was being given to the venous as opposed to the lymphatic aspect.

Surgical intervention might take the form of reversing the lymph-flow. This had very seldom caused lasting benefit; patients treated in this way needed very careful postoperative elastic bandaging, which they could have had without the operation. The centric obstruction might be traversed by providing a lymphatic bridge—from the leg to the axilla, for instance. This could provide benefit, but it was a difficult and dangerous operation which should only be done by a plastic surgeon.

Sir Archibald described a series of cases in which the lymph-bearing area was removed. The subcutaneous tissue and deep fascia was removed down to the muscle, leaving large skin-flaps no deeper than a Wolfe graft. These dermo-epidermal flaps were then applied. The whole process was carried out at one or more operations. The results were most hopeful, although the operation was only suitable in certain cases. The grafts might act as a strong elastic bandage, or it might be that the removal of the lymphatic tissue was itself curative. The œdema was still left at places where excision could not be done—the toes and the tendo achillis.

Lastly, œdema of the leg was a condition which, in the early stages, should be medically curable, and he looked forward to the time when the inflammatory processes could be brought under control.

Sir HAROLD GILLIES said that the operation of putting a wick across a lymphatic block was the right one where there was a mechanical block, as in lymphœdema præcox and traumatic cases.

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Mr. A. H. RATCLIFFE, D.PHIL., said that analyses had been made of serum and tissue fluids, but from the research point of view the results were "depressingly normal." The fluid in the limb might be described as afferent vascular, extravascular, and efferent vascular; the relationship determined the existence and extent of the œdema. The total protein content of the extravascular fluid was usually about 0·5%; rarely was it above 1%. The only positive finding which might be of interest was that the albumin-globulin ratio was either high or the same as in the serum. The former was perhaps attributable to imbalance between the afferent vascular and extravascular fluids and the latter to impaired protein reabsorption.

Mr. S. S. ROSE said that soft-tissue radiographs produced a typical pattern depending upon the increase of the fibrous fascial network. Early cases of "lymphœdema" showed a fine "bubble" appearance, which later became a much thicker framework with a much coarser mesh. This change ran parallel to the pitting œdema and the resolution on elevation of the limb—the later cases showing only slight pitting on a solid basis and being only slightly improved by elevation. Œdema of very recent origin—e.g., cardiac œdema—showed only ground-glass opacity. He also referred to a method of investigation of tissue-fluid circulation which he was using—namely, the subcutaneous injection of radio-opaque water-soluble compounds and subsequent serial radiographs to measure the spread.

Mr. PETER MARTIN said that patients treated by the operation which Sir Archibald McIndoe had described did find that the distal parts of the foot swelled as before, but they were grateful because they lost the recurrent attacks of rigor and there was pronounced general improvement. Mr. Martin felt that the tissue had to be excised because the damage was irreversible.

Mr. MICHAEL OLDFIELD said that he treated minor degrees of œdema by using elastic bandages and raising the foot of the bed at night on high blocks. In gross œdema with elephantiasis, the results of Kondoleon's operation were unsatisfactory. He also believed that if skin which was already damaged was used for skin flaps, œdema of the leg recurred. Excision of wide areas of skin-deep and subcutaneous fascia followed by free skin-grafting, produced a very thin leg which was ugly, but the patient could walk on it afterwards.

In his reply, Professor BOYD remarked that Mr. Walker's method of venous-pressure determination was useful and interesting from the research point of view, but for practical purposes the rubber-bandage method was as good as any.

LIVERPOOL MEDICAL INSTITUTION AND *MANCHESTER MEDICAL SOCIETY*

Tumours of Pancreas and Parathyroid

AT a joint meeting on March 2, Prof. JOHN MORLEY spoke on endocrine tumours of the pancreas and parathyroid gland.

Each of 6 patients from whom a single parathyroid adenoma had been successfully removed showed some degree of generalised osteitis fibrosa, though none had urinary calculi or calcification of the kidneys. No fewer than 4 of the 6 patients had an osteoclastoma of the jaw; and such a finding should always be followed by estimation of the serum calcium and phosphorus. In a 7th patient with the characteristic changes in the skeleton and the serum-calcium, no tumour was found, but there might have been one in the anterior mediastinum that escaped detection owing to failure to split the sternum. In the great majority of patients with parathyroid adenoma a single tumour was present; in not more than 6% of cases was there more than one tumour. The tumours occurred much more commonly in the inferior than the superior parathyroids. When not located in the normal position of the parathyroids, the tumours were most commonly found in the anterior mediastinum. They developed at any age; and they were commoner in females than in males in the proportion of 3 to 1. Generalised osteitis fibrosa cystica (often with spontaneous fractures) was the commonest clinical manifestation, but calculi were often found in the urinary tract. The diagnosis was confirmed by a serum-calcium of over 12 mg. per 100 ml. and by a serum-phosphorus reduced below 3·5 mg. per 100 ml.

Professor Morley then described 4 patients from whom he had removed insulin adenomata of the pancreas. In 3 of these patients the tumour was single and small, situated in the tail of the pancreas; in 1 there were five tumours. All were benign. Of the 4 patients, 2 had been diagnosed for some years as epileptic, and in 2 cerebral tumour had been suspected; 2 had on occasion been regarded as suffering from alcoholic intoxication.

In 88% of cases benign insulin adenomata were single, and in 12% multiple. The tumours were found in any part of the pancreas and not predominantly in the tail. Less than 10% of all insulin tumours were malignant. The diagnosis rested on Whipple's triad of symptoms: (1) nervous (or occasionally gastro-intestinal) attacks in the fasting state, (2) a fasting blood-sugar of 50 mg. per 100 ml. or less, and (3) immediate, or almost immediate, relief by injection of glucose. The nervous symptoms consisted of confusion, convulsions, coma, or collapse, and occasionally there were periods of meaningless laughter. These symptoms were apt to bring the patients to neurological or psychiatric clinics, and it was important that those in charge of these clinics should have in mind the possibility of hypoglycæmic manifestations of insulin tumours. The results of operative removal of these tumours were dramatic; and almost always cure was complete.

Reviews of Books

L'organisation des os

P. LACROIX, professeur à la Faculté de Médecine de Louvain. Paris: Masson. 1949. Pp. 228. Fr. 900.

THOSE interested in problems of bone growth will be acquainted with the experimental studies of Professor Lacroix which have been reported in a long series of papers during the last ten years. He has now gathered his results together in a small book, richly illustrated and abundantly annotated with references to the extensive literature of this subject. Of particular interest is the development of osseous tissue at the site of injection of alcoholic extracts of growth-cartilage or of the implantation of fragments of bone which have been killed by immersion in alcohol. Probably, however, these experiments will need to be extended and amplified before their significance can be finally assessed. There is one curious omission in the discussion of the relation of osteoclastic activity to the remodelling process at the metaphyses of growing bones—no reference is anywhere made to the important observations of E. Mellanby on the influence of vitamin A on this process. The practical application of Lacroix's experimental work are everywhere apparent; for this reason it needs to be carefully studied by the orthopædic specialist.

Medical Societies

ROYAL SOCIETY OF MEDICINE

Chronic Œdema of the Leg

THE section of surgery met on April 5, with MR. DIGBY CHAMBERLAIN, the president, in the chair, to discuss the treatment of chronic œdema of the leg.

Prof. A. M. BOYD said that from analysis of 673 cases a tentative classification had been adopted: (1) venous, (2) erythrocyanoid, (3) lymphœdematous, and (4) angiomatoid. Mixtures of several types were frequently seen. Venous œdema might be complicated by lymphœdema due to spread of inflammation through the vein walls to the perivenous lymphatic vessels; or erythrocyanosis frigida might be followed later by a "white leg," which in its turn might be complicated by inflammatory œdema. The angiomatoid group were usually seen in the pure state.

Describing the routine investigation of cases at Manchester, Professor Boyd said that patients were photographed, their limb-size was measured, and angiograph and soft-tissue radiographs were taken. Venous pressures were measured by a modification of the method used by Mr. A. J. Walker, of St. Bartholomew's Hospital. There were two basic types of limb: (1) normal arterial circulation (arteries and veins of normal calibre), and (2) erythrocyanoid type (both arteries and veins small—a half or a third of the normal calibre).

The clinical manifestations of the various œdemas depended on the type of limb involved: for example, a "white leg" would show less tendency to resolve if the limb already had a poor blood-supply. The same applied to lymphœdema.

Iliofemoral thrombosis—the typical "white leg"—other than puerperal in origin, was commonly seen over 40 years of age. Apparently spontaneous iliofemoral thrombosis over the age of 60 years was indicative of malignant disease. Deep phlebitis in the calf veins was usually traumatic in origin. Fungus infection was a frequent cause of otherwise unexplained phlebitis.

Certain cases of "lymphœdema of indefinite origin" were probably venous in origin, due to progressive loss of valves in the deep veins. The contribution of the arterial, venous, and lymphatic factors must be assessed in the individual. Treatment of these œdemas consisted in ascertaining and remedying these factors.

Prof. IAN AIRD emphasised the importance, in the treatment of chronic œdema, of appreciating individual differences. He suggested that solid non-pitting œdema was the result of an original pitting œdema, but that not every case of chronic œdema developed into the non-pitting kind. Why some should proceed to the non-pitting state was not understood, but it was known that for solid œdema a high concentration of protein in the œdema fluid was necessary, and this concentration was likely to be highest when there was complete lymphatic obstruction. In the early stages of pitting œdema, conservative measures were probably sufficient. But consideration should be given at an early stage to the cause of the œdema, because some causes lent themselves to additional specific therapy.

Reviewing the types of cases, Professor Aird pointed out that congenital œdema was becoming less frequent, which raised the question whether the diagnosis had been correct. In some cases chronic œdema was associated with congenital auriculo-ventricular fistula. Œdema associated with bone injury usually improved within a year. A succession of attacks of cellulitis might proceed to chronic, non-pitting lymphœdema, which was not due to obstruction of the lymph pathways so much as to the presence of fixed local antibodies in the tissues; in these cases special treatment in the form of chemotherapy and massage had some success. Quincke's disease could also be treated by massage in the acute stage, and by sympathectomy; but recovery often took place spontaneously after a year. Lymphœdema præcox was the most progressive and intractable of all.

Professor Aird said in summary that the best hope of controlling œdema of the leg was still the elastic bandage initially and the elastic stocking later; the stocking should extend to the groin and be supported by a suspender-belt. Solid œdema could be relieved only operatively, by excision in two stages of the subcutaneous layer and the deep fascia. Amputation was much less often necessary for elephantiasis of the leg than of the arm.

Sir ARCHIBALD MCINDOE said that chronic œdema had always been, for the patient, one of the most distressing and disabling conditions, and for the surgeon one of the most disappointing. In tropical climates œdema of the leg might be parasitic in origin; or it might be non-parasitic, due to lymphatic obstruction or other causes.

Listing the types of œdema, Sir Archibald doubted whether Milroy's disease ever occurred outside the famous family which Milroy described. Idiopathic lymphœdema præcox, in adolescent females, was a non-inflammatory condition, probably due to a low-grade inflammatory process. Inflammatory lymphœdema began as an inflammatory attack and spread from the nodal points in the leg, the cause being a streptococcus or a staphylococcus. Secondary lymphœdemas formed a mixed group, covering all other types of œdema. Sir Archibald explained that from his point of view cases of idiopathic lymphœdema præcox and of inflammatory œdema constituted the largest group. With regard to lymphœdema, he felt that undue attention was being given to the venous as opposed to the lymphatic aspect.

Surgical intervention might take the form of reversing the lymph-flow. This had very seldom caused lasting benefit; patients treated in this way needed very careful postoperative elastic bandaging, which they could have had without the operation. The centric obstruction might be traversed by providing a lymphatic bridge—from the leg to the axilla, for instance. This could provide benefit, but it was a difficult and dangerous operation which should only be done by a plastic surgeon.

Sir Archibald described a series of cases in which the lymph-bearing area was removed. The subcutaneous tissue and deep fascia was removed down to the muscle, leaving large skin-flaps no deeper than a Wolfe graft. These dermo-epidermal flaps were then applied. The whole process was carried out at one or more operations. The results were most hopeful, although the operation was only suitable in certain cases. The grafts might act as a strong elastic bandage, or it might be that the removal of the lymphatic tissue was itself curative. The œdema was still left at places where excision could not be done—the toes and the tendo achillis.

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THE LANCET

LONDON: SATURDAY, APRIL 29, 1950

Surgical Intervention in Hæmatemesis

In 1935 Gordon-Taylor[1] rendered a service by shattering unwarranted satisfaction with the purely medical management of hæmatemesis. It is easy to understand why at that time surgery was in disrepute; it was demanded only as a last resort, and without blood-transfusions the surgeon's material was a pale corpse, often saline-soaked. Hurst's[2] oft-quoted figure of 4% for the (corrected) case-mortality with medical treatment had encouraged its pursuit. Chiesman[3] had already found that with hæmorrhage recurring within 24 hours of the start of medical treatment the fatality-rate was 74%, and in the Middlesex Hospital series,[4] 1925–35, the rate for such cases was no less than 78%. On the other hand, liberal transfusions and early feeding (Meulengracht[5] and Witts[6]) had begun to increase the safety of medical measures. And it is now clear that after 1935 the pendulum swung too far towards surgery. Finsterer[7] achieved a 5% mortality by operating on every case of massive hæmorrhage in a patient known to have a chronic gastroduodenal ulcer; as he remarked "they needed operation anyhow." Tanner[8] for some five years carried out a similar programme with a mortality of 7% in 110 cases, the average age of the patients who died being 66. But now, like most surgeons in this country, Tanner feels that only in a selected small group of cases is operation necessary. As he says, "it is not the operative mortality that interests us, it is the mortality of hæmatemesis and melæna." Avery Jones's[9] over-all figures (6–7% mortality) confirm the value of this policy. Moreover, he has pointed out,[10] it is the over-70 group, with associated serious medical conditions, that play havoc even with such good statistics. In the 1945–49 period, out of 584 cases in his hospital, only 23 were submitted to emergency surgery, with 4 deaths.

The man under 45 rarely dies from hæmatemesis or melæna: a mass of statistics prove that. Meulengracht[11] had 1031 cases with 26 deaths, only 1 of which was under the age of 40; Tanner has had a consecutive series of 501 with 1 death; Avery Jones records a mortality of 2%. Statistics, however, can be spun too fine, and age is not a reason for ceasing to be alert to the hazard. These figures come from highly specialised clinics, and most surgeons can recall an occasional death in a young patient. Over the age of 45, one or two out of every five patients die from such hæmorrhage, despite massive blood-transfusions and the fullest medical care. The older man dies because he cannot withstand blood-loss well, and because he has a chronic ulcer with the vessel walls fixed, "hard as a quill," unable to retract. Obviously the surgeon's function is to operate only on patients who would otherwise bleed to death. But to know which—aye, there's the rub!

The first essential is a suitable team; "an enthusiastic physician and a reluctant surgeon are the ideal combination" (Lewis[12]). Patients are probably best admitted into medical wards, with an understanding that the surgeon should be invited to see them all within 24 hours of admission. This enriches the surgeon's experience and helps him to appraise the limits of medical measures. The first problem of the physician will be the exclusion of extragastric causes of bleeding—not always easy. In 85% of hæmorrhages gastroduodenal ulceration is responsible, and in deciding for or against operation it should be remembered that the mortality of bleeding from a gastric ulcer is twice as high as that of bleeding from a duodenal ulcer (Avery Jones). The history is of course the most valuable aid in diagnosis; yet it can be misleading. Only in some 60% of massive hæmorrhages is a history of ulcer dyspepsia obtained; with cirrhosis of the liver there is often a dyspeptic story, and indeed often an associated ulcer. Tanner and Avery Jones have advocated the more frequent use of gastroscopy in the doubtful case, but this should normally be practised only by those particularly experienced. American writers think that there is a place for the immediate barium meal, despite its obvious limitations; for the detection of a gastric ulcer may well decide whether operation should be performed or not. But there is evidence that a barium meal may cause bleeding to start again; so it should not be lightly undertaken (Amendola[13]). Meulengracht points out that all his patients who died had hæmatemesis as well as melæna. He holds that with melæna alone it is always justifiable to temporise; for as little as 2 oz. of blood will give a melæna stool.[14] On the other hand in some 60% of cases[15] melæna is but the first sign and the hæmatemesis comes later. Also, as Avery Jones remarks, the very ill patient very often seems too weak to vomit blood. The fact that a melæna is not accompanied by hæmatemesis is therefore no reason for bland optimism. Ulcer pain almost always ceases with the hæmatemesis; its persistence, as Desmond[16] and Avery Jones show, should be seriously viewed as a harbinger of catastrophe. Likewise hæmatemesis during the course of medical treatment is evidence of a progressive burrowing lesion and will usually need surgery for its control.

The question often arises as to whether the hæmorrhage is massive; the loss of a pint of blood is no more than the average blood-donor sustains without any harm. Recurrent syncope is the most valuable single sign of renewed bleeding (Hoerr et al.[17]). In the older patients continued bleeding should always be suspected if the blood-pressure does not rise satisfactorily on repeated transfusion in the first 24 hours (Amendola). The hæmoglobin figure is of some value, even though hæmodilution may not

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1. Gordon-Taylor, G. *Lancet*, 1935, ii, 811; *Brit. J. Surg.* 1937, 25, 403; *Ibid*, 1945, 33, 336.
2. Hurst, A., Lintott, G. A. M. *Guy's Hosp. Rep.* 1939, 137, 177.
3. Chiesman, W. E. *Lancet*, 1932, ii, 722.
4. Quoted by Gordon-Taylor, G. *Proc. R. Soc. Med.* 1934, 27, 1524.
5. Meulengracht, E. *Lancet*, 1935, ii, 1220.
6. Witts, L. J. *Brit. med. J.* 1937, i, 847.
7. Finsterer, H. *Surg. Gynec. Obstet.* 1939, 69, 291.
8. Tanner, N. C. *Proc. R. Soc. Med.* 1950, 43, 145.
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13. Amendola, F. H. *Ann. Surg.* 1949, 129, 47.
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15. Thompson, H. L., McGuffen, de V. W. *Ibid*, 1949, 141, 1208
16. Desmond, A. M. *Proc. R. Soc. Med.* 1950, 43, 153.
17. Hoerr, S. O., Dunphy, J. E., Gray, S. J. *Surg. Gynec. Obstet.* 1947, 87, 338.

Neurological Anatomy in relation to Clinical Medicine

A. BRODAL, professor of anatomy, University of Oslo. London: Oxford University Press. 1948. Pp. 496. 42*s.*

Professor Brodal's work in the department of anatomy at Oxford gave him an approach to the nervous system which was as much concerned with function as with structure. His clinical work in the neurological department in Oslo has led him to apply that liberal approach to the understanding of the nervous system in disease. The Oxford schools of anatomy and physiology have always been in the closest way linked with the English school of neurology, and it so happens that neurology in Oslo springs largely from the same source. Add to this Dr. Brodal's lucid and melodious English and the result is this erudite and gracious volume. It is not the book to fly to when a forgotten piece of anatomy crops up in a clinical problem; but it *is* the place to find clearly discussed the present state of understanding of the working of the optic, olfactory, and autonomic systems, to read up the structural basis beneath the rapidly changing research into the function of the cerebellum or the thalamus, and to savour the fruits of a rather more leisurely observation of nervous diseases than is usual with us today. The good student will derive from it new enlightenment and a stimulating outlook; for this is one of those rare anatomical books where facts seem to be less important than thoughts.

Le curare en anesthésie

ERNEST KERN, D.A. Paris: Masson. 1950. Pp. 124. Fr. 300.

Dr. Kern has written an up-to-date and comprehensive little monograph on curare. The material included is already well known to English-speaking anæsthetists and should now be of the greatest use and interest to our French colleagues. Dr. Kern spent a good deal of time in this country when training, and the British viewpoint can clearly be seen throughout the book. The history of curare, with its pharmacology and physiology, is followed by the indications for the use of the drug, which include cæsarean section and tetanus. The choice of which anæsthetic agent to administer in combination with curare is discussed in detail, while the technique of conducting the combined anæsthesia is described in a practical manner. Kern shows his training by stressing the importance of artificial respiration by pulmonary inflation as the essential immediate treatment of overdose. The book closes with an account of the accidents which may follow curarisation, together with a section describing the more recent synthetic substitutes for curare. This book deserves better illustrations than the few very miniature clinical charts.

Vitamin Methods

Vol. I. Editor: Dr. PAUL GYORGY, School of Medicine, University of Pennsylvania. New York: Academic Press. 1950. Pp. 571. $10.

THE experts responsible for the five sections of this book have sought to provide a complete guide to methods of estimating vitamins. There are short historical accounts and critical appraisals of techniques, but the most important part of the book is devoted to descriptions of the methods themselves. The aim has been to make the text self-contained; for, though over 1100 references have been cited, it is intended that workers shall be able to use any of the methods without referring to the original publications. Working directions are therefore extremely detailed, and clearly based on practical experience in the laboratory.

The sections contain more than their short titles might suggest. Thus E. T. Stiller's account of physical methods of vitamin assay, though mainly concerned with ultraviolet absorption spectrometry and fluorometry, also describes fully methods of extraction and separation. Paul György, with S. H. Rubin, deals with chemical methods of assay; and A. Bessey opens his section on microchemical methods for the determination of vitamins in serum and in blood-cells with instructions on the collection of specimens and the construction of pipettes for measuring small volumes. E. E. Snell, writing on microbiological methods, discusses the nutritional requirements of test organisms and gives methods for maintaining stock cultures. In a closing chapter on the use of optical instruments, E. Hirscberg describes the construction and working of most of the commonly used photometers, spectrophotometers, and fluorometers manufactured in America.

This seems to be one of the most complete laboratory manuals of its kind: a vast amount of useful information that has been packed into less than 600 pages.

Physiology in Diseases of the Heart and Lungs

M. D. ALTSCHULE, assistant professor of medicine Harvard Medical School.

BY an error which we much regret, we last week printed under this heading the review of a different book. The proper review will be published shortly.

Proceedings of the Annual Meeting of the British Medical Association, 1949 (London: Butterworth. 1950. Pp. 468. 25*s.*).—The papers given at last year's "Sections," supplemented by brief accounts of the discussions, are here available for those who wish to turn back to them for reference, or refresh their memories of a stimulating occasion.

The World of Learning (London: Europa Publications. 1950. Pp. 881. 60*s.*).—This compilation's third edition in three years contains 12 more pages in the main text than there were in the second edition and 45 pages of an index of institutions (a new feature). It has been impossible to revise the section on China, because postal communication with that country has been cut by the civil war; nor are Ethiopia and Tibet included. Otherwise much useful information seems to be there about educational, scientific, and cultural institutions throughout the world.

Allergy (London: Gollancz. 1950. Pp. 210. 9*s.* 6*d.*).—Dr. Harry Swartz condenses for the lay reader most of the known factors that influence the allergic state. Historically the concept of allergy is shown as an offshoot of immunology. More recently it has been shown that infection in general has an allergic component. Some of the statements made in the book are dogmatic without being correct, and the meaning is not always clear; but the story about the medical officer whom his superior officer thought "was a goldbrick bucking to get out of the combat zone" was full of interest.

The British Encyclopœdia of Medical Practice (London: Butterworth. 1950. *Medical Progress, 1950.* Pp. 524. 32*s.* 6*d.* *Cumulative Supplement, 1950.* Pp. 481. 27*s.* 6*d.*).—In his introduction to *Medical Progress* Lord Horder, editor in chief, gives pride of place to Dr. Philip S. Hench, of the Mayo Clinic, for his work on 'Cortisone,' which is discussed in a critical survey by Dr. D. T. Davies. Other subjects reviewed in this volume include the use of streptomycin, *p*-aminosalicylic acid, and B.C.G. vaccination in tuberculosis, vagotomy for peptic ulcer, sympathectomy in hypertension, the new antibiotics, and the latest news of the hypothalamus. The *Cumulative Supplement* as usual contains short reports on work substantiated since the publication of the original twelve volumes.

Modern Pattern for Marriage. (London: Reinhardt & Evans. 1949. Pp. 110. 8*s.* 6*d.*).—This American book is intended for those about to marry, but seems likely to bore or depress them. Dr. Walter R. Stokes thinks that no girl should marry until dilatation has been performed by the doctor. If by any chance the couple have been so foolish as to marry without consultation, they are advised not to have intercourse during the honeymoon but to wait and see the physician first. (This would have much astonished Uncle Toby.) Dr. Stokes also looks forward to an increase in the practice of surgical sterilisation, on grounds of family health and welfare, and he advocates relaxation of the laws on abortion. Why Mr. David Mace, PH.D., so well known in connection with the Marriage Guidance Council, has chosen to write a foreword to this English edition of the book is something of a mystery.

There are excellent diagrams of sagittal and coronal sections of the sex organs, but they are labelled simply "side and front views." Medical writers seldom realise how confusing, and even frightening, such illustrations are to lay people. If we are to be frank, let us have faithful representations of the external parts, and then try to explain the internal anatomy. Most people seem to think that the vaginal passage runs straight up and down the body—a misapprehension sustained by the usual neat diagrams showing the uterus poised on top of the vagina to such statistics. He need but have a proper pride in the lives he has saved which would otherwise have almost certainly been lost. Life-saving surgery, not the collection of impressive statistics, is his function.

Inoculation and Poliomyelitis

THE observations in Australia[1] and in London[2] which have drawn attention to the association between prophylactic immunisation and paralytic poliomyelitis were discussed at a crowded meeting of the epidemiology and State medicine section of the Royal Society of Medicine on April 21, when Prof. F. M. BURNET, F.R.S., of Melbourne, gave his interpretation of the facts. Dr. W. H. BRADLEY of the Ministry of Health, who presided, took the view that our knowledge is still too incomplete for any precipitate administrative action to be taken at this stage. Professor BURNET contended that MCCLOSKEY had clearly shown in the 1949 epidemic in Victoria that paralytic poliomyelitis in the injected limb occurred within two months of inoculation with pertussis vaccine, either alone or in combination with diphtheria A.P.T., more often than would be expected by chance. Most of the cases of paralysis arose within seven to eleven days of the injection—i.e., within the accepted limits of the usual incubation period of poliomyelitis. The evidence incriminating A.P.T. given by itself was less conclusive, but there was a suggestion of an increased frequency of paralysis in the injected limb five to fourteen days after inoculation with this agent. Subcutaneous or intramuscular injection of these antigens seemed to be followed by a period of heightened vulnerability to the paralytic effects of poliomyelitis in the injected limb, which lasted usually for seven to eleven days but might last up to forty days.

As a self-confessed academically minded virologist, Professor BURNET was interested in the explanation of this association. There were, he thought, four possible hypotheses. The first—contamination of needle or prophylactic agent—could be ruled out with some confidence; the cases had occurred in widely scattered places after injection with different batches of antigen by different physicians whose technique was apparently flawless. A second view, said to be favoured by MCCLOSKEY himself, was that inoculation produced an altered physical reaction to poliomyelitic infection: the inflammatory focus resulting from the injected antigen produces a suitable milieu for the multiplication of the virus which is circulating in the blood during the incubation period of the disease; and the virus then tracks up the neuronal path to the central nervous system to cause the localised paralysis. But there is no good laboratory evidence that viræmia occurs in poliomyelitis or that the virus multiplies in inflamed mesenchyma tissue. A third possibility is that some toxic agent in pertussis vaccine, when deposited in or near a muscle, tracks up the motor nerve rather as does the toxin of tetanus. Professor BURNET thought it curious that the time taken for the postulated toxic agent to ascend the neurone coincided so closely with the incubation period of poliomyelitis: it might be that the toxic inflammatory mass in the limb muscle produces an antigen-antibody reaction which provokes neural lesions in the spinal cord. He evinced no enthusiasm for these suggestions but inclined to the belief that the inflammatory reaction produces fibrosis and scarring which affects the nerve-trunks and increases their vulnerability by producing a reflex neural disturbance in the corresponding region of the spinal cord. The effect, he thought, was analogous to that of severe exercise.

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To withhold blood-transfusion on the supposition that raising the blood-pressure "blows out" the vessel thrombus is wrong. Some physicians still refrain from giving blood until the hæmoglobin is 40% and the blood-pressure below 100 mm. Hg; but a patient in this state is no longer in a position to withstand a fresh hæmorrhage, which may do irreparable damage to the kidneys, liver, and even the eyes and brain. As COSTELLO[19] points out, massive hæmorrhage may cause death not in a matter of minutes or hours, but days or often weeks after the onset; in 75 fatalities he found that 71 of the patients had received only a moderate fraction of the blood lost. CHURCHILL[20] too has explained that in ulcer hæmorrhages, as in those of battle casualties, late transfusion cannot compensate for the earlier delay. The blood-urea is often held as a warning signal that surgery may be risky. But it often parallels the severity of the bleed, and we know that the high figure is not merely due to blood-protein absorption but is the combined effect of anoxæmia, reduced blood volume, and low blood-pressure. TANNER indeed regards it as an "incentive" to surgery and has operated successfully on patients with blood-ureas of 180–250 mg. per 100 ml.

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The golden hours for surgery are the first 48 hours: FINSTERER and GORDON-TAYLOR have strongly emphasised this. "If the surgeon does not operate when he could, he finds himself unable to operate when he would" (LEWISON[23]). Experience does, however, suggest that even a late case should not be denied operation; for with ample blood, and if the blood-pressure has been previously maintained, the surgeon may yet succeed.

The hæmatemesis of cirrhosis should be viewed gravely. At least 80% of the patients are dead within a year from such repeated hæmorrhages,[24] and, as LEARMONTH[25] has noted, they die long before reduction of hepatic function has become a threat to life. Often the diagnosis can be settled only by œsophagoscopy; after such hæmorrhage the spleen is often too soft to feel, and spider telangiectases, liver palms, weight loss, and fœtor oris may not complete the picture. Œsophagoscopy shows active ulceration as the source of the bleeding, and this is a pointer to treatment. Numerous methods have been devised—sclerosant injections, inflated balloons, packing with 'Oxycel' gauze—but none has proved successful. To separate the portal from the azygos system of veins, a number of measures have lately been introduced, and a combination of these seems desirable—ligation of the left gastric pedicle, ligation of the splenic artery, and (as TANNER has suggested) high division of the stomach and resuture to complete the vein transection. In WANGENSTEEN's view,[26] high partial gastrectomy may perhaps be the better additional step. It has the added advantage of diminishing gastric acidity and the tendency to acid peptic erosion of the œsophageal varices.

The proper appreciation of the surgeon's rôle is important: he is not there as a forlorn hope. But with a policy of selective surgical intervention, he must expect high mortality figures, and the measure of his wisdom will often be his professional *amaurosis* to such statistics. He need but have a proper pride in the lives he has saved which would otherwise have almost certainly been lost. Life-saving surgery, not the collection of impressive statistics, is his function.

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[20] Churchill, E. D. *Ibid*, 1948, 128, 799.

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[24] Snell, A. M. *Proc. Mayo Clin.* 1950, 25, 36.

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Inoculation and Poliomyelitis

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occurred when hexobarbitone ('Evipan') was used instead of pentobarbitone. It seems, too, that intermediate products of glucose metabolism, such as hexose diphosphate, pyruvate, succinate, and fumarate, as well as others, had the same action as glucose, some even more strongly. Sucrose, on the other hand, was inactive.

These observations have not been confirmed in man, but no doubt some evidence will soon be forthcoming. If in fact glucose has this potentiating effect in patients who are recovering from anæsthetics like thiopentone and hexobarbitone, then caution will have to be exercised in the use of intravenous glucose drips during barbiturate anæsthesia or in the immediate postoperative period.

CORTISONE AND A.C.T.H. IN PERIARTERITIS NODOSA

Now that 'Cortisone' and the adrenocorticotropic hormone (A.C.T.H.) have been shown to exert an effect on rheumatoid arthritis and, to a lesser extent, on rheumatic fever, attention is turning to the investigation of these substances in other collagen-vascular diseases—a group which includes periarteritis nodosa, disseminated lupus erythematosus, and anyhow some instances of clinical dermatomyositis. It is now clear that in periarteritis nodosa the effect is profound.

At Johns Hopkins University, Berthrong and his colleagues[1] have shown experimentally that A.C.T.H. can prevent vascular lesions which would otherwise appear after sensitisation. Of 40 rabbits sensitised with horse-serum, half were used as controls and the other half were treated with A.C.T.H. Well-marked vascular and/or cardiac lesions appeared in 18 of the 20 controls, but in only 5 of the 20 animals receiving A.C.T.H. The influence of these hormones on established periarteritis nodosa has been studied clinically at the Mayo Clinic where Shick and his fellow-workers[2] have treated 5 confirmed cases of periarteritis nodosa and 2 of cranial arteritis. In each, prompt subjective improvement ensued, with subsidence of fever in 24–72 hours and a more gradual return to normal of the erythrocyte-sedimentation rate. Partial relapse followed withdrawal of the hormone, with subsequent improvement when treatment was resumed. Of the 5 cases of periarteritis nodosa, 3 were critically ill when treatment (with cortisone) was started; and, despite initial improvement, 2 died in cardiac and renal failure. Necropsy showed complete healing of all arterial lesions; but in the process of healing, fibrous obliteration of the vascular lumens had taken place, with resulting widespread visceral infarction. The adrenal glands of the patient who received the larger amount of cortisone (13·35 g. in 146 days) were atrophied. In most of the patients evidence of hypercortisonism developed during treatment; in the 2 who died there were profound disturbances of plasma electrolytes after lengthy administration of cortisone, but whether this complication was attributable mainly to the hormone or to the antecedent renal disease was uncertain. Together, these two reports encourage the hope that, at least in early cases, cortisone and A.C.T.H. may take an important place in the treatment of periarteritis nodosa.

Cortisone may, it seems, become more plentiful; and in the U.S.A. the price of A.C.T.H. is coming down. At the meeting of the Federation of American Societies for Experimental Biology in Atlantic City last week, Dr. Kenneth Savard and his colleagues at the research division of Cleveland Clinic Foundation reported that ox adrenal-gland extracts retained the enzymes through which cortisone is composed; and that with these enzymes 'Compound F' had been constituted from an inert substance originally derived from soya beans. (Compound F is the principal type of cortisone believed to be secreted by the adrenals in man; but from animal sources it is obtained in smaller amounts than is Compound E, which is also more easily synthesised.) This development is reported in the *New York Times* of April 22, which adds that Messrs. Armour & Co. are reducing the price of A.C.T.H. from $210 per g. to about $100 per g. The company's president has announced that his company has increased production of A.C.T.H. by 30 times in the past year, and is now obtaining almost four times as much of the drug from the same quantity of glands as it did last summer. "Within four or five months we confidently expect to triple the current rate of production"; and he believed that in a few weeks all (American) hospitals equipped to administer the drug safely could be supplied. Work had started on an inhibiting solution that would prolong the action of A.C.T.H.

ADVENTURES AMONG VIRUSES

THE title of the Dunham lectures for 1949, "Adventures among Viruses," gave Dr. C. H. Andrewes, F.R.S., full scope for surveys of the properties of viruses, of influenza, and of the common cold.[1] Viruses, he said, need three properties if they are to be successful parasites—they must be able to multiply, to be transmitted from host to host, and to persist in between. Their urge to multiply involves them in possible trouble at the portal of entry to the host, or at the surface of the cell, or with biochemical conditions inside the cell, and these circumstances may be responsible for the host's ability to resist virus attack in numerous non-specific ways, as Findlay[2] has reminded us. The virus often persists outside the host, in dried crusts or secretions or in the bodies of insect vectors, but latent infection inside the host's body is often important, and latent virus may even be passed from mother or father to offspring, as in the case of the Bittner virus of mammary carcinoma, sheep "scrapie," or mouse choriomeningitis. Jolts which disturb the delicate host-virus equilibrium of latent infection produce clinical signs of disease, as is seen in herpes and possibly in the common cold, and may in fact range from a mild febrile disturbance to an upset as severe as anaphylactic shock.

In dealing with influenza Andrewes turned from the virus to the host-virus interaction in epidemics and pandemics, viewing the problems of the survival of virus and the build-up of epidemics against the background of recent studies of viruses by the World Influenza Centre at Hampstead. Magrassi's observations on the origin of the Sardinian outbreak of 1948, which preceded the Western European epidemic of 1948–49, are particularly interesting in their suggestion of a simultaneous uprising of virus in several village communities, and Andrewes recalled an earlier theory of his own[3] of the evolution of an influenza virus from a basic strain to an epidemic variant. Such a mechanism would explain what Andrewes calls the slow-fuse phase preceding an epidemic, though mutation through several stages is needed to explain pandemics such as the influenza one of 1918.

His third lecture, on the common cold, was largely an account of the work of the research unit at Salisbury which has been described elsewhere,[4] though Andrewes added some tit-bits concerning growth of virus in tissue cultures of human embryo material and the effect of chills on experimental colds. This particular adventure seems likely to lead to long-overdue additions to our knowledge of the epidemiology of the cold, and it will not be surprising if some future annotation describes

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1. Berthrong, M., Rich, A. R., Griffith, P. C. *Bull. Johns Hopk. Hosp.* 1950, 86, 131.
2. Shick, R. M., Baggenstoss, A. H., Polley, H. F. *Proc. Mayo Clin.* 1950, 25, 135.

1. Andrewes, C. H. *New Engl. J. Med.* 1950, 242, 161, 197, 235.
2. Findlay, G. M. *J. R. microscop. Soc.* 1948, 68, 20.
3. Andrewes, C. H. *Proc. R. Soc. Med.* 1942, 36, 1.
4. Andrewes, C. H. *Lancet*, 1949, i, 71.

Annotations

CANCER RESEARCH ON A BROAD FRONT

A WIDE variety of investigations, both complete and in progress, is recorded in the 47th annual report of the Imperial Cancer Research Fund. Some ventures into the realm of hypothesis are also disclosed, indicating an intensification of the attack on chemical aspects of the cancer problem. There is hope, no doubt, that these may succeed where others have reached an impasse.

Promising results have already been attained by Mr. H. G. Crabtree while using six deliberately chosen isomeric aminoazotolenes to determine their carcinogenic properties in rat livers. Contrary to a previous suggestion that some parallelism exists between carcinogenic potency and liberation of the diamine of certain azo- compounds, Crabtree draws attention to some discrepancies in such a correlation. The carcinogenic potency of three isomeric methyl derivatives of "butter yellow," for example, vary, though all three would yield the same diamine. One isomer equals in potency the parent compound, another has moderate carcinogenic action, while the third is almost ineffective in inducing liver cancer. This conspicuous difference between observed fact and current explanation led to an experimental examination of the properties of the "other half" of the split azo- molecule. The conclusion was reached that the monoamine portion of the reduced azo- compound plays an active part in determining cancer production. There emerged also the observation that azo- compounds capable of forming *p*-toluidine by reductive fission lack carcinogenic power and behave as stimulators of normal growth. Conversely, those liberating o-toluidine are carcinogenic and do not influence body growth. Crabtree unites his new observations in one tentative explanation. Appropriate diamines (or their oxidation products), arising from the reductive fission of azo- compounds, may interfere with the function of enzymes concerned with folic-acid synthesis, thus providing in the liver the initial derangement of function for the subsequent induction of tumours. If the azo-compound is potentially capable of liberating *p*-toluidine, the precursor of *p*-aminobenzoic acid, this process is antagonised by compensatory production of folic acid, which preserves a physiological normality in liver cells and permits normal growth, with the biological consequence of preventing the emergence of cancer. Thus *the first stage of the cancer process rather than the* end-result of established disease is being analysed. It has provided valuable data and inspired further effort.

The progressive nature of tumour behaviour is again emphasised by Dr. L. Foulds who last year illustrated this characteristic from a wealth of mammary growths in mice and now adds to them supporting evidence from the experiences of transplantation of an induced bladder tumour. In the course of serial transplantation of a single tumour of the bladder, different stages of progression from localised papilloma through intermediate mixed forms to disseminating undifferentiated carcinoma were seen. These observations correspond with that of von Hansemann in human pathology of the somewhat rare phenomenon of true anaplasia. Manipulation of experimental material has enabled Dr. Foulds to enunciate certain principles or rates of tumour progression.

Contributions to the study of mouse mammary tumours, unaccompanied by Bittner's agent, are being made by Dr. B. D. Pullinger. Dr. Vazquez-Lopez and Mr. P. Williams have attempted to induce gastric tumours in rats by combining local damage by hormone (posterior pituitary extract) with a known carcinogen, acetyl-amino-fluorene. Mr. Williams is investigating œstrogen sensitivity in some pure-line strains of mice.

Dr. James Craigie, F.R.S., who has succeeded Prof. W. E. Gye, F.R.S., as director, is studying intensively isolated surviving malignant cells. Optical methods are being explored to seek reliable criteria of cell death and cell survival. Phase-contrast and also ultraviolet microscopy and photography, to which Mr. J. R. Ludford, D.SC., has also contributed, offer some promise of extending knowledge of the cytology of living tumour cells. Quantitative data concerning viability of tumour cells under various conditions is being gathered and permanently recorded. An artificial intracellular fluid has been devised as a standard for suspension of all cells undergoing test. It resembles the analysis of intracellular muscle fluid with the addition of a succinate as organic ion. These studies are regarded by Dr. Craigie as prerequisite to any further attempts to detect virus in dried tumour material.

The claim, made and widely accepted a year ago,[1,2] to have transmitted tumours by means of virus contained in an inoculum of cells dried to an unmeasured degree appears to have been insecurely founded. No control tests that might have excluded the presence of viable cells among the dextrose-treated dried cells were recorded at that time. It appeared later that similarly dried mammary tumours had also been transmitted.[3] These epithelial tumours grew at the point of inoculation in subcutaneous tissue in both male and female mice. The implication of this result in male mice was either that the epithelial cells were still viable, notwithstanding freezing and drying, or (seeing that a tumour arose at the point of inoculation) that the inoculum coincided with a mammary rudiment. The epithelial cells of the rudiment in the latter case then became infected and were stimulated to tumour growth by a variant of the Bittner agent. This variant would have to possess properties of action far more rapid than the agent we know and would also have to be independent of ovarian hormone, another novel feature. The first interpretation, that sometimes cells survived, was the obvious one, but the second might have been tenable had it in turn been subjected to a control test. A control test would have placed the inoculum outside the mammary fat pads—discrete anatomical structures in which alone mammary glands and mammary rudiments are lodged. Had a mammary tumour developed at the point of inoculation at a distance from any of these pads, it would have provided certain evidence of viability of epithelial cells and, by analogy, of sarcoma cells also. Had no tumours ever developed at the point of inoculation outside fat pads, but only when placed within them, the claims made would have had some support. On the evidence available the virus theory of tumour causation stands where it did after Bittner's discovery of the milk factor.

POTENTIATION OF BARBITURATE ANÆSTHESIA BY GLUCOSE

A SOMEWHAT alarming effect of glucose on barbiturate anæsthesia is described by Lamson and colleagues,[4] who discovered accidentally that if an intravenous injection of glucose was given to a dog recovering from pentobarbitone anæsthesia it sent him back into deep sleep exactly as though he had been re-anæsthetised. If the glucose injection was repeated when the dog again showed signs of recovery the same thing happened; the dog immediately lapsed into deep sleep. However, the cycle of sleep, awakening, glucose injection, and further sleep gradually became shorter until finally the glucose had no further effect, the animal remaining awake and, if anything, hyperexcitable. The same cycle of events

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1. Gye, W. E. *Brit. med. J.* 1949, i, 511.
2. Gye, W. E., Begg, A. M., Mann, I., Craigie, J. *Brit. J. Cancer*, 1949, 3, 259.
3. Mann, I. *Brit. med. J.* 1949, ii, 251, 253.
4. Lamson, P. D., Greig, M. E., Robbins, B. H. *Science*, 1949, 110, 690.

occurred when hexobarbitone ('Evipan') was used instead of pentobarbitone. It seems, too, that intermediate products of glucose metabolism, such as hexose diphosphate, pyruvate, succinate, and fumarate, as well as others, had the same action as glucose, some even more strongly. Sucrose, on the other hand, was inactive.

These observations have not been confirmed in man, but no doubt some evidence will soon be forthcoming. If in fact glucose has this potentiating effect in patients who are recovering from anæsthetics like thiopentone and hexobarbitone, then caution will have to be exercised in the use of intravenous glucose drips during barbiturate anæsthesia or in the immediate postoperative period.

CORTISONE AND A.C.T.H. IN PERIARTERITIS NODOSA

Now that 'Cortisone' and the adrenocorticotropic hormone (A.C.T.H.) have been shown to exert an effect on rheumatoid arthritis and, to a lesser extent, on rheumatic fever, attention is turning to the investigation of these substances in other collagen-vascular diseases—a group which includes periarteritis nodosa, disseminated lupus erythematosus, and anyhow some instances of clinical dermatomyositis. It is now clear that in periarteritis nodosa the effect is profound.

At Johns Hopkins University, Berthrong and his colleagues[1] have shown experimentally that A.C.T.H. can prevent vascular lesions which would otherwise appear after sensitisation. Of 40 rabbits sensitised with horse-serum, half were used as controls and the other half were treated with A.C.T.H. Well-marked vascular and/or cardiac lesions appeared in 18 of the 20 controls, but in only 5 of the 20 animals receiving A.C.T.H. The influence of these hormones on established periarteritis nodosa has been studied clinically at the Mayo Clinic where Shick and his fellow-workers[2] have treated 5 confirmed cases of periarteritis nodosa and 2 of cranial arteritis. In each, prompt subjective improvement ensued, with subsidence of fever in 24–72 hours and a more gradual return to normal of the erythrocyte-sedimentation rate. Partial relapse followed withdrawal of the hormone, with subsequent improvement when treatment was resumed. Of the 5 cases of periarteritis nodosa, 3 were critically ill when treatment (with cortisone) was started; and, despite initial improvement, 2 died in cardiac and renal failure. Necropsy showed complete healing of all arterial lesions; but in the process of healing, fibrous obliteration of the vascular lumens had taken place, with resulting widespread visceral infarction. The adrenal glands of the patient who received the larger amount of cortisone (13·35 g. in 146 days) were atrophied. In most of the patients evidence of hypercortisonism developed during treatment; in the 2 who died there were profound disturbances of plasma electrolytes after lengthy administration of cortisone, but whether this complication was attributable mainly to the hormone or to the antecedent renal disease was uncertain. Together, these two reports encourage the hope that, at least in early cases, cortisone and A.C.T.H. may take an important place in the treatment of periarteritis nodosa.

Cortisone may, it seems, become more plentiful; and in the U.S.A. the price of A.C.T.H. is coming down. At the meeting of the Federation of American Societies for Experimental Biology in Atlantic City last week, Dr. Kenneth Savard and his colleagues at the research division of Cleveland Clinic Foundation reported that ox adrenal-gland extracts retained the enzymes through which cortisone is composed; and that with these enzymes 'Compound F' had been constituted from an inert substance originally derived from soya beans. (Compound F is the principal type of cortisone believed to be secreted by the adrenals in man; but from animal sources it is obtained in smaller amounts than is Compound E, which is also more easily synthesised.) This development is reported in the *New York Times* of April 22, which adds that Messrs. Armour & Co. are reducing the price of A.C.T.H. from $210 per g. to about $100 per g. The company's president has announced that his company has increased production of A.C.T.H. by 30 times in the past year, and is now obtaining almost four times as much of the drug from the same quantity of glands as it did last summer. "Within four or five months we confidently expect to triple the current rate of production"; and he believed that in a few weeks all (American) hospitals equipped to administer the drug safely could be supplied. Work had started on an inhibiting solution that would prolong the action of A.C.T.H.

ADVENTURES AMONG VIRUSES

THE title of the Dunham lectures for 1949, "Adventures among Viruses," gave Dr. C. H. Andrewes, F.R.S., full scope for surveys of the properties of viruses, of influenza, and of the common cold.[1] Viruses, he said, need three properties if they are to be successful parasites—they must be able to multiply, to be transmitted from host to host, and to persist in between. Their urge to multiply involves them in possible trouble at the portal of entry to the host, or at the surface of the cell, or with biochemical conditions inside the cell, and these circumstances may be responsible for the host's ability to resist virus attack in numerous non-specific ways, as Findlay[2] has reminded us. The virus often persists outside the host, in dried crusts or secretions or in the bodies of insect vectors, but latent infection inside the host's body is often important, and latent virus may even be passed from mother or father to offspring, as in the case of the Bittner virus of mammary carcinoma, sheep "scrapie," or mouse choriomeningitis. Jolts which disturb the delicate host-virus equilibrium of latent infection produce clinical signs of disease, as is seen in herpes and possibly in the common cold, and may in fact range from a mild febrile disturbance to an upset as severe as anaphylactic shock.

In dealing with influenza Andrewes turned from the virus to the host-virus interaction in epidemics and pandemics, viewing the problems of the survival of virus and the build-up of epidemics against the background of recent studies of viruses by the World Influenza Centre at Hampstead. Magrassi's observations on the origin of the Sardinian outbreak of 1948, which preceded the Western European epidemic of 1948–49, are particularly interesting in their suggestion of a simultaneous uprising of virus in several village communities, and Andrewes recalled an earlier theory of his own[3] of the evolution of an influenza virus from a basic strain to an epidemic variant. Such a mechanism would explain what Andrewes calls the slow-fuse phase preceding an epidemic, though mutation through several stages is needed to explain pandemics such as the influenza one of 1918.

His third lecture, on the common cold, was largely an account of the work of the research unit at Salisbury which has been described elsewhere,[4] though Andrewes added some tit-bits concerning growth of virus in tissue cultures of human embryo material and the effect of chills on experimental colds. This particular adventure seems likely to lead to long-overdue additions to our knowledge of the epidemiology of the cold, and it will not be surprising if some future annotation describes

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[1] Berthrong, M., Rich, A. R., Griffith, P. C. *Bull. Johns Hopk. Hosp.* 1950, 86, 131.

[2] Shick, R. M., Baggenstoss, A. H., Polley, H. F. *Proc. Mayo Clin.* 1950, 25, 135.

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[1] Andrewes, C. H. *New Engl. J. Med.* 1950, 242, 161, 197, 235.

[2] Findlay, G. M. *J. R. microscop. Soc.* 1948, 68, 20.

[3] Andrewes, C. H. *Proc. R. Soc. Med.* 1942, 36, 1.

[4] Andrewes, C. H. *Lancet*, 1949, i, 71.

studies in remote island communities. Immunity in the case of influenza is often broken down by new antigenic variants, though the experience recorded by Sigel[5] suggests that, even with the same antigenic strain of virus, immunity may have petered out by two years after the original infection. Immunity to colds may be kept up by constant interchange of infection only to suffer defeat if a new variant strain arises, possibly by some such process as the genetic recombination described by Hershey and Rotman[6] and Luria and Dulbecco[7] in plant viruses. Viruses are certainly venturesome creatures and no student of them can lack the spirit of adventure well personified by Andrewes himself.

RESEARCH ON DRUG-ADDICTION

THOSE who study drug-addiction are never likely to be gravelled for lack of matter; for as soon as the behaviour of one drug and its addicts has been thoroughly investigated, a whole host of new substances are already crying out for attention. The World Health Organisation's expert committee on drugs liable to produce addiction,[8] say that, apart from sporadic investigations, the only medical research on drug addiction of which they are aware is being carried out by the United States Public Health Service, and by groups of investigators in South America; and they recommend that governments should be urged to consider whether it would be feasible to start or extend research of this kind. One promising line of research is foreshadowed in their report. They think that a particular arrangement of atoms in the molecule is probably responsible for the addiction-producing power of a drug; and this is supported by the fact that certain drugs which have, in the main, a common structure tend to produce a similar addiction. They argue that other substances with a similar structure should be suspect. The relation of chemical structure to addiction-producing properties should therefore be studied. They also emphasise that any drug which will adequately replace a drug which has produced an addiction must itself be regarded as capable of producing an addiction: that at least is what the available evidence suggests.

Study of addiction is in any case not particularly easy, and a note on chronic barbiturate intoxication, based on the work of Dr. H. Isbell, of the U.S. Public Health Service hospital at Lexington, and published as an appendix to the report, indicates what the difficulties may be—not only for the investigator but for the subjects. It seems that this form of addiction is causing growing concern in America. The production of barbiturates has increased, and is now thought greatly to exceed the amount needed for medical purposes. Since 1940 more and more morphine addicts who are also taking large doses of barbiturates have been admitted to the hospital at Lexington; and on abrupt withdrawal of these barbiturates, or even reduction to less than half the dose, they often developed convulsions or psychotic symptoms, or both. But since these were cases of mixed addiction the direct relation of the withdrawal symptoms to the barbiturates could not be defined. A controlled experiment was therefore undertaken on people whose neurological and psychological state was known; these were five volunteers, all of whom had formerly been morphine addicts. They were given large amounts of barbiturates for 92–144 days and then the drugs were abruptly withdrawn. Their symptoms during the phase of chronic intoxication resembled alcoholism; their mental ability was impaired; they were confused, emotionally labile, dysarthric, and ataxic; and they showed regression. After abrupt withdrawal they all developed abstinence symptoms. The signs of intoxication disappeared and were replaced by weakness, tremor, anxiety, anorexia, nausea and vomiting, rapid loss of weight, rapid pulse and respiration, fever, rise of blood-pressure, cardiovascular instability on standing up, convulsions (in all but one), and psychotic symptoms (in all but one, but not the same one). The psychosis resembled delirium tremens, the patients displaying anxiety, insomnia, confusion, agitation, disorientation, delusions, and hallucinations. Recovery, however, was complete, and no evidence of permanent damage was found 60 days after withdrawal. During intoxication the amplitude of all electro-encephalographic waves increased, and during withdrawal there were bursts of high-amplitude waves and the records during and after convulsions were similar to those found in grand mal; but the pattern returned within 30 days to that seen before the barbiturates had been given. The courage of these volunteers commands admiration; but perhaps neither they nor the investigators realised what they were in for.

CUTS FOR DENTISTS AND PHARMACISTS

LAST June the gross earnings of dentists in the National Health Service were reduced by 20%; and the Ministry of Health has now announced that a further 10% reduction is to be made on May 1. The representative board of the British Dental Association, when it met at the end of last week, protested that this action was arbitrary, and resolved that under existing conditions no useful purpose could be served in continuing negotiations on pay with the Ministry of Health. Presuming the expenses to have remained constant (52% was the proportion accepted by the Spens Committee and in subsequent negotiations), then whereas only a year ago the dentist retained £48 net out of every £100 gross, he will now, it seems, have only £20 for the same work. The dental organisations calculate that the rate of remuneration is in fact down almost to that offered under National Health Insurance; and it is thought that some dentists may turn once again to private practice. In this latest cut, says a spokesman of the British Dental Association, the majority of dentists are being penalised for the behaviour of the few who, by working unduly long hours or giving hasty treatment, have gained remuneration above the Spens scale. Now, it is reasoned, the majority will have to earn a larger number of fees in order to keep their net remuneration anywhere within the Spens scale. The corollaries are that the general standard of work may suffer, and that the Ministry, finding that it is saving much less than the anticipated 10%, will be tempted to make a further cut. Why not, it is asked, impose a ceiling to remuneration, or else a sliding scale of fees, to cut short the activities of the minority, rather than hit at the whole profession?

Another group who have had a cut imposed are the pharmacists. The Chemists' Contractors' Committee have been informed that from May 1 the "on cost" allowance will be reduced from 33 to 16%. (This allowance is the addition made, in remunerating pharmacists, to the wholesale cost of drugs, preparations, and appliances.) This action, the Ministry explains, is being taken because of the delays which might arise in the Whitley Council negotiations; but if agreement is reached on the Whitley Council, or, failing that, if an arbitrator awards a different percentage, that different percentage will apply from May 1.

Prof. A. B. APPLETON died on April 22 at St. Thomas's Hospital, London, where he held the university chair of anatomy. He was 61.

THE death is also announced of Sir ARTHUR ROBINSON, G.C.B., who in 1920 succeeded Sir Robert Morant as permanent secretary to the Ministry of Health and held that office till 1935.

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5. Sigel, M. M., Kitts, A. W., Light, A. B., Henle, W. *J. Immunol.* 1950, 64, 33.
6. Hershey, A. D., Rotman, R. *Genetics*, 1949, 34, 44.
7. Luria, S. E., Dulbecco, R. *Ibid*, p. 93.
8. World Health Organisation Technical Report Series, no. 21. Geneva: W.H.O., Palais des Nations. 1950. Pp. 14. 9*d*.

Special Articles

HOSPITAL EXPENDITURE

NEW CHECKS AND CONTROLS

THE Minister of Health has addressed to hospital authorities the following memorandum on their expenditure:

As will be known from statements made in the House of Commons and elsewhere, the Government is deeply concerned at the rapid increase in expenditure on the National Health Service in relation to the national economy as a whole. In 1950–51 the estimated gross expenditure of hospital boards at £244 million is 45% above the level of actual expenditure in 1948–49; of this total £36·2 million represents expenditure by the boards of governors of teaching hospitals—a rise of 46% on 1948–49.

It is fully realised that the rise in expenditure is due to many factors, some outside the control of boards and committees themselves, and is in no sense a reflection of extravagance or waste on the part of hospital authorities. Essential increases have been made in nursing and other staff salaries; the level of remuneration of medical and dental staff has been fixed for the first time on a national basis: costs of some consumable goods have risen; essential improvements have been made in hospital standards and long-standing arrears in maintenance have been met; unstaffed beds have been reopened as the recruitment of nurses and domestics has improved. All these steps have been not only justifiable but unavoidable if a proper service was to be provided.

It is, however, the considered view of the Government that expenditure has now reached a level which must not be exceeded. Consequently, boards and committees must regard their estimates for 1950–51, so far as they are approved by the Minister or the regional board as the case may be, as their final totals of expenditure for the year—which will not be supplemented. Boards and committees should from the outset conduct their administration on the basis that all maintenance costs arising during the year, including all improvements, staff increases, rises in costs of consumable goods, &c., must be met within their approved estimates and that no supplementary estimate will be available; similarly, all capital expenditure required must be met within the approved capital estimate. This clearly requires that a careful and prudent view should be taken of the possibility of improvements or developments during the year, and that no commitment should be entered into which cannot plainly be met without exceeding the estimate for the sub-heads of expenditure affected.

RUNNING CHECK ON EXPENDITURE

If expenditure is to be kept within the estimate a close and continuous watch must be kept on it, and immediate steps taken at the first sign of possible overspending. It has therefore been decided that the following procedure should be adopted:

Hospital Management Committees

(i) A monthly statement is to be prepared by each management committee as soon as possible after the end of each month, showing under each sub-head used for approval purposes (Regulation 9 of the Hospital Accounts and Financial Provisions Regulations, 1948,—S.I. 1948, no. 1414): (a) the total of cash payments made and bills incurred but not yet paid during the preceding month, and the cumulative total up to the end of that month, together with comparable figures of the estimates themselves; (b) a statement of any commitments entered into under each sub-head which may lead to the estimate under that sub-head being exceeded.

(ii) This statement is to be sent to the regional hospital board as soon as possible after the end of each month, with any comments the management committee may wish to make, and a copy of the statement simultaneously sent to the Minister.

Regional Hospital Boards

(i) A monthly statement covering the board's own expenditure is to be prepared and sent to the Minister . . . as soon as possible after the end of each month, together with a statement of action taken to reduce the rate of expenditure if necessary.

(ii) The board is to examine the statements sent to them by management committees each month, make such inquiries and give such direction as may be necessary to reduce the rate of expenditure, and within 14 days of the receipt of each statement report to the Minister on any case in which it appears that there is a danger of exceeding the approved estimate and on the steps taken to prevent this happening.

Boards of Governors

A monthly statement is to be prepared by each board on the same lines as that prepared by management committees and sent direct to the Minister . . . as soon as possible after the end of each month, together with a report in any case where it appears that there is a danger of exceeding the approved estimate stating the action taken to prevent this happening.

On receipt of the above reports from regional boards and boards of governors (or in any other case where action appears to him necessary) the Minister will, if necessary, arrange for immediate inquiries by his officers to determine whether any further steps should be taken.

LIAISON WITH THE DEPARTMENT

It will clearly assist both the Minister and boards and committees in keeping a close watch on expenditure if the Minister is in constant touch with the work of boards and committees as it proceeds. It has therefore been decided that for liaison purposes arrangements should be made for the principal regional officers of the Ministry, or their deputies, to be kept informed of the proceedings of boards and committees by receiving regularly copies of the agenda, papers, and minutes of all meetings of regional boards, boards of governors and hospital management committees (but not of committees or subcommittees unless they ask for these), and by attending such meetings as appears to them desirable. Accordingly, boards and committees are asked to arrange for the above documents for all their meetings held after the date of this memorandum to be sent to the officers indicated in the appendix.

THE TUBERCULOSIS SERVICE

SIX people recently died of smallpox in Glasgow, and considerable discussion has gone on about it since; in the same month 100 people in Glasgow died of tuberculosis, and probably about 1000 contracted it in the same time—without exciting any remark. Dr. HORACE JOULES, speaking on April 22, at a conference arranged by the Socialist Medical Association, used this example to illustrate our habitual neglect of the tuberculosis problem. The meeting was composed largely of delegates from trade unions and other organisations, and the chair was taken by Mr. SOMERVILLE HASTINGS, F.R.C.S., M.P.

Dr. JOULES insisted, as many have done lately, that the general and teaching hospitals are not playing their full part in providing treatment for tuberculous patients. It is a point of honour with such hospitals, he said, to admit every treatable case of cancer within a week; but they have no beds for patients with early and treatable tuberculosis, whose risk to life may be just as serious and urgent. He believes that these hospitals should set aside 10% of their beds for tuberculous cases, but he is not for compelling them to do so: we should try persuasion first, and we must not be put off, he said, by arguments about the balance of teaching for medical students. There can be no more urgent or important study than tuberculosis for the medical student or the student nurse; and at present they are not taught and inspired about it. Of course, they must be protected: patients with tuberculosis must be transferred to a special ward, and nursed only by those who have a resistance to the infection; and nurses and students must be taught proper precautions. These

are the measures taken in the Central Middlesex Hospital, of which he is medical superintendent; and he hopes to be able to show that there is no greater incidence of tuberculosis among the nurses in his general wards than among girls in the general population. He warns prospective nurses and their parents that they will be expected to nurse tuberculosis, and has never found this to have a detrimental effect on recruitment. Sanatoria, however, are hard put to it to get nurses. He mentioned a tuberculosis hospital of 760 beds in the Metropolitan area: half the beds are closed, and to staff the remainder the hospital has only a third the number of trained nurses and a seventh the number of students, per 100 beds, to be found in any major general hospital. These general hospitals, so lavishly staffed in comparison, should not have the right to second to sanatoria patients whom they will not nurse themselves.

Dr. C. H. C. TOUSSAINT, chest physician to the Central Middlesex Hospital, noted that the incidence of tuberculosis among nurses there is far lower than that in any hospital investigated by the Prophit survey. He described three typical cases to show the advantages of combined hospital and domiciliary treatment: all were early cases in young people, all were admitted the day after he first saw them, all were sputum-negative within 2–3 months, and all went home for continued bed rest after a few weeks in hospital. Two are back in full work, less than a year after the onset, and the third—a boy of 15—was admitted with pneumonic tuberculosis last December and sent home sputum-negative and with a rising weight two months later. These case-histories reinforced a remark of Dr. Joules that domiciliary treatment combined with a short term of hospital treatment has already got scores back to work in 6–9 months.

VARIOUS EXPERIENCE

But the service is uneven. These patients may be contrasted with the wife and a friend of another speaker at the meeting, Mr. L. C. JINKS. His wife, diagnosed as an early case 6 months ago, has been told that she has another 3 months to wait for a sanatorium bed. The friend was referred for major surgical treatment to a thoracic unit, and has already been waiting 12 months. Other speakers mentioned similar failures. Dr. A. ELLIOT described himself as coming from a backward area. He sent a barmaid with hæmoptysis to the chest clinic, and after she had been obliged to queue for some time in the rain, she was radiographed and later told she was not an active case; 18 months afterwards her disease was found to be active, and she was told to go home to bed for 9 months. She lived in lodgings, and could not go to bed; and there were children in the house. Moreover, the tuberculosis officer said he did not believe in domiciliary treatment. None of the voluntary bodies approached by Dr. Elliot could help, and finally, as he said, he "kicked up a row with the tuberculosis officer" and she got a bed in a week. Dr. DAVID KERR, on the other hand, reported that they have a good tuberculosis clinic in his area, but that it is used for maternity and child welfare the day after the clinic is held. He too had stories of people waiting for a bed and deteriorating, perhaps beyond hope. Other speakers mentioned poorly equipped clinics lacking X-ray apparatus. Dr. JOULES said that the Ministry of Health has a large quantity of X-ray apparatus available, which can be had on application. Dr. H. GRUNWALD urged the value of mobile clinics with X-ray equipment.

Dr. H. L. TRENCHARD spoke of the difficulty of providing domiciliary treatment for people who have no homes. He has been asked to let them stay on in hospital and go out to work. Hostels and night sanatoria are needed, he said; and the local authorities have powers to provide them, but little has yet been done. Patients in the Metropolitan area are particularly badly off: before the National Health Service began the London authorities could hire beds in sanatoria outside their area, but these beds are now controlled by the regional hospital boards, who naturally think first of their own patients. Mr. J. ROBERTSON suggested that Glasgow is the blackest spot in this black problem, and Dr. S. LEFF gave some figures bearing this out. Three people die of tuberculosis in Glasgow for every one in Aberdeen; and three die in the Gorbals and Govan districts of Glasgow for every one in Cathcart and Langside. He noted how closely the high mortality-rate is associated with the shocking housing conditions in that city, where 30,000 are homeless and another 30,000 living in overcrowded homes.

DIFFICULTIES

The association of bad housing with tuberculosis was emphasised again and again throughout the meeting. Indeed, Dr. C. K. CULLEN felt that domiciliary treatment is often out of the question for this very reason. How can a housewife rest at home in bed? There may be no room which can be given up to her without disorganising the whole home, and it may be impossible to board out the children, or they may write unhappy letters asking to come home. He considers we are wasting money on tuberculosis because we are using half measures: we would save money in the long run by doubling what we spend now. He urged those present to collect statistics in their own areas, to call conferences under the ægis of trade councils, and to send resolutions to every interested party they could think of, not forgetting the Minister of Health.

Miss L. J. GROUT mentioned the difficulty of getting home helps for the tuberculous; and she described the increasing poverty into which the family falls when the earning member is at home with a long illness. In the past, treatment allowances could be officially supplemented; but under the National Health Service the actual sums received are sometimes lower than those which were available before the Act was passed. The result is that after some months the family is apt to be going short of food—just the opposite of what is needed if they are to resist infection.

Mr. C. M. HAWKIN, a member of a hospital management committee, and twenty years a mental nurse, spoke of the great danger of infection spreading among mental-hospital patients. He wished to see tuberculosis tackled "with the ferocity of D-day."

Miss ELEANOR BANHAM, an ex-patient, paid great tribute to the sanatoria and nurses, and to those who had ensured that she should have extra milk. Tuberculosis, she said, has been neglected by the public, the Government, and the trade unions—the fault is not in the service itself. Another patient, Mr. C. BENSTED, came from Papworth, and spoke enthusiastically of the importance of reablement, and of training the patient for a proper trade.

ACTION

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In all professions, he continued, people really began to learn after they had nominally qualified, and this was abundantly true of those who had the care of human beings in real or imaginary sickness. It was therefore proposed that after qualification a doctor should be required to have not less than a year's practical experience of the care of patients under supervision in a hospital or other approved institution. He was assured that there were more vacancies in house-appointments in England and Wales than there were people qualifying each year. It would be for the General Medical Council to consider what was meant by the term "an approved institution." As it might not be practicable to bring this provision into force everywhere at any one time the G.M.C. would fix the date when it should come into operation.

The Bill also provided that the G.M.C. should be able to visit and inspect medical schools and examine their standards of training. Lord Addison felt, however, that there ought not to be too many bodies with power to inspect. Quite properly the universities and the University Grants Committee had the power, and the aim would be that this new power of inspection should be coördinated with the exercise of the same powers by these other bodies.

It had been represented for many years past that the constitution of the G.M.C. might be improved, and under this Bill the number of members of the council would be increased from 39 to 45. There would be a specially appointed disciplinary committee which, apart from the chairman, would have only 19 members, of whom substantially a third would be medical men who had been elected by their fellows. A medical man struck off the register would in future have an opportunity to appeal to the Judicial Committee of the Privy Council.

The fee for interim provisional registration would remain at 5 guineas as at present, but when the final interim period was finished and a man or woman was added to the register, the fee would be increased to 11 guineas. The statutory description of the body, instead of being the General Council of Medical Education and Registration of the United Kingdom, would in future be simply the General Medical Council—the title under which it had been generally known for many years past.

Lord **Horder** admitted that he had been a severe and unrepentant critic of the Government during the last two or three years, but he supported this Bill. He believed that the first five clauses, if properly administered, would add considerably to the efficiency of doctoring and general practice in Britain. The Bill did not improve the conditions of doctoring, but it gave the doctor the best chance of being efficient. Immediately after qualification, and synchronously with registration, the young doctor went out into practice ill fitted in the sense of responsibility and judgment (which was born only of experience) and the ability to declare the inherent principle which was in him. If properly administered the present Bill could do much to remedy this. But several points called for careful consideration. Was it clear that this additional year was to be added to the present 5–6 years of the ordinary curriculum? The position should be safeguarded, so that the present curriculum was not modified to make this desirable twelve months part of the 5-year or 6-year period. Again, what was to be the status of the qualified but only provisionally registered doctor? Lord Horder suggested that the provisional registration should entitle the newly qualified doctor to full responsibility and privileges within the terms of his appointment, such as were accorded to registered medical practitioners in general. For example, would he be legally entitled to prescribe dangerous drugs? Might he sign death certificates or certify as to insanity? Should his remuneration be the same as the present rates for house-appointments? Lord Horder did not feel certain that there were enough suitable hospital appointments available for these provisionally registered doctors. He thought that any approved hospital should be able to provide a minimum of 20 beds or an equivalent number of outpatients. If there were not sufficient of these institutional posts he suggested that some of these people should be accredited to recognised approved groups of practitioners. This might be an incentive to get on with the health centres so as to provide some venue in which these young people could work. The idolatry of the hospital had gone rather far. These young men and women were ultimately going to be faced with domiciliary practice. The object was to make them more efficient doctors, not to feed their already avid desire to leave the ranks of general practice and become specialists.

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4 of the nurses and the laundry maid died. Compulsory vaccination would be difficult to justify in view of the fact that Parliament had abolished universal compulsion. It would also be somewhat of a deterrent to staff recruitment at fever hospitals, where such difficulties were perhaps more evident than in any other class of hospital in the country. The original Glasgow case was admitted to hospital for pneumonia which might well have been dealt with in a general hospital, while 1 other case, that from Hamilton, was, in fact, admitted on a mistaken diagnosis to a general hospital. It would be somewhat illogical to make vaccination compulsory for fever-hospital staffs but not for general-hospital and public-health staffs, including sanitary inspectors.

Hospital Endowments Fund

In the House of Commons on April 19 Sir John Mellor moved that the National Health Service (Hospital Endowments Fund—Discharge of Liabilities) Regulations, 1950, be annulled. He said that the regulations did not define the extent of the liabilities which the Minister might discharge out of the fund. The Minister was asking the House to give him a blank cheque on the fund. The House should be told the present value of the fund and the amount of the liabilities taken over by the Minister in connection with the voluntary hospitals.

Mr. Arthur Blenkinsop, parliamentary secretary to the Ministry of Health, said it was unfortunate that it was not possible to produce accounts before the regulations were put forward. The first of the accounts, however, would be presented shortly. Even now the transfer of assets had not been completed. The Ministry were still dealing with many thousands of separate endowments and it had proved a very complex and detailed matter. They were now in a position to estimate pretty accurately the total liabilities to be met. The total assets would certainly be not less than £20 million. The gross value of the fund should be approximately £30 million. There would be approximately £11 million to meet liabilities, which included £6 million for bank overdrafts. The motion was negatived.

Bulk Prescribing and Advertising

In the House of Commons on April 20 Mr. Hugh Linstead moved that the regulations dated Dec. 16, 1949, entitled the National Health Service (General Medical and Pharmaceutical Services) Amendment (No. 2) Regulations, 1949 (S.I. 1949, No. 2341) be annulled. He said that regulation 11 permitted in an institution a doctor who was responsible for the medical care of the inmates to write prescriptions for stocks of drugs and medicines instead of writing prescriptions for individual patients. A provision whereby bulk medicines were prescribed to institutions to be kept in store until somebody there required them was a complete departure from the principle of a medical service. He believed the intention had been to meet a complaint from boarding-schools where it had been customary to keep stocks of medicine. But why choose one type of institution for preferential treatment? Why should factory proprietors be expected to pay for the medicines in their sick bays while the governors of a boarding-school were given free medicines to stock their medicine cupboards?

Another point, Mr. Linstead continued, was that the Minister had permitted competitive advertising among chemists against the advice of the Pharmaceutical Society, who had laid down that advertisements should not refer to dispensing services.

Mr. Blenkinsop agreed that in general the practitioner should prescribe individually for each patient and that had been the principle on which the service had been founded; but in practice it had been found that there were exceptional cases where its application would be wasteful both of the time of the doctor and the patient, and of medicine bottles and medicines. For instance, at an institution where there might be some mild infection, the doctor under the existing regulations had to make out a separate prescription form for each patient. But it was appreciated that problems might arise, and the matter would be carefully watched. Schools and residential institutions were in a different category from factories because their doctor was the regular doctor who provided care for patients. In a factory, first-aid or emergency treatment was offered and the worker was still on the list of his own doctor.

Turning to Mr. Linstead's second point, he said advertising could be undertaken solely in chemists' windows and within the approved wording. It was not quite fair to say that the profession were unanimous about this matter: there were three points of view. Some chemists suggested that the present position should be retained. Others urged that there should be completely free opportunity to advertise. A further group suggested a restricted form of advertising should be allowed in approved wording not only in shop windows, but also in the press and in other ways. The Ministry felt that it was fair, in view of the representations which had been made to them, and the differing points of view, to adopt the middle course. But these changes would be kept under review, and if there appeared to be any abuse the Ministry would be willing to make such amendment of the regulations as might be necessary. *The motion for annulment was withdrawn.*

QUESTION TIME

Cost of N.H.S. Drugs and Appliances

Replying to a question, Mr. Aneurin Bevan stated that the total amount paid to chemists in England and Wales for drugs and appliances under the National Health Service up to Feb. 28, 1950, was just over £41 million. A running 1% sample suggested the following approximate percentage cost for 1949:

Appliances	*Proprietaries*	*Other preparations*
10%	28–29%	61–62%

Reciprocal Benefits

In answer to a question, Dr. Edith Summerskill stated that the only reciprocal arrangement so far made with a foreign country for providing insurance benefits for British nationals in that country was with France. Negotiations were proceeding with a number of other countries.

Trial Release of Mental Defectives

Mr. N. N. Dodds asked the Minister of Health if arrangements could be made for appeals to an independent body of experts, from decisions of local hospital committees refusing applications for a trial release from hospitals or homes of mental defectives.—Mr. Bevan *replied*: *I am not satisfied that there is a sufficient case for modifying the present arrangements.*

Trypanosomiasis in West Africa

Mr. Thomas Reid asked the Secretary of State for the Colonies, in view of the wide prevalence of trypanosomiasis in West Africa, what reports he had received of the treatment of this disease by the use of 'Antrycide.'—Mr. T. F. Cook *replied*: *The department's tsetse fly and trypanosomiasis committee has recently been considering reports from many parts of Africa, including West Africa, concerning experiments in the use of antrycide in cases of animal trypanosomiasis. These reports tend to confirm the curative merits of the drug, but, owing to the danger of toxicity and drug resistance, expert advisers are agreed that further experimental work is required into its prophylactic qualities. This work will be pursued.*

Salaries of Local Authority Dentists

Mr. E. H. Keeling asked the Minister of Health how soon Whitley machinery would be set up to negotiate new salaries for dentists in the service of local authorities—Mr. Bevan *replied*: *Progress in setting up a Dental Whitley Council now depends entirely on the representatives of the dental profession.*

Hospital Staffs

Mr. K. W. M. Pickthorn asked the Minister of Health what were the numbers and the costs of the clerical and administrative staffs of hospitals for each of the last four years.—Mr. Bevan *replied*: *Figures are available for only the last two years. On Dec. 31, 1948, when staff was still being built up and much of the administrative work was being done by local authorities on an agency basis, the total clerical and administrative staff of hospitals was 20,933. On Dec. 31, 1949, when the agency* [illegible] *een superseded, the figure was 25,654.* [illegible] *res of cost are not available, but the c* [illegible] *in the financial* might well be applied to our own countrymen. He thought that the disciplinary committee was too large and he supported Lord Horder's view that there should be some sifting committee independent of the tribunal. He was considerably disturbed that the decision of this tribunal could be made by the casting vote of the chairman. He thought that there might be some power to give some other sentence than erasure from the register. He also supported the suggestion that even if there was a report on conviction, or a report of something in divorce proceedings which was regarded as "infamous conduct," it should be the duty of the disciplinary committee to hold their own inquiry. His only anxiety with regard to the appeal was lest the cost of appeal to the judicial committee of the Privy Council should be prohibitive.

Finally, Lord Webb-Johnson urged that as this was a Medical Bill and not a General Medical Bill they should consider whether there was any important point outside the provisions already drafted which might be included. One point which had been brought to his notice was that while the curriculum was extended for a year, while the training was more exacting, and while the public were more dependent on scientific guidance in time of illness, the maximum penalty for a man masquerading as a qualified practitioner without any grounds for so doing was only £20.

Viscount JOWITT, the Lord Chancellor, frankly admitted that he, too, regarded a disciplinary committee of 19 as rather large; he would have preferred a committee of, say, 9 which was a quorum with its chairman. However, this point had been discussed with the G.M.C. and they were anxious that all interests should be represented. The matter could be considered in the committee stage. The advantage of an appeal to the Privy Council was that the appeal would be to a court which had upon it the most eminent judges from England, Scotland, and Northern Ireland. The proposal had given the medical profession complete satisfaction. The idea that an appeal to the Privy Council was necessarily expensive was wrong. He had no doubt they would be able to avoid undue expense falling on an appellant. In clause 19 it was proposed that where the name of a person had been erased from the register the committee might, if they thought fit, at any time direct the registrar to restore it. As the law stood wherever there had been a conviction the G.M.C. took that as a fact. They only considered whether that conviction was of such a grave character that it should involve a man being struck off the register. In the case of adultery they had to consider whether the circumstances made it an act of professional misconduct. He thought that was the right way to approach the matter, but it was a question which the Government would certainly consider in the committee stage if noble Lords so desired.

Lord HADEN-GUEST pointed out that many doctors already did six months' or a year's training after completing their normal studies, and he believed that there would be enough places to provide appointments for all who required them. Turning to Lord Horder's suggestion that health centres might be approved institutions, he said that a health centre was not primarily a building but a group of doctors working together as a team. Some were already being formed, and it seemed to him very desirable that young doctors should be apprenticed to such a group as an alternative to going into some institution.

Lord STAMP, in a maiden speech, pointed out that the medical schools of the University of London were already visited regularly by the senate of the university, and the University Grants Committee now also proposed to visit them every 5 years. The proposed visits by representatives of the G.M.C. would lead to an increased danger of overlapping and of inconvenience due to multiple inspections and reports. He hoped arrangements could be made for representatives of the interested bodies to visit the schools as a single body.

Lord SHEPHERD, replying to the debate, said the Government would certainly look into Lord Webb-Johnson's suggestion that clauses 1 and 2 were too rigidly drawn. But at the same time he pointed out that those clauses were in accord with the report of the Goodenough Committee. Moreover, the two clauses had since received the approval of the G.M.C. It was the intention of the Government that the interns should occupy house-posts and that the rate for the job should be paid. The appointed day for the disciplinary committee could come into operation almost forthwith, but a good many problems had to be solved in regard to the interns, and this provision would become compulsory only as and when circumstances permitted. Replying to Lord Horder's speech, Lord Shepherd said he could not answer specifically the question whether an intern would be able to issue death certificates or deal with drugs; but under sub-section (3) of clause 4 it was contemplated that an intern would be registered only in so far as certain functions could be performed and no further. He did not think they need fear that the hospitals and institutions secured for the purpose of intern training would be other than suitable and practical. The universities and other examining bodies could be trusted to make a proper choice.

Recruitment of R.A.M.C. Officers

In the debate on Army problems in the House of Lords on April 19, Lord WEBB-JOHNSON returned to the point he had made in the recent debate on defence [1] that the shortage of specialists in the R.A.M.C. was only likely to be overcome by the integration of the Army Service with the National Health Service and by secondment of officers from the N.H.S. to the Armed Forces. Unfortunately, since that proposal was put forward officially as a recommendation to the Minister of Defence, to the Secretaries of State, and to the Cabinet, many posts had been filled without any such obligations of secondment. The establishment of R.A.M.C. officers was 915, including long-term and short-term commissions, and the total deficiency was 342; the deficiency in the number of long-term officers was 10%; the deficiency on short-term commissions was 64%; and the over-all deficiency was 37%. These figures showed that the R.A.M.C. was in danger of running down beyond chance of recovery. The only remedy was improvement of terms and conditions of service. It was a comparatively easy matter to determine how remuneration in the civilian National Health Service and remuneration in the R.A.M.C. could be brought within reasonable comparison of each other.

Lord PAKENHAM, Minister of Civil Aviation, in his reply said that the matter raised by Lord Webb-Johnson was regarded by the Government as one of real urgency. It was past the stage of "being considered," and even past the further stage of "being examined." The consideration now being given to it was exactly the sort of consideration which Lord Webb-Johnson would expect, and Lord Pakenham promised him every opportunity for casting stones if nothing was done by the time their Lordships next came to debate it.

Vaccination of Fever Hospital Workers

In the House of Lords on April 19, Lord CLYDESMUIR asked whether, in view of the experience of the recent outbreak of smallpox, the Government would consider the advisability of making periodic vaccination compulsory for all those who worked in fever hospitals. Lord MORRISON, replying for the Government, said it was of course the general rule that the staffs of smallpox hospital units should be drawn entirely from persons protected by vaccination. While emphasising the desirability of vaccination for staffs employed at fever hospitals, or otherwise liable to come into contact with smallpox, the Minister of Health and the Secretary of State for Scotland did not feel justified at present in making vaccination a condition of service. Both Ministers were, however, reminding hospital and other authorities of the need to ensure that vaccination was offered to all persons on recruitment to such staffs and periodically to all persons so employed. In answer to a further question he added that out of the 21 smallpox cases in the recent West of Scotland outbreak, 9 were members of the staff of the fever hospital in which the original case was treated. The original case was undiagnosed when the man entered the hospital. Some of the 9 cases mentioned were not adequately protected by vaccination. They included 8 nurses and 1 laundry maid. Of these 9 people

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[1] See *Lancet*, April 22, p. 777.

In England Now

A Running Commentary by Peripatetic Correspondents

SOME occupations so stamp themselves on the features and bearing that they are easily identified by even the comparatively unobservant. Take jockeys, and indeed the whole class of "horsey" men, in whom constant equine contemplation and society produces a most characteristic facies. The Army man displays the fixed expression imposed by discipline, but it is not so easy to explain the distinctiveness of the sailor. Is it the sea, the breezes, the life, or the way of living? Thought we know has its effect in moulding the features; outstanding examples of this are the divine and the man of law. Is there a medical face? I have often glanced round a gathering of doctors and have decided that there is nothing whatever in their appearance to suggest the healing art in all or any of its manifold ramifications. One sees what might be dashing cavalry officers, film stars, prosperous brewers or butchers, country parsons, actors, farmers, policemen in plain clothes, and not a few like nothing on earth.

Does not our special education and training impose a single characteristic mark? A recent experience, stimulated by a paragraph in the journals, has thrown a little light on the problem. In the *New England Journal of Medicine* for March 23 (p. 430), quoted in *The Lancet* of April 15, one reads "The *internist* is recognisable by his preoccupied look, as a man wrestling with difficulties... considering every organ as a potential villain. The *surgeon* cuts more of a figure. . . . He exudes optimism and radiates confidence. The burden of accumulated uncertainty that weighs on the shoulders of the internist never bends the surgeon's erect structure." The Conjoint Finals were on and I took the opportunity to substitute for a haphazard collection of medical men the segregation in the examiners of physicians, surgeons, gynæcologists, and pathologists, and it seemed to me that the physicians did exhibit a sort of family resemblance distinct from their colleagues in the other specialties, whether or no this was attributable to the cause alleged.

I pondered as I left Queen Square, for other mundane explanations seemed at least feasible. As I turned into Southampton Row I ran into George, a middle-aged G.P. in practice in Bloomsbury. "Is there a typical medical face?" I asked him. "Of course there is," replied George with some bitterness, "it is unmistakable —a composite resulting from poverty-stricken senility and duodenal ulceration."

* * *

In Germany the buds are bursting, the birds singing, and the forsythia in full bloom; another month and the country roads will be bright with apple-blossom for mile after mile; only the mildest of winters separates us from last year's fruit crop, and the lengthening evenings and blue skies bring memories of last summer, and particularly of an old university town in the south, where the deep shadows of the narrow streets seemed all the deeper for the sun-drenched stucco of the overhanging gables. Here it was that I learnt what an *Ausflug* is. I had often read of *Ausflüge* in German lessons but had never before experienced one; there is no precise equivalent in English, but perhaps "expedition" is the nearest translation.

The houseman at the hospital where I was staying called at my room the evening before. "Tomorrow," he said, "I will take you for an *Ausflug*; your breakfast will come at quarter to seven, and I will come at quarter past." My breakfast (a fried egg, to my surprise) came at twenty to seven, and my guide at ten past. At a quarter to eight we were sitting on the hard slatted seats of a country train bound for Hechingen (onetime capital of the principality of Hohenzollern), complete with rucksack full of sausage sandwiches, bottles of mineral water, and a guidebook. The Hohenzollern castle, our objective, towers above the town, crowning a solitary hill which lies off the long limestone plateau known as the *Schwäbische Alb*, like a ship off shore. Burg Hohenzollern is an amazing sight; it caps a hill whose sides rise at first steeply, and then almost sheer, from the surrounding fields. An hour of steady climbing up small paths through dense pinewoods brought us to the summit. The castle is all that a castle should be: pointed turrets, battlements, and a succession of drawbridges leading to a courtyard on which the principal rooms open. There has been a castle here for a thousand years, but the present one was built by Kaiser Wilhelm I, grandfather of "the Kaiser" of world war I. We sat in the courtyard and ate a substantial meal from the rucksack before touring the castle—full-blooded Gothic revival on a Teutonically thorough scale.

That duty done we descended the other side of the hill, as steep as the side we had climbed up, and after scrambling up the northern slope of the *Schwäbische Alb* were rewarded with a superb view, marred by a slight mist, of the castle and the plain beyond, and, just visible to the west, the hills of the Black Forest. We were now on the summit of the Zellerhorn, a spur which juts out towards Burg Hohenzollern. After taking some photographs we settled down to a large lunch, which at last made some difference to the weight of the rucksack. I took this to be our midday meal, but I had misjudged the German appetite, for after another hour's walk across the rocky plateau we came to an inviting *Gasthaus* just over the brow. As we sat down, my companion asked cheerfully: "Well, what would you like for lunch? A pork chop, perhaps?" And pork chops it was, with an enormous dish of vegetables. It was as well that the rest of the way lay downhill. A winding chalky road brought us to a village called Onsmettingen, a railhead in the hills, whence we travelled over the Rhine-Danube watershed, back to Tübingen, and I had learnt the ingredients of a German *Ausflug*—an early start, a long walk with hills to climb, a rucksack, a guidebook, vast amounts of food, and a rendezvous with a country train to take you back when you're tired. How the princes of Hohenzollern, a tiny State in the south-west corner of the country, became German Emperors is another story; but I couldn't help thinking of the ill-fated Kaiser Friedrich III, now remembered as the "Ninety Day Emperor," who came to the throne in 1888 with a carcinoma of the larynx and a palliative tracheotomy.

* * *

Phyllis is a second-year student nurse at one of our famous teaching hospitals. "How do they look after your health?" I asked her; she was enthusiastic. "They take *great* care of us; there's always a doctor on duty to see anyone who likes to go to him between nine and half-past every morning." "Do you have to ask the sister?" "No, you just tell her you're going." She was looking thinner than I remembered, and had a dressing on her chin. At bedtime this came off and an over-ripe boil suddenly exuded about 2 c.cm. of pus. "I thought you said they looked after you. What were you doing on the ward with that thing?" I asked. "Oh well, that's my fault. If I'd gone to the doctor I expect he'd have sent me off." As she was doing a period of tuberculosis nursing, and was perhaps in contact with some surgical cases, I expected so too. "But why haven't you been to him?" "Oh well— we're always rather busy on the ward between nine and half-past."

How well these things look on paper.

* * *

When we moved into this house we took over some coal in the basement cellar which subsequently proved to be mostly dust. Since then a succession of purveyors of domestic help have adopted the view that lumps are intended for breaking up small, and an undue proportion of our "best" coal ration has arrived as powder; so our cellar has come to contain a great accumulation of dust. My Bank Holiday task was to search for buried lumps, attired in a boiler suit and gum-boots, with a theatre-mask over my nose and mouth. At the subsequent ablutions my nostrils were black, and a douche produced an astonishing nasopharyngeal deposit of coal-dust. It is true that the mask was very dirty, but the douche result seemed considerably worse.

This makes me wonder whether wearing a gauze mask can be really effective after all, or whether it is merely a fetish. Surely if coal-dust can pass in one direction, organisms can pass in the other?

year 1949–50 was estimated at £3½ million, and in the financial year 1950–51 at £4½ million.

Replying to a further question, Mr. BEVAN said it was quite impossible to make any estimates for the condition of things when the Ministry took over because voluntary hospitals had no uniform system of accounting which would throw up the various categories upon which the money was being spent.

Public Health

Scotland's Health Services

IN Scotland only one health centre—at Sighthill, a developing Edinburgh suburb—is to be constructed at the moment; and other ways are being sought to encourage coöperation among groups of general practitioners and their closer working with the public-health and hospital services. The first annual report of the Scottish Health Services Council [1] states that meanwhile the impact of the new service on the practitioner's work is being studied by the Standing Medical Advisory Committee; and "the Council feel it is their duty to put on record that in many quarters there is a conviction that certain features of the general practitioner services are operating to the disadvantage of the best types of general medical and dental practice."

The report of the Department of Health shows that the number of prescriptions dispensed under the National Health Service grew steadily from 706,000 in July, 1948, to 1,339,000 in December, 1948. In 1949 the January total of 1,567,000 was not surpassed until November, which, with a total of 1,581,000 was the peak month of the year. The numbers for the later months of 1949 are about one-quarter higher than for the same months of 1948; the total number of prescriptions for the calendar year 1949 was about 17 million. The cost per prescription also rose—from 40·8*d.* in September, 1948, to 46·4*d.* in April, 1949.

The number of new cases of respiratory tuberculosis provisionally notified in 1949 was 8427, compared with 8204 corrected notifications in the previous year and 7984 in 1947. However, in 1949 deaths were more than 10% fewer than in 1948. Notifications of non-respiratory tuberculosis declined to 1627 (provisional) in 1949, compared with 1842 and 2133 in 1948 and 1947. "There is no doubt that the efforts made in Scotland to eliminate tuberculosis from dairy herds and otherwise to improve the cleanliness and safety of the milk supply are largely responsible for these results."

During the late war there was undoubtedly a real increase in the incidence of respiratory tuberculosis, and this has continued into the post-war years;

> "but there is little doubt that the rising figures recently recorded are in part due to earlier diagnosis and improved methods of case finding. A stage has now been reached when 5 to 10 per cent. of all new cases coming to light are found through mass radiography. Many cases are now discovered in the relatively early stages when the disease is more susceptible to treatment, and it is probable that a great many of the cases of tuberculous disease of the lungs found by mass radiography would in the ordinary course of events have remained undiagnosed, but still infectious, for months or even years."

During the year the total number of beds for patients with respiratory tuberculosis was increased to 4895, from 4707 a year before. Nevertheless the number of patients awaiting admission at the end of the year was 2877, compared with 2572 at the end of 1948.

Smallpox in Glasgow

Speaking in Glasgow on April 18, the Lord Provost of the city criticised the time that elapsed between the date when the seaman through whom the recent outbreak of smallpox originated was admitted to a Glasgow hospital, and the date when official confirmation was received by the city corporation and medical officer. The seaman, he said, was admitted to hospital on March 10, and 18 days passed before the corporation was told of the disease. It was, he suggested, high time that steps were taken to see that never again would such a time elapse before Glasgow was informed of an impending epidemic.

In a letter to the Lord Provost, Mr. Hector McNeil, secretary of State for Scotland, remarks that it seemed that "you feared that the Western Regional Hospital Board had been guilty of delay in notifying to the Glasgow Public Health Department the original case of smallpox which led to the recent outbreak."

> "Now, it seems to me," Mr. McNeil continued, "that your statement suggests that there was some slackness in allowing this original case into the country without being isolated, and that further this function had been better done while it was the function of the local authority. I am sure there is some confusion here. Port health control is, of course, as I am sure you know, still in the hands of the local authorities and is not the job of the Regional Hospital Boards. However, here I do not want to be thought at all critical of the appropriate local authority."

Unhappily, continued Mr. McNeil, when the man who was the original contact landed in this country, he was apparently perfectly well.

> "I think you should know that on March 14th the hospital authorities told an officer of the Glasgow Public Health Department that the patient was thought to be suffering from chickenpox. This was, I am informed, the first day on which the patient had shown a rash, his admission to hospital on 10th March (arranged through the Public Health Department) having been on account of pneumonia. The information was given in the course of inquiry by the hospital authorities from the Public Health Department as to whether there was any record of illness on the ship in which he had come to the country; and I understand the Department took action to the extent of putting under daily observation the seamen's hostel from which he had been admitted. Further, a medical officer of the Department saw the patient in the hospital on March 17th. Suspected smallpox was first diagnosed on March 26th in contacts of the original case, and I am assured that the Public Health Department was informed by telephone that same day."

Sir Andrew Davidson, chief medical officer of the Department of Health for Scotland has sent to medical officers of health a letter thanking those concerned for their strenuous and successful efforts in controlling the outbreak.

Births and Deaths in England and Wales

The Registrar-General's weekly return for the week ended April 15 records the following rates for the quarter ended March 31 this year (rates for the corresponding quarter of 1949 in parentheses): birth-rate 16·7 (17·3) per 1000 population; stillbirth-rate 22·9 (23·1) per 1000 live and still births; death-rate 14·0 (14·9) per 1000 population; and infant-mortality rate 37 (40) per 1000 related live births.

Dysentery in England and Wales

The last week of the first quarter of the year (week ended April 1) produced 461 notifications of dysentery—the highest weekly figure recorded this year. The total number of notifications for the quarter were 3938, compared with 5163 in the corresponding period of the peak year 1945. There is therefore every indication of the present year becoming comparable to 1945 in dysentery incidence as judged by notifications.

The disease due to *Shigella sonnei* remains confined very largely to the North; the counties of Durham, Lancashire, Northumberland, and the West Riding have contributed 67·7% of all notifications in the first quarter. The county boroughs in these areas which had the highest figures were Sheffield (566), Leeds (365), Newcastle (183), Manchester (169), Bradford (127), and South Shields (87). At the other end of the scale the following places in the same areas recorded no notifications at all: Barrow-in-Furness, Blackpool, Bootle, Bury, Rochdale, Warrington, and Halifax; and the following registered only 1 case each: Darlington, Burnley, Oldham, Tynemouth, and York. County areas with figures next highest to those mentioned above were Gloucester, Stafford, and Glamorgan, which together were responsible for 9·7% of all notifications. In the remaining counties in the East and West the incidence was satisfactorily low.

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[1] Report of the Department of Health for Scotland and of the Scottish Health Services Council, 1949. H.M. Stationery Office. Pp. 115. 3s.

unanimously found this treatment to be of no significant benefit in rheumatoid arthritis.

The total of cases treated amounts to 172. Of these some limited improvement was noted in 14 cases (subjective only in 11 and objective in 3). Many of us have had the opportunity of treating cases with adrenocorticotrophic hormone and of observing in the U.S.A. the therapeutic effects of 'Cortisone.' and we were convinced immediately of the very great value of these substances. In contrast, when cases are adequately studied under controlled and standardised conditions, treatment with deoxycortone and ascorbic acid produces no more improvement either subjectively or objectively than can be observed to follow other forms of injection treatment—e.g., procaine or even normal saline.

In view of the widespread publicity being given to the use of deoxycortone and ascorbic acid in the treatment of rheumatoid arthritis we have thought it desirable to report our failure to obtain any significant benefit and to record the unanimity with which we are agreed on this.

W. S. C. Copeman **O. Savage** **G. D. Kersley**
J. J. R. Duthie **F. Dudley Hart** **H. A. Burt**
E. Fletcher **J. H. Kellgren** **E. G. L. Bywaters**
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HÆMORRHAGE FROM PEPTIC ULCER

Sir,—There seems to be a world-wide interest just now in the surgical treatment of bleeding peptic ulcer, and recent papers have revealed a significant change in the accepted indications for operation.

In this department we have based our indications for operation on the investigations of Dr. Jorgen Pedersen in Meulengracht's department of the hospital. Pedersen[1] analysed some 850 cases of bleeding ulcer, covering a ten-year period up to May, 1948. He found that among the 530 patients under 40 years of age only 1 died. On the other hand, among the 317 over 40 there were 30 deaths, distributed as follows:

Type and time of hæmorrhage	*Cases*	*Deaths*
No visible bleeding	2	2 (100%)
Melæna	119	3 (2·5%)
Hæmatemesis *before admission*	128	4 (3·1%)
Hæmatemesis *in hospital*	68	21 (31%)
All cases in patients over 40 years	317	30

Pedersen concludes: "The main result of this analysis is the setting up of a small group of hæmorrhages with the easily recognisable sign of hæmatemesis in hospital. The lethality of this group is so high and it comprises so large a number of those dying from exsanguination that criteria for surgical intervention with a view to hæmostasis must be considered for this group."

We have therefore decided to operate only on patients who have (1) a proved or highly probable ulcer, and (2) a hæmatemesis while in hospital, and then (3) only if they are over the age of 40. In the last two years our group has dealt with some 380 cases of bleeding ulcer, of which 35 conformed with these criteria. Of the 35 patients, 12 were, for various reasons, not operated on; and 2 of these died (men of 42 and 69), both from loss of blood. Of the 23 who were operated on, 3 died—a woman of 63 and man of 73 from heart-failure, and a man of 73 from continued bleeding. Among the remainder which did not conform with Pedersen's criteria, 6 died from melæna, the youngest being aged 51 and the oldest 92, so that altogether there were 11 deaths.

In the same period we performed 319 partial gastrectomies for ulcer (including the bleeding ulcers) and lost 12 patients—a gross mortality-rate of 3·8%.

One of the principal difficulties, in our experience, is to establish the diagnosis of ulcer, particularly duodenal ulcer, in elderly patients with a very short history of a week or ten days. Somewhat reluctantly, we have had such patients taken to the X-ray department with a transfusion running; but in most cases this has been rewarded by the demonstration of an ulcer, and the patient has been operated on. In a few cases no ulcer could be seen radiologically, but gastrectomy was performed and the ulcer found. In one case, in a man of 69, no abnormality was found in the stomach or duodenum at laparotomy; the abdomen was closed, and he has had no further symptoms.

We have found that by following Pedersen's criteria we ensure that the most gravely threatened cases are operated on early, and at the same time we avoid doing a large number of "unnecessary" emergency gastrectomies.

Surgical Department A,
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K. H. Koster.

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[1] Pedersen, J. *Gastroenterology*, 1949, 13, 597.

Sir,—When, in March, 1948, Sir Gordon Gordon-Taylor, lecturing to the Medical Society of Athens on the treatment of hæmorrhage from gastroduodenal ulcer, said that the case-mortality from this hæmorrhage amounted, on an average, to 10%, this statement appeared strange to most of us, and some of us even contradicted it. This Greek view is supported by Blackford, Smith, and Affleck,[1] who have reported that a great many physicians with a large practice have never met with a fatal case of hæmorrhage from gastroduodenal ulcer and therefore consider the mortality to be very low.

Since the mortality-rate of hæmorrhage from gastroduodenal ulcer is of vital significance from a therapeutic point of view, we have investigated the material available at the hospitals of Athens and Piræus, and we reported our findings in detail to the Medical Society of Athens on May 1, 1949. Briefly, our conclusions were as follows:

(1) Hæmorrhage complicated gastroduodenal ulcers in 1172 out of 4954 cases (23·65%). The only hæmorrhages that were counted were those for which the patients were being treated; so the actual proportion must be higher in view of the fact that the patients' individual histories could not be investigated, owing to various obstacles, including the destruction of many hospitals' records during and after the war. Thus it was impossible to ascertain, in each case of gastroduodenal ulcer under treatment for some condition other than hæmorrhage, whether hæmorrhage had occurred in the past.

(2) The incidence of hæmorrhage from gastroduodenal ulcers during the war (28·25%) was higher than the pre-war rate (12·16%) and somewhat lower than the post-war rate (33·92%), suggesting that the privations of the war period and other physical and emotional factors, and their post-war repercussions, have increased the tendency of ulcers to bleed.

(3) The age-incidence of hæmorrhage from gastroduodenal ulcers before, during, and after the war has not fluctuated appreciably, except that during the post-war period it seems to have increased in patients over the age of 45. In this period

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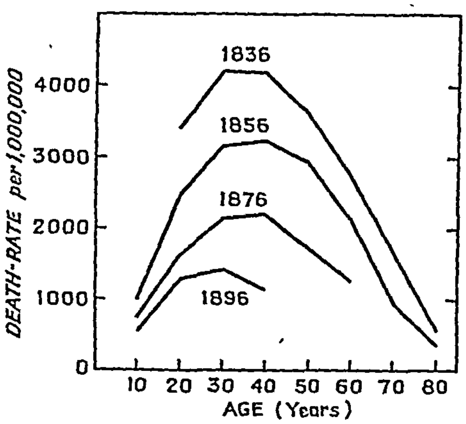
[1] Blackford, J. M., Smith, A. L., Affleck, D. H. *Amer. J. digest. Dis.* 1937, 4, 646.

Letters to the Editor

TUBERCULOSIS MORTALITY

SIR,—It is well known that the age at which the death-rates from tuberculosis are at a maximum (apart from infancy) has been getting progressively older. The Registrar-General's figures for deaths of males from all forms of tuberculosis in England and Wales during the years 1851–60 show a maximum death-rate at the ten-year age-group 25–35; for 1881–90 the maximum is at age-group 35–45; and for 1931–40 at the age-group 45–55.

This aspect is the result of the usual method of examining mortality, which is to consider the death-rates over a calendar year or period of calendar years. It has, however, been shown by Frost,[1] using United States statistics, that a rather different picture is obtained if the death-rates are examined according to year of birth instead of calendar year; and the vital statistics of this country are found to show similar features—a fact which does not seem to have been fully appreciated here.



Each curve in the accompanying diagram shows, for England and Wales, the tuberculosis death-rates per 1,000,000 which have been experienced by a group of males born during the given period as they get progressively older. Curves are drawn for males born during the periods 1826–45, 1846–65, 1866-85, 1886–1905 (average years of birth 1836, 1856, 1876, 1896). The curves for the later years of birth are, of course, incomplete because the group of lives under consideration has not yet reached the advanced ages.

It will be seen from the diagram that the curves for all years of birth are of very similar shape and show no sign of the postponement of age of maximum mortality found in the case of death-rates by calendar year. It would therefore appear that every generation experiences its own mortality and that the *relative* variations with age are rather similar for all generations (i.e., the shape of all the year-of-birth curves is similar). Thus the year of birth seems to be a more fundamental function than the calendar year so far as tuberculosis mortality is concerned, and a generation which has experienced high tuberculosis mortality at the young ages continues to suffer from high mortality throughout life. In this light the progressive increase in the age of maximum (calendar year) mortality does not represent the postponement of maximum risk to later life but is rather the result of the higher rates experienced by the older lives in their young days. It would be incorrect to infer that young adults of today will experience higher tuberculosis death-rates in middle life than they are at present subject to; tuberculosis is still primarily a disease of youth. Female lives show somewhat similar features, although the picture is less pronounced and rather more confused than for males.

A full account of this investigation will appear later in the *Journal of the Institute of Actuaries*.

R. H. DAW.

Harrow, Middx.

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[1] Frost, W. H. *Amer. J. Hyg.* 1939, **30A**, 91.

ARTERIAL CALCIFICATION

SIR,—We have read with interest the article of March 4 by Sir Adolphe Abrahams and subsequent correspondence.

For the past two years we have been doing chemical analyses on arteries obtained post mortem. In confirmation of the work of others, we have found that the concentration of calcium in arteries which on gross and microscopic examination appear normal increases with age, or, more correctly, the logarithm of the concentration of calcium (and magnesium and phosphorus) increases with age. This is true for both the aorta and the internal carotid arteries. The concentration of minerals, like the concentration of lipids, also increases with the degree of atherosclerosis.

Of great interest are the cerebral arteries. The concentration of calcium (and magnesium and phosphorus) does not increase with age and, unlike the concentration of lipids, does not increase with the degree of atherosclerosis. In other words, cerebral arteries do not usually calcify. It would thus appear that such vague diagnoses as "hardening of the arteries of the brain" and "calcification of the cerebral arteries" are unjustified. These results support the suggestion of Wells [1] that calcification in atheromatous arteries may be a protective mechanism. It is possible that the lack of calcification in atheromatous cerebral arteries is a reason why such arteries are so liable to rupture.

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R. C. BUCK
J. C. PATERSON
R. J. ROSSITER.

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[1] Wells, H. G., in Cowdry, E. V. *Arteriosclerosis.* London, 1933.

DEOXYCORTONE WITH ASCORBIC ACID IN RHEUMATOID ARTHRITIS

SIR,—The difference between the excellent results reported in your columns in the treatment of rheumatoid arthritis with deoxycortone acetate and ascorbic acid (Lewin and Wassén 1949, Le Vay and Loxton 1949, Fox 1949, Loxton and Le Vay 1949, Douthwaite 1949, Robertson 1950, Fox 1950, Nashat 1950, Landsberg 1950, Le Vay and Loxton 1950, Hallberg 1950, Spanopoulos 1950, and Morelli and Pusateri 1949) and those obtained by the clinical members of the Empire Rheumatism Council Scientific Advisory Committee and Research Subcommittee (using the same substances and essentially the same technique) has prompted this letter.

The original proponents of this method of treatment claimed that "fifteen to thirty minutes later" (after the injection) "pain had practically disappeared and the mobility improved as much as the anatomical changes in the joints and muscular atrophy would allow. All the patients reacted in a similar way. In some cases the improvement was astounding. One of the patients was completely crippled by pain and contractures after rheumatoid arthritis for fifteen years: after *one* combined injection, she sat up with ease and moved her arms and legs about freely: all her pain had gone. . . . The effect lasted from two to six hours, occasionally more than twenty-four hours"—and occasionally "two or three weeks."

Such results are claimed also by the various authors mentioned above, from Poland, Cyprus, Naples, and Bagdad as well as from England. It is noteworthy, however, that such an experienced investigator as Spies (1949) as well as Hart and Starer (1949), Currie and Will (1950), and some of us (Kellgren 1949, Hartfall and Harris 1949, Fletcher et al. 1950, Kersley, Mandel and Jeffrey 1950) have already published results at variance with those described above.

The undersigned, each of whom has had experience in the assessment of "cures" in rheumatoid arthritis, have

PENICILLIN IN UNCOMPLICATED GONORRHŒA

SIR,—The article by Mr. Ambrose King and his colleagues, in your issue of April 15, is a salutary reminder that gonorrhœa is still a serious disease and still needs serious attention. Few would deny that in penicillin we have a specific cure for uncomplicated gonorrhœa. The difficulty is that it is impossible to determine the precise point at which cure has been achieved, and the possibilities of error are great.

Owing to the anatomy of the area, every case is, to a greater or lesser extent, a closed infection, which would account for the undoubtedly delayed response to penicillin therapy. It is a pity that local treatment has fallen into such disuse, because this is a valuable means of opening up and draining channels of infection. Even so, one wonders how many of the relapsed cases mentioned by Mr. King and his fellow-workers were penicillin failures.

It used to be taught—and I think the teaching still holds good—that the commonest causes of relapse were sexual indulgence, alcohol, and trauma. The physiological disturbance accompanying the first of these is quite enough to revive a dying infection. It would have been interesting to have known the part possibly played by alcohol as a cause of some of the relapses.

Queen Mary's Hospital for the East End, London, E.15.

F. G. MACDONALD
Venereologist.

GENERAL PRACTICE TODAY

SIR,—I believe that a partial return to the apprentice system would do a great deal to remove the dissatisfaction which is apparent in general practice today. As a representative of a group of students has pointed out in your columns,[1] it is useless and unfair not to let them know what they are in for when they enter general practice. This is one of the root causes of frustration in later years. The rarefied atmosphere of the teaching hospitals, and the privileged conditions of work in hospitals generally, do not prepare them psychologically for the wear-and-tear of treating patients in their homes, or in surgeries without elaborate equipment and ancillary services. They do not appreciate how much ill health is due to environmental factors.

I feel sure that a short period of time spent in company with a general practitioner would be time very well spent from the student's point of view. But it would be even more beneficial and stimulating for the general practitioner. Everyone who has had any experience of teaching undergraduates knows what pertinent questions they ask, and how salutary it is to have them challenge ideas which are not well founded. They would provide living links with the teaching hospitals and with the new ideas from which the G.P. feels himself to be irrevocably severed, and would stimulate, indeed help, him to make the best possible use of his facilities, limited though they are. At the same time the student would learn to rely more on clinical methods, and less on laboratory findings.

Edgware General Hospital, Middlesex.

M. D. BABER.

SIR,—So far everyone seems to accept what the Act has done to the general practitioner. It has divided the profession into the sheep and the goats—there is no process of metamorphosis. Once a young man has become a G.P. he is excluded from any active clinical part on the hospital side. Any bent that he has—be it medicine, surgery, radiology, pathology, obstetrics, or anything else—is allowed to die out. There are no part-time clinical assistantships through which the G.P. might graduate to specialist status. The very system of prespecialist training is evolving the man who "knows more and more about less and less."

Compared with Army medicine the present service is stultifying. In the Army every medical officer has opportunities for acquiring knowledge in every branch of medicine and is actively encouraged to take an additional appropriate diploma or degree, on which hangs definite professional advancement in the Service. Not so in "civvy street." You may have a specialised degree or diploma and have vast experience to match, but if you are a G.P. you are like "Barney's bull."

In case I might be thought an iconoclast let me offer a very little constructive advice:

1. The colleges should not admit for their higher diplomas those for whom a career in that specialty is not open. Each candidate should be responsibly sponsored.
2. The hospitals should throw open their doors and allow G.P.s to become trainees in the specialties they favour.

Many would not "make the grade," but I think that a kindlier atmosphere would pervade the profession, and it would be more difficult to distinguish between the sheep and the goats.

Longtown, Cumberland.

R. RUTHERFORD.

PROPHYLACTIC INOCULATIONS AND POLIOMYELITIS

SIR,—Dr. McCloskey and other workers in this field have certainly raised an issue worthy of the fullest investigation.

I have one or two questions to ask about his article in your issue of April 8. Apart from the obvious statistical difficulties to which you refer in your leading article of the same date, I think we all would be interested to hear what diagnostic criteria were applied to the 31 cases occurring after inoculation. In how many of these cases was the virus demonstrated? Did they all show characteristic changes in the cerebrospinal fluid?

In an issue of this magnitude we should be certain beyond all possible doubt that these were cases of poliomyelitis, and not possibly some form of peripheral neuritis.

Chester.

B. G. GRETTON-WATSON.

CONTINUOUS DRIP TREATMENT OF PEPTIC ULCER

SIR,—I should be glad if you would allow me to amplify a few points which have arisen regarding my article in your issue of March 11.

My experiments were designed to see if alkali—magnesium bicarbonate—would give results equal to milk with regard both to the neutralisation of gastric contents and to the relief of pain, with the presumption that if it did so, then it furthered healing. The answer here was that it did.

Secondly, the actual pH achieved, along with clinical details, was shown on a table, which was unfortunately too large to be published. In 39% of the samples the pH of the aspirated sample was less than 2·0. This is not nearly as good as theoretical considerations would suggest as desirable. Nevertheless the relief of pain and clinical results suggest that the therapy is effective. Incidentally, where radiological examination indicated that healing had taken place, this was confirmed by gastroscopic examination except in one case.

This raises the question of how the drip does good. Perhaps our sights have been set too high and only small alterations in pH are necessary to produce healing. It must be remembered that the pH scale masks the tenfold difference between pH 1 and 2. Perhaps, again, the therapeutic effect has nothing to do with reduced acidity.

In reply to Dr. Houlder (March 25), I should like to affirm that the drip is less trouble than the more conventional dietetic régimes in hospital practice and, I believe, also in general practice after a little extra trouble by the doctor at the start of treatment.

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[1] Hart, J. T. *Lancet*, April 15, p. 737.

out of 537 cases of ulcer hæmorrhage 183 were in persons aged under 45 and 262 in persons over this age.

(4) The average case-mortality in the cases observed by us was 12·96%.

The mortality was lower in persons under 45 before the war (4·16% under 45, against 12·08% over 45), during the war (4·55% and 10·89%), and since the war (0·93% and 6·33%). A comparative survey shows no increase worth mentioning in the case-mortality during the war over the pre-war rate, whereas both the pre-war and war-time rates were considerably higher than the post-war rate. This fact can probably be explained by the pre-war practice of dietetic abstinence, which had to be continued during the war from lack of light foods, the only ones which could be given after a strict milk diet (when milk could be had) to ulcer patients. In the post-war period, the modern practice of earlier and more generous feeding of patients and the more extensive use of blood-transfusion, have lowered the death-rate from gastroduodenal hæmorrhage.

If we accept that the average case-mortality from hæmorrhage from gastroduodenal ulcer in Greece is (in round figures) 13% and that the fatal cases are mostly in persons over 45, it follows that in patients over this age operation is clearly indicated when the bleeding is severe, is undoubtedly due to an ulcer, and continues or recurs in spite of conservative treatment (mainly blood-transfusion).

A. G. SIMONETOS
A. APOSTOLIDES.

State General Hospital, Athens.

PREGNANCY AND PULMONARY TUBERCULOSIS

SIR,—Dr. Midgley Turner is to be congratulated on his careful accumulation of facts and their varied presentation in his article of April 15. His findings are generally similar to those of others who have looked into this problem in recent years. His evidence regarding the "danger periods" is particularly striking.

Whilst studying a similar large group of cases a few years ago, we also became aware of "danger periods." Our figures[1] were very similar to those in table IV of Dr. Turner's article; but, as in that table, the numbers were not regarded as sufficient to give conclusive evidence. We found that relapses and deaths in patients with both active and quiescent pulmonary disease occurred almost invariably during the first three months of pregnancy, or within a month or six weeks of delivery or termination of pregnancy. A caution is perhaps necessary here; the "month of onset" of tuberculosis is not always easily determined. Routine X-ray observation of pregnant women and others may discover new lesions which appear before more spectacular clinical symptoms later draw attention to them.

In contrast to the findings in the pregnant patients, relapses and deaths in our non-pregnant control groups were more evenly distributed throughout the period of observation (15 months). The total relapses for both groups for the same period were similar. Whether or not the hormonal changes during pregnancy influence the time of relapse in a patient with established disease, it is certain that the over-all effect is not different from what would be expected had they not borne children. It would therefore seem illogical to advise termination of pregnancy at any time when it is known that the risk of endogenous relapse is no greater than would be expected had the patient not been pregnant. It is interesting that in the literature on pregnancy and tuberculosis written during the past forty years, physicians who normally see their patients throughout pregnancy take a more favourable view of the outcome than do obstetricians, who are more likely to follow the patient closely at delivery and during the puerperium —one of the "danger periods."

The main evidence brought forward by Dr. Turner in support of the "danger periods" concerns the onset of tuberculous disease rather than relapse of established disease. Might it not be that hormonal changes have a greater influence in lowering the local tissue defence to primary invasion of the tubercle bacillus rather than in generally lowering resistance in those already infected? There is no doubt that progressive disease resulting from primary infection in adult life is being recognised more frequently.

Finally, we would endorse Dr. Turner's hope that physicians will find time to investigate this problem further, in order to get a better understanding of what, for want of a better term, we must still call "resistance," be this biochemical or biophysical.

C. J. STEWART
F. A. H. SIMMONDS.

Clare Hall Hospital,
South Mimms, Barnet.

WHAT MAKES A GOOD HOSPITAL?

SIR,—I have read with great interest the article of April 1 (p. 633) on this subject. While fully subscribing to the writer's views, so well expressed, I feel that he could have included the spiritual element. Many of our hospitals, especially such ancient institutions as St. Bartholomew's, which he mentions, were founded on religious ideals. Just as hospitals have their medical, nursing, and administrative staffs, so they should have their religious advisers, who may be of considerable comfort to patients in low waters. This is especially true of our large mental hospitals. There should be a close alliance between priest and physician as many patients' ills are spiritual as well as physical.

Referring to the administrative side, I feel that the greatest care is required in the appointment of a hospital secretary, house-governor, or whatever be his official designation. The appointment of a man of refinement and tact, who does not seek to wield totalitarian sway over the personnel, will avert avoidable friction within the hospital. The need here is for an effective combination of brains and character.

J. B. GURNEY SMITH.

Long Grove Hospital,
Epsom, Surrey.

TREATMENT OF HERPES ZOSTER

SIR,—I read with interest, but also with despondency, your leading article last week. Although among the manifold remedies you mentioned you did mention physiotherapy, I am surprised that ultraviolet irradiation, which has definitely a specific and curative effect in this disease if applied in its early stages, was not referred to.

Authors of books on ultraviolet irradiation are all agreed on this. The first edition of *Artificial Sunlight and its Therapeutic Uses*, by the late Dr. F. Howard Humphris, appeared in 1924. In this and subsequent editions the following statement is made: "The treatment of herpes by ultra-violet irradiation is spectacular in its success."

As a general practitioner I treated some twenty cases of herpes zoster with ultraviolet irradiation. On an average six treatments were required. None of these patients were incapacitated from work; pain was relieved within two days; there was no subsequent scarring and no intercostal neuralgia. I am confident that with accurate technique similar results can invariably be achieved. Down the years I have treated innumerable cases of intercostal neuralgia following herpes.

Unfortunately, in medical schools and textbooks of medicine ultraviolet rays in the treatment of herpes is never mentioned, so that the general practitioner is almost entirely ignorant of the efficacy of such treatment. Intercostal neuralgia would never occur after herpes zoster if ultraviolet irradiation was always applied.

W. ANNANDALE TROUP.

London, W.1.

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[1] Stewart, C. J., Simmonds, F. A. H. *Brit. med. J.* 1947, ii, 726.

may be suggested that, given the opportunity, research forms a part of his duties, especially in the laboratory. On the other hand it may be argued that a registrar who burns the midnight oil in research deserves encouragement in contrast to his colleague who may adhere closely to his hours of duty and spend his leisure hours in remunerative activities such as, for example, writing his autobiography or a textbook. In any case, if these sums cannot be paid to whole-time salaried workers, what use is to be made of them? Should they be spent in the purchase of apparatus? To whom would such apparatus finally belong? Should they be consolidated so that the aggregate sum will support a whole-time research-worker? Is such consolidation legally permissible?

Full-time salaried doctors did not spring into existence with the introduction of the National Health Service, and it used to be common practice for such men to receive personal grants for research, although, of course, salaries were then much lower.

It would be convenient if an authoritative ruling were given on this point, and when that ruling is given consideration should be given not only to the letter of the law as affecting registrar's salaries, but also to the possible effect of the ruling on the future of medical research.

R. J. V. PULVERTAFT.

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CARDIAC EFFECTS OF P.A.S.

SIR,—Dr. Cayley, in his article of March 11, records cardiac irregularity in three patients under treatment with *p*-aminosalicylic acid (P.A.S.).

I performed electrocardiography (E.C.G.) on a young man seriously ill with tuberculous peritonitis, who had had massive doses of P.A.S. for ten days and whose pulse-rate suddenly fell to 50 per min. from the usual high rate of 100–120 per min. Study of the E.C.G. tracing revealed auricular fibrillation and apparent complete auriculoventricular block. The patient died before serum-potassium estimation had been performed. In retrospect it appears that this may well have been a further example of the effect of P.A.S.

Royal Naval Hospital, Haslar,
Gosport, Hants.

B. S. LEWIS.

THE OPEN WOUND IN TRAUMA

SIR,—It had to come. The debate remained undecided at the end of the war. Tribute was paid to Trueta for his contributions to war surgery, but many surgeons continued to criticise his methods much in the same way as Mr. Essex-Lopresti has done in his article last week.

Trueta's technique is not based wholly on the idea that all wounds are contaminated (although one must make this assumption in the case of war wounds). The five points he emphasises are all important, and any deviation from them in any respect cannot be described as his method. Contamination is only part of the story. Equally important is the presence of non-viable tissue, especially muscle, which is easy to detect if it is dead: and every bit of ischæmic muscle and hæmatoma must be excised in every part of the wound, which must be enlarged in each direction sufficiently to enable the surgeon to explore every nook and cranny. It is fair to say that the 10 cases which became infected in Birmingham were not treated by Trueta's technique. I have had the opportunity of working with, and seeing the cases of, Professor Trueta for some years, and I can categorically state that no wound or compound fracture treated by him ab initio ever became infected; osteomyelitis was therefore unknown.

Even more important are the unfortunate effects of this article. It is admirable to hear that primary skin cover has been successfully applied in compound fractures treated in Birmingham; but I am sure that the pursuit of this precept would be highly dangerous in less skilled hands, since, owing to inadequate excision, limbs, and perhaps lives, would be lost owing to tissue tension and gangrene.

Trueta has never said that wounds are to remain open. Even before the days of penicillin he was closing his wounds after periods varying with conditions, and since the appearance of penicillin he has been getting early skin cover over wounds which, I must repeat, are never infected if he carries out the primary wound treatment. His teaching, properly applied, means the complete absence of sepsis, early skin cover, and the minimum time for the restoration of optimum function. Critics should understand Trueta's technique before trying to saddle it with failures which do not occur in the hands of Trueta himself.

St. Margaret's Hospital, Swindon.

F. LOUIS.

TREATMENT OF DISSEMINATED CUTANEOUS HERPES SIMPLEX WITH AUREOMYCIN

SIR,—Baer and Miller[1] treated with oral and local 'Aureomycin' two adult cases of disseminated cutaneous herpes simplex (Kaposi's varicelliform eruption). They found that the aureomycin produced rapid healing of the skin lesions and prevented the development of further lesions. Bereston and Carliner[2] also reported a favourable response to aureomycin in an unusually severe case of disseminated cutaneous herpes simplex. We were encouraged by these reports to treat with aureomycin two infants with this condition.

CASE 1.—A girl, aged 11 months, had had atopic eczema since the 10th week of life. Three days before admission on Jan. 15, 1950, she became febrile and the eczematous areas became œdematous and were covered with an eruption of small umbilicated vesicles which also extended a short distance on to previously normal skin. A history was elicited of contact during the previous week with an aunt who was suffering from labial herpes. A clinical diagnosis of Kaposi's varicelliform eruption was made and treatment with oral aureomycin (125 mg. 8-hourly) and intramuscular penicillin (100,000 units 8-hourly) was initiated. Two days later new vesicles continued to appear on and near the eczematous areas. The dose of aureomycin was increased to 150 mg. 6-hourly. Occasional further vesicles developed during the next day or two. The child made a satisfactory recovery; no secondary infection developed.

The serum titre of herpes antibody increased from 2 units in the acute phase to 32 units in the convalescent phase (Dr. J. A. Dudgeon).

CASE 2.—A boy, aged 7 months, who had had atopic eczema since his 3rd month, was admitted to hospital on Feb. 8, 1950. The clinical appearance on admission and the course of the disease differed very little from the previous case and new vesicles continued to appear 2–3 days after the administration of aureomycin was started. An attack of severe diarrhœa was attributed to the aureomycin since no other cause was discovered.

Virus-antibody estimations were not undertaken.

In neither case did the aureomycin prevent the continued development of new vesicles, nor did it obviously modify the natural course of the herpetic infection. Any benefit derived from the aureomycin is to be attributed to the control of secondary bacterial infection of the vesicles. The course of the disease in these two infants treated with aureomycin did not differ from that of two similar cases previously treated by one of us with penicillin alone.

Our observations in these two cases lend no support to the claim that aureomycin has any specific value in the treatment of disseminated cutaneous herpes simplex.

St. Helier Hospital,
Carshalton, Surrey.

A. J. ROOK
C. C. UPJOHN.

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1. Baer, R. L., Miller, O. B. *J. invest. Derm.* 1949, 13, 5.
2. Bereston, G. S., Carliner, P. E. *Ibid*, p. 13.

I used no controls, since previous articles, which I quoted, had shown quite definitely that dietetic régimes do not maintain adequate neutralisation of the gastric contents throughout the 24 hours.

Worcester. A. M. CLARK.

THE CARNAGE ON THE ROADS

SIR,—The driving test may have its drawbacks, but it is a step in the right direction. I suggest extending the scheme by the institution of a probationary period for one year following the test. Such drivers would carry "P" plates, and since the majority of accidents are due to speed "P" drivers would be prohibited from exceeding 30 m.p.h. The penalties for exceeding this limit would be the same as in a built-up area for the first two offences, but the third would automatically result in a return to learner-driver conditions and the cycle would begin again. The main advantage of this scheme is that the curbing of the instinct to speed would become almost automatic, and the existing machinery is adequate to deal with the administrative side.

Preston. E. B. LOVE.

VITAMIN B_{12} IN IDIOPATHIC STEATORRHŒA

SIR,—May we correct a misquotation in last week's article by Dr. Tuck and Dr. Whittaker? We stated[1] that "the percentage fat absorption defect of less than 90% [not 95%] could not be regarded as normal" and "if the figure was between 85 and 90 and the presence of a defect not closely supported by other clinical manifestations, reinvestigation was made." Only 2 [not 4] of our cases had a percentage absorption of 90%, one of which was reported to have a second balance of 80% absorption. Usually a single three-day balance is adequate for diagnosis, but in patients in whom the defect may not be marked we employ continuous or repeated three-day balances.

The two excellent papers and interesting leading article last week afford timely emphasis on the occurrence of a fat-absorption defect in certain macrocytic anæmias. We would strongly support the observations made that the presenting symptoms and the macroscopic appearances of the stools may be no guide to the presence or absence of steatorrhœa, as indeed was originally pointed out by Samuel Gee and, more recently, by many other workers.

In our first 100 cases of idiopathic steatorrhœa, intestinal disturbance was the presenting symptom in less than half, while of the remainder 10 were free from intestinal symptoms and had macroscopically normal stools. The latter group contained a number of patients with a macrocytic anæmia which was only distinguishable from pernicious anæmia by virtue of a fat-absorption defect and the failure to attain normal blood-values with adequate therapy with liver extracts.

We have found that megaloblastic anæmias associated with idiopathic steatorrhœa invariably react favourably to folic acid, but of 9 cases studied in detail none at any time produced normal absolute values and in only 3 did any of the subsequent red blood-cell counts rise above 4,200,000 per c.mm., and reinforcement with oral liver preparations was without further effect. Although some patients will respond with a maximum reticulocyte response following parenteral vitamin B_{12} (we have studied 3 such cases), other patients who have similar hæmatological findings and definite fat-absorption defects fail completely to react.

We are still of the opinion expressed in 1948[2] that the varied hæmatological responses which may be found in steatorrhœa are manifestations of deficiencies caused by the underlying and hitherto unexplained defect, and that they vary from time to time in any given patient. Nevertheless, the underlying defect can be favourably influenced by strict adherence to a high-protein low-fat diet, and this must remain one of the foundations of the treatment of these cases.

W. TREVOR COOKE
A. L. P. PEENEY
C. F. HAWKINS.

Department of Medicine,
University of Birmingham.

THE GLASGOW SMALLPOX OUTBREAK

SIR,—The recent outbreak of smallpox at Glasgow, now happily ended, is of more than usual interest, and it is not surprising that it has aroused more than usual concern. Some important lessons taught by it may be emphasised:

1. The truly disastrous consequences which may result from "missed" cases of smallpox. In view of the heavy mortality attending the outbreak no further emphasis on this is called for.

2. The effect of vaccination and revaccination in "masking" the nature of the disease and so leading to "missed" cases. Had the well-vaccinated lascar sailor who was the cause of this outbreak been unvaccinated, it is in the highest degree unlikely that his illness would have been unrecognised, or at least unsuspected; precautions would have been taken, the case isolated, and contacts vaccinated, and presumably six deaths would have been prevented. True, he would have had a much more serious attack and he might even have died, but six lives would have been saved. This is an aspect of the vaccination question which has been too long ignored.

3. The undesirability, when smallpox breaks out, of at once resorting to mass vaccination. We now know that in this latest outbreak, as in the outbreak in Glasgow in the summer of 1942 and in that in Edinburgh a few months later, spread of infection had ceased before mass vaccination was begun, so could have had nothing whatever to do with the cutting short of the outbreak. The price of a mass-vaccination campaign has to be paid in injury to health whether it has any effect or not in preventing the spread of the disease. Vaccination is not a trivial operation unattended by any danger to health. Amongst the 300,000 persons estimated to have been vaccinated in the Glasgow area, and not counting the many more thousands vaccinated in other parts of the country, we may assume that there will be some (an unknown number) who will have suffered permanent injury to health, and a much larger number who will have suffered at least temporary injury. In the Edinburgh mass-vaccination campaign of 1942, there were 22 cases of postvaccinal encephalitis reported, 8 of which proved fatal, making a total of 10 certified deaths. Let us hope that less unfortunate results will follow this latest scare.

4. The desirability of all doctors and nurses not only being vaccinated but of being kept immune by repeated vaccination as often as necessary. The safest rule would be once a year as a matter of routine. Any unpleasant reactions would then be negligible or indeed non-existent.

Leicester. C. KILLICK MILLARD.

USE OF HOSPITAL RESEARCH FUNDS

SIR,—The position of medical research-workers under the National Health Service Act has not yet been fully clarified. There is one question which perhaps might readily be settled, but on which no authoritative ruling has been given.

Many institutions have relatively small sums of money available earmarked for research as a result of gifts or bequests. Is it permissible for these moneys to be paid to doctors who are whole-time servants under the National Health Service?

The group most affected are registrars. It appears to be established that whole-time registrars cannot receive fees of any kind. If they carry out research outside their hours of duty, is it in order for them to receive payment from research funds? The arguments for and against such payments are very evenly balanced. On the one hand, the registrar is assumed to be paid the full amount suitable for his age and duties, and it

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Obituary

WILLIAM HENRY BUTTER STODDART

M.D. LOND., F.R.C.P.

GENERATIONS of students from the Royal Free Hospital, Westminster Hospital, and St. Thomas's Hospital will remember with affection W. H. B. Stoddart, who during the first quarter of this century lectured to them on mental diseases.

He was the son of William Stoddart, a surveyor, and in the '80s attended the City of London School, where the famous Mr. Abbot was headmaster. Later he went to University College and to University College Hospital, where he qualified in 1893, taking his M.B. the following year and proceeding to his M.D. in 1894. After holding house-appointments under Frederick Roberts at U.C.H., he became clinical clerk to Hughlings Jackson at the National Hospital, Queen Square. W. H., who joined him there as house-physician in 1895, recalls him as "balding even then at twenty-seven, 6 ft. 3 in. tall, with a most genial and kindly temperament, and a fine baritone voice. He was very musical, a good pianist, and fond of singing, and I would often get him to play for me some of the Beethoven sonatas, and on one or two occasions we would venture on trios, aided by my violin, and Ronald Carter, then clerking for Gowers, with his 'cello. At Christmas '95, we produced some theatricals in the outpatient waiting-hall; stage-managed by Dr. Walter Colman, our pathologist, in which many of the nurses took part, in costume, and Stoddy's singing was a principal feature."

After leaving the National Hospital in 1896, Stoddart was clinical clerk at Bethlem Royal Hospital for some months before taking up an appointment as pathologist at Prestwich Mental Hospital in Lancashire. In 1898 he returned to Bethlem Hospital as assistant physician under Percy Smith, Hyslop, and Maurice Craig. Later he succeeded Craig as physician-superintendent, and in 1908 he was elected F.R.C.P. He remained at Bethlem Hospital until 1914. Meanwhile he had received his teaching appointments at the Royal Free and Westminster Hospitals. Later he was appointed to a similar post at St. Thomas's and elected to the staff as physician.

In 1901 he had been awarded the Gaskell gold medal of the Medico-Psychological Association, and at the International Medical Congress in 1913 he read a paper on Acute Confusional Insanity. His colleagues found it natural for Stoddart to veer from pure neurology to psychiatry, for he had always been attracted by the theoretical side of neurology as taught by Hughlings Jackson, and later he became an ardent disciple of Freud's theories and practice. For his Morison lectures to the Royal College of Physicians of Edinburgh in 1915 he chose as his subject the New Psychiatry. The early editions of his *Mind and its Disorders*, which first appeared in 1919, were then the best of their kind. Later editions were somewhat confused by the inclusion of psychopathological ideas which he had not quite assimilated into his thinking. For many years he was treasurer of the British Psychological Society and of the British Psycho-Analytical Society, and he also served on the council of both these bodies. J. R. writes: "A tall portly man, vastly oval in body—viewed from whatever angle—and oval in head, Stoddart arrayed himself in morning-coat and top hat (grey frock coat and grey topper in summer) to lead his students round Bethlem or teach them in an outpatient department. Placid almost to indolence in manner, detached yet friendly, he soon got his patients to forget the huddle of students and give their histories. Despite his casual manner little escaped his small lively eyes; despite his drawling speech he conveyed to his students something of his enthusiasm for new ideas. He was the butt of many jokes, at which he was much amused, and his colleagues professed to take him less seriously than in fact they did; this did not disturb him, for he knew and they knew that his clinical experience and acumen were considerable and were always at their service. His genial philosophy was a support not only to others but to himself in time of trouble; when very ill after an operation he said as he lay exhausted, 'Death is sweet, but dying is bloody.' Nevertheless he was even then cheerful and could not but turn the bedside conversation into a pleasant social occasion. Those who stood closest to him will mourn the loss of a friend whose good humour and good nature flowed from his being at peace with himself, so he made others feel at peace with the world."

Dr. Stoddart married in 1909 Mrs. Rosa Johnstone, who was matron of the Bethlem Royal Hospital. After her death in 1945 he continued to live with his stepdaughter in London until his death early this month.

FERDINAND SIMEON LE QUESNE

V.C., M.R.C.S.

Lieut.-Colonel F. S. Le Quesne, who died on April 4 at Clifton, won his V.C. in 1889 in operations against the Chinns in Burma. During an attack on the village of Tartun he remained close to the enemy's stockade for a quarter of an hour dressing the wounds of a lieutenant of the Norfolk Regiment, who was lying within five yards of a loophole from which the enemy was maintaining continuous fire. Later, while tending other casualties, he was himself severely wounded.

Born in 1863 in Jersey, the son of Lieut.-Colonel Giffard Le Quesne, he qualified from King's College Hospital in 1886 and received his commission in the Army the same year. Colonel Le Quesne also served with the Chin Lushai expedition in 1890, and in South Africa and Cape Colony at the beginning of the century. During the 1914–18 war he served in France. He retired in 1918. A fine shot, he was also in his youth a keen rackets and tennis player.

RONALD RILEY

B.A. CAMB., M.R.C.S.

Dr. Ronald Riley, who died at Broadstairs on April 3 at the age of 49, had been in practice in the Isle of Thanet since 1930. The younger son of William Riley, he was educated at Blackburn Grammar School and Sidney Sussex College, Cambridge. He qualified in 1923, and held appointments as house-surgeon, house-physician, and medical superintendent at his own hospital, St. Mary's, and as house-physician at the Hospital for Sick Children, Great Ormond Street. Deciding on general practice, he went into partnership at Broadstairs with the late Dr. E. G. Moon, likewise a former student of St. Mary's. He rapidly built up a large and interesting practice, including work for preparatory schools, convalescent homes, hospitals, and infant-welfare centres. His general and special training had fitted him well for this work, and he did it with confidence and assiduity. In 1934 he was appointed honorary physician to the General Hospital, Margate, and he was senior physician from 1945 until his retirement from the staff last October. He was medical officer of a number of convalescent homes for children, among them the Yarrow Home of the Westminster Hospital, the Metropolitan Home, the Daughters of the Holy Cross Convent, the Red Cross Auxiliary Hospital, and the Shaftesbury Home for Children, Kingsgate. In 1940 he was appointed physician in the E.M.S. and stationed at the Minster Hospital, Isle of Sheppey; but in 1941 he was transferred back to the General Hospital, Margate, and was able to do part-time work in his practice. This proved arduous and often dangerous, but he found time to enter into many welfare activities in his town, as well as being a medical officer of the Home Guard and the Air Training Corps. After the war he interested himself in the revival of Broadstairs and worked hard as a member and chairman of the Chamber of Commerce. A prominent Freemason, he was past master of two lodges. He was also vice-president of the Broadstairs Sailing Club, and one of the original owners of the Foreland class of boats.

R. W.-S. writes: "Ronald Riley had a quiet charm and dignity of manner. He was a very kind and courteous general-practitioner physician, unsparing of himself in consideration for his patients, and a most loyal colleague; it was a delight to meet him in consultation because he always brought common sense to bear on the problem. He remained a true student of St. Mary's, seeking expert advice from his old teaching hospital in any difficult case. A devoted husband and father, the happiest times of his life were when he was surrounded by his family."

He married, in 1933, Patricia Aline Twiss, and leaves three sons.

FIRST OBSERVATION OF ANTIBIOTIC ACTION ?

SIR,—Historians of science are well aware of the difficulty of ascertaining the first observations of many natural phenomena. When the climate of opinion becomes favourable, or when there is an advance in technique, similar observations are frequently made independently and almost simultaneously by several workers.

Attention has already been drawn, for example, to the reference by Tyndall in his paper on the Optical Deportment of the Atmosphere (1876) to the antibiotic action of "*Pencillium glaucum*" on bacteria,[1] and Tyndall's observations are the earliest noted by Florey[2] in a recent historical review. Observations on this phenomenon were, however, made by the versatile William Roberts,[3] of Manchester, during careful "Studies on Biogenesis" carried out during 1872–73. In a paper published in 1874[4] describing his results (later considered at length by Tyndall[5]), Roberts stated his views very clearly in these words, which afford an early, if not the earliest, example of the use of "antagonism" in this connection :

> ". . . the growth of fungi appeared to me to be antagonistic to that of *Bacteria* and *vice versa.* I have repeatedly observed that liquids in which the *Penicillium glaucum* was growing luxuriantly could with difficulty be artificially infected with *Bacteria* ; it seemed, in fact, as if the fungus played the part of the plants in an aquarium, and held in check the growth of *Bacteria,* with their attendant putrefactive changes. On the other hand, the *Penicillium glaucum* seldom grows vigorously, if it grows at all, in liquids which are full of *Bacteria.* It has further seemed to me that there was an antagonism between the growth of certain races of *Bacteria* and certain other races of *Bacteria* . . . when an organic liquid is exposed to the contamination of air or water," he continued, ". . . There is probably . . . a struggle for existence and a survival of the fittest. It would be hazardous to conclude that because a particular organism was not found growing in a fertile infusion, that the germs of that organism were really absent from the contaminating media."

Department of Botany,
University College,
Exeter, Devon.

G. C. AINSWORTH.

SECULAR TRENDS AND BLOOD CHANGES

SIR,—It has been demonstrated[6] that in normal individuals horizontal rest for 30 minutes produces a mean fall in plasma-protein of 0·35 g. per 100 ml. ($p < 0{\cdot}1\%$). An experiment designed to eliminate variation due to time showed that bed rest for 48 hours produced a mean fall of 0·65 g. per 100 ml. ($p = 1{\cdot}0\%$). Under standard conditions of activity, posture, diet, and blood-sampling, changes occurred during the hours of 7 A.M.–2 A.M. in Hb, hæmatocrit, plasma-protein concentration, and erythrocyte-sedimentation rate (E.S.R.), of twenty normal individuals. Variance analysis of the data showed that many individuals have a true diurnal rhythm (significant diurnal variation) in Hb, hæmatocrit, and plasma-protein.

In the case of the first two variates this consists in a statistically significant fall during the day with a rise sometime in the evening or the early hours of the morning. In the case of the plasma-protein, changes occur during the day but are of a random nature. However, a statistically significant fall occurs after 10 P.M.–midnight. In the case of the E.S.R. no true diurnal rhythm is present, but on any particular day a group of individuals show a significant variation during the day, suggesting that external factors—possibly the weather—may be concerned.

Under similar standardised conditions changes occur in periods longer than one day in the variates described. In the case of Hb, and hæmatocrit, variance analysis of data obtained from a group of eight normal individuals revealed statistically significant changes during the same consecutive 8-day period. Possibly weather changes (indoor or outdoor climate) may again be concerned. Elimination of this time-factor as a cause of variation in blood constituents (or in any physiological function) requires carefully controlled experiments.

It is still widely accepted that the concentration of blood constituents is fixed and does not change appreciably over various periods of time. Hence changes occurring during the period of an experiment (posture, bed rest, change in water balance, drug or surgical treatment, and so on) are often assumed to be causally related to the effects of the experiment itself. The interesting paper of March 25 by Miss Widdowson and Professor McCance shows that Hb, hæmatocrit, and plasma-protein fall after 2 hours' rest in bed, with a return to the original level after a further 3 days of bed rest. Although it is not clear from the text, it appears possible that the test subjects were examined over the same 2-hour and 3-day period. In such a case the fall in Hb and hæmatocrit after 2 hours may be due, at least in part, to diurnal change rather than to the horizontal posture, and the rise after 3 days to day-to-day variation and again partly or wholly unrelated to posture or inactivity. The red cells (as measured by Hb and hæmatocrit) and plasma-proteins appear to be independent variables, and recent work[7] suggests that neither may be an accurate index of changes in plasma-volume or even in the direction of change.

London, N.2.

E. T. RENBOURN.

Medicine and the Law

Delayed X-ray Report

A 7-year-old child fell from a swing in a playground in Clapham on March 8 and came home with a grazed forehead and a bleeding nose. Her mother took her next day to the Weir Hospital, Balham. An X-ray examination was made at once ; but, owing to the illness of both the radiologist and the radiographer, the films were in arrear and a report was not made until March 20, when a small fracture of the front of the skull was revealed.

Meanwhile, the mother, according to her evidence at the inquest, had made four inquiries about the result of the examination. After the fourth inquiry, she said, she was told that the X-ray result was clear, but that if she was still in doubt about anything she was to bring her daughter back to the hospital. She took the child to her own doctor, who advised her to put the child to bed. She followed this advice ; on the following morning the child "seemed to be having a fit." The child was admitted to the Weir Hospital, and was removed thence to another hospital where she died next morning of meningitis, sixteen days after her accident.

A pathologist told the deputy coroner that, if the child had been admitted to hospital with the fracture immediately after her fall, she would probably have been discharged before the symptoms of meningitis were suspected. The deputy coroner, who recorded a verdict of accidental death, observed that, had the findings of the X-ray examination been known earlier, steps would have been taken which might have prevented the child's death.

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University of London

On Wednesday, May 31, at 5.30 P.M., Mr. Ernest Baldwin, PH.D., who has lately succeeded Prof. J. Z. Young, F.R.S., in the chair of biochemistry at University College, will deliver his inaugural lecture. He is to speak on the Biochemical Approach to Biological Organisation.

On Tuesday, June 27, at 5.30 P.M. at the London School of Hygiene, Keppel Street, W.C.1, Dr. C. J. Watson, professor of medicine in the University of Minnesota, will speak on Porphyrin Metabolism and Porphyria.

University of Leeds

At a congregation to be held on May 19, an honorary degree will be conferred on Dr. W. N. Pickles.

National University of Ireland

Dr. Kieran McGrath has been appointed to the chair of dental surgery at University College, Dublin.

Royal College of Surgeons of England

On Wednesday, May 3, at 5 P.M., Dr. P. D. Wilson, professor of orthopædic surgery, College of Physicians and Surgeons, New York, in the Robert Jones lecture will describe his Experience with the Use of Refrigerated Bone in Surgical Procedure.

Royal College of Obstetricians and Gynæcologists

On Friday, May 19, at 5 P.M., Dr. Linton Snaith will deliver at the college the biennial scholarship (sterility) lecture, on Habitual Abortion. Tickets may be had from the secretary of the college, 58, Queen Anne Street, London, W.1.

Almroth Wright Lectures

On Monday, May 8, at 5 P.M., at the Wright-Fleming Institute, St. Mary's Hospital, London, W.2, Prof. Alexander Haddow, will give the first of six Almroth Wright lectures. The other lecturers will be Prof. Perrin H. Long, Mr. A. T. Glenny, F.R.S., Dr. A. A. Miles, Mr. C. D. Darlington, F.R.S., Prof. F. M. Burnet, F.R.S. Further particulars will be found in our advertisement columns.

Oliver Memorial Fund

An award of £50 will be made from this fund to a British subject for original work or service in connection with blood transfusion. Applications must be sent before June 30, to F. W. Mills, Esq., National Provincial Bank Ltd., Holborn Circus, London, E.C.1.

Research Scholarships in Obstetrics and Gynæcology

The council of the Royal College of Obstetricians and Gynæcologists will shortly award Leverhulme research scholarships. Forms of application can be had from the secretary, 58, Queen Anne Street, London, W.1, and should be returned by July 1.

Appointments for Outpatients at St. Mary's Hospital

An appointment system for new outpatients will come into operation at St. Mary's Hospital, London, W.2, from May 1. Appointments may be made by telephone message to Ambassador 2241; by letter addressed to the appointments clerk at the hospital; or by the personal call of a patient, at the outpatient department of the hospital, with a letter of introduction to the consultant concerned. A letter of introduction should always accompany the patient.

Replacement of Glasses and Dentures

Executive councils have been told by the Ministry of Health that in replacing and repairing glasses "the criteria which are being applied in determining whether there has been carelessness are still not sufficiently exact." Claims should be admitted only when the ophthalmic services committee are satisfied beyond reasonable doubt that the loss or damage is due to circumstances beyond the applicant's control. Similar criteria should be applied when claims for replacement of dental appliances are considered. "Examination of some of the schedules of actual claims for denture replacement makes it apparent that a great many claims derive from the alleged loss of dentures in cases of vomiting. Claims of this kind have undoubtedly been much too readily accepted by some Executive Councils as justifiable." Where there has been lack of reasonable precaution or care, councils should normally require the patient to bear the entire cost of replacement, except when they are satisfied that this would involve substantial financial hardship.

Central Midwives Board

Mr. Arnold Walker has been re-elected chairman, and Dr. J. P. Hedley vice-chairman, of the board for the coming year.

Association of Sea and Air Port Health Authorities of the British Isles

This association is holding its annual meeting at Grimsby on June 7, 8, and 9. Further particulars may be had from Dr. H. C. Maurice Williams, health department, Civic Centre, Southampton.

Care of the Aged

A meeting to discuss medical aspects of the care of the aged will be held at the Hope Hospital, Salford, on Thursday, May 4, at 5 P.M. The speakers will include Dr. J. M. Greenwood, Dr. Marjory Warren, and Dr. E. B. Brooke, who will also take part in an informal conference on the coöperation of home and hospital in the care of the aged which will take place the following day at Salford Town Hall at 2.30 P.M.

Institute of Child Health

Prof. Ph. Sandblom, surgeon-in-chief to the Crown Princess Louise's Children's Hospital, Stockholm, will deliver the Alex Simpson-Smith lecture for 1950 at the Hospital for Sick Children, Great Ormond Street, London, W.C.1, on Thursday, May 25, at 5 P.M. He is to speak on Factors Influencing the Rate of Wound Healing. Tickets may be had from the director of the institute.

Blood Donations

Blood donors set up a new post-war record in 1949 by contributing over 456,000 bottles of blood to the National Blood Transfusion Service for hospitals in England and Wales. This was an increase of 72,000 on 1948 and of 160,000 on 1947. New donors totalled 133,000, compared with 98,000 and 72,000 in the two preceding years; but another 200,000 are needed to reinforce the 369,000 on donor panels at the end of the year.

Course in Tropical Hygiene for Planters and Miners

The annual course for laymen will be held by the Ross Institute this year from Monday, July 24 to Friday, July 28. The morning sessions will provide a continuous course on malaria and its control, and in the afternoons there will be lectures on other subjects, such as hookworm, bilharzia, nutrition, housing and sanitation, and protection against heat. There is no fee for the course, but those who wish to attend should send their names as soon as possible to the organising secretary of the institute, Keppel Street, London, W.C.1.

Liverpool Emergency Bed Bureau

During the three months from November, 1949, to January of this year, the Liverpool Emergency Bed Bureau dealt with 3516 cases. In 3151 of these it succeeded in admitting the patients, and in a further 168 accommodation was found which was not accepted. The bureau failed, in the first instance, to place 197 patients, but later arranged admission for 78 of these. Of the 197 "failures," 70 were children under 12 years of age (54 being under the age of 2 years) and 79 were over 60 years of age. For about ten days at the end of November and beginning of December accommodation for maternity cases was insufficient.

Too Many Residents?

At a meeting of the Sheffield Regional Hospital Board on April 17, Lord Quibell, chairman of Scunthorpe Hospital Management Committee, complained of the "wasteful overstaffing of hospitals with resident doctors." There were, he said, far too many registrars and house doctors; and the Ministry of Health should take action. Dr. W. A. Ramsay, senior administrative officer of the board, is reported by the *Daily Telegraph* (April 18) to have replied that the Ministry had asked regional boards to investigate the number of doctors employed in hospitals; and the boards were seeking detailed reports from the management committees. "There has been some difference of opinion between us and the committees, but generally we want to cut the numbers down and the committees want to keep them up." The number of people attending hospitals, said Dr. Ramsay, was now much greater, and it was difficult to justify a reduction; for if this were effected, then either hospital work would have to be reduced or the consultant staff would have to undertake more work.

Notes and News

EFFECTS OF MASS B.C.G. VACCINATION

MEASURING the effects of mass B.C.G. vaccination by the subsequent tuberculosis mortality involves long delay. This time-lag, Dr. T. Gedde-Dahl[1] suggests, might be overcome by studying the earliest manifestations of infection with tuberculosis. In Norway both erythema nodosum and pleurisy are notifiable; and since 1941 their incidence has declined remarkably, as the following figures show:

	Erythema nodosum	*Pleurisy*
1941	1374	2989
1942	1416	2687
1943	1155	2203
1944	1192	2293
1945	1073	2108
1946	1147	1991
1947	859	1708
1948	634	1217

It will be seen that the fall in numbers was greatest in the last two years, during which, for the first time, mass B.C.G. vaccination was carried out (about 35,000 vaccinations in 1947, and about 135,000 in 1948). There are, of course, various other factors for which credit can be claimed; during the past decade there have been large advances in the campaign against tuberculosis, and since 1943 mass radiography has played an important part. The invidious task of apportioning marks between all the factors capable of reducing morbidity and mortality would tax the ingenuity of any statistician, and Dr. Gedde-Dahl is not prepared to rush in where purists would not tread. But he has a suggestion to make: let tuberculosis notifications be accompanied by a statement that the person concerned has, or has not, been vaccinated with B.C.G. In countries where mass vaccination with B.C.G. is extensively practised, this plan might well yield valuable information.

ADDITIONS TO THE POISONS LIST

THE following changes are to be made in the poisons list and rules:

D. F. P. (*di-isopropyl fluorophosphonate*) will be added to part I of the poisons list and included in the first and seventh schedules to the poisons rules. The special labelling requirements prescribed by the seventh schedule will apply to eyedrops as well as to injection solutions.

Deca-, hexa-, penta-, &c., methonium iodide will be added to part I of the poisons list and included in the first and fourth schedules to the poisons rules. They will be listed as "polymethylene bis-trimethyl ammonium salts."

Anti-histamine drugs will be added to part I of the poisons list and included in the first and fourth schedules to the poisons rules. Exemption will be provided for preparations intended for external application only.

Synthetic drugs.—The following drugs to which part III of the Dangerous Drugs Act, 1920, is shortly to be applied will be added to part I of the poisons list and included in the first schedule to the poisons rules:

Alphaprodine (α-4-propionoxy-4-phenyl-1 : 3-dimethyl-4-piperidine) its salts;
Betaprodine (β-4-propionoxy-4-phenyl-1 : 3-dimethyl-4-piperidine) its salts;
Hydroxypethidine (ethyl-4-*m*-hydroxyphenyl-1-methylpiperidine-4-carboxylate) its salts;
Isoamidone (6-dimethylamino-4 : 4-diphenyl-5-methylhexan-3-one) its salts;
Ketobemidone (4-propionyl-4-*m*-hydroxyphenyl-1-methylpiperidine) its salts;
Methadol (6-dimethylamino-4 : 4-diphenylheptan-3-ol) its salts;
Methadyl acetate (6-dimethylamino-4 : 4-diphenyl-3-heptyl acetate) its salts.

Part III of the Dangerous Drugs Act, 1920, will also be applied to phenadoxone, a poison at present included in part I of the poisons list and in the first [illegible] under the description "[illegible]; its salts." The name [illegible] will be adopted in part I [illegible] to the poisons rules. The [illegible] leleted as no poison in that schedule is also subject to control under the Dangerous Drugs law.

The British and American conventional form will be adopted in the Dangerous Drugs law for amidone, a poison included in part I of the poisons list and the first schedule to the poisons rules. [illegible] ne) its [illegible] list and [illegible] amidone [illegible]

Rules 7 and 12 of the poisons rules will be amended to legalise the supply in ampoules of an additional quantity of a poison sufficient to permit the withdrawal and administration of the quantity ordered and the amount prescribed.

NUFFIELD TRUST IN NORTHERN IRELAND

THE first meeting took place recently in Belfast of the Northern Ireland committee of the Nuffield Provincial Hospitals Trust. In 1942 the Northern Ireland Regional Hospitals Council was constituted under the chairmanship of Mr. D. Lindsay Keir (now Sir David Lindsay Keir). This council was formed under the ægis of the Nuffield Provincial Hospitals Trust, and it will be remembered mainly for its "Survey of the Hospitals Services of Northern Ireland," published in 1945, and for its "Plan for the Hospital Services for Northern Ireland," published in 1946. With the passing of the Health Services Act (Northern Ireland), 1948, it was believed that the council had fulfilled its main purpose. It was felt, however, that there was a place for an independent voluntary body, fully representative of all the health and social services; and accordingly the council's final act was to draw up a new constitution, providing for the formation of a committee to be known as the Northern Ireland committee of the Nuffield Provincial Hospitals Trust.

Under its constitution this committee has for its aims: (*a*) to assist the coördination on an area basis of hospital services; (*b*) to initiate and promote research which aims at the raising of the standard of hospital services throughout the area; and (*c*) to advise on any proposals which serve the foregoing purposes. Further, its functions are to advise and coöperate with the statutory and other bodies on such matters as may seem conducive to the improvement of the hospital, ancillary, or auxiliary services within the area, and also to initiate, promote, and encourage, whether independently or in consultation with appropriate bodies, research on the causation, prevention, and treatment of disease, and for the improvement of the hospital, ancillary, and auxiliary services. It aims to achieve in every possible way the raising of the standard of service to the patient throughout the area.

"IN PRAISE OF NURSES"[1]

NURSES have always deserved a poet to sing their praises, and it is pleasant that they should have found such a distinguished one as Mr. John Masefield. In a set of verses he declares his appreciation, especially, of the five who lately nursed him in sickness:

> "All honour Doctors; let me honour those
> Who tend the patient when the doctor goes."

He wrote at that enchanted stage of recovery when every one of the five seemed more than human, more than the kind young woman his wits knew her to be; and this is surely the right moment to praise nurses for the essential quality of their art. To each other they may be sensible, jolly, hard-working, flippant, talkative, or a dozen other things that go with youth, hearty appetites, and simple tastes; but to the sick man they have something to give of which they are themselves unaware until they fall sick and experience it—a nourishing tenderness springing from their own strongest and most lasting instinct. It was this quality which another poet had in mind when he wrote:

> "When pain and anguish wring the brow
> A ministering angel thou."

—lines now so hackneyed that they can hardly be read without a smile. Mr. Masefield, less romantic and more direct about it, writes of them

> "*Cleansing the foul*, and smiling through the pique
> *Of nerves unstrung* . . ."

He ends with a gratitude and simplicity which we must all share on his behalf:

> "I thank and bless you: that I write at all
> Is, by itself, your work's memorial."

University of Cambridge

At a congregation to be held on June 8 the honorary degree of SC.D. will be conferred on Dr. William S. Middleton, dean of the medical school of the University of Wisconsin.

University of Birmingham

On May 15, 16, 17, and 18, at 4 P.M., Prof. Herbert M. Evans, director of the institute of experimental biology, University of California, will deliver the William Withering lectures at the anatomy theatre of the medical school. He is to speak on the Internal Secretions of the Anterior Lobe of the Pituitary Body.

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[1] *Nord. Med.* March 10, p. 444

[1] London: Heinemann. 1950. 1s.

STREPTOMYCIN IN ACUTE MILIARY TUBERCULOSIS

A REPORT TO THE MEDICAL RESEARCH COUNCIL

EARLY in 1947 a trial of streptomycin in the treatment of acute miliary tuberculosis was undertaken by the Streptomycin in Tuberculosis Trials Committee of the Medical Research Council.* At first it was proposed to admit cases to only three centres, but later other centres participated in the trial. The centres and the specialists in charge of patients and pathological work were:

Alder Hey Children's Hospital, Liverpool.—Clinician: Prof. N. B. CAPON. Pathologist: Prof. A. W. DOWNIE.

Brompton Hospital, London.—Clinician: Dr. W. E. LLOYD. Pathologists: Dr. J. W. CLEGG and Dr. D. A. MITCHISON.

Guy's Hospital, London.—Clinician: Dr. P. R. EVANS. Pathologist: Dr. F. L. JACKSON.

Hammersmith Hospital (Postgraduate Medical School of London).—Clinician: Dr. J. W. CROFTON. Pathologist: Dr. MARY BARBER.

Harefield Hospital, Middlesex.—Clinician: Dr. R. H. BRENT. Pathologist: Dr. E. NASSAU.

Highgate Hospital, London.—Clinician: Dr. J. RUBIE. Pathologists: Dr. J. M. ALSTON and Dr. A. MOHUN.

Hospital for Sick Children, Great Ormond Street, London.—Clinicians: the consultant staff, with Dr. P. M. RANSFORD as registrar. Pathologist: Dr. I. A. B. CATHIE.

St. Charles Hospital (L.C.C.), London.—Clinician: Dr. T. V. MENDELSOHN. Pathologist: Dr. MARY BARBER (Hammersmith).

Dr. Marc Daniels, of the council's Tuberculosis Research Unit, was responsible for the clinical coördination of the trial, and he also prepared the report for the committee. X-ray changes were assessed by an independent panel composed of Dr. L. G. Blair, Dr. Peter Kerley, and Dr. Geoffrey S. Todd.

As in other trials undertaken by the committee, the centres kept uniform records and followed recommendations made regarding dosage and duration of treatment. As in the trial in tuberculous meningitis (but not the trial in pulmonary tuberculosis) all patients were treated with streptomycin, since the very high fatality of acute miliary tuberculosis rendered a control series unnecessary. Moreover, preliminary results from the U.S.A. suggested that the drug is effective in this condition.

This report analyses the records of all the patients fulfilling the criteria given below and admitted for treatment under the scheme between March 22 and Sept. 30, 1947 (numbering 25). Though many reports on the subject have been published, this one should have particular value in virtue of the two-year follow-up of the survivors.

Diagnostic Criteria

Particulars and chest radiographs of all patients were submitted to a panel of clinicians. Cases were accepted if in the opinion of the panel (*a*) the X-ray appearances were consistent with a diagnosis of miliary tuberculosis, (*b*) there was additional definite or presumptive evidence that the origin was tuberculous, and (*c*) the condition was acute. Patients found on admission to have meningitis as well are excluded from this analysis.

Bacteriological Proof

Though bacteriological proof before the start of treatment was not required, in 14 of the 25 cases pre-treatment specimens were positive for tubercle bacilli—in 4 of these on sputum smear, and in the others by cultures of sputum (1), laryngeal swab (1), or gastric washings (8).

In 7 cases specimens taken on admission did not yield tubercle bacilli but later specimens were positive.

In 2 of these 7 cases tubercle bacilli were found one month after admission. In 1 the first isolation was from the cerebrospinal fluid (C.S.F.) when meningitis developed three and a half months after start of treatment. In 3 cases positive results were not obtained till much later—one nine months later from cavitating pulmonary lesions, one ten months later from pericardial fluid, and one thirteen months later when meningitis developed. In 1 case cultures from tissues at post-mortem examination were the first positive ones to be obtained.

In 4 cases tubercle bacilli were not isolated at any time.

Of these 4 patients, 2 died but no necropsy was performed: one died two days after admission; the other (case 15), a child of fourteen months, had a history of contact, a tuberculous hip and cervical adenitis, a primary complex in addition to the miliary lesions, and developed meningitis.

A boy of 5 (case 23) had a history of contact, and was tuberculin-positive. A month after admission, choroidal tubercles were seen, and later he developed meningitis. He also developed skin lesions which histologically had the appearance of tuberculides.

The fourth patient, aged 27, had a characteristic history and her X-ray film showed, in addition to typical miliary shadows, calcified lesions at both apices. She was acutely ill. The lesions cleared in the same length of time as in other patients who responded well.

Unfortunately tubercle bacilli were not sought systematically in the urine of all patients in this investigation.

Tuberculin Test

Of the 25 patients, 19 were given a complete Mantoux test and 18 reacted positively. The remaining patient tested, negative to Old Tuberculin 1 in 100 (case 5), was very acutely ill on admission; one month after start of treatment he too was tuberculin-positive.

Radiological Appearances

In 17 cases radiography showed the classical millet-seed dissemination with well-defined nodules 1–2 mm. in diameter. The other 8 patients presented larger (3–5 mm.) nodules, more fluffy in outline, but, as in the first group, evenly spread over both lungs.

Treatment

Streptomycin was given as the sulphate by the intramuscular route in daily doses of 2 grammes for persons aged fourteen or over, and of 20 mg. per lb. of body-weight (up to a dose not exceeding 2 g.) for those below that age. The daily dose was given in four injections at six-hourly intervals. Since the work embodied in this report was done, it has become a practice to give streptomycin at twelve-hourly intervals or in one daily injection. The treatment was given continuously for three months or more.

Results

On October, 1949 (i.e., between two and two and a half years after the beginning of treatment) the survivors of the original 25 patients numbered 14 (56%). Excluding 3 patients who died in the first week of treatment, the proportion of survivors is 64%. Fig. 1 shows the numbers and percentages of survivors at different periods after the start of treatment. At six months 72% of patients survived; at one year 60%; at two years 56%.

The figures in table I showing fatality in age-groups suggest that the prognosis is worst in children under two years of age, and best in older children; excluding the 3 who died in less than a week, the fatality in children aged two to fourteen was 15% (2 out of 13). The totals involved, however, are small and the differences are not statistically significant.

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* Members: Dr. GEOFFREY MARSHALL (chairman), Prof. J. W. S. BLACKLOCK, Prof. C. CAMERON, Prof. N. B. CAPON, Prof. ROBERT CRUICKSHANK, Prof. J. H. GADDUM, Prof. F. R. G. HEAF, Prof. A. BRADFORD HILL, Dr. L. E. HOUGHTON, Dr. J. CLIFFORD HOYLE, Prof. H. RAISTRICK, Dr. J. G. SCADDING, Prof. W. H. TYTLER, Dr. G. S. WILSON, and Dr. P. D'ARCY HART (secretary).

Roffey Park Rehabilitation Centre

This centre has been removed from the St. Thomas's Hospital group.

World Health Assembly

The third World Health Assembly will open on Monday, May 8, at the Palais des Nations at Geneva.

British Association

The annual meeting of the association will be held this year in Birmingham from Aug. 30 to Sept. 6, under the presidency of Sir Harold Hartley.

Society for Psychical Research

Prof. J. B. Rhine, director of the parapsychology laboratory, Duke University, North Carolina, will deliver the Myers lecture at the Caxton Hall, Westminster, S.W.1, on Wednesday May 10, at 8.30 P.M. He is to speak on Telepathy and Human Personality.

Institute of Hospital Administrators

At 10.30 A.M. on Friday, May 5, Mr. Aneurin Bevan will open the two-day conference of this institute at Caxton Hall, Westminster, S.W.1. Further particulars may be had from the secretary of the institute, Tavistock House North, London, W.C.1.

Dr. W. S. C. Copeman is to attend the opening of a university department of rheumatism in Barcelona on May 10, and to deliver a short course of lectures.

CORRIGENDUM: *Research on Arthritis Treatment.*—In the procedure described by Dr. Landsberg in his letter of April 1 (p. 643), the strength of the aqueous methylene-blue solution of which 10 ml. was injected intramuscularly or intravenously was 10%.

Diary of the Week

APRIL 30 TO MAY 6

Monday, 1st

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Prof. E. C. Dodds, F.R.S.: Recent Advances in Endocrinology in relation to Diagnosis and Treatment. (First of a course of lectures in General Medicine.)
UNIVERSITY OF LONDON
4.45 P.M. (University College, W.C.1.) Prof. J. B. S. Haldane, F.R.S.: Genetics and Biochemistry. (First of 8 lectures.)
INSTITUTE OF PSYCHIATRY, MAUDSLEY HOSPITAL, S.E.5
4.30 P.M. Dr. H. McIlwain: Brain Metabolism and Activity. (*First of 2 lectures.*)

Tuesday, 2nd

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Prof. Robert Platt: Renal Failure.
UNIVERSITY OF LONDON
5.15 P.M. (University College.) Prof. Hamilton Hartridge, F.R.S.: Physiology of Vision.
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2.
5 P.M. Dr. F. R. Bettley: Psoriasiform Eruptions.
INSTITUTE OF CHILD HEALTH, Great Ormond Street, W.C.1
5 P.M. Prof. K. J. Franklin: Special Aspects of the Physiology of Early Life. (First of 10 lectures.)

Wednesday, 3rd

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Prof. P. D. Wilson (New York): Experience with the Use of Refrigerated Bone in Surgical Procedure. (Robert *Jones lecture.)*

Thursday, 4th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. J. T. Ingram: Diagnosis and Significance of Skin Diseases.
ROYAL COLLEGE OF [illegible]
5 P.M. Dr. V. E. [illegible] Treatment of Pharyngeal Diverticul[illegible] [illegible]cture.)
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. R. T. Brain: Physio- and Electro-therapy.
ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Sir Paul Mallinson: Psychiatry lecture-demonstration.
UNIVERSITY OF DUBLIN
4.30 P.M. (Trinity College.) Professor Dodds: Synthetic Œstrogens in Treatment with special reference to Malignant Disease. (John Mallet Purser lecture.)

Friday, 5th

MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. W. Russell [illegible] -ical demonstration.
EDINBURGH POST-GRAD[illegible] [illegible]INE
5 P.M. (University N[illegible] [illegible]ace.) Dr. Frank H. Krusen (Mayo Cl[illegible]: [illegible] in America.

Appointments

ALLEN, JOYCE, M.B. Edin., D.P.H.: asst. M.O.H. and asst. school M.O., Great Yarmouth.
ANDERSON, C. D., M.C., B.A., M.B. Camb., M.R.C.P., F.R.F.P.S.: second asst. physician, Western Infirmary, Glasgow.
BURNS, J. P. J., M.C., M.B. Belf.: deputy M.O.H., Great Yarmouth.
CALDWELL, D. L., M.A., M.B. Camb., M.R.C.P.: cons. chest physician, North Wirral and Birkenhead area.
CRAWLEY, F. E., M.D. Glasg., M.R.C.P., D.P.H.: cons. chest physician, South Liverpool area.
DOWNES, C. E. P., M.R.C.S., M.R.C.P.: chest physician, Huntingdonshire and Isle of Ely area.
LAMB, ROBERT, M.B., B.SC. Glasg., D.P.H.: physician, Gateside Infectious Diseases Hospital, Greenock.
MCKAIL, R. A., M.B. Edin., D.M.R.: diagnostic radiologist, Aberdeen General Hospitals.
MILNE, G. P., M.B. Aberd., M.R.C.O.G.: *asst. obstetrician* and gynæcologist, Aberdeen Special Hospitals and Aberdeen General Hospitals.
OLIVER, J. O., O.B.E., M.B. Lond.: cons. pathologist, St. John's Hospital for Diseases of the Skin, London.
RIDLEY, E. F., M.B. St. And., F.R.C.S.E., D.M.R.: radiotherapist, Aberdeen General Hospitals.
ROSS, R. H. M., M.B. Edin., M.R.C.P.E.: cons. asst. chest physician, East Liverpool area.
RYAN, J. J., M.B., B.SC. N.U.I., D.P.H., D.P.M.: psychiatrist and deputy medical superintendent, Little Plumstead Colony, Norfolk.
SCOTT, G. A., M.D. Belf., M.R.C.P.I.: cons. physician, hospitals in East Antrim area.
SHAW, C. W., M.A., M.B. Camb., M.R.C.P.: consultant in diseases of the chest, Preston Hall Hospital, Kent.
TORRIE, E. C., M.D. Belf., D.P.H.: asst. M.O., Antrim County Health Committee.
WEST, H. F., M.D. Lond., M.R.C.P., D.T.M.: cons. physician for *rheumatic diseases, United Sheffield* Hospitals.
YOUNG I. M., M.D. Glasg.: chest physician, Great Yarmouth and Lowestoft area.

Hospital for Sick Children, Great Ormond Street, London:

BROOKS, D. H., M.A., B.M. Oxfd: registrar, dept. of physical medicine.
BUTLER, N. R., M.D. Lond., M.R.C.P., D.C.H.: house-physician.
EVANS, J. W., M.A., M.B. Camb.: house-physician.
LOCHHEAD, HELENOR, M.B. Glasg.: house-physician.
PARTRIDGE, J. P., M.B. Lond.: house-surgeon *to orthopædic* and plastic departments.
WATSON, ELIZABETH, M.D. Aberd.: asst. resident M.O., Tadworth.

Local Treasury M.O.:

BARCLAY, W. J., M.B. Glasg.: *Glasgow* area.
BRIDGWOOD, W. A., M.B. Leeds: Douglas, I.O.M., area.
DYSON, C. B., B.A. Camb., M.R.C.S.: Doncaster area.
HENDERSON, JAMES, M.B. Aberd.: Barnsley area.
ROBERTSON, W. G., M.D. St. And.: Crail, St. Androws.
TOWNLEY, J. C., M.R.C.S.: Cambridge.

Births, Marriages, and Deaths

BIRTHS

BROWNE.—On April 18, in London, the wife of Mr. Denis Browne, F.R.C.S.—a daughter.
DINNICK.—On April 21, in London, the wife of Dr. O. P. Dinnick—a son.
MCDOUGLE.—On April 21, at Norwich, the wife of Dr. H. A. McDougle—a son.
OLIVER.—On April 14, at Norwich, the wife of Dr. W. A. Oliver—a daughter.
WHITNEY.—On April 18, at Broseley, Salop, the wife of Dr. Rupert Whitney—a son.

MARRIAGES

GOLDSMITH—FITZGERALD.—On April 15, at Seaford, Kenneth Leslie Grant Goldsmith, M.B., to *Pamela Aileen* Fitzgerald, S.R.N.
KENDRICK—MENSCH.—On April 18, at Bolton, Lancs, Bernard Kendrick, M.B., to Katherine Mensch, B.A.

DEATHS

APPLETON.—On April 22, in London, Arthur Beeny Appleton, M.A., M.D. Camb.
BALFOUR.—On April 18, at Aviemore, Archibald Craig Balfour, L.R.C.P.E.
BEACH.—*On April 17, at* Weymouth, Henry William Beach, M.R.C.S., D.P.H., aged 78.
BOWDEN.—On April 19, at Boscombe, *Reginald* Trencher Bowden, M.D. Durh., aged 89.
DEEPING.—On April 20, George Warwick Deeping, M.A., M.B. Camb., aged 72.
HOLTHUSEN.—On April 20, Alan William Holthusen, M.B. Lond., aged 64.
HUTCHINSON.—On April 20, Roger Jackson Hutchinson, M.R.C.S.
JOSCELYNE.—On April 17, Arthur Edwin Joscelyne, M.D. Durh., aged 83.
LE QUESNE.—On April 14, at Bristol, *Ferdinand* Simeon Le Quesne, V.C., M.R.C.S., lieut.-colonel, R.A.M.C. retd., aged 86.
MANSON.—On April 17, David Manson, M.B. *Glasg.*, aged 66.
MARTIN.—On April 17, at Didsbury, Lancs, Ernest Martin, M.B. Durh.
O'HEA.—On April 17, at Croydon, James Patrick O'Hea, M.B. Lond., F.R.C.S., aged 82.
RODD.—On April 16, at Yelverton, South Devon, Arthur Rodd, M.R.C.S., captain, R.A.M.C. retd., aged 55.
STODDART.—In April, in London, William Henry Butter Stoddart, M.D. Lond., F.R.C.P.
WHITE.—On April 19, in London, Christopher *Theodore Redwood* White, L.R.C.P.E., aged 76.

in all respects. She weighed 28 lb. more than on her admission to hospital and was working as a shop assistant.

RECOVERY WITH RESIDUAL PULMONARY TUBERCULOSIS (1 CASE)

Case 25.—A girl of 11 had been ill for three months when admitted for treatment; her general condition was good but the temperature was between 98 and 101·6°F and the sedimentation-rate was 60. The radiological shadows were of the coarse nodular type. The temperature came down two days after starting treatment and clinically she improved considerably within the first weeks of treatment, though the temperature rose again and she did not become apyrexial again until twelve weeks after treatment started. Radiological clearing was first seen at the end of the second month and continued slowly subsequently. Though the miliary lesions were still visible at six months, clinically she seemed to have fully recovered, had a temperature within normal limits, had gained 12 lb. in weight, and her sedimentation-rate was 16. With the clearing of miliary shadows small lesions at both apices became apparent. She was transferred to a country tuberculosis hospital and her condition closely watched. Fourteen months after the start of treatment, tomograms showed cavities at the left apex. A pneumothorax was induced but later abandoned because of contraselective collapse. Following induction of a pneumoperitoneum she made good progress, and at the last examination, two years after first admission for miliary tuberculosis, she was in good general condition, afebrile, had a sedimentation-rate of 5 and negative sputum.

MENINGITIS (8 CASES)

In 8 cases the patient developed clinical tuberculous meningitis during or after the cessation of treatment. Of these 8, 7 had temperatures of 101°F or over on admission; case 21 was apyrexial and remained so even when meningitis developed. In case 22, C.S.F. findings during treatment were suggestive of meningitis, but the patient improved, only to develop clinical meningitis several months after treatment had stopped. Her case is described below with 3 other cases of meningitis arising after the end of treatment.

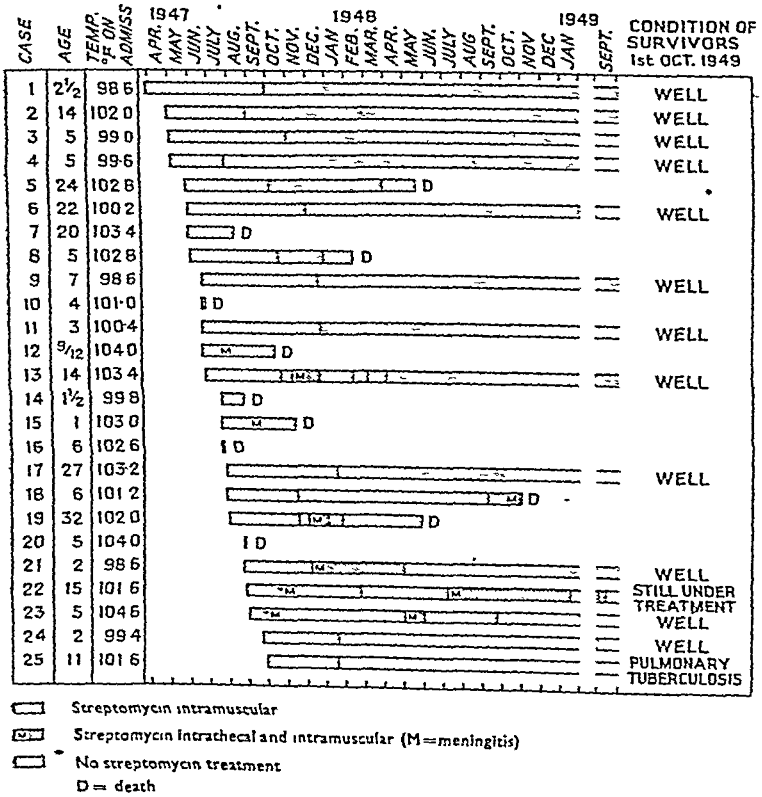

Fig. 2—Results in each of 25 patients whose treatment started between March and September, 1947.

Meningitis Developing during Treatment

Of the 4 patients in this group, 2 were infants under fifteen months, 1 was two years old, 1 was five years old. The 2 infants both died, the 2 older children have survived.

Both infants came from tuberculous families. One (case 12) had shown much clinical improvement after being desperately ill during the first week of treatment, but the C.S.F. at one month showed 30 cells per c.mm., protein 240 mg. per 100 ml., and chlorides 680 mg. Pyrexia persisted, but otherwise clinical improvement was maintained until the fourth month, when he was found one morning semicomatose and with right hemiplegia. He died four days later. Radiologically there had never been any clearing, and post-mortem examination showed widespread miliary lesions with meningitis. The other infant (case 15) had a tuberculous hip; he also improved clinically during the first months, but he developed meningitis towards the end of the second month, and died two months later. Neither of these patients had intrathecal treatment (at the time the value of intrathecal treatment had not been fully established).

Of the 2 children who have survived, 1 (case 21) developed meningitis in the fourth month of treatment. When admitted she was an ill child of two, with a sedimentation-rate of 44 but temperature within normal limits. The C.S.F. was normal, the Mantoux reaction was positive. Radiography showed disseminated coarse nodules in both lungs, collapse and consolidation of the left lower lobe, and an enlarged paratracheal gland. During the first three months after the start of treatment her general condition improved steadily; she gained weight and the sedimentation-rate fell to 19. Radiological clearing began at the end of two months. Three and a half months after the start of treatment she became irritable and ill generally; a clinical diagnosis of meningitis was confirmed by a characteristic C.S.F. picture, by the finding of choroidal tubercles, and by the culture of tubercle bacilli from the C.S.F. Intrathecal streptomycin was added to the intramuscular treatment and this was continued for four and a half months. She responded very well to the combined treatment. During this time the pulmonary lesions continued to clear. At nine months the C.S.F. was nearly normal and at twelve months she was discharged home, in good general condition and with a normal C.S.F. She has attended a chest clinic regularly since then and clinical improvement has continued uninterrupted.

Case 23.—The other surviving child who developed meningitis during treatment had an abnormal C.S.F. from the end of the first month of treatment. A boy of 5, with a history of one week, he was clinically acutely ill when admitted; his temperature ranged from 101 to 104·6°F, the E.S.R. was 35, and the chest X-ray film showed typical fine miliary dissemination. The C.S.F. was normal. His general condition improved in the first two months of treatment, though he remained febrile. One month after treatment started several choroidal tubercles were seen, and the C.S.F. was abnormal with 10 lymphocytes per c.mm., protein 150 mg. per 100 ml., and chlorides 700 mg. There were no clinical signs of meningitis, and no intrathecal treatment was given. At two months the clinical condition was still improving, and radiography showed some clearing of the miliary lesions; but the C.S.F. was abnormal as before. At three months there was slight clinical deterioration, the temperature was still high, choroidal tubercles were still present, and there was blurring of the disc margins; the protein and lymphocytes in the C.S.F. had increased. At this time a papular rash developed on the soles and palms; it persisted for several months, and was found to have histologically the character of tuberculides. After the temporary clinical setback at three months, he again improved and at six months

Although every case was considered acute on acceptance, 3 patients were apyrexial during the week after admission. It is obvious from table II that even with streptomycin treatment, the prognosis is still very grave in those most acutely ill on admission. There were 10 deaths among the 16 patients with temperatures of 101°F or over, compared with 1 death among the 9 others. Of the 12 patients who were considered clinically extremely ill, 9 died, as against 2 of the 13 less ill.

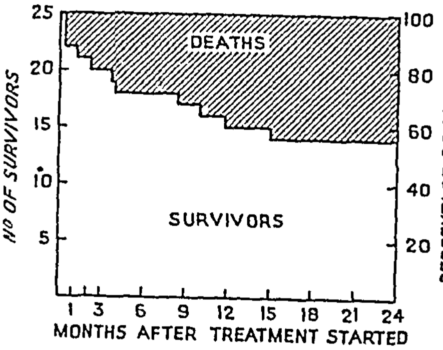

Fig. 1—Survivors at different periods after start of streptomycin treatment for miliary tuberculosis.

Similarly, 3 deaths occurred among 12 patients with sedimentation-rates (Westergren, 200 mm. reading at one hour) below 50, and 3 among 6 patients with rates over 50. In 7 cases the examination was not done.

Apart from primary complexes, 6 patients had manifest tuberculous lesions in addition to the miliary lesions seen on radiography. There were 3 deaths among them, and little difference in fatality is apparent between these 6 patients and those without any clinical evidence of other lesions (8 deaths among 19).

Radiological Progress of Miliary Lesions

The most remarkable feature of the response to treatment was the clearing of the miliary lesions in the lungs —not only in those patients who made a complete clinical recovery, but also in those who later died of meningitis or other complications. Of the 21 patients who survived more than two months, only 2 showed no radiological improvement; these were patients who died two and a half and three and a half months after treatment started.

TABLE I—RESULTS RELATED TO AGE

Age in years	Total	Died
Under 2	3	3
2–4	5	1*
5–9	8	4†
10–14	3	0
15 + ...	6	3

* Died in less than a week.
† Two died in less than a week.

Of the remaining 19, by two months clearing had commenced in 12, but in only 2 of these had improvement started in the first month (table III). In 4 cases radiological improvement was not seen until the third month, and in the remaining 3 it was not seen until the fourth.

The date at which the clearing of the miliary lesions in the lungs was first noted to be complete varied between four and eleven months after treatment started (table III); clearing took place in 17 out of the 18 patients who survived more than four months. The 1 exception was case 19 (death at ten months).

TABLE II—RESULTS RELATED TO ACUTENESS OF CONDITION ON ADMISSION

Cases	Temperature on admission (°F)				General condition on admission	
	102 +	101–101·9	99–100·9	Less than 99	Very ill	Others
Total	12	4	6	3	12	13
Deaths	8	2	1	0	9	2

Among the 17 patients whose X-ray films showed the typical millet-seed dissemination there were 8 deaths. Of the 8 patients who had the coarser nodule type, 3 died, 2 of them after clearing and then developing the classical miliary picture (cases 8 and 18, described later). On these small numbers no difference in fatality is apparent.

Clinical Course of the Disease (fig. 2)

As already stated, 3 extremely ill patients died after less than a week's treatment; 2 died within two days, while a 3rd child developed mediastinal emphysema on the fourth day and died on the sixth day. Of the remaining 22 patients, all but 1 (case 14) showed initial improvement. The clinical response of miliary tuberculosis to streptomycin is sometimes dramatic, with a fall in temperature and return of well-being within the first weeks; the sedimentation-rate falls more slowly. Frequently, however, the fever persists much longer, though at a level lower than at the start of treatment, and despite general improvement it may be many months before the clinical picture is wholly satisfactory. The prognostic importance of the early response to treatment is studied in the following analysis of the clinical course.

TABLE III—DATE OF RADIOLOGICAL CLEARING OF MILIARY LESIONS

Months after treatment started	1	2	3	4	5	6	7	8	9	10	11
Improvement first noted	2	10	4	3	..	..	..	..	..	..	..
Complete clearing ..	..	..	..	3	2	4	1	5	..	1	1

Of the 22 patients who survived more than a week, 9 recovered without complications, 1 recovered from miliary tuberculosis but with cavitating pulmonary lesions, 8 developed meningitis (4 died), and 4 died without meningitis.

UNINTERRUPTED RECOVERY (9 CASES)

Of the 9 patients who made an uninterrupted recovery 2 were apyrexial on admission but had a raised sedimentation-rate (43 and 47), and the rate did not return to normal till eight or nine months later. Of the 7 others, 5 had normal temperatures at the end of two months, and the remaining 2 at the end of four months. Case 2 is typical of this group of patients.

Case 2.—A girl of 14 had been ill for three months and her condition was diagnosed a month after her illness started. Her brother died of tuberculous meningitis during this time. On her admission to the centre for streptomycin treatment, she looked ill, had a temperature between 98·4 and 102°F, and a sedimentation-rate of 106. She had typical fine miliary infiltration of the lungs, enlarged hilar glands, and a probable primary focus in the left upper zone. She improved considerably within the first two weeks after treatment started; the temperature fell almost to normal by the ninth day but rose again to 101°F, and after that subsided gradually and remained normal from six weeks after start of treatment. There was a slow clinical improvement after the first two weeks and until the end of the fourth month; she gained a few pounds in weight and the sedimentation-rate fell to 55. Clearing of the miliary lesions began at four months and was amost complete at eight months, but the primary lesion at the left apex seemed little affected by treatment and in the fifth month a gland at the right hilum became enlarged and she developed collapse of the right dorsal lobe. At the end of the fourth month there was a slight setback; she had nausea and seemed lethargic. The C.S.F. was normal. Treatment was stopped and she then made considerable improvement clinically and gained weight rapidly. After a period of convalescence in a country hospital she was discharged home, and when last seen, over two years after treatment was first started, she was in excellent health in all respects. She weighed 28 lb. more than on her admission to hospital and was working as a shop assistant.

RECOVERY WITH RESIDUAL PULMONARY TUBERCULOSIS (1 CASE)

Case 25.—A girl of 11 had been ill for three months when admitted for treatment; her general condition was good but the temperature was between 98 and 101·6°F and the sedimentation-rate was 60. The radiological shadows were of the coarse nodular type. The temperature came down two days after starting treatment and clinically she improved considerably within the first weeks of treatment, though the temperature rose again and she did not become apyrexial again until twelve weeks after treatment started. Radiological clearing was first seen at the end of the second month and continued slowly subsequently. Though the miliary lesions were still visible at six months, clinically she seemed to have fully recovered, had a temperature within normal limits, had gained 12 lb. in weight, and her sedimentation-rate was 16. With the clearing of miliary shadows small lesions at both apices became apparent. She was transferred to a country tuberculosis hospital and her condition closely watched. Fourteen months after the start of treatment, tomograms showed cavities at the left apex. A pneumothorax was induced but later abandoned because of contraselective collapse. Following induction of a pneumoperitoneum she made good progress, and at the last examination, two years after first admission for miliary tuberculosis, she was in good general condition, afebrile, had a sedimentation-rate of 5 and negative sputum.

MENINGITIS (8 CASES)

In 8 cases the patient developed clinical tuberculous meningitis during or after the cessation of treatment. Of these 8, 7 had temperatures of 101°F or over on admission; case 21 was apyrexial and remained so even when meningitis developed. In case 22, C.S.F. findings during treatment were suggestive of meningitis, but the patient improved, only to develop clinical meningitis several months after treatment had stopped. Her case is described below with 3 other cases of meningitis arising after the end of treatment.

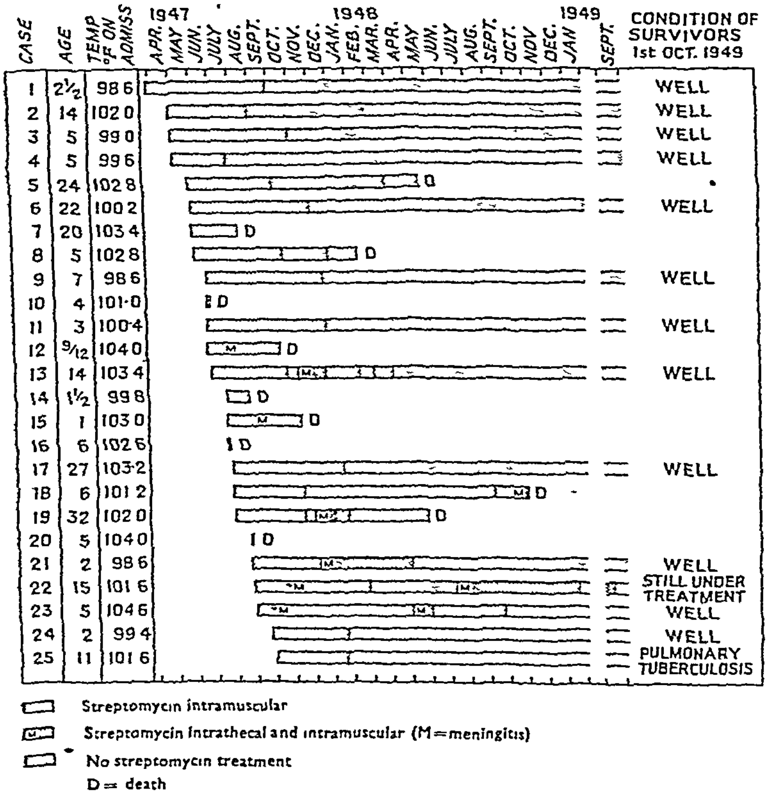

Fig. 2—Results in each of 25 patients whose treatment started between March and September, 1947.

Meningitis Developing during Treatment

Of the 4 patients in this group, 2 were infants under fifteen months, 1 was two years old, 1 was five years old. The 2 infants both died, the 2 older children have survived.

Both infants came from tuberculous families. One (case 12) had shown much clinical improvement after being desperately ill during the first week of treatment, but the C.S.F. at one month showed 30 cells per c.mm., protein 240 mg. per 100 ml., and chlorides 680 mg. *Pyrexia persisted*, but otherwise clinical improvement was maintained until the fourth month, when he was found one morning semicomatose and with right hemiplegia. He died four days later. Radiologically there had never been any clearing, and post-mortem examination showed widespread miliary lesions with meningitis. The other infant (case 15) had a tuberculous hip; he also improved clinically during the first months, but he developed meningitis towards the end of the second month, and died two months later. Neither of these patients had intrathecal treatment (at the time the value of intrathecal treatment had not been fully established).

Of the 2 children who have survived, 1 (case 21) developed meningitis in the fourth month of treatment. When admitted she was an ill child of two, with a sedimentation-rate of 44 but temperature within normal limits. The C.S.F. was normal, the Mantoux reaction was positive. Radiography showed disseminated coarse nodules in both lungs, collapse and consolidation of the left lower lobe, and an enlarged paratracheal gland. During the first three months after the start of treatment her general condition improved steadily; she gained weight and the sedimentation-rate fell to 19. Radiological clearing began at the end of two months. Three and a half months after the start of treatment she became irritable and ill generally; a clinical diagnosis of meningitis was confirmed by a characteristic C.S.F. picture, by the finding of choroidal tubercles, and by the culture of tubercle bacilli from the C.S.F. Intrathecal streptomycin was added to the intramuscular treatment and this was continued for four and a half months. She responded very well to the combined treatment. During this time the pulmonary lesions continued to clear. At nine months the C.S.F. was nearly normal and at twelve months she was discharged home, in good general condition and with a normal C.S.F. She has attended a chest clinic regularly since then and clinical improvement has continued uninterrupted.

Case 23.—The other surviving child who developed meningitis during treatment had an abnormal C.S.F. from the end of the first month of treatment. A boy of 5, with a history of one week, he was clinically acutely ill when admitted; his temperature ranged from 101 to 104·6°F, the E.S.R. was 35, and the chest X-ray film showed typical fine miliary dissemination. The C.S.F. was normal. His general condition improved in the first two months of treatment, though he remained febrile. One month after treatment started several choroidal tubercles were seen, and the C.S.F. was abnormal with 10 lymphocytes per c.mm., protein 150 mg. per 100 ml., and chlorides 700 mg. There were no clinical signs of meningitis, and no intrathecal treatment was given. At two months the clinical condition was still improving, and radiography showed some clearing of the miliary lesions; but the C.S.F. was abnormal as before. At three months there was slight clinical deterioration, the temperature was still high, choroidal tubercles were still present, and there was blurring of the disc margins; the protein and lymphocytes in the C.S.F. had increased. At this time a papular rash developed on the soles and palms; it persisted for several months, and was found to have histologically the character of tuberculides. After the temporary clinical setback at three months, he again improved and at six months was very lively, and the X-ray film was clear; but he was still febrile, and the C.S.F. was still abnormal. At eight months there was again a clinical setback, and it was finally decided to add intrathecal streptomycin to the intramuscular treatment which had been given continuously. The intrathecal treatment was given for one month, and the intramuscular treatment until the end of thirteen months after admission. He responded well, and the subsequent history is one of steady clinical improvement. The tuberculides and choroidal tubercles healed, the C.S.F. was normal at twelve months. A low pyrexia persisted for a long time, and he was not finally discharged from hospital until twenty months after admission. He has since attended regularly for check-up and has continued to make good progress.

Meningitis Developing after Treatment

The ages of the 4 patients in this group were 6, 14, 15, and 32 years, whereas all 4 patients who developed meningitis during treatment were under 6. There were 2 deaths. In 2 cases (13 and 19) meningitis developed two weeks after the end of treatment.

Case 13.—A girl of 14 showed little clinical response during the first two months of treatment; she remained pyrexial and lost weight, and at the end of two months choroidal tubercles were seen. In the fourth month there was marked clinical improvement, with temperature fall and considerable radiological clearing. At the end of four months she appeared very well, though still with a slight evening pyrexia; treatment was stopped, but two weeks later the temperature rose again, and the girl was again ill, with headache and vomiting; there were clinical signs of meningitis, a fresh crop of choroidal tubercles and a C.S.F. characteristic of tuberculous meningitis. She was given intrathecal and intramuscular streptomycin, and responded well. Strains of bacilli isolated from the C.S.F. at four and a half months, and from the urine at six months, were streptomycin-sensitive. Subsequently she made a complete recovery: when last seen, two years after first admission, she was clinically well in all respects.

Case 19.—A woman of 32 was admitted very ill, with a history of several months since the birth of a child. In addition to dense miliary infiltration, there was cavitation in both upper zones, and a small effusion at the right base. The C.S.F. was normal. Clinically she improved rapidly in the first months of treatment; in the fourth month some radiological clearing was seen for the first time; the E.S.R. was 12, and she still had a low pyrexia. Treatment was stopped at three and a half months, but two weeks later she developed clinical meningitis. She appeared at first to respond well to intrathecal treatment, and radiologically there was further improvement, but the C.S.F. remained very abnormal; at eight months she began to go downhill and she died two months later. Moderately resistant strains had been isolated from the sputum at two months; at four months the first strain isolated from the C.S.F. was sensitive, but subsequent strains six weeks and four and a half months later were moderately resistant.

The other 2 patients relapsed with meningitis a considerable time after treatment had stopped—over four months in one case, ten months in another.

Case 22.—A girl of 15 was extremely ill on admission. She responded clinically to treatment, but after one month complained of headache, and the C.S.F. showed 100 cells (45 lymphocytes) per c.mm., and protein 100 mg. per 100 ml. She appeared subsequently to improve, however, apart from onset of total deafness. At the end of four months the lung fields were practically clear; she then still had a temperature between 98 and 101°F, and at the end of six months there was still a low pyrexia. The C.S.F. at six months was normal apart from a protein level of 105 mg. Treatment, which had been by the intramuscular route only, was then stopped, and at eight months she was discharged home, clinically well apart from total deafness and a C.S.F. protein at 75 mg. During the next three months she seemed to keep well, and put on weight; but she then developed fever, headache, and vomiting, and was admitted to hospital with tuberculous meningitis. The subsequent history is one of first response to intrathecal and intramuscular streptomycin for six months, a relapse two and a half months after this course stopped, and good response to a second course of treatment. At the time of reporting, two years and four months after she was first admitted for miliary tuberculosis, she was still in hospital, and still having streptomycin treatment by the intramuscular route. Her general condition was excellent, and she suffered from no disability except the persistent deafness. The last examination of the C.S.F. showed 6 cells per c.mm., protein 40 mg. per 100 ml., sugar 53 mg., and chlorides 720 mg.

Case 18.—A boy of 6½ had radiological shadows of the coarse nodular type. The condition had developed in hospital, where he was under observation with erythema nodosum. The response to the three and a half months' course of intramuscular streptomycin was good; at four months he still had a mild evening pyrexia, but was otherwise clinically well, had put on 12 lb. in weight, and had a normal lung picture. The low pyrexia persisted for several months, though in all other respects he was doing very well. Thirteen and a half months after his first admission, he was readmitted to hospital, not acutely ill, but with increased pyrexia, and general malaise. Radiography showed a typical dense millet-seed dissemination throughout both lungs. The C.S.F. was normal. Intramuscular streptomycin treatment was started again. Five weeks later choroidal tubercles were seen, and the C.S.F. then showed increased cells and a low sugar level, though there were no clinical signs of meningitis. Intrathecal treatment was started five days later, but he rapidly became worse and died ten days after the commencement of this treatment. Strains isolated from gastric washings on his readmission and from the C.S.F. when he developed meningitis were sensitive, but those from the C.S.F. on the day before his death and from a post-mortem specimen were highly resistant.

Choroidal Tubercles

Results of ophthalmoscopic examination were not recorded with sufficient constancy to permit an adequate analysis. However, there is no record of choroidal tubercles having been seen in any of these cases on admission; it must be remembered that patients with meningitis on admission were excluded.

Choroidal tubercles were observed later in 5 patients, and in all 5 the observation preceded or accompanied onset of tuberculous meningitis. In case 13 they were seen two months after treatment started; no lumbar puncture was done at the time, but the patient developed clinical meningitis two and a half months later. In 2 other cases (15 and 23) tubercles were seen at a time when there was no clinical meningitis but the C.S.F. was abnormal and suggestive of meningitis. In the 2 remaining cases (18 and 21), the observation was made when onset of clinical meningitis was apparent.

Debré et al. (1948), reporting results in 16 cases of miliary tuberculosis, record that choroidal tubercles were seen in 5 of the 6 patients who developed meningitis, and in only 2 of the others who did not. Bernard et al. (1949) found choroidal tubercles in 19 of 38 patients who developed meningitis, and in 13 of 56 who did not.

DEATH WITHOUT MENINGITIS (4 CASES)

All 4 patients were acutely ill on admission. A child of eighteen months (case 14), deteriorated progressively to his death five weeks later; at necropsy there was no meningitis, but very widespread miliary lesions and a large primary complex. Another patient (case 7), a girl of 20, had on admission, besides the typical fine miliary lesions in the lungs, a cervical abscess and tuberculous laryngitis. She improved slightly in the first two months, but there was no radiological clearing; her clinical condition then suddenly deteriorated and she died two and a half months after admission. Necropsy revealed very extensive large caseous lesions in many organs.

The two other cases are of particular interest.

Case 5.—An Indian, aged 24, had been ill for a month before admission with pyrexia of unknown origin, and repeated chest X-ray films were normal till a few days before admission to the centre, when the typical appearance of miliary tuberculosis was found. He was desperately ill on admission, and was in fact considered moribund. There was a remarkable response to treatment; clinically after the first dramatic improvement he made continuous further progress, and by the end of the third month he was apyrexial; radiological clearing began in the second month, and was complete at seven months. Treatment was stopped at four months; a week later he developed jaundice, but recovered from this without incident, as also from a small right spontaneous pneumothorax. He was discharged for convalescence at nine months, apyrexial, very fit, having gained over 40 lb. since admission. Three weeks later he was readmitted, acutely ill, with fever, extreme weakness, and precordial pain. He was found to have a pericardial effusion, and tubercle bacilli were grown from the fluid (the first and only to be isolated from this patient). The lungs remained clear. The condition did not respond to streptomycin given systemically and into the pericardial cavity, and he died, nearly a year after his first admission. Permission for post-mortem examination was refused.

Case 8.—A boy of 5 was acutely ill on admission with a temperature 99–102·8°F, and E.S.R. 60, and had radiologically disseminated shadows of the coarse nodular type. During the first month of treatment his condition became worse, but in the following months he improved progressively, though he retained a low pyrexia for many months. Radiological clearing was first seen in the third month, and was almost complete at the end of the fourth month. C.S.F. examinations during this period showed no abnormality. Treatment was stopped at four and a half months, and at five and a half months he was discharged home. Four weeks after his discharge, he was seen at outpatients, and appeared very fit, and the chest X-ray film was considered clear; but the E.S.R. was 19. A week later he developed acute tonsillitis and cervical adenitis, and after ten days (seven months after his first admission) was readmitted to hospital, ill, listless, with a high swinging temperature. Radiography showed a characteristic fine millet-seed dissemination in both lungs. Looking back through the films, the miliary shadows can be perhaps seen on the film at two months, definitely on the six-month film. Streptomycin treatment was given again, but the condition this time did not respond, and the child died seven weeks after his readmission. Miliary lesions were found in many organs, and large tuberculous abscesses in cervical and mesenteric glands. Tubercle bacilli isolated from these lesions were resistant. Histologically, the lungs and other organs contained both healing and active lesions.

The special interest of this case, as of case 18, is the character of the relapse, with a typical fine miliary picture appearing some time after treatment had cleared coarse nodular shadows.

Streptomycin Sensitivity

There were 4 deaths within the first six weeks. From 12 other patients tubercle bacilli were not isolated after the first six weeks. Of the remaining 9 cases, sensitivity tests were not done in 2 cases. Table IV relates therefore to only 7 cases.

Strains were isolated from the sputum of 3 patients; one was highly resistant at six weeks, and another moderately resistant at eight weeks and twenty-eight weeks (both these patients died); the third was sensitive at thirty weeks, and this patient recovered. A resistant culture was isolated at thirty-six weeks from the cervical glands of another patient who died. Strains from the gastric washings of one patient at fifty-six weeks were sensitive.

TABLE IV—STREPTOMYCIN SENSITIVITY. (The figures in parentheses are weeks after treatment started.)

Case	Specimen	Streptomycin sensitivity*	Clinical note
7	Sputum	1000(6) 1000(10)	Death (11)
8	Cervical gland	66(36)	Death (36)
13	Sputum Urine C.S.F.	0·5(30) 0·5(26) 0·5(18)	Meningitis (18) Recovered
18	Gastric washings C.S.F.	0·5(56) 0·5(61) 250(63)	Meningitis (61) Death (63)
19	Sputum C.S.F.	8(8) 12·5(28) 0·6(17) 12·5(23) 12·5(35)	Meningitis (17) Death (43)
21	C.S.F.	0·5(15)	Meningitis (15) Recovered
22	C.S.F.	0·5(48)	Meningitis (48) Recovered

* Reported as minimum concentration of streptomycin, in µg. per ml., to which tubercle bacilli were sensitive. The 'Tween'-albumin medium was used.

Strains isolated from the C.S.F. of 5 patients were all sensitive at the onset of meningitis (fifteen weeks, seventeen weeks, eighteen weeks, eleven months, and fourteen months after the start of treatment); in 1 case (19) a moderately resistant strain had been isolated from the sputum nine weeks previously. Of those cases which yielded further positive C.S.F. cultures, one had a moderately resistant strain (case 19) and another a highly resistant strain (case 18); a strange feature of this second case is that resistance emerged after only ten days' intrathecal treatment.

No conclusion is possible, since there is scanty evidence from 7 cases only. It is noteworthy however that sensitive strains were isolated from the C.S.F. after quite long periods of treatment by the intramuscular route. McDermott et al. (1947) record 2 cases in which "the strains first isolated from the C.S.F. were drug sensitive even though organisms from the corresponding systemic infections were highly resistant to streptomycin in vitro." They note also the appearance of in vitro resistance in 3 cases in which the organisms persisted in the fluid. In a case reported by Lincoln and Kirmse (1950), relapse with meningitis occurred twenty-five days after completing six months of treatment for miliary tuberculosis; the organisms then cultured from the C.S.F. were fully sensitive to streptomycin, but during the second month of treatment for meningitis strains were isolated which were highly resistant to streptomycin.

Other Reported Results

Comparison of the results of this investigation with those of investigations reported elsewhere is difficult, because of differences in methods of reporting and in

TABLE V—RESULTS OF STREPTOMYCIN TREATMENT IN MILIARY TUBERCULOSIS OF THE LUNGS WITHOUT DIAGNOSED MENINGITIS AT COMMENCEMENT OF TREATMENT

Author	Year	Miliary only			Miliary followed by meningitis			All cases			Observation period
		Cases	Deaths	Fatality (%)	Cases	Deaths	Fatality (%)	Cases	Deaths	Fatality (%)	
Bunn	1948	19	7	37	13	13	100	32	20	62	> 14 mos.
Cathala and Bastin ..	1948	14	2	14	7	7	100	21	9	43	?
Debré et al.	1948	10	2	20	6	5	83	16	7	44	> 4 mos.
Bernard et al.	1949	70	12	17	44*	37	84	114*	49	43	> 1 year
Lincoln and Kirmse† ..	1950	5	1	20	3	2	67	8	3	37	> 10 mos.
M.R.C.	1950	17	7	41	8	4	50	25	11	44	> 2 years

* Includes 17 cases of meningitis diagnosed before commencement of treatment. † Streptomycin treatment combined with promizole.

duration of observation, and sometimes also because of the inclusion of cases with meningitis at the start of treatment. However the main results reported to date are listed in table v.

Discussion

Though in this investigation the number of cases of miliary tuberculosis treated with streptomycin and followed up for two years or more is small, the analysis has revealed certain interesting features.

The effect of streptomycin in this form of the disease is striking; as has been observed already by many workers, the fatality has been reduced to below 50%. It is important to note, however, that the prognosis is much less favourable for those patients most acutely ill at the start of treatment. Of the 16 patients whose temperature was 101°F or higher at the start of treatment, 3 died within a week, and 7 died later. The miliary picture of the lungs is only a part of the picture of blood dissemination, and streptomycin seems to have relatively little effect where that dissemination is acute and massive by nature either of the patient's low resistance or of the lesions liberating tubercle bacilli into the circulation. This is reflected particularly in the figures for meningitis: 7 of the 16 patients with a temperature of 101°F or over at the start of treatment developed meningitis later, and only 1 of the 9 with lower temperatures. Thus the acuteness of the clinical state at the start of treatment is a fundamental factor in prognosis.

The rate of response to treatment is also important. Of the 21 patients who survived more than two months, 7 had normal temperatures at two months and all 7 survived, whereas 7 of 14 patients still pyrexial died. At four months after the start of treatment, of the 18 survivors 12 had normal temperatures and 1 of these died; of the 6 who were still pyrexial, 3 died later, and 3 others all developed meningitis but recovered. While the importance of the temperature response to treatment is demonstrated, it is equally evident that the clearing of miliary lesions in the lungs is no guide to prognosis; clearing had been seen in 6 of the 8 patients who developed meningitis, and in 2 patients who later died without meningitis. The miliary lesions in the lungs appear to be more accessible to the drug's action than the lesions in other parts of the body.

Meningitis is the main complication obscuring the prognosis, and, if it is to be cured by the addition of intrathecal treatment, it must be diagnosed as early as possible. The analysis has shown how often it supervenes in very acute cases, and in cases where temperature does not return to normal within the first months of streptomycin treatment; certainly in such cases one must be particularly alert to this risk. The onset may be very insidious, and early clinical diagnosis is difficult, even in patients under close hospital observation. It is important to examine the fundi frequently; discovery of choroidal tubercles is a danger signal, though they may be seen without meningitis. The only certain method of diagnosing meningitis early in cases of miliary tuberculosis is by examination of the C.S.F., made before the start of treatment and repeated the more frequently the more acute the condition and the less responsive to treatment. Minor changes in the elements of the C.S.F. may be difficult to interpret, but in this series every patient who showed some abnormality of the C.S.F. developed meningitis. It is reasonable to recommend introduction of intrathecal therapy where there is any doubt.

Emergence of streptomycin-resistant strains was observed in 4 of the 7 patients whose bacilli isolated after the first six weeks were tested for sensitivity. All 4 patients died, and the other 3 recovered. Most recent information indicates that emergence of streptomycin resistance may be prevented or delayed by giving the drug with *p*-aminosalicylic acid (Medical Research Council 1949, Veterans Administration 1949).

How long should treatment continue? In 4 cases meningitis developed after treatment had stopped; 2 of them had been treated by the intramuscular route for three and a half months, 1 for four months, 1 for six months. Another 2 patients died without meningitis some time after the cessation of treatment; they had been treated for four and four and a half months. No definite decision had been taken regarding duration of treatment for patients in this investigation, apart from the recommendation that all should have at least three months' continuous streptomycin therapy. Of the 18 patients who survived more than six months, 9 had been treated continuously in the first place for twelve to twenty-two weeks, 9 for six months or more. A post-hoc analysis of the results in these two groups is not strictly valid, since many reasons intervened in the decision to prolong treatment, but the fact that the 9 who were treated for six months or more all survived, while 4 of the 9 others died, is suggestive. Several authors have shown the frequency of meningitis or miliary relapse occurring within a few weeks after stopping treatment (Mattei 1947, Bunn 1948, Bernard et al. 1949). There is a growing impression that chemotherapy should be continued in all cases of miliary tuberculosis for at least six months, and possibly longer. This recommendation is most strongly to be made for those patients most acutely ill on admission, and for those who do not respond fairly rapidly to treatment. Possibly treatment after the six months should be continued with some other tuberculostatic drug.

Summary

In 25 cases, acute miliary tuberculosis was treated with streptomycin. The survivors, numbering 14 (56%), have been followed up for over two years.

Apart from the 3 patients who died in less than a week, all but 1 showed clinical response to treatment. Uninterrupted recovery took place in 9; 1 recovered from miliary disease but with residual pulmonary tuberculosis; 8 developed meningitis, and 4 of these died; 4 died without meningitis.

The miliary lesions in the lungs cleared in 19 of the 21 patients who survived more than two months.

The prognosis was much worse in the patients most acutely ill at the start of treatment than in the others: 10 of the 11 deaths, and 7 of the 8 cases of meningitis, occurred among the 16 patients with temperatures of 101°F or over at the start of treatment.

Early diagnosis of meningitis and the conduct of treatment are discussed.

The opinions expressed in this report represent a consensus of the opinions of the clinicians and pathologists engaged in the trial. The committee is greatly indebted to them for their constant coöperation. Particular thanks are due also to the nursing staff and laboratory technicians of the centres.

Addendum.—In April, 1950, all the 14 survivors had been observed for over two and a half years. Of the 2 patients still under treatment in October, 1949, case 25 still had a pneumoperitoneum and was making good progress; case 22 was discharged from hospital in December, 1949, and when last seen at outpatients in March, 1950, was in excellent health. The other 12 patients were well.

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SURGERY IN PARKINSON'S DISEASE

COMPLETE SECTION OF THE LATERAL COLUMN OF THE SPINAL CORD FOR TREMOR

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Experience gained from 79 cordotomies done for the relief of parkinsonian tremor has shown that satisfactory results can be obtained only if patients are chosen for operation with the greatest possible care, and that the maximum elimination of tremor, without permanent paralysis, occurs after a complete section of the lateral column of the spinal cord at the second cervical segment. Ebin[1] claims good results in 11 patients from division of the lateral pyramidal and the opposite ventral pyramidal tracts through a single incision in the cord at the fifth cervical segment (3 in figure).

I have previously described[2] the effects of a 5 mm. cut into the posterior part of the lateral column (2 in figure) and drew attention to the observation that the results were better in those patients who, after operation, had patches of analgesia on the opposite side, from involvement of the lateral spinothalamic tract. In an attempt to improve the results still further I increased the extent of the incision in the cord to include the whole of the lateral column (4 in figure), so that complete analgesia was produced on the opposite side to a level high up on the thorax and sometimes including the upper limb.

SELECTION OF PATIENTS FOR OPERATION

With rare exceptions, patients with bilateral parkinsonism are unsuitable for cordotomy because, though the tremor is often severe, the major symptom is loss of dexterity, sometimes amounting to complete helplessness. Even more important is the fact that the patient's mental state is usually incompatible with a good result. It is possible to relieve tremor, but it is another matter to satisfy the patient. The problem is similar in some respects to the surgical treatment of intractable pain. The surgeon must be convinced that the patient will be grateful for his efforts. I have records of patients who have come to me with the most violent tremor and have been "bitterly disappointed" after operation because they have had a little tremor occasionally when excited. On the other hand, others have been happy with a moderate reduction of tremor after the more conservative operation.

Patients selected for complete division of the lateral column should have the disease confined strictly to one side, and it is important to note that a patient with tremor on one side is not necessarily suffering from unilateral disease, for there may be mental changes, a bilateral masking of the face, and some rigidity of the opposite side to reveal that both sides are affected. The radical operation, the subject of this article, is not advised if there is the slightest evidence of bilateral disease, partly for the reasons already mentioned and also because it is unjustifiable to leave a patient with bilateral analgesia.

A strictly unilateral syndrome is diagnosed after careful investigation. A history from relations should reveal no unfavourable mental changes. There should be masking of one side of the face only. When the patient walks, the unaffected arm should swing freely and there should be no suspicion of disability or rigidity on this side.

Even when it is decided that the parkinsonism is confined to one side, the patient as well as his malady must be carefully studied. If the tremor is the presenting symptom, the surgeon must discover what part it plays in the patient's life as well as its importance in relation to the other manifestations of the disease. Is the relief from tremor going to restore the patient's mental health, or will *paresis of the hand* or the analgesia be regarded as far worse than the tremor?

SECTION OF THE LATERAL COLUMN

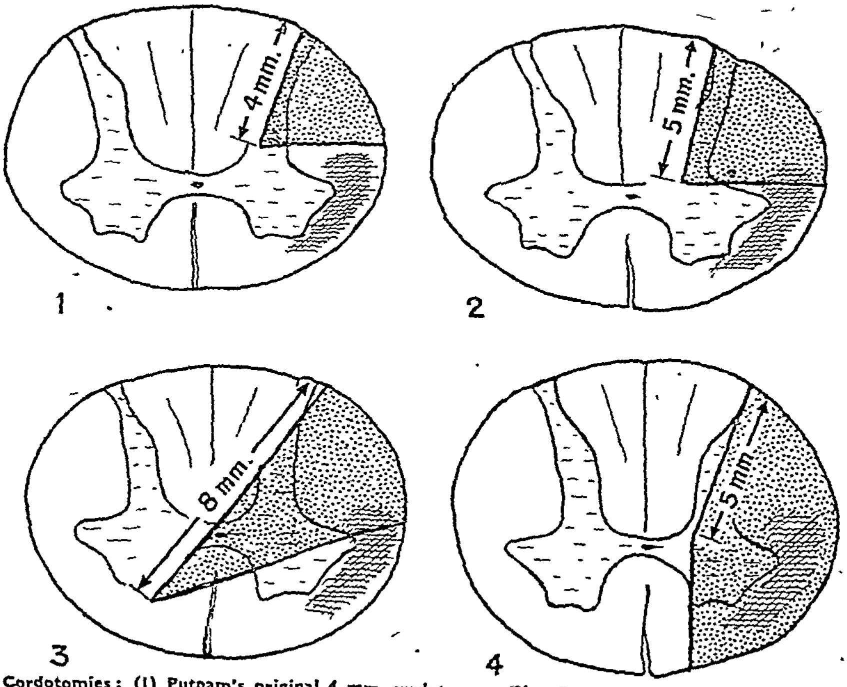
Anæsthesia

'Omnopon' gr. $^{1}/_{3}$ and hyoscine gr. $^{1}/_{150}$ are given subcutaneously an hour before the induction of anæsthesia. Immediately before the induction the patient's throat is sprayed with 10% cocaine solution. Anæsthesia is induced with a mixture of nitrous oxide, oxygen, and a little ether, and then an acrylic tube, size 9 or 10, is passed through the mouth into the trachea. The throat is packed, and the tube is threaded through a London Hospital airway. The tube is secured in place with strapping and then connected to the anæsthetic apparatus containing a carbon dioxide absorption unit. Anæsthesia is continued with nitrous oxide and oxygen, with the addition of a little ether or cyclopropane.

Operation

The patient's eyes are protected with cotton-wool held in place by adhesive elastic bandage. The patient is then placed in the "cerebellar position."

The incision extends from the seventh cervical spine to the external occipital protuberance. Pressure is applied to the skin edges by the assistants' fingers to control bleeding. The cut is extended through the deep fascia, to which fine artery forceps are applied, as to the galea aponeurotica in the case of incisions in the scalp. The weight of the forceps helps to control bleeding from the skin. Vessels which continue to bleed are coagulated by diathermy.



Cordotomies: (1) Putnam's original 4 mm. cordotomy; (2) a 5 mm. cordotomy involving the lateral spinothalamic tract; (3) Ebin's combined section of the lateral pyramidal and opposite ventral pyramidal tracts; and (4) complete section of the lateral column described here.

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[1] Ebin, J. *Arch. Neurol. Psychiat.* 1949, 62, 27.
[2] Oliver, L. C. *Lancet,* 1949, i, 910.

Absolute hæmostasis is essential, for even a small ooze of blood may completely obscure the site of the cordotomy. For this reason the muscle-fibres attached to the spines and laminæ of the second and third cervical vertebræ are detached by diathermy.

The margins of the wound are separated with a self-retaining retractor. The spines and laminæ of the second and third cervical vertebræ are removed. The dura mater is incised longitudinally, and several traction sutures are inserted into the edges of the incision. The arachnoid is torn to expose the spinal cord. A no. 15 Bard-Parker blade is then clamped with an artery forceps so that 5 mm. of the blade projects beyond the beak of the forceps. With the cutting edge facing towards the anterior aspect of the cord, the point of the blade enters the cord at the site of attachment of a convenient posterior nerve-rootlet. The blade is pushed into the cord as far as the end of the artery forceps at an angle of 45°. The blade is then swept outwards. The depth of this incision is then checked with a blunt instrument—e.g., a blunt dura hook. The division of the lateral column is then completed with a blunt-ended tenotome. This instrument is inserted into the cord to the full depth of the incision, and then brought forward to emerge at the line of origin of the attachment of the anterior nerve-roots. Again the depth of the cut is checked with a blunt instrument.

The dura mater is closed with fine interrupted black silk sutures. The muscle is sutured in two layers, and the skin in one. Because the spinal membranes have been opened, a course of intramuscular penicillin is given.

POSTOPERATIVE COURSE

After operation there is a temporary hemiplegia on the side of the cordotomy with a permanent hemianalgesia and hemithermanæsthesia on the opposite side extending up to a level on the chest and sometimes including the arm. Horner's syndrome is present on the side of the operation. Babinski's reflex is also positive on this side.

Even after this radical procedure the hemiplegia usually begins quickly to recover. Recovery appears first in the leg, on the day after operation. Sometimes some return of movement will be observed at the elbow at the same time. In two or three weeks the patient will be walking unaided but with some dragging of the foot. The upper limb will be making good progress, but there will still be some weakness of the grip and loss of dexterity at this stage. Recovery of the paresis proceeds gradually, and will closely approach normal in most cases. The loss of sensation to pain and temperature on the opposite side is always permanent. After the more conservative operation which I described previously (5 mm. cordotomy) Horner's syndrome was not found, but it is always present after division of the whole lateral column. It usually improves and has never been a source of complaint.

Tremor.—There is immediate and complete relief from tremor in all cases, both in the arm and the leg. Usually there will be a slight return of tremor as the hemiplegia recovers, but it is present only when the patient is unduly excited. Division of the lateral column is more effective than either the original Putnam operation [3] (1 in figure) or the 5 mm. cordotomy (2 in figure).

RESULTS

I have done 79 cordotomies. In 6 a 4 mm. cut was made (Putnam), but the tremor returned to its former intensity in a few weeks, and in 55 a 5 mm. incision gave worth-while relief in 17 patients (33%)—the minimum follow-up time being twelve months. The best results, however, were obtained in the 18 patients in whom the whole lateral column was divided. With one exception all these patients were pleased with the result, and they were free from tremor except sometimes during moments of excitement.

The first cordotomy was done in October, 1947, and the last one, included in this report, six months ago. There were 5 deaths among the earlier patients. In each instance the parkinsonism was bilateral. The causes of death were: pneumonia in 3 cases, meningitis due to a coliform organism in 1 case, and unknown in 1 case. There have been no deaths after the complete division of the lateral column.

COMPLICATIONS

"*Rheumatoid Arthritis.*"—There were 3 patients who developed painful swelling of the wrist and finger joints on the side of the cordotomy, and clinically the condition was indistinguishable from rheumatoid arthritis. In each instance this complication arose after a 5 mm. cordotomy. There has been gradual improvement in all the patients.

Retention of urine lasted long enough to require catheterisation in 3 patients: the first was a man with an enlarged prostate; the second was the patient who developed meningitis; and the third was a man who had experienced the same difficulty after a cholecystectomy.

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Paræsthesia.—One patient complained of very unpleasant sensations like "electric shocks" in the leg on the side of the operation.

SUMMARY

A new operation for unilateral parkinsonian tremor is described, in which the whole lateral column of the spinal cord is divided on the side of the tremor.

The immediate effects of the operation are total absence of tremor, hemiplegia on the same side, and loss of sensation to pain and temperature on the opposite side. Later a little tremor is to be found at times of mental stress, and the hemiplegia usually recovers almost completely, but the hemianalgesia and hemithermanæsthesia are permanent.

Great care is essential in the selection of patients for operation. The disease must be confined to one side, and the surgeon must satisfy himself that cessation of the tremor will restore the patient's mental health.

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3. Putnam, T. J. *Arch. Neurol. Psychiat.* 1940, 23, 303.

FURTHER OBSERVATIONS ON THE POTENCY OF ŒSTROGENS

CLINICAL ASSESSMENT

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In a previous study (Bishop et al. 1948), the potencies of the synthetic œstrogens, stilbœstrol, dienœstrol, hexœstrol, and bis-dehydrodoisynolic acid were compared by observing their action in the production of uterine bleeding in women with amenorrhœa. In the present report the potencies of two further œstrogenic compounds, ethinyl œstradiol and "equine conjugated œstrogen," are compared with that of stilbœstrol by the same method of clinical assessment.

Ethinyl œstradiol is derived from œstradiol by substitution of the ethinyl group at the 17-carbon atom (Inhoffen and Hohlweg 1938). It has been used extensively during the past ten years in the United States, and more recently in this country, and has proved to be a highly effective œstrogen. There has, however, been considerable disagreement about the optimal dose. To relieve menopausal symptoms, for instance, Salmon et al. (1941) used an average daily dose of 0·45 mg.; Watson (1942) 0·15–0·45 mg.; Groper and Biskind (1942) 0·05–0·45 mg.; Birnberg et al. (1947) 0·15 mg.; Harding (1944) 0·05–0·1 mg.; and Soule (1943), Lyon (1944), and Wiesbader and Filler (1946) 0·05 mg. Allen (1944) estimates that it is seven and a half times as potent as stilbœstrol; Bickers (1946) that it is seventeen times as potent; Soule (1943) that it is from five to twenty times as potent; Gershenfeld and Perlmutter (1948) used 1·5 mg. daily to suppress lactation, and Jeffcoate et al. (1948) consider that it is more than fifty times, and possibly seventy times, as potent as stilbœstrol when used for this purpose.

"Equine conjugated œstrogen" is a term that may be used for the extract of œstrogenic substances from the urine of pregnant mares. The extract has been prepared by Ayerst, McKenna, and Harrison, in Canada, by collecting urine from pregnant mares kept in stables during the winter. The urine is immediately cooled to low temperatures by standing the collecting barrels out of doors. The resulting extract is a mixture of conjugated œstrogens, containing among other compounds œstrone sulphate, and seems to be considerably more potent than pure crystalline œstrone. In Canada and the United States this compound is marketed as 'Premarin.' The extract is distributed in this country by John Wyeth and Brother Ltd. under the trade name of 'Strogene.' Hamblen (1945) regards the ratio of dosage as stilbœstrol 1: premarin 1·25.

METHOD

The method of clinical assessment was the same as in the previous study, and the following description is quoted from Bishop et al. (1948):

> "The œstrogen was given by mouth in daily doses for a fortnight to induce 'withdrawal bleeding' within fourteen days of the last dose, the usual interval being from two to four days. The first course consisted of a 'sighting' dose (usually 2 mg. daily in the case of stilbœstrol). Depending on whether the response was positive or negative, the daily dose of the second course (the 'first bracketing' dose) was either lowered or raised—usually halved or doubled. The daily dose of the third course (the 'second bracketing' dose) was similarly adjusted according to the response of the first bracketing dose. In this way a 'therapeutic unit' was obtained, being the mean of the daily doses of two courses, one of which consisted of the highest, and the other of the lowest, daily dose to fail or succeed, respectively, to produce a withdrawal bleeding.
>
> "The patients selected had primary amenorrhœa, or secondary amenorrhœa of at least some months' standing.
>
> "In general an attempt was made first to determine the therapeutic unit of stilbœstrol, and subsequently the therapeutic unit of one or more of the other œstrogens, on the same patient."

RESULTS

Of the 62 patients studied, 52 had secondary amenorrhœa and 10 primary amenorrhœa; 462 courses of œstrogen were given; 47 therapeutic units of stilbœstrol, 38 of ethinyl œstradiol, and 23 of equine conjugated œstrogen were obtained.

The statistical analysis was carried out in the same way as that previously used by Dr. C. W. Emmens (Bishop et al. 1948). The logarithm of the ratio of the effective doses of two of the œstrogens on an individual patient was taken as the statistical unit. The potencies and limits of error thus reached were as follows, the comparisons being made with the therapeutic unit of stilbœstrol expressed as unity:

Substance	*No. of comparisons*	*Potency*	*Fiducial limits of error (P = 0·05)*
Ethinyl œstradiol	38	25·674	19·968–33·014 (77·8–128·6%)
Equine conjugated œstrogen	23	0·4949	0·2975–0·8231 (60·1–166·3%)

Since the scatter of the effective doses of any one œstrogen in different patients seemed to be much less than in the stilbœstrol-dienœstrol-hexœstrol-doisynolic acid series, the logarithms of the actual effective doses have been subjected to analysis of variance. The results of these analyses for the comparisons of ethinyl œstradiol and equine conjugated œstrogen against stilbœstrol are as follows.

Œstrogens compared	Degree of freedom	Sum of squares	Mean square	F	P
Stilbœstrol v. Ethinyl œstradiol:					
Between substances	1	25·0674	25·0674	199·62	< 0·001
Within substances	54	6·7812	0·1256	..	..
Total	55	31·8486	..	..	..
Stilbœstrol v. equine conjugated œstrogen:					
Between substances	1	1·5842	1·5842	10·18	0·001–0·01
Within substances	52	8·0940	0·1557	..	..
Total	53	9·6782	..	..	..

Potency ratios:
Ethinyl œstradiol v. stilbœstrol .. Potency ratio = 1 : 21·783
Equine conjugated œstrogen v. stilbœstrol .. .. Potency ratio = 1 : 0·4544

It will be seen that even with this form of analysis there are significant differences between these œstrogens, and the potency worked out on this basis very closely resembles that calculated by the original method.

"TOXICITY"

In the previous report it was shown that the "toxicity" range and the therapeutic range overlapped to such an extent in the case of stilbœstrol that it was possible to establish the probit-of-percentage-"toxicity"/log-dosage relationship, which was found to be linear, with a very good fit, indicating that "toxicity" virtually depended on dosage. This was not possible with any of the other œstrogens, because "toxicity" was so seldom met with in the doses administered that the data were quite insufficient for this type of statistical treatment. Thus the number of patients responding to treatment who complained of nausea at some time during the treatment was 36 out of 92 with stilbœstrol, but only 9 out of 129 with the other three œstrogens. Similarly, in the present series, the number of patients complaining of nausea when ethinyl œstradiol was being given was too few to enable a dose/"toxicity" curve to be constructed. Nevertheless, nausea was noted on several occasions; and in a higher dose range, such as is commonly used to check uterine flooding, nausea almost always occurs. "Toxic" effects were recorded in only one case of the equine conjugated œstrogen series, and some authorities say that so-called "toxic" effects are a manifestation of synthetic or partially synthetic compounds only, and never occur with "natural" œstrogens—i.e., those extracted from body-fluids or animal tissues. In 2 cases in which high doses of equine conjugated œstrogen were given for their hæmostatic effect (a total dose of 180 mg. in eight hours in both cases), however, both patients had severe nausea and vomiting and refused to continue with the treatment next day.

DISCUSSION

Choice of End-point

In the previous report (Bishop et al. 1948) reasons were given for our choice of œstrogen withdrawal bleeding in cases of amenorrhœa as the most suitable end-point for a clinical assessment of œstrogenic potency. These reasons may be briefly recapitulated here:

Other possible end-points are relief of menopausal symptoms, conversion of an atrophic to an œstrous type of vaginal smear, and suppression of lactation.

(1) *Relief of menopausal symptoms.* These symptoms are entirely subjective and difficult to assess quantitatively.

Absolute hæmostasis is essential, for even a small ooze of blood may completely obscure the site of the cordotomy. For this reason the muscle-fibres attached to the spines and laminæ of the second and third cervical vertebræ are detached by diathermy.

The margins of the wound are separated with a self-retaining retractor. The spines and laminæ of the second and third cervical vertebræ are removed. The dura mater is incised longitudinally, and several traction sutures are inserted into the edges of the incision. The arachnoid is torn to expose the spinal cord. A no. 15 Bard-Parker blade is then clamped with an artery forceps so that 5 mm. of the blade projects beyond the beak of the forceps. With the cutting edge facing towards the anterior aspect of the cord, the point of the blade enters the cord at the site of attachment of a convenient posterior nerve-rootlet. The blade is pushed into the cord as far as the end of the artery forceps at an angle of 45°. The blade is then swept outwards. The depth of this incision is then checked with a blunt instrument—e.g., a blunt dura hook. The division of the lateral column is then completed with a blunt-ended tenotome. This instrument is inserted into the cord to the full depth of the incision, and then brought forward to emerge at the line of origin of the attachment of the anterior nerve-roots. Again the depth of the cut is checked with a blunt instrument.

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Even after this radical procedure the hemiplegia usually begins quickly to recover. Recovery appears first in the leg, on the day after operation. Sometimes some return of movement will be observed at the elbow at the same time. In two or three weeks the patient will be walking unaided but with some dragging of the foot. The upper limb will be making good progress, but there will still be some weakness of the grip and loss of dexterity at this stage. Recovery of the paresis proceeds gradually, and will closely approach normal in most cases. The loss of sensation to pain and temperature on the opposite side is always permanent. After the more conservative operation which I described previously (5 mm. cordotomy) Horner's syndrome was not found, but it is always present after division of the whole lateral column. It usually improves and has never been a source of complaint.

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were made from the rats on the fourth and fifth days, and a positive response was recorded for all animals giving smears consisting of exclusively cornified cells or of cornified cells with sporadic nucleated epithelial cells. Stilbœstrol was used as the standard preparation.

The total number of positive responses in each dosage group was summed and expressed as a proportion of the total number of rats receiving that dose. From these results potencies and limits of error were calculated by the method for quantal responses described by Gaddum (1933).

With the exception of premarin all the substances examined were prepared in the research department of Boots Pure Drug Co. Ltd. The premarin was the commercial article marketed in tablets by Messrs. Ayerst. McKenna, and Harrison. This was stated to consist of naturally occurring œstrogens in their water-soluble form expressed as sodium œstrone sulphate. Because of the presence of other substances in the tablets it was assumed that all the tablets contained exactly the amount stated on the label. To extract the water-soluble material the tablets were broken, ground to a paste with water, and finally made up to a known volume with water. It was assumed that all the active material was extracted in this way.

RESULTS

The relative activities of the compounds examined together with those reported previously are given in the accompanying table.

DISCUSSION

For a biological assay technique to be satisfactory it not only must give reproducible results but should also give results which correspond with clinical findings. In our earlier experiments with stilbœstrol, hexœstrol, and dienœstrol the results we obtained agreed reasonably well with the clinical findings of Bishop et al. (1948). With 7-methyl-bis-dehydrodoisynolic acid and ethinyl œstradiol the picture was very different. On ovariectomised rats 7-methyl-bis-dehydrodoisynolic acid given by mouth was five times as active, and ethinyl œstradiol a fifth as active as stilbœstrol, whereas in patients 7-methyl-bis-dehydrodoisynolic acid was a fifth and ethinyl œstradiol twenty times as active as stilbœstrol.

From the point of view of the research-worker looking for new synthetic œstrogens these discrepancies are serious, since it may well be that clinically useful œstrogens have been discarded because of unfavourable results in tests on animals.

The difference between results in patients and those in animals may be due to several causes. Parkes et al. (1938) have suggested that the effectiveness of œstrogens given by mouth depends largely on the conditions of absorption from the alimentary tract, which differ widely from species to species. The mechanism of metabolism may also vary from species to species. Many workers have shown that œstrogens are inactivated in the liver, and Heller (1940) has shown that œstradiol is also inactivated in the rabbit's kidney but not in the rat's kidney. Finally, the rate of excretion may also vary between species.

RELATIVE ACTIVITIES OF ŒSTROGENS GIVEN BY MOUTH AND SUBCUTANEOUSLY

Œstrogen	By mouth		Subcutaneously	
	Activity	P = 0·95 limits of error	Activity	P = 0·95 limits of error
Stilbœstrol	100	(assumed)	100	(assumed)
Hexœstrol	10	8·5–11·7	66	64–68
Dienœstrol	68	63–73	28	27–29
Potassium hexœstrol sulphate	7·3	6·7–8·0	0·98	0·91–1·05
7-methyl-bis-dehydro-doisynolic acid.. ..	500	445–560	46	41–51
Œstrone	2	1·6–2·4	29	28–30
Premarin	5	..	8	..
Ethinyl œstradiol ..	18	14–23	233	191–285
Divinyl stilbœstrol ..	103	75–142	45	22–91

Whatever may be the correct explanation of the difference between the biological results and the clinical findings, it seems clear that, whereas existing biological techniques will detect œstrogenic action in a new substance, a clinical assay is necessary before the value of a new œstrogen relative to existing preparations can be established. We are therefore fortunate in having available the withdrawal-bleeding assay method described by Bishop et al. (1948, 1950). This method is particularly valuable in that the data obtained can be statistically treated and the limits of error of any particular assay determined. It is in fact a biological assay on patients. Its main disadvantage is the long time taken to carry out a test. There is therefore still an urgent need for a biological assay technique which will give the same answer as the clinical method.

SUMMARY

Large-scale experiments designed to assay the œstrogenic activity of various œstrogens have been made with ovariectomised adult female rats.

The results obtained in some cases agree with clinical findings, but in others the biological and clinical results differ considerably.

The significance of these discrepancies is discussed.

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MYXŒDEMA FROM RESORCINOL OINTMENT APPLIED TO LEG ULCERS

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IN the last decade the study of thyroid disease has received considerable impetus from the development of techniques using radioactive iodine, and from the discovery of the antithyroid action of certain drugs such as thiouracil. We report here a hitherto unrecognised antithyroid substance which has been discovered from the clinical application of these radioactive techniques: instances of clinical myxœdema have been encountered resulting from this antithyroid substance, which is different chemically from the already known antithyroid agents.

An unexpected result with a radioactive-iodine test was reported by Rawson et al. (1943) in a case of myxœdema with goitre due to previous long-continued administration of thiocyanate for hypertension. He found that this patient's thyroid gland took up the iodine as avidly as the gland of hyperthyroid patients. This finding has since been clarified. Vanderlaan and Vanderlaan (1947) showed that when thiocyanate circulates in the blood above a critical level (10 mg. per 100 ml.), it inhibits the thyroid's ability to concentrate iodine, and so to form an adequate supply of thyroid hormone. Consequently, with its continued administration, there develops thyroid deficiency together with a hyperplastic

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Even if the daily hot-flush count were accepted as a semi-quantitative end-point, considerable alterations in the count would have to occur to be significant, and after each course of œstrogen which gave a positive result the hot-flush count would have to be allowed to return to its pre-treatment base-line. At least two œstrogens would have to be tested on each patient. The assessment might therefore take many months, during which the œstrogenic status of the patient might be constantly changing. Finally, the patient would be disinclined to endure the series of relapses which the return to the base-line after each course of effective œstrogen therapy would entail.

(2) *Changes in the vaginal smear.* It has seldom been our experience to encounter menopausal women with a sufficiently labile smear to change from the atrophic to the œstrous condition and vice versa quickly enough to allow assessment of at least two œstrogens by this method.

(3) *Suppression of lactation.* Only one course of œstrogen is given to succeed or fail to suppress lactation in any one patient on one occasion. It is therefore impossible to compare two œstrogens in the same patient.

There are variables in the present method which might have been expected to vitiate the results seriously—such as the possibility of occasional spontaneous periods being mistaken for withdrawal bleedings, or of the level of response in any one patient varying during the investigation. That such variables did not in fact seriously affect the results seems clear from the statistical analysis.

Comparison of Clinical Assessment and Animal Assay

Harmer and Broom (1948) conducted large-scale experiments to assess the œstrogenic activity of certain synthetic œstrogens in ovariectomised adult female rats, and found that, given by mouth, hexœstrol was a tenth and dienœstrol two-thirds as active as stilbœstrol. These ratios did not exactly correspond with those established in the clinical experiments of Bishop et al. (1948), who found hexœstrol an eighteenth and dienœstrol a quarter as potent as stilbœstrol, but the animal and human studies agreed in establishing that stilbœstrol was the most potent, dienœstrol the next most potent, and hexœstrol the least potent, of the three œstrogens, the results differing in degree only.

In the present studies, however, there is more fundamental disagreement between the results, for Harmer and Broom (1950) find ethinyl œstradiol to be a less potent œstrogen in rats than stilbœstrol. Furthermore, they find bis-dehydrodoisynolic acid to be more active than stilbœstrol, whereas Bishop et al. (1948) found it to be less active. It seems clear therefore that one is not justified in depending on the result of animal assays to determine the relative potency of œstrogens in the human subject.

It is also possible that the ratios of potencies may change at different levels of œstrogenic response, and that one is not justified in accepting the ratios given in this study as applying, for instance, to relief of menopausal symptoms on the one hand, or to suppression of lactation or treatment of inoperable carcinoma of the breast or prostate on the other.

SUMMARY

A method is described for comparing the potency of œstrogens in the human subject. It consists in giving the œstrogen daily by mouth in fourteen-day courses to amenorrhœic women and recording whether œstrogen-withdrawal bleeding takes place.

The results obtained indicate that ethinyl œstradiol is 20–25 times as potent as stilbœstrol, and equine conjugated œstrogen half as potent.

Few cases of nausea were encountered with ethinyl œstradiol at the therapeutic levels necessary to induce withdrawal bleeding, and only one case of nausea occurred with equine conjugated œstrogen. At higher dosage levels, however, such as those necessary to produce hæmostasis in cases of functional uterine bleeding, "toxic" effects usually developed with ethinyl œstradiol, and in 2 such patients given equine conjugated œstrogen (a natural œstrogenic product) severe vomiting was caused by high dosage. "Toxicity" does not therefore depend on whether the compound is wholly or partially synthetic or whether it is extracted entirely from natural sources.

Reasons are given for choosing this end-point and for the failure to devise any other suitable method of assessment at different levels of œstrogenic response, such as relief of menopausal symptoms, the production of an œstrous vaginal smear, or the suppression of lactation.

We wish to thank Sir Jack Drummond, F.R.S., for facilities to enable us to carry out this work; Mr. P. Keddie, of John Wyeth and Brother Ltd., for supplies of strogene; and Dr. Perry for his statistical work in connection with this study. The ethinyl œstradiol was supplied by The British Drug Houses Ltd., Messrs. Ciba Ltd., Organon Ltd., and Roussel Ltd.

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ACTIVITY OF SOME FURTHER SYNTHETIC ŒSTROGENS DETERMINED BY EXPERIMENTS ON RATS

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In a previous paper (Harmer and Broom 1948) we described experiments in which we determined the relative activity on ovariectomised rats of the three synthetic œstrogens: stilbœstrol, dienœstrol, and hexœstrol. Our results agreed with those published by Kemp and Pedersen-Bjergaard (1943) and were in substantial agreement with the findings of Bishop et al. (1948), who examined their relative clinical efficiencies.

We have now extended our experiments to include other œstrogens of clinical interest, and have examined ethinyl œstradiol, 7-methyl-*bis*-dehydrodoisynolic acid, 'Premarin,' divinyl stilbœstrol, and sodium stilbœstrol sulphate. The results of these experiments are of particular interest in the light of the clinical findings of Bishop et al. (1950).

METHODS

The experimental techniques are essentially the same as those reported earlier (Harmer and Broom 1948), but a brief résumé of the details is given here.

Inbred Wistar rats ovariectomised at 7–8 weeks were used. The completeness of the ovariectomy was checked by taking vaginal smears during the 10–20 days after the operation, and only those animals in continuous anœstrus during the whole of this period were used for experiment. The substance under test was given, either once daily by stomach-tube or injected subcutaneously twice daily, for three days. Vaginal smears

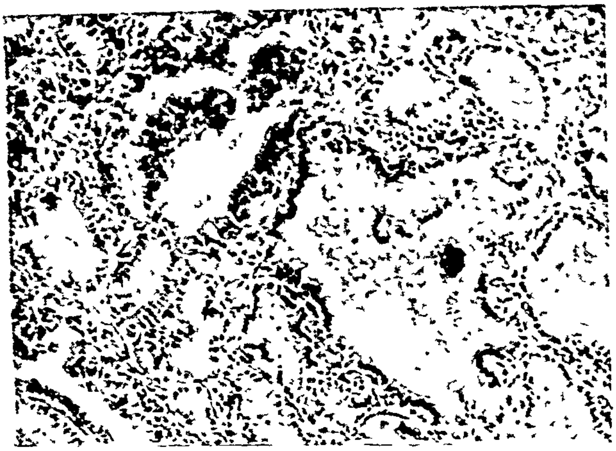

Fig. 4—Section of thyroid gland (× 90) post mortem in case I.

face and eyes were puffy and her features heavy; her hair was dry, and her skin, especially on the face, arms, knees, and feet, dry and scaly; her palms and soles were grossly hyperkeratotic. All these features, she insisted, were recent. Her nails were normal.

The pulse-rate was 72 per min., and blood-pressure 110/80 mm. Hg. The jugular venous pressure was not raised; the apex-beat was 4½ in. from the midline in the 5th intercostal space; and the heart sounds were normal. She showed moderate kyphoscoliosis, a few crepitations at the base of the right lung, and a few generalised rhonchi. Palpation of the neck revealed a very soft, diffusely enlarged thyroid gland, with to-and-fro audible bruits; its weight was estimated at 100 g. Its size and its vascularity were later confirmed both by I^{131} measurement and by biopsy inspection. Moderate œdema was evident in both legs, but not elsewhere; over most of the circumference of the left leg just above the ankle was a very large, grossly purulent ulcer. A similar, smaller ulcer was present just above the right external malleolus (fig. 6).

Investigations.—The patient was admitted for investigation on Feb. 7, 1950, when the ointment application was stopped. Urine: no abnormality. X-ray examination of the chest showed some increased basal markings, and appreciable transverse enlargement of the heart involving both ventricles. Hb 12.5 g. per 100 ml. (85%). E.C.G. revealed left bundle-branch block and a small anterior myocardial infarct, but otherwise normal complexes and voltage.

Findings confirming thyroid deficiency included: on Jan. 31 plasma-cholesterol 316 mg. per 100 ml., plasma-proteins 8·4 g. per 100 ml. (albumin-globulin ratio 1 : 1), and protein-bound iodine under 1 γ per 100 ml. B.M.R. (Feb. 9) 14%. C.S.F. normal apart from protein 60 mg. per 100 ml. An intravenous insulin-tolerance test (Feb. 20) showed an abnormality consistent with myxœdema—i.e., a slightly delayed fall and subsequent rise and no hypoglycæmic symptoms. The readings were as follows:

		Blood-sugar, mg. per 100 ml.
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A radioactive-iodine uptake test (Feb. 10) showed a very low urinary excretion—6% in 48 hours (4·1% in 0–8 hr., 0.8% in 8–24 hr., and 1·1% in 24–48 hr.)—and a high thyroid uptake (62% at 73 hours). This finding was inconsistent with spontaneous myxœdema and suggested previous long-continued administration of an antithyroid drug (fig. 3).

Thyroid biopsy on Feb. 14 (fig. 6) confirmed this indication, showing a hyperplastic gland made up of small and medium-sized follicles empty of colloid and lined by high cuboidal and columnar epithelium often showing papilliform infolding. There was moderate œdema of the interstitial tissue, which showed no lymphoid infiltration.

Progress.—From Feb. 7 to 20 the resorcinol ointment was not applied; and the patient noticed significant recession in the myxœdematous symptoms and features—a change also observed by us. The same ointment was then applied once more to her leg from Feb. 21 to March 13. On its subsequent withdrawal, improvement was again noticed, and her normal general health was restored without any medication (fig. 5B). Measurements of thyroid function during a further fortnight's application of the ointment and a further fortnight after withdrawal confirmed the antithyroid effects of applying this ointment to the ulcers.

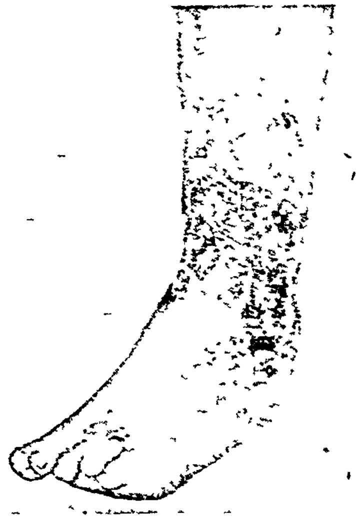

Fig. 6—Varicose leg ulcer in case 2.

Case 3.—The patient, a housewife aged 50, with five children, was admitted to Fulham Hospital under the care of Dr. R. J. Harrison. For 2 years she had noticed increasing effort dyspnœa and sensitivity to cold, for 1 year general slowness and anergia; and for 7 months anorexia, irritable depression with poor memory and insomnia, husky voice, thinning of the scalp hair, and dry skin.

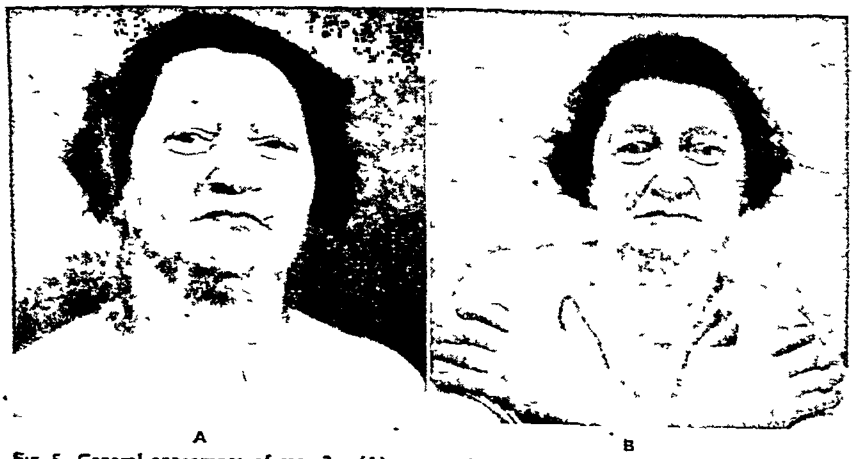

Fig. 5—General appearance of case 2: (A) one week after last resorcinol application; (B) on discharge from hospital, 35 days after finally ceasing resorcinol application.

She had always had good health until 1943, when an attack of pneumonia was complicated by a left white-leg, which soon became complicated by a varicose ulcer which has never yet healed. For the past 3 years she had been applying to the ulcer ung. resorcini co. *B.P.C.* (4% resorcinol) using about 1 lb. per week. She had not been taking other drugs or unusual diet. For the last 2 years she had noticed swelling of the neck. She had also had two attacks of "jaundice"—one 3 years ago, lasting a month without pain or abnormal motions, and another 7 months ago lasting 4 months and associated at its onset with two weeks of vomiting and various pains; both attacks subsided spontaneously. Since the first attack she had been pale, depressed, and lethargic. For the first fortnight of the second, she also suffered

goitre, just as in severe iodine deficiency. Only so long as the high blood-level of the thiocyanate is maintained is this hyperplastic gland prevented from concentrating iodine. When the thiocyanate administration is stopped, and the blood-thiocyanate concentration rapidly falls below the critical level, the unfettered hyperplastic gland takes up iodine avidly. When Rawson's patient was admitted for investigation the thiocyanate administration had been stopped, which explains the unexpectedly high iodine uptake which he found.

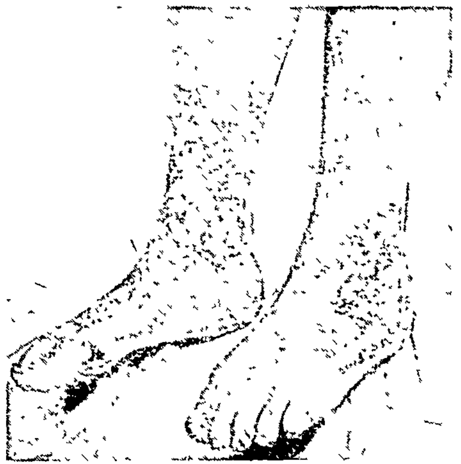
Fig. 1—Varicose leg ulcers in case 1.

Excessive uptake of iodine by the gland of a patient with myxœdema has therefore become the hallmark of myxœdema resulting from previous prolonged administration of an antithyroid agent. It was a similar finding with a radioactive iodine-uptake test in our patients which led ultimately to the conclusion that their myxœdema was due to resorcinol absorbed from the ointment applied to their varicose ulcers.

CASE-REPORTS

Case 1.—This patient, a 60-year-old housewife, had been under observation since 1936. At the age of 9 years she had had rheumatic fever; and in 1945 she was admitted with cardiac failure apparently consequent on mitral stenosis. Thereafter she was more or less continuously in some degree of heart-failure, from which she ultimately died in June, 1949.

The significant history relating to her myxœdema began in 1936 when she developed extensive bilateral ulceration of the legs after an injection for varicose veins. Despite Trendelenburg operations on both legs in 1945, these ulcers never healed. In October, 1948, she was admitted to hospital because of gross cardiac failure with extensive œdema.

Condition on admission.—Her weight was 14 st. 3 lb. (90 kg.), and she had large dirty ulcers on both legs (fig. 1). Certain features suggested that she might be mildly thyrotoxic. In addition to auricular fibrillation, which might have been due to the mitral stenosis, she had slight tremor of the hands, a warm periphery with sweating palms, and a blood-pressure of 150/60 mm. Hg. Neither thyroid enlargement nor abnormal eye signs were noted. The basal metabolic rate (B.M.R.) was + 25%, and the arm-to-tongue circulation-time (saccharin method) was 17 sec. An electrocardiograph (E.C.G.) showed normal voltage of the Q R S complex (fig. 2A).

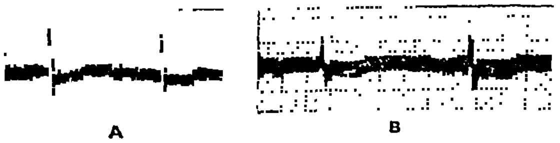

Fig. 2—E.C.G., lead 2, in case 1: (A) Oct. 2, 1948; (B) June 15, 1949.

Progress.—When seen again in the outpatient department in December, 1948, her condition appeared unchanged.

Readmission.—When the patient was readmitted on June 14, 1949, a striking change in her appearance was apparent. During the previous six weeks dyspnœa had increased considerably, and she had noticed a gain in weight. She had also noticed since the last admission a gradual increase in the size of her neck and gradually increasing dysphagia and hoarseness of voice. The only medication she had received since the previous admission was digitalis folia gr. 1 twice daily and applications of resorcinol ointment to the legs.

She now weighed 17 st. 10 lb. (112·5 kg.)—a gain of 49 lb. (22·3 kg.) in seven months. Her hair was coarse, her skin dry, and her general appearance myxœdematous. The thyroid gland was considerably and diffusely enlarged and firm, but neither nodular nor hard. She was in gross cardiac failure and her arm-to-tongue circulation-time was now 28 sec. The blood-pressure was 126/84 mm. Hg and an E.C.G. now showed low voltage and flat T waves (fig. 2B). The plasma-cholesterol was 192 mg. per 100 ml. and the protein-bound iodine under 1 γ per 100 ml. (normal 4–8 γ); the cerebrospinal fluid (C.S.F.) protein content was 100 mg. per 100 ml. A radioactive urinary iodine-excretion test (Arnott et al. 1949) on June 17 showed an extremely low excretion suggesting an avid uptake by the thyroid gland: 7·6% in 0–48 hr. (3% in 0–8 hr., 2·5% in 8–24 hr., and 2·1% in 24–48 hr.); and 2·3% in 48–72 hr. (fig. 3).

On the patient's admission to hospital, her legs were dressed with plain tulle gras, and the cardiac failure was treated with low-salt diet, rest in bed, and digitalis. For the first few days after admission her condition improved, but on June 26 her cardiac condition deteriorated and she died next day.

Necropsy confirmed the presence of rheumatic heart-disease with cardiac failure. The thyroid gland was about four times normal size (130 g.), and was pale and fleshy with a normal capsule. Histologically (fig. 4) the gland showed gross parenchymatous hyperplasia, with small and large follicles, mostly depleted of colloid, lined by columnar epithelium rich in papilliform infoldings. There were occasional islets, a few millimetres across, of hyperplastic follicles filled with peripherally vacuolated colloid. The gland was traversed by numerous thickened fibrous trabeculæ. It showed very occasional scattered lymphocytes but no lymphoid follicles, strongly suggesting that the hyperplasia was a response to a goitrogen rather than thyrotoxicosis.

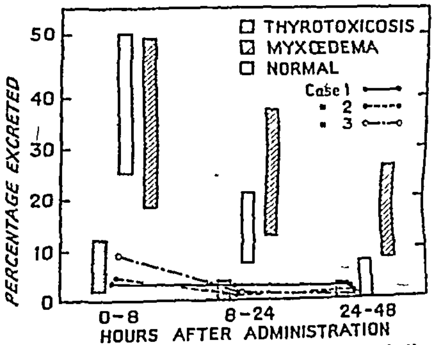

Fig. 3—Urinary excretion of radioactive iodine from each of the 3 patients, compared with the range of findings (mean, S.D. ± 2) in 30 normals, 35 obvious thyrotoxic patients, and 10 patients with typical spontaneous myxœdema.

Case 2.—A normally active housewife, aged 59 years, who was the mother of seven children, attended the outpatient department on Jan. 31, 1950, complaining of a series of symptoms which she insisted had all developed over the last two months. For two months she had noticed tiredness with backache, for six weeks tinnitus and deafness, for four weeks dyspnœa with substernal anginal pain on effort, and for two weeks anorexia, unusual sensitivity to cold, puffiness and dry scaliness of the face and arms, hoarseness, and slight cough without sputum.

Previously she had had a normal menopause at the age of 49, and had always had good general health except for varicose veins and ulcers on both legs. For 12 years she had been liable to evening swelling of the legs. She had never previously sought a doctor's advice, although for 23 years the leg ulcers had never healed. For the past 2 years she had been dressing these with a chemist's ointment three times daily, using approximately 4–6 oz. per week; this was ascertained to be 12% resorcinol in glycerin, paraffin, and lanoline. She had taken no other medicines, and her diet was not abnormal.

Examination.—The patient had a typical myxœdematous appearance (fig. 5A). Her weight, usually about 10 st., was 11st. 11 lb. (75 kg.). She was moderately obese with supraclavicular pads and a rather prominent abdomen. Her

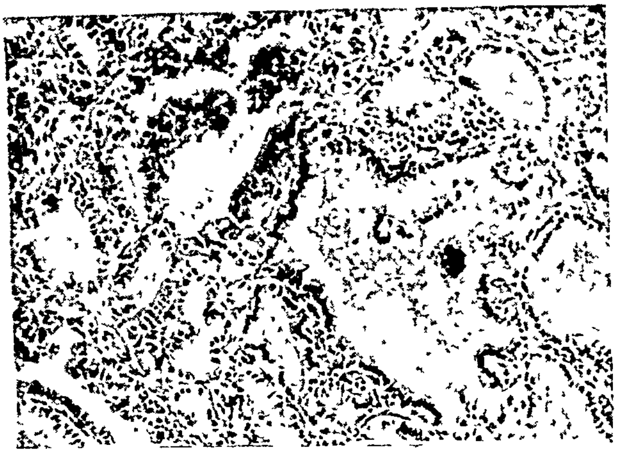

Fig. 4—Section of thyroid gland (× 90) post mortem in case I.

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The pulse-rate was 72 per min, and blood-pressure 110/80 mm. Hg. The jugular venous pressure was not raised; the apex-beat was 4½ in. from the midline in the 5th intercostal space; and the heart sounds were normal. She showed moderate kyphoscoliosis, a few crepitations at the base of the right lung, and a few generalised rhonchi. Palpation of the neck revealed a very soft, diffusely enlarged thyroid gland, with to-and-fro audible bruits; its weight was estimated at 100 g. Its size and its vascularity were later confirmed both by I^{131} measurement and by biopsy inspection. Moderate œdema was evident in both legs, but not elsewhere; over most of the circumference of the left leg just above the ankle was a very large, grossly purulent ulcer. A similar, smaller ulcer was present just above the right external malleolus (fig. 6).

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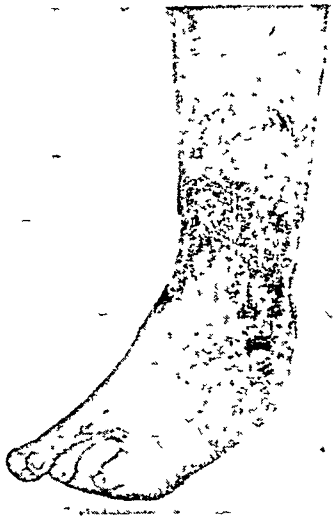

Fig. 6—Varicose leg ulcer in case 2.

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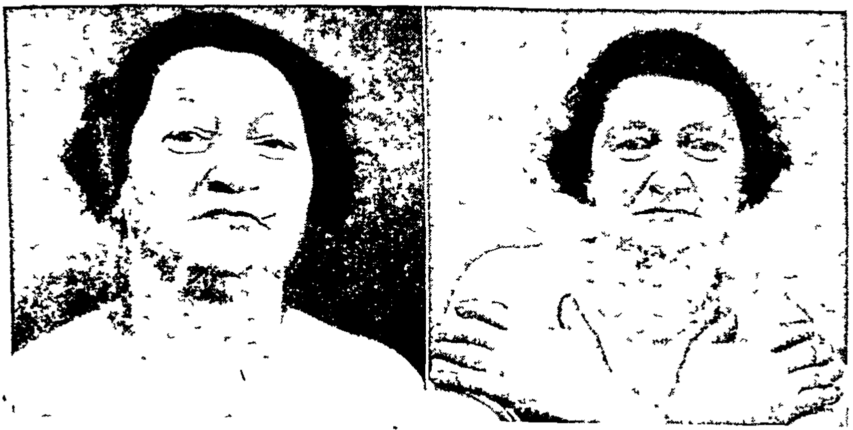

A

B

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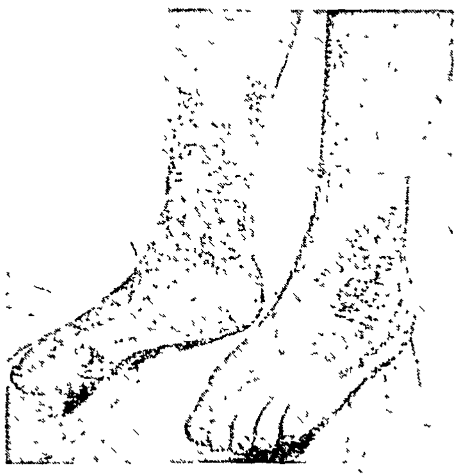

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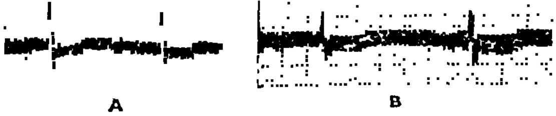

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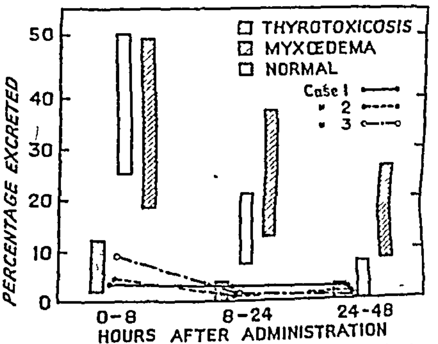

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Examination.—The patient had a typical myxœdematous appearance (fig. 5A). Her weight, usually about 10 st., was 11st. 11 lb. (75 kg.). She was moderately obese with supraclavicular pads and a rather prominent abdomen. Her

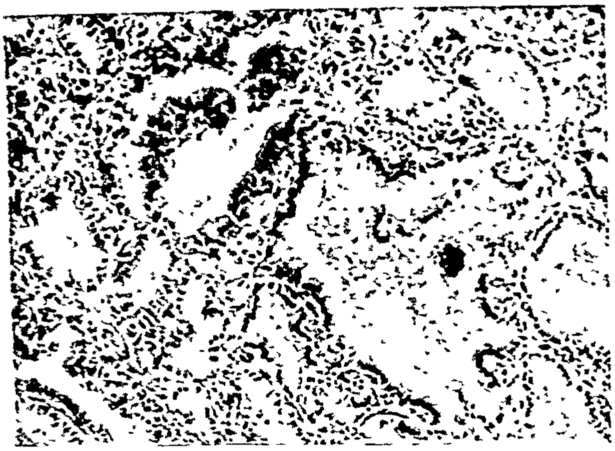


Fig. 4—Section of thyroid gland (× 90) post mortem in case 1.

face and eyes were puffy and her features heavy; her hair was dry, and her skin, especially on the face, arms, knees and feet, dry and scaly; her palms and soles were grossly hyperkeratotic. All these features, she insisted, were recent. Her nails were normal.

The pulse-rate was 72 per min., and blood-pressure 110/80 mm. Hg. The jugular venous pressure was not raised; the apex-beat was 4$^1/_2$ in. from the midline in the 5th intercostal space; and the heart sounds were normal. She showed moderate kyphoscoliosis, a few crepitations at the base of the right lung, and a few generalised rhonchi. Palpation of the neck revealed a very soft, diffusely enlarged thyroid gland, with to-and-fro audible bruits; its weight was estimated at 100 g. Its size and its vascularity were later confirmed both by I^{131} measurement and by biopsy inspection. Moderate œdema was evident in both legs, but not elsewhere; over most of the circumference of the left leg just above the ankle was a very large, grossly purulent ulcer. A similar, smaller ulcer was present just above the right external malleolus (fig. 6).

Investigations.—The patient was admitted for investigation on Feb. 7, 1950, when the ointment application was stopped. Urine: no abnormality. X-ray examination of the chest showed some increased basal markings, and appreciable transverse enlargement of the heart involving both ventricles. Hb 12·5 g. per 100 ml. (85%). E.C.G. revealed left bundle-branch block and a small anterior myocardial infarct, but otherwise normal complexes and voltage.

Findings confirming thyroid deficiency included: on Jan. 31 plasma-cholesterol 316 mg. per 100 ml., plasma-proteins 8·4 g. per 100 ml. (albumin-globulin ratio 1 : 1), and protein-bound iodine under 1 γ per 100 ml. B.M.R. (Feb. 9) 14%. C.S.F. normal apart from protein 60 mg. per 100 ml. An intravenous insulin-tolerance test (Feb. 20) showed an abnormality consistent with myxœdema—*i.e.*, a slightly delayed fall and subsequent rise and no hypoglycæmic symptoms. The readings were as follows:

		Blood-sugar, mg. per 100 ml.
Fasting		99
Min. after glucose:	20	58
	30	51
	45	51
	60	68
	90	77
	120	87

A radioactive-iodine uptake test (Feb. 10) showed a very low urinary excretion—6% in 48 hours (4·1% in 0–8 hr., 0·8% in 8–24 hr., and 1·1% in 24–48 hr.)—and a high thyroid uptake (62% at 73 hours). This finding was inconsistent with spontaneous myxœdema and suggested previous long-continued administration of an antithyroid drug (fig. 3).

Thyroid biopsy on Feb. 14 (fig. 6) confirmed this indication, showing a hyperplastic gland made up of small and medium-sized follicles empty of colloid and lined by high cuboidal and columnar epithelium often showing papilliform infolding. There was moderate œdema of the interstitial tissue, which showed no lymphoid infiltration.

Progress.—From Feb. 7 to 20 the resorcinol ointment was not applied; and the patient noticed significant recession in the myxœdematous symptoms and features—a change also observed by us. The same ointment was then applied once more to her leg from Feb. 21 to March 13. On its subsequent withdrawal, improvement was again noticed, and her normal general health was restored without any medication (fig. 5B). Measurements of thyroid function during a further fortnight's application of the ointment and a further fortnight after withdrawal confirmed the antithyroid effects of applying this ointment to the ulcers.

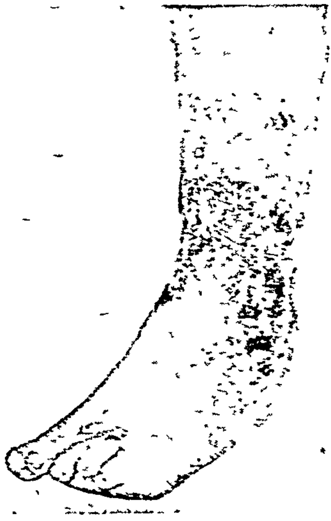
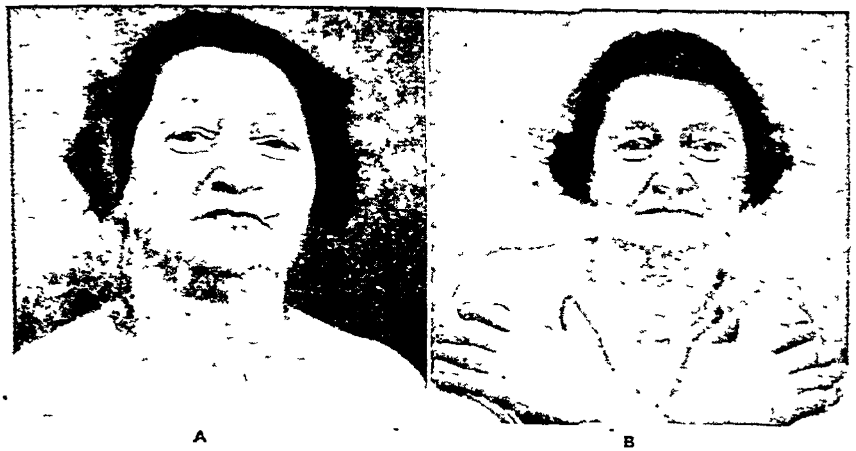


Fig. 6—Varicose leg ulcer in case 2.

Case 3.—The patient, a housewife aged 50, with five children, was admitted to Fulham Hospital under the care of Dr. R. J. Harrison. For 2 years she had noticed increasing effort dyspnœa and sensitivity to cold, for 1 year general slowness and anergia; and for 7 months anorexia, irritable depression with poor memory and insomnia, husky voice, thinning of the scalp hair, and dry skin.

She had always had good health until 1943, when an attack of pneumonia was complicated by a left white-leg, which soon became complicated by a varicose ulcer which has never yet healed. For the past 3 years she had been applying to the ulcer ung. resorcini co. *B.P.C.* (4% resorcinol) using about 1 lb. per week. She had not been taking other drugs or unusual diet. For the last 2 years she had noticed swelling of the neck. She had also had two attacks of "jaundice"—one 3 years ago, lasting a month without pain or abnormal motions, and another 7 months ago lasting 4 months and associated at its onset with two weeks of vomiting and various pains; both attacks subsided spontaneously. Since the first attack she had been pale, depressed, and lethargic.



A B

Fig. 5—General appearance of case 2: (A) one week after last resorcinol application; (B)

goitre, just as in severe iodine deficiency. Only so long as the high blood-level of the thiocyanate is maintained is this hyperplastic gland prevented from concentrating iodine. When the thiocyanate administration is stopped, and the blood-thiocyanate concentration rapidly falls below the critical level, the unfettered hyperplastic gland takes up iodine avidly. When Rawson's patient was admitted for investigation the thiocyanate administration had been stopped, which explains the unexpectedly high iodine uptake which he found.

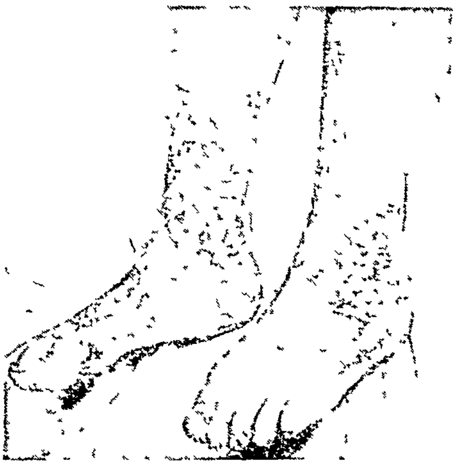


Fig. 1—Varicose leg ulcers in case 1.

Excessive uptake of iodine by the gland of a patient with myxœdema has therefore become the hallmark of myxœdema resulting from previous prolonged administration of an antithyroid agent. It was a similar finding with a radioactive iodine-uptake test in our patients which led ultimately to the conclusion that their myxœdema was due to resorcinol absorbed from the ointment applied to their varicose ulcers.

CASE-REPORTS

Case 1.—This patient, a 60-year-old housewife, had been under observation since 1936. At the age of 9 years she had had rheumatic fever; and in 1945 she was admitted with cardiac failure apparently consequent on mitral stenosis. Thereafter she was more or less continuously in some degree of heart-failure, from which she ultimately died in June, 1949.

The significant history relating to her myxœdema began in 1936 when she developed extensive bilateral ulceration of the legs after an injection for varicose veins. Despite Trendelenburg operations on both legs in 1945, these ulcers never healed. In October, 1948, she was admitted to hospital because of gross cardiac failure with extensive œdema.

Condition on admission.—Her weight was 14 st. 3 lb. (90 kg.), and she had large dirty ulcers on both legs (fig. 1). Certain features suggested that she might be mildly thyrotoxic. In addition to auricular fibrillation, which might have been due to the mitral stenosis, she had slight tremor of the hands, a warm periphery with sweating palms, and a blood-pressure of 150/60 mm. Hg. Neither thyroid enlargement nor abnormal eye signs were noted. The basal metabolic rate (B.M.R.) was + 25%, and the arm-to-tongue circulation-time (saccharin method) was 17 sec. An electrocardiograph (E.C.G.) showed normal voltage of the Q R S complex (fig. 2A).

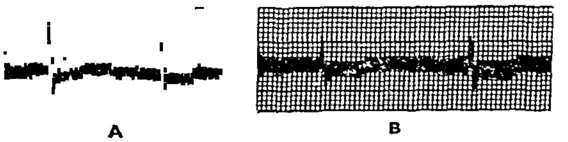


Fig. 2—E.C.G., lead 2, in case 1: (A) Oct. 2, 1948; (B) June 15, 1949.

Progress.—When seen again in the outpatient department in December, 1948, her condition appeared unchanged.

Readmission.—When the patient was readmitted on June 14, 1949, a striking change in her appearance was apparent. During the previous six weeks dyspnœa had increased considerably, and she had noticed a gain in weight. She had also noticed since the last admission a gradual increase in the size of her neck and gradually increasing dysphagia and hoarseness of voice. The only medication she had received since the previous admission was digitalis folia gr. 1 twice daily and applications of resorcinol ointment to the legs.

She now weighed 17 st. 10 lb. (112·5 kg.)—a gain of 49 lb. (22·3 kg.) in seven months. Her hair was coarse, her skin dry, and her general appearance myxœdematous. The thyroid gland was considerably and diffusely enlarged and firm, but neither nodular nor hard. She was in gross cardiac failure and her arm-to-tongue circulation-time was now 28 sec. The blood-pressure was 126/84 mm. Hg and an E.C.G. now showed low voltage and flat T waves (fig. 2B). The plasma-cholesterol was 192 mg. per 100 ml. and the protein-bound iodine under 1 γ per 100 ml. (normal 4–8 γ); the cerebrospinal fluid (C.S.F.) protein content was 100 mg. per 100 ml. A radioactive urinary iodine-excretion test (Arnott et al. 1949) on June 17 showed an extremely low excretion suggesting an avid uptake by the thyroid gland: 7·6% in 0–48 hr. (3% in 0–8 hr., 2·5% in 8–24 hr., and 2·1% in 24–48 hr.); and 2·3% in 48–72 hr. (fig. 3).

On the patient's admission to hospital, her legs were dressed with plain tulle gras, and the cardiac failure was treated with low-salt diet, rest in bed, and digitalis. For the first few days after admission her condition improved, but on June 26 her cardiac condition deteriorated and she died next day.

Necropsy confirmed the presence of rheumatic heart-disease with cardiac failure. The thyroid gland was about four times normal size (130 g.), and was pale and fleshy with a normal capsule. Histologically (fig. 4) the gland showed gross parenchymatous hyperplasia, with small and large follicles, mostly depleted of colloid, lined by columnar epithelium rich in papilliform infoldings. There were occasional islets, a few millimetres across, of hyperplastic follicles filled with peripherally vacuolated colloid. The gland was traversed by numerous thickened fibrous trabeculæ. It showed very occasional scattered lymphocytes but no lymphoid follicles, strongly suggesting that the hyperplasia was a response to a goitrogen rather than thyrotoxicosis.

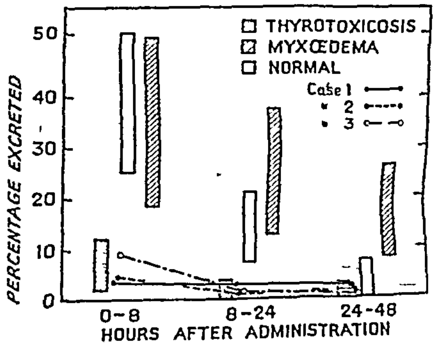


Fig. 3—Urinary excretion of radioactive iodine from each of the 3 patients, compared with the range of findings (mean, S.D. ± 2) in 30 normals, 35 obvious thyrotoxic patients, and 10 patients with typical spontaneous myxœdema.

Case 2.—A normally active housewife, aged 59 years, who was the mother of seven children, attended the outpatient department on Jan. 31, 1950, complaining of a series of symptoms which she insisted had all developed over the last two months. For two months she had noticed tiredness with backache, for six weeks tinnitus and deafness, for four weeks dyspnœa with substernal anginal pain on effort, and for two weeks anorexia, unusual sensitivity to cold, puffiness and dry scaliness of the face and arms, hoarseness, and slight cough without sputum.

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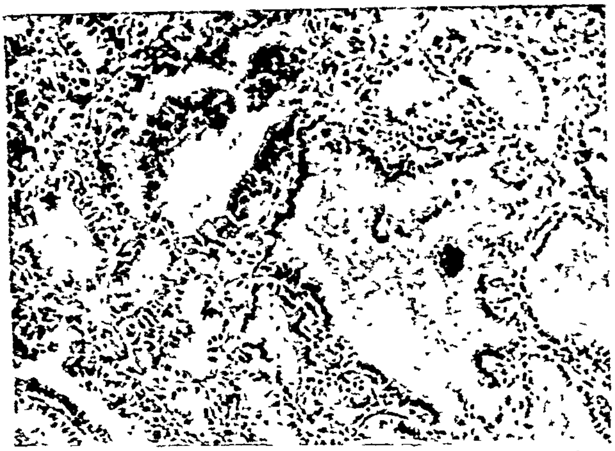

Fig. 4—Section of thyroid gland (× 90) post mortem in case 1.

face and eyes were puffy and her features heavy; her hair was dry, and her skin, especially on the face, arms, knees, and feet, dry and scaly; her palms and soles were grossly hyperkeratotic. All these features, she insisted, were recent. Her nails were normal.

The pulse-rate was 72 per min., and blood-pressure 110/80 mm. Hg. The jugular venous pressure was not raised; the apex-beat was $4\frac{1}{2}$ in. from the midline in the 5th intercostal space; and the heart sounds were normal. She showed moderate kyphoscoliosis, a few crepitations at the base of the right lung, and a few generalised rhonchi. Palpation of the neck revealed a very soft, diffusely enlarged thyroid gland, with to-and-fro audible bruits; its weight was estimated at 100 g. Its size and its vascularity were later confirmed both by I^{131} measurement and by biopsy inspection. Moderate œdema was evident in both legs, but not elsewhere; over most of the circumference of the left leg just above the ankle was a very large, grossly purulent ulcer. A similar, smaller ulcer was present just above the right external malleolus (fig. 6).

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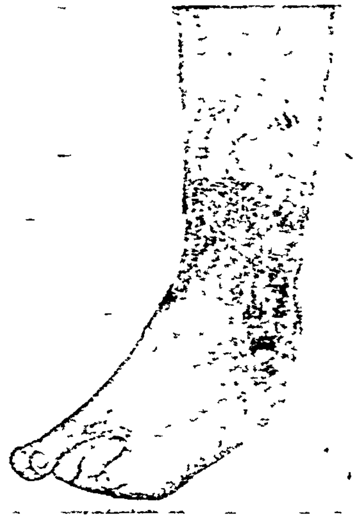


Fig. 6—Varicose leg ulcer in case 2.

Case 3.—The patient, a housewife aged 50, with five children, was admitted to Fulham Hospital under the care of Dr. R. J. Harrison. For 2 years she had noticed increasing effort dyspnœa and sensitivity to cold, for 1 year general slowness and anergia; and for 7 months anorexia, irritable depression with poor memory and insomnia, husky voice, thinning of the scalp hair, and dry skin.

She had always had good health until 1943, when an attack of pneumonia was complicated by a left white-leg, which soon became complicated by a varicose ulcer which has never yet healed. For the past 3 years she had been applying to the ulcer ung. resorcini co. *B.P.C.* (4% resorcinol) using about 1 lb. per week. She had not been taking other drugs or unusual diet. For the last 2 years she had noticed swelling of the neck. She had also had two attacks of "jaundice"—one 3 years ago, lasting a month without pain or abnormal motions, and another 7 months ago lasting 4 months and associated at its onset with two weeks of vomiting and various pains; both attacks subsided spontaneously. Since the first attack she had been pale, depressed, and lethargic. For the first fortnight of the second, she also suffered

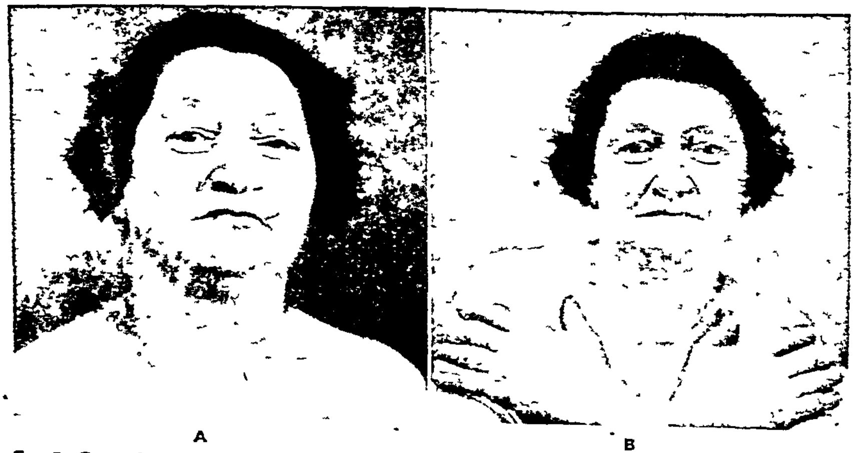


Fig. 5—General appearance of case 2: (A) one week after last resorcinol application; (B) on discharge from hospital, 35 days after finally ceasing resorcinol application.

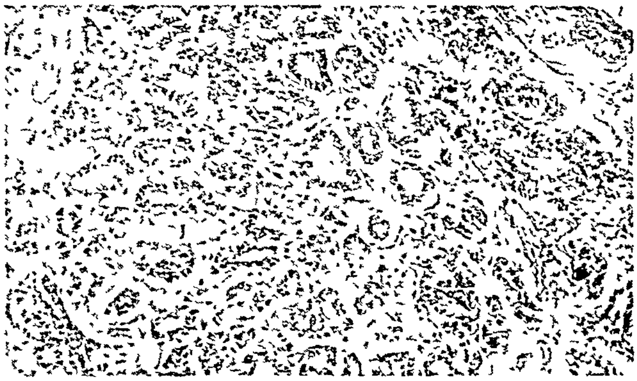


Fig. 7—Thyroid biopsy in case 2. (× 90.)

from vomiting, left-sided upper abdominal pain radiating round the left side of the chest, diplopia, and pain, numbness, and tingling in both hands and in the left leg. Complete amenorrhœa, probably menopausal, supervened 7 months before admission, after 2 years of irregular periods.

Examination.—The patient, when examined on Jan. 16, 1950, was found to be a placid, pale obese woman weighing 11 st. (70 kg.). She had been obese for many years and 3 years ago weighed 13 st. She had supraclavicular pads, and the skin was dry and scaly, especially on the face and arms; the palms of the hands were horny, and the scalp hair thin and dry. Pulse-rate 68 per min., regular; blood-pressure 180/100 mm. Hg. The thyroid gland was diffusely enlarged (estimated at over 100 g.), soft, without nodules, and with audible bruits. She had moderate kyphosis. Above the left ankle were two varicose ulcers about 2 in. and 3 in. in diameter. No other significant abnormalities were noted.

Investigation.—B.M.R. − 28% and − 18%. Plasma-cholesterol 151 mg. per 100 ml. Blood-urea 31 mg. per 100 ml. E.C.G.: low-voltage curve. Hb 6·8 g. per 100 ml. (red blood-cells, 3,800,000 per c.mm., packed-cell volume 35%, mean corpuscular volume 92 c.μ, mean corpuscular hæmoglobin concentration 25%). Wassermann and Kahn reactions negative. Liver-function tests normal (serum-bilirubin 0·2 mg. per 100 ml., thymol-turbidity test 2 units, serum colloidal-gold reaction negative, serum alkaline phosphatase 6·3 units per 100 ml.). Fractional test-meal: normal free and total acidity. Urea-clearance 63% of normal. Plasma protein-bound iodine was not estimated until 7 weeks after discontinuing resorcinol ointment; it was then normal—4·9 γ per 100 ml.

A radioactive-iodine uptake test (Feb. 14) showed a very low urinary excretion: 9·9% in 48 hours (8·8% in 0–8 hr., 0·8% in 8–24 hr., and 0·3% in 24–48 hr.) (fig. 3). This again suggested, in association with the signs of myxœdema, previous administration of an antithyroid drug over a long period.

A biopsy of her thyroid gland was taken on Feb. 24, 5 weeks after the ointment was stopped. The histology was that of a hyperplastic gland, made up of small and large follicles lined by a high cuboidal and low columnar epithelium often thrown into papilliform infoldings. The majority of the follicles contained colloid, mostly showing peripheral vacuolation. There was moderate œdema of the interstitial tissue, which contained only very occasional scattered lymphocytes. The colloid accumulation suggested a phase of recovery in a goitrogen-induced hyperplasia (fig. 8).

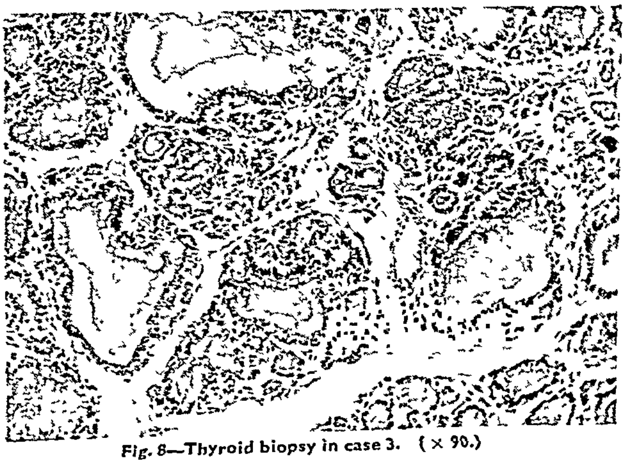


Fig. 8—Thyroid biopsy in case 3. (× 90.)

Progress.—The resorcinol ointment was discontinued from Jan. 16 to Feb. 20, by which time both the patient and her attendants had noted considerable improvement in her symptoms—the lethargy and depression had lessened, the skin was warmer and softer, and the anæmia had begun to improve (Hb 10·4 g. per 100 ml. on Feb. 17).

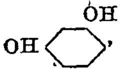
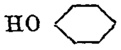
DISCUSSION

There is little room for doubt that these three patients had myxœdema. The clinical picture was typical (see figs. 5 and 8). In all three there was a low basal metabolic rate, and in the two patients tested before the withdrawal of the ointment protein-bound iodine in the blood was low. In cases 1 and 2 the C.S.F. protein content was high, and in cases 1 and 3 the electrocardiographic findings were consistent with the diagnosis; the absence of electrocardiographic change in case 2 was probably due to the short duration of the myxœdema. Histological examination of the skin in cases 1 and 2 showed an appearance consistent with the diagnosis of myxœdema.

A striking feature in these cases was the rapid development of severe myxœdematous symptoms and signs; in cases 1 and 2 the patients were able to date the onset to within a few weeks. Spontaneous myxœdema usually develops so slowly that it is difficult to define the onset within a period of years; and sometimes the slow change remains unobserved by either the patient or his relatives. This rapid development of myxœdema in itself suggested an unusual cause, and prompted a very careful but unsuccessful search for exposure to known antithyroid agents. However, the rapid onset, with goitre showing histological features of hyperactivity, very strongly suggested that an antithyroid drug was responsible. The excessive radio-iodine uptake by the thyroid glands of these myxœdematous patients (fig. 3) confirmed this suspicion. Since all three patients had applied resorcinol ointment to their leg ulcers, it seemed possible that this was the agent causing the myxœdema.

It is probably significant that all their leg ulcers were large (figs. 1 and 6) and that the ointment had been applied for a long time. The suspicion that resorcinol was indeed responsible was strengthened by the finding in all three cases that when resorincol applications were stopped, the thyroid took up iodine avidly; and in cases 2 and 3 the myxœdematous features rapidly disappeared with a return to normal levels of the basal metabolic rate and serum protein-bound iodine. In case 1 the rapid worsening of the cardiac condition on the 12th day after stopping the resorcinol applications may have been due to a similar release of thyroid hormone. Furthermore, in case 2 a later reapplication of resorcinol to the leg ulcer grossly reduced the thyroid's ability to concentrate I^{131} and again lowered the serum protein-bound iodine to levels found in myxœdema. Finally, subsequent biological studies with resorcinol have confirmed its antithyroid activity in animals, provided it is administered parenterally (Doniach and Fraser 1950).

One feature generally found as a sign of thyroid deficiency—a high serum-cholesterol—was absent from two of these patients and little evident in the third (case 2, 316 mg. per 100 ml.). However, this is not a universal finding in thyroid deficiency; it is only a secondary effect, whose mechanism is ill understood (Peters and Man 1943). In thyroidectomised animals the raised cholesterol can be abolished by dietetic restriction (Entenman et al. 1942). It may be absent from cases of thyroid deficiency associated with liver disease or malnutrition—e.g., from the severer cases of Simmonds's disease with thyroid deficiency, or from cases of severe primary malnutrition which show other evidence of thyroid deficiency. It is probably relevant that of our two patients with serum-cholesterol levels in the normal range, one (case 1) had had long-standing severe heart-failure due to rheumatic heart-disease, and the other (case 3) was anæmic. Further, resorcinol, which, like phenol, is known to be metabolised by the liver—i.e., conjugated and then excreted in the urine—may be similarly toxic to the liver. Some such toxic effect may possibly have contributed to the failure of the cholesterol levels to rise with thyroid deficiency. Since resorcinol is known to produce methæmoglobinæmia, its toxic effects may also have caused the anæmia and the other complicating symptoms found in case 3. Further studies are still being conducted with the collaboration of our colleagues on two of these three patients, and fuller details will be published later.

Many antithyroid compounds are already known (Astwood et al. 1945). The study by Chesney et al. (1928) of the goitrogenic or antithyroid action of cabbage probably initiated the investigation of such compounds. Marine et al. (1932) afterwards showed that the goitrogenic agent in cabbage is probably a glucosidic compound of an organic cyanide. Later discoveries of clinically important antithyroid agents included those of rape seeds by Hercus and Purves (1936), of sulphonamides by Mackenzie et al. (1941), and of thiouracil by Astwood (1943); and many subsequent studies have expanded these discoveries. Griesbach et al. (1941) showed that the goitrogenic action of these drugs was mediated through secondary stimulation of the anterior pituitary, arising from the interruption of thyroid-hormone secretion. The known antithyroid drugs can be grouped into three main chemical types (Charipper and Gordon 1947): (1) the thiourelene compounds, characterised by the thiocarbonamide grouping ($> N - CS - N <$), which include thiourea, thiouracil, and ergothionene; (2) the anilene derivatives, characterised by the amino-benzene grouping and including the sulphonamides, and aminobenzenes such as 4.4′ diaminodiphenylmethane; and (3) the thiocyanates and the organic cyanides. Chemically, resorcin, or resorcinol, a dihydroxyphenol, , is not clearly allied to any of the former groups, but some of its known chemical features may be relevant to its antithyroid action. It can be iodinated either by free iodine, or by iodides in the presence of an oxidising agent, to form tri-iodoresorcinol. Its formula somewhat resembles that of tyrosine,  $CH_2CHNH_2.COOH$, which is believed to be the precursor which the thyroid gland iodinates by some oxidising mechanism, in the presence of iodide, to form thyroxine and the thyroid hormone. The antithyroid action of resorcinol may be due to its competing in the thyroid gland with tyrosine for the iodinating mechanism; or to some other toxic action. Further investigation is in progress on the biological action of resorcinol and allied substances.

SUMMARY

In three cases myxœdema was associated with varicose ulcers to which resorcinol ointment had been applied.

Further study showed that the thyroid glands of these patients were enlarged and hyperactive.

On withdrawing resorcinol, the myxœdema subsided and thyroid function returned to normal.

Resorcinol, when absorbed through a leg ulcer, is an antithyroid agent.

We wish to acknowledge an indebtedness to many colleagues for help with these studies: to Mr. Maurice R. Ewing and Mr. Selwyn Taylor for biopsies; to Dr. I. Doniach for the histological studies; to Dr. Q. J. G. Hobson, aided by Dr. L. Phillips and Dr. M. Jones, for extensive assistance in the clinical studies; to Mr. D. G. Arnott, B.SC., and to Mr. F. S. Stewart (Medical Research Council radiotherapeutic unit) for the isotope measurements; to Miss P. Scarlett for the iodine estimations; and to Mr. V. Wilmott for the photographs. We are also especially indebted to Dr. R. J. Harrison for bringing case 3 to our notice, and for his generous courtesy in transferring her to our care for a period of investigation.

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EFFECT OF RESORCINOL ON THE THYROID UPTAKE OF I^{131} IN RATS

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IN three elderly women with myxœdema and a goitre, Bull and Fraser (1950) found that the thyroid disorder was due to prolonged application of a resorcinol ointment to varicose ulcers. Radio-iodine uptake studies confirmed the suspicion that the resorcinol applied to these ulcers had an antithyroid action and suggested the need for further study of this antithyroid action.

We report here preliminary results of some experiments on the effect of resorcinol on thyroid function in the rat.

METHODS

Adult rats, weighing 150–250 g., mostly females of the hooded Lister strain, were used throughout.

The ability of the rats' thyroids to take up iodine was measured by killing them 1, $1^1/_2$, and 2 hr. after an intraperitoneal injection of 10 microcuries (μC) I^{131} with 0·5 μg. carrier potassium iodide, and counting the radioactivity in the alkaline digest of the dissected thyroid glands in a liquid counter (Veall 1948). For autoradiographs, rats were killed 2 hr. after an intraperitoneal injection of 18 μC of I^{131}.

Drugs whose antithyroid effect was being tested were injected subcutaneously in 1 ml. of water, 10–30 min. before administration of I^{131}, the injection sometimes being repeated 1 hr. later. The effect of these drugs was assessed either by measuring the reduction in the thyroid uptake from that found in the controls, or by making an autoradiograph instead of the digest.

The drugs used were: 4-methyl-2-thiouracil, as a watery suspension of crystals containing at least 50 mg. per ml., to ensure maximal antithyroid effect; sodium thiocyanate, 50 mg. per ml.; and resorcinol in graded doses or given in the drinking-water as a 2% solution. In the accompanying figure, the thyroid uptake of each rat is recorded simply as the actual number of counts per min. given by the thyroidal digest,* and the results are summarised.

RESULTS

Previous injection with 1 mg. (5 mg. per kg. body-weight) or more of resorcinol reduced the iodine uptake

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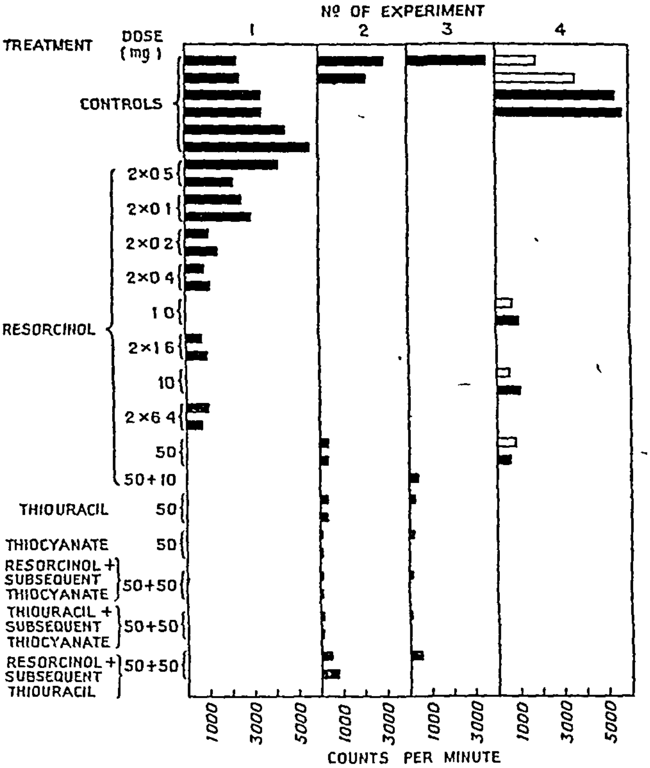
* The results are presented by this method because of the wide range of readings among the controls and the small number of rats used per experiment. The reader should compare the uptake of any rat only with that of the controls or others recorded in the same experiment. The ratio of uptake by treated rats to their own controls is comparable in all experiments.



Inhibiting effect of resorcinol on uptake of I^{131} by rats' thyroids, compared with that of methyl thiouracil and sodium thiocyanate.

Each rat is represented by a horizontal bar whose length gives the counts per min, recorded from its digested thyroid. The rats were killed 2 hr. after injection of 10 µC I^{131}, except all rats in experiment 3, which were killed $1^1/_2$ hr. afterwards, and those shown as open bars in experiment 4, which were killed 1 hr. afterwards.

to $^1/_5$–$^1/_9$ of that found in controls—an extent not exceeded with higher doses and comparable to the maximal reduction obtained with methyl thiouracil. Further experiments will be needed to establish the minimum dose required to produce the maximal antithyroid effect. A number of rats were given the resorcinol in two doses—the second, 1 hr. 10 min. before they were killed. As is shown in the figure, the results did not differ greatly from those produced by single doses. When the resorcinol was administered orally instead of parenterally, there was an indication in some animals of a smaller, but definite, antithyroid effect, which will be further studied.

Comparison of the antithyroid action of resorcinol with that of other known drugs throws some light on its mode of action on the thyroid. The thyroid is known to concentrate iodide from the serum in at least two steps—first by concentrating the iodide in the gland, and then by organic binding of this iodide into protein, in which form most of the thyroid's store is made. The first step is inhibited by thiocyanate and the second step by the thiouracils; in each case this is the only known antithyroid effect of the drug. Autoradiographs of alcohol-fixed paraffin-embedded thyroids show the presence of organically bound iodine only. Autoradiographs made after pretreatment with resorcinol, as after methyl thiouracil, failed to show any organically bound I^{131}. The prevention of organic binding was further confirmed by finding that the antithyroid action of resorcinol could be further enhanced by injecting sodium thiocyanate 1 hr. before killing; and the antithyroid action of methyl thiouracil could be enhanced in exactly the same way (see figure, experiments 2 and 3). This addition of thiocyanate further reduced the concentration of I^{131} from $^1/_5$ to $^1/_{10}$ of that obtained with resorcinol or methyl thiouracil alone. In this connection, it should be noted from experiment 4 that the thyroid uptake in the presence of resorcinol at the end of 1 hr. is not significantly different from that at the end of 2 hr.; thus the addition of thiocyanate at 1 hr. before killing had evidently discharged some of the iodide ion which had been concentrated there despite the presence of resorcinol. Vanderlaan and Vanderlaan (1947) have reported similar results with propyl thiouracil and thiocyanate. From the figure (experiments 2 and 3) it will also be noted that when thiouracil is given in addition to resorcinol antithyroid action was not enhanced.

With regard to the toxicity of resorcinol, 50 mg. doses never proved fatal, but the injected animals all showed a severe tremor for the first half-hour. Smaller doses had no overt toxic results.

CONCLUSIONS

Preliminary assessment of the antithyroid action of resorcinol on rats, using I^{131} to measure thyroid uptake, shows it to be similar to that of methyl thiouracil in all the respects tested—namely, the maximal depression of thyroid uptake of iodine which can be induced, the abolition of organic binding as evidenced by autoradiography, and the enhancement of its antithyroid effect obtainable by the additional injection of thiocyanate but not of methyl thiouracil.

We are indebted to Mr. D. G. Arnott, B.SC., for the isotope measurements and help in the experiments, and to Mr. S. R. Pelc, PH.D., for the autoradiographs.

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SEROLOGICAL DIAGNOSIS OF HERPES SIMPLEX INFECTIONS

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PRIMARY infection with herpes simplex virus occurs frequently in young children (Dodd et al. 1938, Burnet and Williams 1939). The primary infection may be symptomless (Anderson and Hamilton 1949) or there may be clinical manifestations varying from inconspicuous vesicular lesions about the mouth, with or without stomatitis, to more extensive eruptions on the skin of other parts of the body, especially in children or adults suffering from chronic eczema. The acute stomatitis (aphthous stomatitis) may be accompanied by constitutional upset (McNair Scott et al. 1941). Cases of herpetic meningo-encephalitis may also be commoner than the literature suggests. Infected individuals apparently carry the virus throughout life and their sera contain antibodies to the virus.

The diagnosis of herpetic infection may be confirmed or established by isolation of virus or by demonstrating an increase in antibody in the serum during the illness. Estimation of serum antibody has generally been made by testing the power of the serum to inhibit the action of the virus in susceptible animals or to prevent the development of lesions on the chorioallantois of developing chick embryos (neutralisation test). Such methods require several days for their performance and a sensitive in-vitro serological test would offer obvious advantages. Sera containing antibodies to herpes virus were shown by Bedson and Bland (1929) to fix complement in the presence of a herpetic antigen; their technique when used in the examination of human sera (Brain 1932) did not give as high a proportion of positive reactions in adults as did the neutralisation test in the hands of other workers (Andrewes and Carmichael 1930, Burnet and Williams 1939).

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[*] Holding the John W. Garrett International Fellowship in Bacteriology.

TABLE I—COMPLEMENT-FIXATION AND NEUTRALISATION WITH IMMUNE GUINEAPIG SERA AGAINST FOUR STRAINS OF VIRUS

Immune sera	"H" virus				"McC" virus				"N" virus				"P" virus			
	C.F.* titre	% Neutralisation			C.F. titre	% Neutralisation			C.F. titre	% Neutralisation			C.F. titre	% Neutralisation		
		Serum dilutions				Serum dilutions				Serum dilutions				Serum dilutions		
		1/10	1/100	1/1000		1/10	1/100	1/1000		1/10	1/100	1/1000		1/10	1/100	1/1000
"H"	16	97	0	0	16	98	77	0	32	89	75	0	32	99	33	0
"McC"	64	99	80	0	64	100	87	0	128	100	90	0	64	100	53	0
"N"	64	100	98	0	128	100	99	75	256	100	96	73	128	100	97	33
"P"	14	99	66	0	14	95	43	0	16	90	60	0	14	97	20	0

* Complement-fixation titres are expressed as reciprocal of highest dilution of serum giving < 50% hæmolysis.

Observations on a complement-fixation test for the detection of antibody to the virus of herpes simplex were reported in a previous paper (Hayward 1949). The antigen for these tests was prepared from herpes-infected extra-embryonic fluids from developing chick embryos several days after inoculation of virus into the yolk-sac, into the amniotic cavity, or into the allantoic cavity. The activity of the antigen was found to be due chiefly to a "soluble" specific substance separable from the virus by high-speed centrifugation; the antigen was stable on storage at 4°C but its activity was considerably weakened by heating at 56°C for 1 hour. Serological differences were not detected among four recently isolated strains of herpes simplex virus by the complement-fixation technique using immune sera prepared in guineapigs and sera from individuals who provided three of the strains. Infected chick-embryo fluids were more sensitive antigens than extracts of tissue from infected animals, and a preliminary examination of human sera by this complement-fixation test gave a high proportion of positive reactions.

Before accepting this technique as a sensitive method for the detection of herpetic antibody in human sera, it seemed advisable to find out whether it gave results comparable to those obtained by neutralisation tests which are commonly used by other workers for this purpose. Immune guineapig sera prepared against four strains of virus were therefore tested against each of the strains by both complement-fixation and neutralisation techniques. A similar comparison was made of 95 specimens of sera from healthy adults. The results of these tests are reported in this paper.

METHODS

The virus strains studied, the preparation of the antigen and the technique of the complement-fixation tests have already been described (Hayward 1949). To obtain potent antigen, the fluids from individual eggs were tested separately in doubling dilutions against an immune human serum diluted 1 in 8. Only those fluids which showed fixation in high dilution (1 in 64 or 1 in 128) were pooled and used for routine tests.

The guineapig immune sera, as previously described, were obtained from animals which had received several injections of active virus from herpes-infected guineapig pads. The 95 specimens of human serum were kindly supplied by Dr. D. Lehane, director of the Liverpool Regional Blood Transfusion Service. When testing these sera, known negative and positive control sera were included with each batch.

The neutralisation tests were carried out by the chorio-allantois titration technique, 4 membranes being inoculated with each serum-virus mixture. All the sera were inactivated at 56°C for 20 minutes before the test. The guineapig sera were tested in dilutions of 1 in 10, 1 in 100, and 1 in 1000, the human sera in a dilution of 1 in 10 only. Serum from a normal uninoculated guineapig and sera from individuals with no history of herpetic infection were used as control negative sera. Herpes-infected allantoic and amniotic fluids collected as for complement-fixation tests served as a source of virus for the neutralisation tests. After clarification by low-speed centrifugation the virus content of the fluids was estimated by titration on the chorioallantois of 12-day chick embryos. For tests with sera a dilution of the virus was used which gave a count of over 1000 lesions on control membranes. The serum dilutions were mixed with equal volumes of virus suspension and the mixtures were allowed to stand for 1–2 hours at room-temperature before inoculation of 0·2 ml. volumes on the chorioallantois of 12-day chick embryos. After two day's incubation, the membranes were cut out and placed in 2% formol saline and the number of lesions counted. The results were expressed as the percentage reduction in the number of lesions compared with those on membranes which had received the control mixtures of virus and diluted negative serum.

RESULTS

Titration of antibody in immune guineapig sera by complement-fixation and neutralisation tests.—Table I shows the results when the immune guineapig sera were tested against each of the four viruses both by complement-fixation and neutralisation techniques. With the complement-fixation technique the sera are arranged in fixing potency in order P<H<McC<N. This order is maintained in tests with antigens from all four viruses as mentioned in the previous paper.

Similarly when the sera were tested by the neutralisation technique, the relative titre of antibody was of the same order except that serum P gave better neutralisation of virus H than did the homologous serum H.

These results support the opinion based on complement-fixation tests only (Hayward 1949) that there are no marked antigenic differences between the four virus strains. The titre of antibody measured by the complement-fixation technique parallels that demonstrated by neutralisation tests; there is no evidence that different antibodies are measured by the two techniques.

Comparison of complement-fixation and neutralisation with human sera.—The results of the complement-fixation and neutralisation tests with the 95 human sera are shown in table II.

In neutralisation tests each serum was tested in a single dilution of 1 in 10. Those sera which contained antibody showed 95–100 % neutralisation, and sera with weaker neutralising capacity were not observed, though the high lesion counts on the control membranes did not

TABLE II—HERPETIC ANTIBODY IN 95 HUMAN SERA DETERMINED BY COMPLEMENT-FIXATION AND NEUTRALISATION

Neutralisation		Complement-fixation					
		Negative at serum dilution 1/8	Positive at final serum dilution of				
			1/8	1/16	1/32	1/64	1/128
–	19	19	0	0	0	0	0
+	76	1	9	12	37	12	5
Totals	95	20	75				

facilitate the detection of such sera. The all-or-nothing character of herpes-neutralising antibody in adult human sera is, however, generally recognised (Burnet 1946). The testing of a single serum dilution did not enable a quantitative estimate of the amount of antibody present in individual sera to be made.

It can be seen that 75 sera (80%) gave a positive test and 19 (20%) gave a negative test for herpetic antibody by both techniques. One serum gave a positive result by neutralisation and was negative by complement-fixation. Unfortunately this specimen was too small to allow the test to be repeated.

These tests with human sera, like those with the guineapig sera, show close agreement by the two techniques. The proportion of sera showing herpetic antibody (80%) is similar to that found by others (Burnet and Lush 1939).

SUMMARY

Immune guineapig sera for four strains of herpes simplex virus were tested for antibody against the four strains by complement-fixation and neutralisation techniques. The results by the two techniques showed close agreement and did not disclose antigenic differences among the four virus strains.

Tests on 95 adult human sera by the two methods gave similar findings with the two techniques. 80% of these sera contained herpetic antibody.

The complement-fixation technique, using as antigen extra embryonic fluids from herpes-infected chick embryos, provides a simple and reliable test for the detection and titration of herpetic antibody in human sera.

I am indebted to Prof. A. W. Downie for encouragement and advice during the course of this work.

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TYPHOID FEVER TREATED WITH CHLORAMPHENICOL

DEVELOPMENT OF THE CARRIER STATE

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SEVERAL papers published in England in the last few months have confirmed the original observation, made by Prof. J. E. Smadel and his team in Malaya, of the value of chloramphenicol in typhoid fever. So far, however, the drug has not prevented the development of relapses or of the chronic carrier state. At a meeting of the epidemiological section of the Royal Society of Medicine on March 17 the hope was expressed[1] that "some cunning and at present unsuspected technique" would make it possible to prevent and cure the carrier state with chloramphenicol. How much cunning is likely to be required is indicated by the following 3 cases treated with chloramphenicol, of which 2 have become chronic carriers.

CASE-RECORDS

Case 1.—A female catatonic schizophrenic, aged 37, was treated with chloramphenicol from the third day of her illness, when cultures of the blood and the stools grew *S. typhi phage-type* F1. She was given 4 g. in the first hour, 0·25 g. two-hourly for the next four days, then 0·75 g. twice daily for nine days, and finally one dose of 0·75 g., making a total of 31 g. Because there was clinical evidence of bronchopneumonia she was also given 3,650,000 units of penicillin and 36 g. of 'Sulphatriad' in six days. On the third day of chloramphenicol treatment her temperature fell sharply, and it swung at a lower level until four days later, when, to all intents, the patient's illness seemed to have resolved.

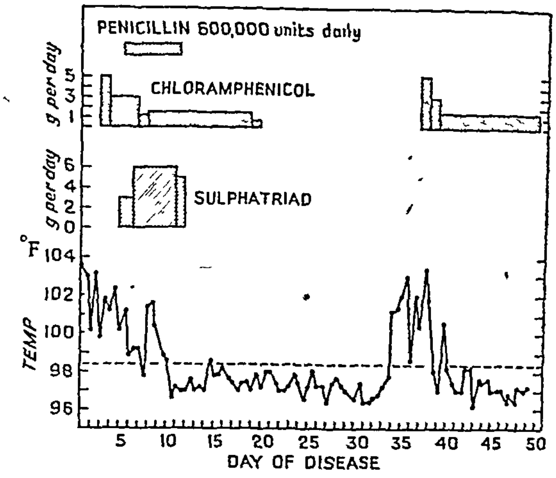

Fig. 1—Case 1. Relapse in typhoid fever despite apparently good response to chloramphenicol.

Relapse.—Sixteen days after the withdrawal of chloramphenicol the patient relapsed. Blood-culture and stools were again positive for *S. typhi*. On the fourth day of this relapse chloramphenicol was started again, and she received a total of 24·75 g. in thirteen days. Her temperature again settled after three days (fig. 1). Her excreta became negative for *S. typhi* after four days and have remained so for the subsequent five months. Clinically, the relapse was characterised by what appeared to be neurological involvement. She had a well-marked "trombone" tremor of the tongue and a coarse tremor of the lips, arms, and legs, but no other neurological abnormalities were detected. These symptoms appeared on the third day of her relapse and had disappeared forty-eight hours after the reintroduction of chloramphenicol. Thereafter the patient made an uneventful recovery.

Case 2.—A female schizophrenic, aged 34, was at first diagnosed as having bronchopneumonia, so penicillin and sulphatriad were given at once. Three days later a blood-culture grew *S. typhi* F1. Chloramphenicol was started next

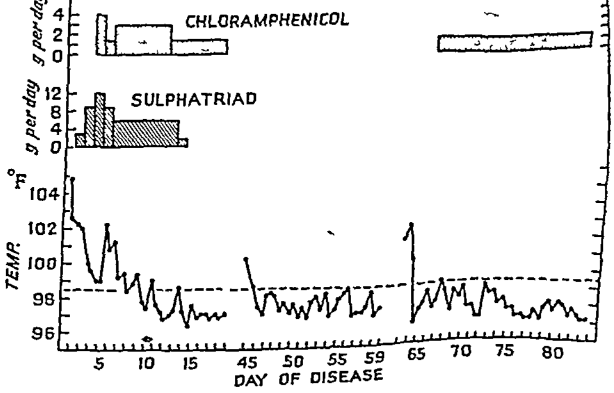

Fig. 2—Case 2. Response in patient who became a chronic carrier.

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1. See *Lancet*, March 25, p. 544.

day, the fourth day of her illness, 4 g. being given initially, and then 1·5 g. on the second day, 3 g. daily for six days, and finally 1·5 g. daily for six days; the total amount was 32·5 g. in fourteen days, and in the same period she received 7,900,000 units of penicillin and 77 g. of sulphatriad. She seemed to recover completely from her severe attack of typhoid (fig. 2), though in the early days of her convalescence cultures from both urine and fæces occasionally yielded *S. typhi*.

On the forty-fifth day of her illness her temperature rose to 100·2°F, but bacteriological and serological examinations for *S. typhi* were negative.

On the sixty-third day the patient had a mild rigor, with a temperature of 102 0°F. Blood-culture was negative, but since both urine and fæces grew *S. typhi* it was thought that this might be a relapse, so she was given a further course of chloramphenicol: 1·5 g. daily for seventeen days to a total of 25·5 g. On the day after her rigor she complained of tenderness over the gall-bladder, her urine contained bile-salts and bile-pigments in excess, and she then showed clinical jaundice, making a relapse seem doubtful, but it was decided to continue with the chloramphenicol. Her skin and conjunctivæ cleared during this course. Five days after the chloramphenicol was stopped her urine again yielded *S. typhi*, and in the subsequent six months almost every specimen of urine and fæces has yielded *S. typhi*.

Case 3.—A mental defective female, aged 46, received chloramphenicol from the twenty-second day of her illness, when the typhoid fever appeared to be resolving naturally. Altogether she was given 20 g. in eight days. Her excreta remained negative for *S. typhi* until eighteen days after the chloramphenicol was stopped, when both urine and fæces yielded *S. typhi* v1 for two days. Daily specimens were negative for the next three weeks, but thereafter weekly examinations showed that she was excreting *S. typhi* in both urine and stools. She has now been under observation for eleven months and is still a chronic typhoid carrier.

DISCUSSION

In case 1 the patient received 31 g. of chloramphenicol in sixteen days for the original attack and 24·75 g. in thirteen days for the relapse, which responded even more dramatically than the original illness. She had been given 0·25 ml. and 0·5 ml. of T.A.B.C. twenty-one and seven days before her first illness, but neither this nor the combination of chloramphenicol, penicillin, and sulphatriad prevented her relapse. At no time did the urine yield *S. typhi*. Throughout both illnesses vitamin-B complex was given in the form of yeast tablets.

Cases 2 and 3 have become chronic typhoid carriers. In case 3 the chloramphenicol was begun late, when the disease was resolving naturally, and it might be argued that the development of the carrier state was largely a result of this delay and the small dosage given. However, in case 2 the chloramphenicol was started on the fourth day of illness and the patient received 32·5 g. in fourteen days, whereas the total dosage advocated at the Royal Society of Medicine discussion, already referred to, was 30 g. in fourteen days. So early and apparently adequate treatment with chloramphenicol, even when combined with penicillin and sulphatriad, does not invariably prevent the carrier state.

Throughout her early convalescence case 2 excreted *S. typhi* intermittently in both urine and fæces. It was thought that she had relapsed when she had a rigor on the sixty-third day from the start of her original illness and she was therefore given a further 25·5 g. of chloramphenicol, making 58 g. altogether. In fact, this was not a relapse, but why she developed jaundice on the day after her rigor is not easily explained. She had been in this hospital for the past five years and had no previous history of jaundice. Because of its comparatively short duration the jaundice is unlikely to have been due to hepatitis. The most probable diagnosis seems to be a small gall-stone with cholecystitis, and serological examinations showed that the jaundice was of an obstructive type.

The mechanism of the production of the carrier state in typhoid fever is still not fully understood, but the reason for the failure of chloramphenicol to prevent it may be that this condition may arise even in the prodromal period of the disease. Only 4 cases of typhoid fever have been treated with chloramphenicol at this hospital, and it is remarkable that 2 of them have become carriers. Nevertheless, Smadel,[1] in his large experience, has found no reason to believe that patients treated with chloramphenicol are more likely than others to develop the carrier state.

SUMMARY

Three adult mental-hospital patients with typhoid fever were treated with chloramphenicol. One relapsed and 2 have become chronic carriers, including a patient treated early with what is considered to be adequate dosage.

I wish to thank Dr. J. S. McGregor, the medical superintendent, for his help and permission to publish; Mr. D. C. Hubbard, senior laboratory technician; and the nurses who attended the patients.

Preliminary Communication

AMNIOTIC GRAFTS IN CHRONIC SKIN ULCERATION

Chronic ulcers on the legs in elderly people are notoriously difficult to treat. In 1939 I began to dress such ulcers with boiled human amnion, and I have found this treatment remarkably successful.

My original series up to 1942 consisted of seven bedridden patients aged 60–80, who had had ulcers for 4–15 years. All the patients had been in hospital for 3 years, and none of their ulcers showed any sign of healing. Amnion grafts were applied in six of these cases, the seventh being dressed with soft-paraffin gauze only, as a control. In 10 weeks the six ulcers treated with amnion had completely healed, whereas the control had not. The control ulcer was then treated with amnion and it healed in 5 weeks. A follow-up of these cases showed that none of the ulcers subsequently broke down, but six of the patients have since died of other causes. The seventh I examined this year; no further ulceration has occurred, and the skin over the old ulcer is thick and healthy.

My belief that amniotic membrane possesses some specific healing power was supported by the work of Chao et al.,[2] who used amnion to close dural defects. Penfield [3] later reported that if the amnion had not been boiled it led to the formation of fibrous adhesions. The same tendency was noted when amnion was used in the repair of tendons.[4] This stimulation of fibrous-tissue growth, combined with my own observations on epithelial repair, convinced me that amnion was an ideal covering for chronic skin ulcers. In 1949 therefore I started a new series of cases at Charing Cross Hospital, and so far there has not been a single failure.

PREPARATION OF AMNION

The "caul" is obtained from the obstetric wards within 24 hours of a delivery. It is cleaned and the amnion is carefully freed from chorion and clots. To be suitable for use the amnion must be thin, clear, tensile, and strong, with no yellow tinge from meconium staining.

The amnion is boiled for 7 minutes in normal saline and preferably used immediately. It can safely be kept dry in a sterile pot for 24 hours, but if not used in this time it should be discarded.

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[2] Chao, Y., Humphreys, S., Penfield, W. *Brit. med. J.* 1940, i, 517.
[3] Penfield, W. *Ibid*, p. 668.
[4] Pinkerton, M. C. *Lancet*, 1942, i, 70.

An average confinement provides a piece of amnion about 8 inches square, which contracts on boiling to about 4 inches square.

TECHNIQUE

The patient is admitted to hospital, and the ulcer is scraped with a Volkmann's spoon under general anæsthesia. A dressing of 'Phenoxetol' cream is applied, covered with gauze, and left in situ for 5 days, after which the dressing is removed, the ulcer is gently cleaned, and the prepared sheet of amnion is spread carefully over it. I have found it best to apply the smooth side, which secretes the amniotic fluid in utero, to the ulcer. The area is next covered with soft-paraffin gauze and wool held in place by a pressure bandage. The patient is sent home to rest in bed, and no further treatment is required. The dressing is removed after 6–10 weeks, according to the size of the ulcer.

CASE-RECORDS

Case 1.—A man, aged 66, had had intermittent claudication with varicose ulceration of the left leg since 1948, and had already had an above-knee amputation of the right leg for the same condition. He had been in hospital from Nov. 13 to Dec. 15, 1948, during which time the ulcer only partially healed and then relapsed.

When seen in October, 1949, he had a large painful ulcer measuring 5×4 in. on the anterior surface of his left leg, with surrounding discoloration. He was treated with 'Priscol' (2-benzyl imidazolin hydrochloride, a peripheral vasodilator) and nicotinic acid, and a lumbar sympathectomy was performed by Mr. Norman Lake. A month later no further healing had taken place, and Mr. Lake asked me to try amnion grafting. On Jan. 3 this was done, but the ulcer was so extensive that only part of it could be covered with the material available, and a raw area the size of half a crown which remained was dressed with soft-paraffin gauze. The patient was sent home to bed for 10 weeks. When we inspected the ulcer at the end of this period it had completely healed except for the "half crown" area. Over the healed part of the ulcer the skin was healthy, elastic, and pink, not just a thin membrane overlying chronically infected granulation tissue. An amnion graft has since been applied to the remaining area, and we are awaiting results.

Case 2.—A man, aged 52, had had a varicose ulcer of the left leg and intermittent claudication for 6 years. The ulcer never healed and was a source of pain and discomfort. Thiersch and pinch grafts had been tried, and finally a pedicle graft, but all had broken down, apart from a small marginal area. A lumbar sympathectomy was performed in October, 1949. Three weeks later, on Nov. 17, I was asked to try amnion grafting. The patient was so distressed by his ulcer that he had actually agreed to have his leg amputated. On Dec. 8 I put on an amnion graft and sent him home to bed for 10 weeks. After this time the ulcer had completely healed. One might be tempted to say that it was the sympathectomy that resulted in the cure; perhaps it was, but similar ulcers have been healed without sympathectomy.

Case 3.—A diabetic man, aged 65, had a varicose ulcer on the inner side of his left ankle and gangrene of the left big toe. His varicose veins had previously been injected. The ulcer had been present for 10 years and had never healed. On Jan. 27, 1950, the ulcer was amnion grafted, and on March 16 it had completely healed.

Case 4.—A man, aged 48, had large ulcers on both legs. The one on the right leg measured 4 × 5 in. and extended from front to back on both sides. The left leg had a smaller ulcer over the medial malleolus. Owing to the patient's general condition and vascular calcification lumbar sympathectomy was considered inadvisable. On Nov. 17, 1949, I treated these ulcers with amnion, and on Feb. 22, 1950, they had completely healed, again with strong thick skin of extraordinarily good quality. The patient has been seen recently, and there is no sign of the areas breaking down.

Case 5.—A man, aged 50, had a chronic ulcer of his right leg dating from Nov. 21, 1949, when he had had a minor trauma to the scar of an old gunshot wound. The ulcer had not healed in spite of complete rest in bed for 4 weeks and penicillin therapy. On March 2, 1950, I applied an amnion graft to the area, and the patient was treated as an outpatient, since he refused to go to bed. A fortnight later the ulcer had healed with healthy skin.

Case 6.—A married woman, aged 48, had a varicose ulcer which remained unhealed after 16 weeks' rest in bed in hospital. It had healed completely and soundly 10 weeks after amnion grafting.

COMMENTS

All these patients say that, two or three days after the amnion is applied, the pain disappears from the ulcer, which is not so when other dressings are used. In principle this treatment follows the lines laid down by Winnett Orr and Trueta; and keeping the wound closed with an ideal membrane, such as amnion, seems to be particularly successful in the treatment of chronic ulceration. When varicose ulcers are encased in plaster-of-paris they heal slowly, and the granulations are thick and raised above the skin level, whereas with amnion grafting the granulation tissue is never raised above the skin margin, and healing takes place equally from all sides. When the soft-paraffin gauze dressing is removed, after 10 weeks, the ulcer is healed and there is no sign of the amnion over the actual ulcer site, but all round the edge of the ulcer the amnion is still fixed to the gauze. An interesting problem, which will require biopsy-study, is: What has become of the amnion covering the ulcer?

The properties of amnion are being investigated: a series of cases is being collected in which the results are recorded photographically; control trials are being carried out with other media, such as aluminium foil: and the amnion treatment is being tried in outpatients without rest in bed, and with and without preliminary scraping of the ulcers. Up to now we have found that ulcers heal with thicker skin if they are scraped before grafting. A few patients have complained of the smell from their ulcers, due to the products of saprophytic organisms, and there is the possibility that an accumulation of pus or gas-bubbles under the amniotic covering might prevent it adhering to the ulcer. I am therefore proposing to dust the ulcer lightly with penicillin-sulphathiazole powder before grafting.

The patients with chronic ulcers now attending outpatient departments could receive amniotic grafting and be sent home for 10 weeks rest in bed, after which they could be seen occasionally and ordered necessary preventive measures, such as elastic stockings, thick socks to prevent trauma, &c., by their own doctors. This should result in an appreciable reduction in outpatient attendances and a substantial saving in time for both patients and doctors. Moreover, if even the most minute varicose ulcer was treated by grafting as soon as it was seen by a doctor the period of rest in bed could probably be reduced to 2–3 weeks.

I should like to thank Mr. N. C. Lake, Mr. C. MacLeod, Mr. R. A. Fitzsimons, Mr. D. Trevor, and Dr. N. S. Plummer for kindly allowing me to treat their cases, and for the interest they have shown in this technique.

E. TROENSEGAARD-HANSEN
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"... The Universities, with their museums and botanic gardens, are happy to forget what, in 1859, they were unable to resist. They contain no memorial of his work, and all the means of developing his doctrine they frustrate by an arrangement of teaching which the theory of evolution is not allowed to disturb. The old pedantic learning of botany and zoology, which Darwin treated as one subject, they continue to cleave asunder burying the halves under their ancient schedules of instruction."—C. D. DARLINGTON, D.SC., F.R.S., in a foreword to a reprint of the 1st edition of *On the Origin of Species*, by Charles Darwin. (*London: C. A. Watts. 15s.*)

Medical Societies

MEDICAL SOCIETY FOR THE CARE OF THE ELDERLY

The society's spring meeting was held in Leeds on April 21 and 22. The afternoon meeting on April 21 was held under the chairmanship of Prof. R. E. Tunbridge.

Cardiac Conditions.—Dr. Curtis Bain (Harrogate) remarked that in patients over the age of 70 the same conditions (including congenital and rheumatic disease) were encountered as in younger patients, and the methods of treatment were not affected by age. Sociological factors were very important in reablement. He emphasised the need to keep these patients in bed for as short a time as possible, and suggested that three weeks in bed was quite long enough for the average case of coronary thrombosis.

Senile Purpura.—Dr. R. N. Tattersall (Leeds) re-established this as a clinical entity. The condition was produced by trauma on altered skin and had a selective distribution on the face and extensor surface of the forearms. There was no evidence of dietary deficiency or of blood disorder, and the basic pathological lesion was an alteration in the skin collagen which became more pronounced with increasing years and was localised to the face and extensor surface of the forearms.

Cup Arthroplasty.—Mr. R. Broomhead (Leeds) demonstrated by means of films the technique and results of operative treatment with cup arthroplasty for osteoarthritis of the hip. His oldest patient was 68 years of age, but he mentioned cases in the U.S.A. operated on in the late 70s. It was important to operate as early in the course of the disease as possible and before muscular wasting and fibrosis were far advanced. Patients must be physically fit to undertake the strenuous course of physiotherapy required after operation.

Rheumatic Pain.—Dr. Trevor H. Howell described some new methods used by him in the treatment of rheumatic pain in the elderly. He reported good results from the pericapsular injection of tetraethylammonium bromide.

MEDICOSOCIAL PROBLEMS

On April 22, at the morning session, under the chairmanship of Mr. Peter McEwan (Bradford), the organisation of a geriatic service was discussed.

Mr. Roger Wilson (Hull) opened with a review of the social background. He emphasised that the increasing interest in the elderly did not merely indicate a change of mind: it was forced on us by the pressure of population changes. In 1947 one in six and a half of all adults were over the age of 65, and by 1977 the ratio would be one in four. Finance alone offered no solution, but finance could not be neglected. Every shilling added to the old-age pension cost the taxpayer £15 million per year, and by 1978 the cost of pensions at the present rates of benefit would be £512 million a year. Fortunately people did not necessarily retire on reaching the pensionable age; two-thirds of men continued in employment, and half the women who were working continued to do so. More than half the women over 60 continued to bear heavy domestic responsibilities, and by looking after grandchildren they often enabled younger women to remain in employment. Mr. Wilson emphasised the importance of the increasing average age of adults in accentuating conservative trends in public life, and thought that there was a real danger of old-age pensioners becoming a political pressure-group. There was also the danger in our highly organised society that only those who had retired would be able to give part-time service to public bodies, thus raising the average age of those administering such organisations.

Dr. Murray Melvin (Leeds) described the increasing demands which the ageing population made on the general practitioner. Apart from the increase in medical work, the G.P. was now expected by the relatives to carry out the functions performed in the past by the relieving officer. Dr. Melvin held that these duties could be performed by a liaison officer from the hospital, who should visit the patient at home and assess the social needs and the urgency of admission. Since old people had such low priority in the home-help scheme, the possibility of paying relatives who undertook their care might be considered. Some sort of physiotherapy should be available in the home, even if this was administered by those not fully qualified. Mobility was the essential in therapy. Every effort should be made to shorten the interval between the last time of going to bed and death.

Dr. E. D. Irvine (Dewsbury) described the function of the public-health department in organising liaison between the patient, the hospital, and the various ancillary services. He postulated that the prevention of a geriatric problem began in the school and with the various health services available to adults, which, if fully utilised, should lead to a healthy old age. The possibility that atmospheric pollution might be important in the causation of respiratory disease in old people should be investigated. It would also be valuable to investigate a group of happy and healthy old people to see if they had any factor in common.

Dr. Marjory Warren spoke on geriatrics as a specialty. She regarded the title as a challenge, and justified the existence of the specialty by quoting figures from her own and other units. She and her staff now managed in 180 beds the same number of patients that had previously occupied 520; and she did not think that the present number of hospital beds was inadequate if they were efficiently utilised. There was, however, a deficiency in social-amenity beds. She mentioned 50 hand-fed, bedridden, and incontinent patients transferred from elsewhere, all of whom had been in this state for at least two years. At the end of three months 20% had returned to their homes ambulant and independent, and a further 30% were up and dressed and were partially independent.

Dr. S. G. Laverty (Bradford) described his experiences as a hospital doctor performing domiciliary visits to patients on his waiting-list. He suggested that a doctor, rather than a lay officer, was the proper person to take over the relieving officer's duties. He sometimes found that it was the relatives, and not the old person, who needed hospital treatment. Home visits to old people living with their families, when it was possible to see three or even four generations at once, provided valuable material for study of the effects of heredity and environment.

LIVERPOOL MEDICAL INSTITUTION

At a meeting on March 23, with Mr. H. V. Forster, the vice-president, in the chair, Mr. Leslie J. Temple discussed the Undetected Foreign Body in the Bronchus. The cases he described included those of: (1) a seaman with part of a spectacle lens in his bronchus who was treated for a long time as a case of tuberculosis in a sanatorium; (2) a girl with a screw in the bronchus, apparently since childhood, who attended because of hæmoptysis; (3) a woman with a glass tube in the lung, no cause being found for its presence; and (4) a child with bronchiectasis due to rough grass inhaled through a pea-shooter.

Reviews of Books

Antibiotics

ROBERTSON PRATT, PH.D., associate professor of pharmacognosy and plant physiology, University of California College of Pharmacy; JEAN DUFRENOY, D.SCI., research associate in antibiotics, at the college. Philadelphia and London: J. B. Lippincott. 1949. Pp. 255. 40*s.*

THIS book has been written by a professor of pharmacognosy and by another non medical author, apparently mainly a bacteriologist. It attempts to describe the broad principles of antibiotics and antibiotic chemotherapy sufficiently comprehensively to satisfy those concerned with the health sciences, but not so technically as to discourage those whose major activities lie in other fields. Throughout, the bias is towards chemistry and bacteriology and the clinical paragraphs are secondary in importance and scope. It provides little technical information of direct use to the clinician or bacteriologist, but gives a broad account of antibiotics in relation to general biology and of the numerous chemical and bacteriological problems arising in these studies. A serviceable chapter explains the methods of industrial manufacture of these substances in simple language, and there are also chapters on each of the more important antibiotics including up-to-date accounts of 'Chloromycetin' and 'Aureomycin.' The chapter on the mechanisms of antibiotic action is less lucid than the others; this is due less to the fault of the authors than to the incompleteness of our present knowledge: what is only partially known cannot easily be explained. The paper, print, and format are pleasing, although the motto headings over each chapter seem irrelevant and fanciful. The book can be recommended to the general reader who is interested in this subject. It will not assist him directly in his clinical or bacteriological work but it will greatly broaden his conception of the whole subject.

Malignant Disease

JAMES F. PHILIP, CH.M. Aberd., F.R.C.S.E., radium officer, Aberdeen Royal Infirmary. Aberdeen: University Press. 1949. Pp. 238. 15*s.*

THIS survey describes the principles on which a cancer clinic should be founded and includes an analysis of the results of treatment for malignant disease at the Aberdeen Royal Infirmary from 1930 to 1939 inclusive. The records of any complete series of cancer cases such as this are valuable, and the book is sure of a welcome. Each of the important sites is dealt with in a separate section, the method of staging is given, and charts show the proportion in each stage and the method of treatment adopted. The table in which the results of treatment are set out is very simple, and when percentages are used they are crude rates with no allowance for intercurrent disease. In each section the methods employed in other centres are described and the results of the various methods compared, so that much useful information is made available both to surgeon and to radiotherapist. For instance it is found that of 411 cases of cancer of the stomach only 50 were considered to be operable; 20 patients of these 50 died in the postoperative period and only 7 survived five years. Cancer of the colon is the subject of detailed analysis by site; 286 cancers were found, of which 66 were operable, and 22 patients survived five years. For cancer of the rectum it is suggested that, while surgery is the treatment of choice, radium is still a useful palliative. Radiotherapy shows satisfactory results.

An appendix gives the survival-rates for histologically proven cases treated by radiotherapy in 1930–36, and compares them with rates for cases treated in 1940–43. In cancer of the skin the survival-rate rose from 42 to 57%, in cancer of the lip from 56 to 67%, in cancer of the tongue from 8 to 41%, in cancer of the mouth from 18 to 24%, and in cancer of the cervix from 29 to 36%. This is an example of the great improvement obtained when all the radiotherapy of a centre is guided into the hands of one experienced radiotherapist.

Evaluation of Chemotherapeutic Agents

Editor: COLIN M. MACLEOD, M.D. Symposium held at the New York Academy of Medicine, Section on Microbiology, March 25 and 26, 1948. New York: Columbia University Press. London: Oxford University Press. 28*s.*

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Thérapeutique médicale oto-rhino-laryngologique

GEORGES PORTMANN, professeur de clinique oto-rhino-laryngologique à l'Université de Bordeaux. Paris: Doin. 1950. Pp. 315. Fr. 960.

HERE is a topical, brief, and elegant summary of the methods of non-surgical treatment which can be used in diseases of the ear, nose, and throat. More than half of the book consists of lists of prescriptions of medicaments, drops, and lotions to be used in diseases of the ear, nose, and throat. A regional classification of these diseases inevitably leads to some overlapping. The most serious defects are the absence of any discussion on the principles underlying the use of a particular drug, or of the results to be expected from its exhibition. A great variety of preparations is thus recommended without any critical evaluation, guidance, or instruction. About a quarter of the book deals with general medical methods of treatment, having good chapters on sulphonamides and penicillin, and even including a brief mention of streptomycin and tyrothricin. There is also a brief but very good account of modern electrical hearing-aids. In the rest of the book the various special methods of treatment necessary in this specialty are described and well illustrated: everything seems to have been included, from the technique of syringeing an ear to the Proetz method of performing suction-displacement. There is even a short chapter on aerosols.

The Diabetic Life (14th ed. London: J. & A. Churchill. Pp. 238. 10*s.* 6*d.*).—A fourteenth edition with 25 years of service behind it needs no puff. Dr. R. D. Lawrence remarks in his preface that the new health service, which has made insulin and other necessities free to diabetics, should now help to establish regional clinics, so that these patients can be given expert supervision in their own districts. He urges every patient to join the Diabetic Association, which safeguards the interests of its members, and, by providing funds for research, maintains the prospect of better treatment, and even of the prevention and cure, of diabetes.

English Index to Soviet Medical Publications Available in London Libraries, Vol. I, 1945-47 (London: H. K. Lewis. 1950. Pp. 93. 20*s.*).—Seventeen Russian periodicals are listed here. Those which have been fully covered by the *Quarterly Cumulative Index Medicus* have been purposely omitted. It is intended to publish later this year a second volume to cover 1948–49 and to include further journals of 1945–49, and thereafter to issue a further volume each year. No subject cross-references are given: these should be picked up in the *Index Medicus*, which has been used as a pattern for the arrangement of the text. The book has been edited on behalf of the Medical Committee of the Society for Cultural Relations with the U.S.S.R. by Mr. Donovan T. Richnell, deputy librarian, University of London.

THE LANCET

LONDON: SATURDAY, MAY 6, 1950

Cardiac Catheterisation

CATHETERISATION of the heart comes of age this year, and it now has an established place among the diagnostic procedures of all up-to-date cardiological centres. Following some tentative venous catheterisations by BLEICHROEDER[1] many years before, FORSSMANN,[2] in 1929, introduced a catheter into his own heart; but the time and circumstances were not propitious for further development of his bold technique. JIMÉNEZ DIAZ[3] obtained data by catheterisation for a single estimation of cardiac output in 1930, and then for a time catheterisation was used in Portugal and France for the injection of sodium iodide to outline the vessels at the root of the lung. But it was the work of COURNAND and his colleagues[4] in the U.S.A., who left a cardiac catheter in situ for long periods for measuring pressures and taking blood-samples, primarily for the study of pulmonary blood-flow, that established the safety of the procedure and led to its increasing use all over the world. Many thousands of cardiac catheterisations have since been performed, and the number of accidents reported is extremely small.

Since BLALOCK and TAUSSIG[5] showed that some forms of congenital cyanotic heart-disease could be treated surgically, there has been a demand for more exact diagnosis in these cases, and, as a result, cardiac catheterisation has become widely accepted as a preliminary to cardiac surgery, though the risks involved are slightly greater in these cyanotic cases. The blue child with a congenital heart lesion and thick viscid blood may be peculiarly liable to thrombotic accidents, and one case of extensive thrombosis of the inferior vena cava after cardiac catheterisation has been reported from Montreal.[6] Transient hemiplegia has also followed the procedure.[7] If tiny thrombi form on the tip of the catheter and escape into the circulation they may do little harm in a normal anatomical circulation, for they are trapped in the lung capillaries. In the patient with a right-to-left shunt, however, such small emboli may block cerebral or other important arteries. At first it was unusual to pass the catheter beyond the right atrium, and no harm has ever been reported from catheterisation in this position. But the catheter is now often passed into the right ventricle and through it into the pulmonary artery. Extrasystoles are readily precipitated by irritation of the right ventricle, especially in the region of the outflow tract,[8] but these may be avoided by readjusting the position of the catheter or by injecting 5–10 ml. of 2% procaine. In ischæmic heart-disease, where sudden death from ventricular paroxysmal tachycardia or fibrillation is a known risk, the catheter may possibly precipitate disaster. When catheterisation is undertaken in such subjects full electrocardiographic control is necessary at all stages, and judicious retreat is advisable if premature beats are not readily controlled. There has been a notable absence of published necropsy reports on patients who had been catheterised shortly before death, but BANFIELD and his colleagues[9] have collected details of 30 unpublished cases, and in none of these were any lesions ascribable to the catheterisation demonstrated. In dogs, however, minute lesions have been found where the catheter impinged on the endocardium,[10] and, though the less active human heart is probably less liable to injury, it would be reassuring if the extent of the risk could be assessed by pooling the data from many clinics. The present impression is that catheterisation is safer than, for example, gastroscopy or even lumbar puncture.

In the early days of cardiac catheterisation, pressure measurements inside the heart were made by the simplest means. COURNAND and his colleagues[11] were the first to record intracardiac pressures optically and to demonstrate the value of these records. Sensitive membrane manometers of various types attached to the outer end of the catheter will record the pressure in the right ventricle accurately during diastole and fairly accurately during systole. But the long catheter has a damping effect on the recording system, and many of the published pressure curves obviously contain artefacts. The Mayo Clinic workers[12] have obtained more satisfactory pressure curves by embodying a pressure-recording device in the tip of the catheter. Discussing the value of catheterisation in the diagnosis of congenital disorders, and the difficulties that may arise in interpreting the findings, they conclude that the investigation of an obscure congenital heart case is at present bound to be a protracted and complex procedure requiring a skilled team. It had been hoped at one time that the need for tedious analyses of the oxygen content of blood-samples from various parts of the heart might be eliminated by using some system of electrical recording of the oximeter type. But such methods have not proved accurate enough, except to give an approximate indication of the oxygen content which will be checked later by more direct methods.[13] In theory, by taking single samples of blood from the right heart it should be possible to calculate the relative volume of blood shunted through

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Thérapeutique médicale oto-rhino-laryngologique

GEORGES PORTMANN, professeur de clinique oto-rhino-laryngologique à l'Université de Bordeaux. Paris: Doin. 1950. Pp. 315. Fr. 960.

HERE is a topical, brief, and elegant summary of the methods of non-surgical treatment which can be used in diseases of the ear, nose, and throat. More than half of the book consists of lists of prescriptions of *medicaments*, drops, and lotions to be used in diseases of the ear, nose, and throat. A regional classification of these diseases inevitably leads to some overlapping. The most serious defects are the absence of any discussion on the principles underlying the use of a particular drug, or of the results to be expected from its exhibition. A great variety of preparations is thus recommended without any critical evaluation, guidance, or instruction. About a quarter of the book deals with general medical methods of treatment, having good chapters on sulphonamides and penicillin, and even including a brief mention of streptomycin and tyrothricin. There is also a brief but very good account of modern electrical hearing-aids. In the rest of the book the various special methods of treatment necessary in this specialty are described and well illustrated: everything seems to have been included, from the technique of syringeing an ear to the Proetz method of performing suction-displacement. There is even a short chapter on aerosols.

The Diabetic Life (14th ed. London: J. & A. Churchill. Pp. 238. 10*s*. 6*d*.).—A fourteenth edition with 25 years of service behind it needs no puff. Dr. R. D. Lawrence remarks in his preface that the new health service, which has made insulin and other necessities free to diabetics, should now help to establish regional clinics, so that these patients can be given expert supervision *in their own districts*. He urges every patient to join the Diabetic Association, which safeguards the interests of its members, and, by providing funds for research, maintains the prospect of better treatment, and even of the prevention and cure, of diabetes.

English Index to Soviet Medical Publications Available in London Libraries, Vol. I, 1945–47 (London: H. K. Lewis. 1950. Pp. 93. 20*s*.).—Seventeen Russian periodicals are listed here. Those which have been fully covered by the *Quarterly Cumulative Index Medicus* have been purposely omitted. It is intended to publish later this year a second volume to cover 1948–49 and to include further journals of 1945–49, and thereafter to issue a further volume each year. No subject cross-references are given: these should be picked up in the *Index Medicus*, which has been used as a pattern for the arrangement of the text. The book has been edited on behalf of the Medical Committee of the Society for Cultural Relations with the U.S.S.R. by Mr. Donovan T. Richnell, deputy librarian, University of London.

but important sections of the population were receiving amounts of calcium, vitamin A, and riboflavine well below any acceptable physiological standard. These findings confirm the impression of the casual visitor to Dublin. There he will find hotels and restaurants in which those with money may buy unlimited quantities of the best and richest foods. But outside he will find beggars in the streets who look undernourished. How big are the underfed and overfed minorities in Dublin and other Irish cities is uncertain; probably both are small. For the majority the hard facts of pounds, shillings, and pence ensure a diet that is frugal but sufficient, and in most respects differs little in nutritional value from the diets in England today. Tradition, however, still determines that all Irish families, whatever their economic status and both in town and country, eat more potatoes and less bread than corresponding families in England. The Irish also eat little cheese or fruit and are largely dependent on the potato for supplies of vitamin C.

The four parts of the Nutrition Survey so far published cover only the findings of the dietary surveys. While these were in progress a widespread clinical nutritional survey was also undertaken. This is now completed, but the data are not yet fully analysed, and until these clinical findings are published the significance of the dietary surveys cannot be finally appraised. Meanwhile we can congratulate the Irish on planning and carrying out a large-scale nutritional survey on a sound statistical basis. Probably no other country now possesses such accurate knowledge of what its people eat. When the final reports are written up it is to be hoped that those responsible for this excellent work will discard the cloak of anonymity which enshrouds the first four parts.

The Biology of Antibiotics

NOWADAYS, when penicillin has ceased to be a wonder and streptomycin is beginning to be "last year's model," when even chloramphenicol and 'Aureomycin' are losing their novelty though they are not yet released for everyday use, and when valuable new antibiotics are reported every month or two, one is apt to regard the moulds and similar organisms as convenient and highly efficient pharmaceutical laboratories provided by a beneficent providence to produce remedies for man's worldly ills. And if we discard this anthropocentric view as too naïve, the question arises why *do* living organisms manufacture this vast variety of complex compounds apparently directed against a fairly limited range of bacteria and other micro-organisms? Analysing the matter further, it may be asked why Penicillia should be so determined to eradicate gram-positive bacteria, whereas the Streptomycetes seem to be a particularly vicious class ready to pounce on both gram-positive and gram-negative micro-organisms, not to mention various rickettsias and viruses. Within the narrow limits of medicine these characteristics seem inexplicable; but when they are seen against the background of general biology, as PRATT and DUFRENOY show in their book reviewed on p. 862, some of these explanations begin to appear.

The component members of any society, whether they are human beings or any other living organisms, continuously influence, and are influenced by, their environment. Further, the neighbouring beings or organisms or cells constitute an important part of that environment. These principles are as true for the growth of bacteria as for the waxing and waning of civilisations. The relations between different organisms living in the same space may be of various kinds. Their influences on each other may be mutually beneficial, when the position is called symbiosis. One organism may use the other to supply it with food and protection against the outside world, as is done by well-adapted parasites. Finally, one organism may inhibit or altogether prevent the growth of another, presumably to gain more *Lebensraum* and food by eliminating its competitors; this is the relationship which VUILLEMIN, in 1889, called "antibiosis," from which the modern term "antibiotic" is derived, though its sense is now narrowed to only part of this field. Such antibiosis is not restricted to bacteria. Many higher plants possess means of keeping bacteria in check, and our own enzyme lysozyme is a similar protective mechanism against bacteria. Some plants exert an antibiotic action against other plants. Thus in the sparsely vegetated Colorado deserts there is a kind of daisy (encelia) which prevents the growth of other plants in the neighbourhood by excreting a toxic substance (3-acetyl-6-methoxybenzaldehyde) which diffuses out from the centre.

The apparently obliging behaviour of the moulds, which labour to cure man's ills, is an artefact produced by anthropocentrism and selection. Man pays particular attention to the factors in his environment that do him harm or good. (Especially, a cynic would say, to those that do him harm.) Thus medical textbooks describe bacteriology in terms of the pathogenic micro-organisms and hardly mention the much more numerous non-pathogenic ones. In reality most bacteria ignore man even more than he ignores them, and the few micro-organisms that produce useful therapeutic agents are a tiny minority among the millions that do not. Their apparently kind action is merely one of a great variety of characters, which has been brought into prominence by man's careful selection of something which will be useful to him. The fineness of discrimination needed in this selection may be judged from WAKSMAN's statement that about 10,000 cultures of organisms were studied in his laboratory alone in the search for useful antibiotics: about 1000 were found to have antibacterial properties; when these were grown in liquid media only about 100 produced specific antibacterial substances; of these, 10 substances have been isolated and described; but only 1 has proved to be of therapeutic importance—namely, streptomycin. To be of therapeutic value, an antibiotic substance must be highly poisonous to some pathogenic bacteria but non-poisonous to the patient. Presumably such a substance is poisonous to an organism because it blocks some essential metabolic pathway. If it blocks a pathway common to all living cells, then it has a wide range of action but it is toxic to the host and so useless. If it blocks a pathway which is irreplaceable only in a small group of bacteria, then the substance has a highly specific action, but it is of therapeutic value only if this small group of bacteria happens to contain important pathogens. All gradations between these extremes of antibiotic action various abnormal orifices. In practice, however, as ROSSIER[14] and other speakers at last year's Swiss Cardiological Congress pointed out, calculations on this basis may be misleading, because streams of blood of different composition entering one chamber of the heart are not necessarily completely and immediately mixed. Shunts can readily be recognised and confirmed on the evidence of single catheter samples, but estimations of their magnitude call for the greatest care and checking by multiple samples. The investigation of congenital heart-disease by catheterisation therefore involves the use of complex pressure-recording devices and critical analysis of the blood-samples obtained, and the unavoidably lengthy sessions, in which the positions of the catheter are followed on the X-ray screen, may expose both the patient and the investigating team to a dangerous dose of radiation unless a time limit is set on screening exposures and the observers are duly protected.[15] The possibilities of error in making cardiac-output estimations on single samples from the right heart were recognised early, and one set of measurements,[16] in subjects with more or less normal circulations, indicates that the coefficient of variation in the cardiac output obtained by the direct Fick method is ± 6 %. This means that estimations must differ by at least 12% to be statistically significant; and when the circulation is rapid, as in anæmia or emphysema, and arteriovenous oxygen differences may be small, the margin for error in cardiac-output calculations is probably still wider.

Hitherto catheterisation has been confined to the right side of the heart. To reach the left ventricle the catheter must be passed against the arterial blood-stream, and arterial spasm is likely to block its passage. Moreover, the aortic valve opens for only a fifth of a second, and it is probably not wide open even then, for ZIMMERMAN and his colleagues,[17] who tried passing a catheter up the ulnar artery, failed to get it through the valve in 5 normal people, though they were successful in 11 patients with aortic insufficiency. The risks of damaging the valves or blocking a coronary ostium, however, are likely to deter others from attempting this feat.

The present position then may be summed up as follows. Cardiac catheterisation of the right heart is remarkably safe and is fully justified in the preoperative investigation of congenital heart-disease. With the advent of surgery in many forms of acquired heart-disease, such as mitral stenosis, catheterisation may also yield results of vital and decisive importance for the future welfare of these patients. While the technical problems involved in extracting the maximum amount of information from a catheter session are still great, such investigations should be restricted to the centres with a considerable experience of the method. In these centres the technique is also justifiably used to advance our knowledge of grave circulatory disease, which can now claim to be the "Captain of the Men of Death." But, as MAHAIM says,[18] "The method must be applied with discernment, humanity, and with respect to the patient."

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[14] Rossier, P., Maier, C., Wolkmann, M. *Cardiologia*, 1949, 15, 147.

[15] Hills, T. H., Stanford, R. W. *Brit. Heart J.* 1950, 12, 45.

[16] McMichael, J. *Cardiologia*, 1949, 15, 172.

[17] Zimmerman, H. A., Scott, R. W., Becker, N. O. *Circulation*, 1950, 1, 357.

[18] Mahaim, I. *Cardiologia*, 1949, 15, 131.

The Irishman's Food

HISTORY can provide no more striking example of the vagaries of fortune than the changing lot of the Irish peasant in the last hundred years. At the time of the great famine in 1845–47, the story of which has been brilliantly retold by SALAMAN in his *History and Social Influence of the Potato*, a large proportion of the poor people in Ireland were subsisting almost wholly on potatoes. Owing to an insufficiency of land and the uncertainties of agriculture, the Irish peasant's hold on life was then as precarious as it often is now in the rice-growing countries of the East. Hunger was his daily companion; starvation a not infrequent intruder. Further, the almost exclusive rôle of the potato in the economic life of the peasants enabled the economically stronger landlords to dominate them completely and reduce them to a state of serfdom paralleled by the absolute subservience of the potato-eating natives of the Andes to their Inca rulers. SALAMAN has demonstrated convincingly how the cultivation of the potato by an agricultural community to the exclusion of all other crops reduces that community to the lowest levels of human degradation. The vast difference in the conditions of today is revealed in the reports of the National Nutrition Survey,[1] sponsored by the Medical Research Council of Ireland, discussed at a meeting of the Nutrition Society in Dublin on April 15. The food consumption of 948 families of small farmers, in all parts of Ireland except Ulster, was determined by weighing over a period of a week. The average weekly consumption per person was 11·1 oz. of butter, 11·6 oz. of sugar, 9·2 pints of milk, 6·4 eggs, 10·6 oz. of bacon, 25·8 oz. of other meat, 162·7 oz. of potato, 65·5 oz. of flour, and 38·2 oz. of bread. These figures will satisfy the dictates of the most rigid nutritionists, and the diet they represent would make the ordinary British citizen's mouth water. Another survey of 200 families cultivating small holdings on poor land on the west coast showed that here the living was not so high, though physiological requirements were more than met. The main reason for this extraordinary change in a hundred years is the disappearance of the landlords. An Irish speaker at the Nutrition Society meeting said: "The Irish peasant is the only farmer in Europe today who owns his own land." This striking statement went unchallenged, and, as regards Ireland at least, represents the facts. More than to any other factor, the Irish peasant owes the change in his fortunes and his satisfactory diet to the present system of land tenure.

In the urban population the general position is not so uniformly satisfactory. The surveys of 500 Dublin families, 329 families in other large towns, and 516 families in small towns show that economic factors play a big part in determining the townsman's diet. Thus the average weekly consumption of milk per head varied at different income levels from 2·7 to 6·7 pints; of eggs from 1·0 to 5·9; of meat from 8·6 to 55·4 oz.; and of vegetables from 12·6 to 41·9 oz. Consumption of bread and potatoes was always adequate. Analyses revealed no serious shortage of calories or proteins in any large group, the local level also, it is hard to understand why this country fails to learn the lessons of the past, and persists in manufacturing ad-hoc authorities to undertake its services, instead of facing boldly the reform of local government."

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[1] National Nutrition Survey, Parts I to IV. 1949. Stationery Office, 3–4, College Street, Dublin. 2s., 1s., 1s. 6d., and 1s.

CARDIAC MASSAGE SUCCEEDS AFTER 7 HOURS

Few doctors would now contend that when a patient's heart stops in the operating-theatre the best thing to do is to inject camphor or some other analeptic. More than a generation of medical students have been taught that the only hope lies in cardiac massage, which not only stimulates whatever power of contraction the heart still possesses but also supplies blood to the cardiac muscle and to the cerebral cortex. Not more than a few minutes may elapse between cardiac arrest and the start of cardiac massage if the manœuvre is to succeed, and that may be why so few permanent successes have been reported. Resuscitation by this means is always dramatic, and it is understandable that even a straightforward case has news value. The case lately reported in the *New York Times*,[1] however, has special claims to novelty. A man of 65 was having an abdominal operation when he collapsed and the anæsthetist said he was dead. The surgeon thereupon opened the chest and gave cardiac massage for 2½ hours. At the end of this the patient was believed to be "again living" and was about to be moved to his room. Then his heart stopped again. This time cardiac massage was maintained for nearly 4 hours, but the patient ultimately recovered and is now walking about the hospital. According to one story [2] he is even planning to take the surgeon with him on a fishing trip.

THE NEW HUMANITIES

"The humanities" are defined by the *Oxford English Dictionary* as "learning or literature concerned with human culture, as grammer, rhetoric, poetry and esp. the ancient Latin and Greek classics." In our changing times this definition seems unsatisfying. Asked where to look for learning or literature concerned with human culture, few men would nowadays turn to grammar or rhetoric, as we use the terms, and not very many to poetry; their hands would more readily stray to texts on anthropology, social history, or preventive medicine. To some extent it must be so; science has taught us to weigh and measure, and the duty of exactness lies heavy upon us—even tempting us at times to believe that what is imponderable cannot exist. But the old humanities, as they were taught to our fathers in medicine, did something more than entertain or bore them, according to their temperaments; just as advances in science did something more to our poets and classical scholars than startle or annoy them—as Prof. John Fulton, giving the Ludwig Mond lecture [3] at Manchester University last year, showed by many a well-chosen quotation. Each aspect of learning drew upon and was nourished by the other. He recalled Osler's words on the same subject:

> "One of the marvels, so commonplace that it has ceased to be marvellous, is the deep rooting of our civilisation in the soil of Greece and Rome—much of our dogmatic religion, practically all the philosophies, the models of our literature, the ideals of our democratic freedom, the fine and the technical arts, the fundamentals of science and the basis of our law. The Humanities bring the students into contact with the master minds who gave us these things—with the dead who never die, with those immortal lives 'not of now or of yesterday but which always were.'"

It was an experience modern students well may envy, peering out, as they hew their way through the thicket of a crowded curriculum, at the spacious rides and noble vistas which refreshed their forerunners. How can they be helped through the trees in time to take a look at the wood? There is not much hope that they will revert to the study of Latin and Greek, as Professor Fulton is well aware; but they may be taught to contemplate the past in a different way, and to contemplate it, he suggests, as George Sarton did, thirty years ago, "from the summit of modern science, with the whole of human experience at his disposal and with a heart full of hope." It can be done, he believes, if teachers will approach the sciences historically, placing them within the framework of general history. By thus drawing on our cultural heritage—the humanities—they can give perspective and meaning to the sciences. They have, moreover, the corresponding duty of seeing that no man graduates from a modern university without having some contact with the sciences, especially the methods of science: without that he cannot understand the world he lives in.

HOSPITAL RECORDS OF PSYCHIATRIC PATIENTS

Interest in "patient documentation" in hospitals continues to grow. In the *Bethlem Royal Hospital and the Maudsley Hospital Records Handbook*, prepared by Dr. C. P. Blacker, the application of the all-conquering unit system to a psychiatric teaching unit is described.

The usefulness of a records handbook in any large hospital is obvious: to the short-service junior member of the professional staff it is a light upon dark places, and to the records department it is a court of appeal. The Bethlem and Maudsley booklet is open to criticism as being less simple than the system it describes. The new doctor has to read through a good deal of detail about the mechanics of the records system before he learns that his share of the work basically consists in (*a*) contributing adequate and legible clinical notes, (*b*) supervising the notes of his juniors to the end that their notes also are adequate and legible, and (*c*) recording and coding diagnoses as soon as a case is closed. It is true that the more he knows about the mechanics of the system, the less likely is he to fall foul of it, but his introduction to the proformas, the decennially arranged master name-file, the registry index cards, the numbering system, the colour signals, and the punch-card should perhaps be less formidable. In other respects, however, Dr. Blacker and his records subcommittee have notably succeeded in what is a specially difficult task. They have homogenised the clinical records of two hospitals 9 miles apart, bringing together (ultimately) ward, clinic, and domiciliary notes. They have achieved the ideal of one patient, one hospital number. They have devised a method of dealing with that perennial nuisance, the outpatient record which cannot be closed because the patient has not been discharged but has simply given up coming to hospital. They have centralised the storage of closed case-records. They have prescribed the order in which the sheets comprising a closed record are to be arranged for filing. They have set up a system whereby interesting data are abstracted routinely from closed case-records and transferred to punch-cards for subsequent study. Their handbook tells everyone on the "line" how to do his duty—how to register a new patient, how to allot a number which will not be duplicated, how to close a record, how to make an abstract, and how to check records for omissions. Definitions are given, and also an extract from the new International Statistical Classification of Diseases and Causes of Death, listing mental, psychoneurotic, and personality disorders.

Any who are shirking the modernisation of archaic hospital record systems (plural numbering, separate ward and clinic notes, bound volumes, and the rest of the familiar hindrances) would do well to look through Dr. Blacker's handbook. It will not tell them how to reorganise the records of a general hospital, but it is

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1. *New York Times*, April 20.
2. *Sunday Express*, April 23.
3. Humanism in an Age of Science Now published by the Manchester University Press. 1950. Pp 26. 1s. 6d.

occur in nature, but it is only a special few in the middle of the range which have been selected by man for medical use.

Why the Penicillia should be particularly antagonistic to gram-negative cocci, while Streptomycetes inhibit gram-negative ones, is still obscure. Further research may reveal some reason for this antagonism in the natural history of the Penicillia. It may be just a case of overlapping, where a mechanism, devised by an organism for one purpose, happens to react beneficially in quite a different biological system elsewhere with which it could never have come into contact by natural means. Thus the cinchona alkaloids are used by man to destroy malaria parasites in his blood; yet the cinchona tree could never have come into biological contact with Plasmodia during its evolutionary history, and it must have developed these alkaloids for some purpose or under some stimulus of its own. Similarly morphine reacts on the human cerebral cortex so as to relieve pain, but this cannot be the reason for its synthesis by the opium poppy. We must conclude that now and again a biological key happens to fit a biological lock quite remote from the one for which it was primarily shaped. Whether this applies to the selective action of penicillin on staphylococci or of chloramphenicol on rickettsias can only be solved by further research on the antibiotics. Work began in this field seventy years ago with Pasteur and Joubert, but it is only in the past decade that it has been pursued with system, energy, and great resources. Progress, which was initially so slow, is now so fast that we may reasonably expect to see these and many other questions answered in the near future.

Annotations

BLOOD DONORS

The men and women whose blood is used for transfusions in increasing amounts year by year probably receive little thought except from those concerned with their recruitment and organisation, or when one of them has the rare misfortune to suffer temporary disablement and sues for compensation. That recourse to law should be necessary to secure compensation is regrettable. In proportion to the total number of donors who are bled each year, the number who have to complain of the way in which they have been treated is very small, and very few of these have to seek financial compensation for loss of wages or expenses incurred by their temporary disablement. In the case recently reported,[1] a donor's arm had become infected. This complication may be unpleasant, causing inconvenience and perhaps anxiety; but fortunately it is rare. In the years 1946–49 infection of the site of venepuncture was reported to the regional transfusion centres on some 44 occasions. During this period some 1,384,000 donors were bled by these centres, so the incidence of infection was about 1 in 31,450 donors bled. In 7 out of the 44 instances it seemed unlikely that the infection was attributable to the venepuncture itself; and, omitting these, the incidence of infection due to venepuncture was about 1 in 37,000. There were probably further cases which were not reported to the centres; but it may be inferred that very few, or none, of these were serious. Of the 44 donors who did report, only 6, or 1 in 230,666, asked for financial compensation; and in each case this was paid without recourse to law. In a smaller series of some 750,000 donors bled during the war years the incidence of infection of the site of venepuncture was about the same—namely, 1 in 31,500.

The medical services and patients of this country owe a considerable debt to their voluntary blood donors; and, though these are repaid mainly by the satisfaction of knowing that their gifts of blood have been used to relieve suffering, we cannot do less than ensure that the care they get is of a high order. The responsibilities to the donor of those who arrange the donor clinics and take the blood are great. The apparent simplicity of this commonplace manœuvre may tend after a while to obscure the need for an immaculate technique carried out by a skilled and practised operator. With constant repetition, venepuncture becomes a dull occupation; but it should not be undertaken in a lighthearted or careless manner, and it should remain a medical responsibility. Nor should it be forgotten that the voluntary blood donor deserves the best, medically and in other ways. This implies, among other things, a polite and friendly atmosphere, a reasonable standard of comfort, and a competent operator who will not have to "dig for victory" with each needle. Donors who have been badly treated in any way do not come back, nor are they likely to persuade their friends to become donors. Should these volunteers be unlucky enough to suffer injury or loss attributable to the donation of blood, requests for compensation should be considered sympathetically and rapidly.

OPINIONS FROM EASTBOURNE

The Chancellor of the Exchequer has suggested that the proportion of the national income that can be devoted to health services has now reached its upper limit. The Congress of the Royal Sanitary Institute, held in Eastbourne from April 24 to 28, revealed lively concern that available funds are not being used to the best advantage. Thus Earl de la Warr, in his inaugural address as president of the congress, spoke forcefully about the imbalance between expenditure on the curative and on the preventive services. "Last year," he said, "Exchequer and personal payments amounted to over £450 million for the National Health scheme, and during the same period the sum of £9 million was allowed for subsidising new permanent houses, and just over £6 million for the school health services. 'Clinics and hospitals are great and wonderful institutions . . . but if we had to choose between a hospital bed and having a house to ourselves, there is not much doubt where our choice would lie, on both personal and health grounds." Dr. H. C. Maurice Williams, president of the conference of medical officers of health, spoke in similar vein. "With a limit on national expenditure, a stage has been reached when the relative values between an extension of the social services and the rehousing of the people ought to be properly assessed. It appears illogical to have reduced for financial reasons the erection of permanent houses by 25% during the last two years, whilst the expenditure on other less essential social welfare is going ahead by leaps and bounds." Our preoccupation with curative services was also criticised by Prof. James Mackintosh, president of the preventive-medicine section. There had, he remarked, been no broad conception of a national *health* policy, either in the National Health Service Act or in the plans which had been put forward since the Act came into force. "On the contrary, there has been an unmistakable tendency to split the rounded concept of national health into artificial segments, each under a different government department. This creates a muddle of central authorities competing for the supervision of local health services at the very time when one might have hoped for greater coordination and economy of effort. . . . At

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[1] *Lancet*, March 11, p. 461.

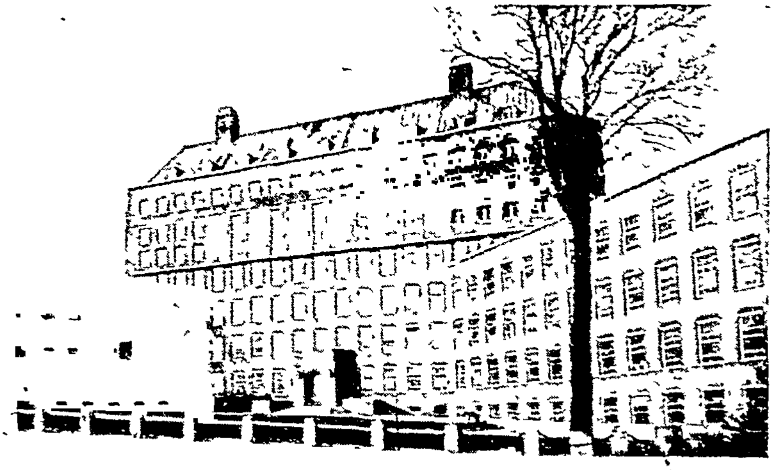
Special Articles

NATIONAL INSTITUTE FOR MEDICAL RESEARCH

Opening of New Building

TODAY, Friday, May 5, His Majesty the King opens the new building of the National Institute for Medical Research, at Mill Hill, London. Construction began as long ago as 1937 and the outer shell was finished in 1940, when work had to be discontinued. From 1942 until 1946 it was used by the Royal Navy as a training-centre for the W.R.N.S., and it was only last November that departments began to move from the old headquarters in Hampstead.

This is not the first time that war has delayed plans for the institute's development. In 1914 the Mount Vernon Hospital, Hampstead, was purchased by the Medical Research Committee (the precursor of the Medical Research Council), which had been set up a year before. This building was to be the Committee's main research establishment—as the present institute is the Medical Research Council's—but war intervened, and the building at Hampstead was first brought into use in 1920.



Exterior of the new building.

[*Associated Press*

In 1922 the council purchased an estate at Mill Hill, where farm laboratories and other buildings were erected. In 1936 a demand for further expansion of the institute arose from the need for extension of research in chemotherapy; and, since the possibilities at Hampstead were by then exhausted, it was decided that a new and larger building should be constructed on the Mill Hill site.

RETROSPECT

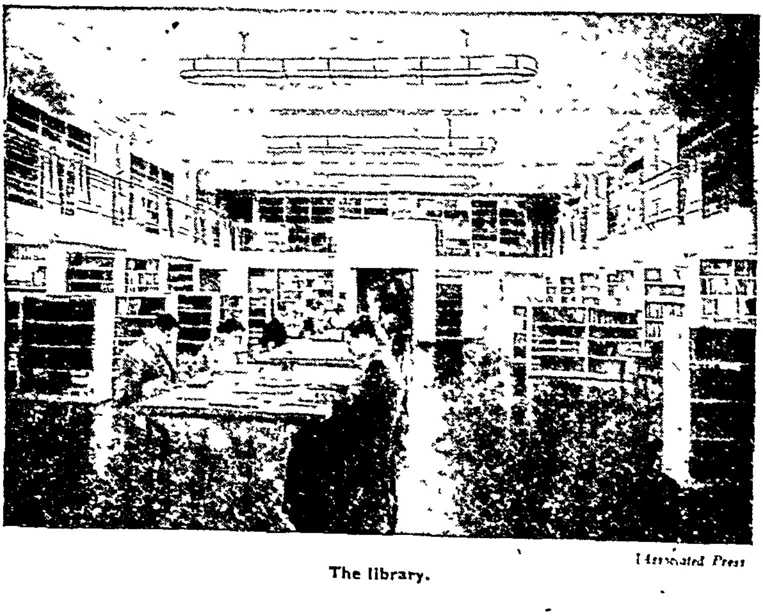
Though the building is new, the policy, as Sir Charles Harington, F.R.S., director of the institute, has made clear,[1] will remain the same. This policy has remained unchanged since it was first set out by the Medical Research Committee in their first report (1915):

> "The object of the research is the extension of medical knowledge with the view of increasing our powers of preserving health and preventing or combating disease. But otherwise than that this is to be the guiding aim, the actual field of research is not limited and is to be wide enough to include, so far as may from time to time be found desirable, all researches bearing on health or disease, whether or not such researches have any direct or immediate bearing on any particular disease or class of diseases, provided that they are judged to be useful in promoting the attainment of the above object."

The Committee decided on four methods by which to achieve these aims: (1) the employment of full-time investigators in centralised laboratories; (2) the appointment of full-time and part-time investigators in hospitals and elsewhere for special researches; (3) the provision of assistance grants to workers in academic institutions engaged in independent researches in the general field of interest; and (4) the maintenance of a statistical department. Under the National Insurance Act of 1911, one penny per insured person was provided from public funds for purposes of research; and in the first year this yielded £55,000. The sum allotted for current expenditure by the council in 1948–49 was £770,000.

The work of the council, and of the institute, has all along been conducted, in Sir Charles Harington's words "with almost academic freedom." Departmentalisation has been abjured: but teamwork has become increasingly prominent.

> "It seems to me," Sir Charles has said,[1] "that the history of the virus work at the Institute . . . forms a good illustration of effective team work in medical research, although at no time has there been any pretence at the formal constitution of a team. It is perfectly clear that the field of scientific effort covered by the research as a whole has been so wide that no one man unaided could have made much progress. On the other hand, at the outset of the investigation it was quite impossible to predict the devious paths which would have to be followed and the different branches of science into which excursions would have to be made. In these circumstances the course which was actually followed seems to have been the best, the essential feature being readiness at all times to extend the investigation in any desired direction by the addition of the help of an appropriate worker. In this way there is in fact ultimately formed a team of investigators whose efforts are all generally directed to the same end; but the team is never rigidly defined; it grows only in response to the demands of the work, and the individual members retain a considerable degree of scientific independence and scope



The library.

[*Associated Press*

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[1] *Proc. roy. Soc. B.* 1949, 136, 333.

certainly good evidence that the unit principle can be applied successfully in circumstances far more complex than those existing in any ordinary general hospital.

HEALTH AND SAFETY IN MINES

COAL-MINING is one of the most hazardous occupations. The latest reports of the chief inspector[1] and the electrical inspector[2] of mines offer no cause for complacency with the safety or the control of disease. Nevertheless in recent years there has been a fairly steady decline both in fatal and in other serious accidents. Between 1928 and 1948 fatalities fell from 103 to 65 per 100.000 employed, and serious injuries from 437 to 390. (In 1948 factory workers, numbering some $6^1/_2$ million, suffered a fatality-rate of only 8 per 100,000 employed.)

The chief causes of accidents were "falls of ground" and "haulage"; 243 persons were killed and 905 seriously injured by falls, and 109 killed and 618 injured by haulage accidents. The chief inspector rightly points out that the combined accident figure is the only one that matters; it is pure chance whether a man is killed or seriously injured by a fall of ground. The increasing use of locomotives and trunk conveyors for underground transport is one of the chief factors in the decrease in haulage accidents; the practice adopted in the Dutch State mines of providing a driver's seat and controls at each end of the locomotive should be followed here. Serious accidents occurred through contact with the coal-conveyor, often due to riding or stepping on the conveyor belt—a forbidden practice. Fires on conveyor belts can cause serious loss of life, as was tragically demonstrated at Whitfield Colliery, North Staffs, where six men died as a result of one such accident.

In 1948 there were no major underground explosions, but there were seven minor fire-damp explosions causing severe injury; in four cases smoking was the immediate cause, and in every case the ventilation in that part of the mine was found to be defective. Accidents from electricity resulted in the death of 3 and serious injury of 66. Nearly all these accidents occurred underground, and often the use of unscreened trailing cables was the cause—the electrical inspector rightly condemns the continued use of such dangerous apparatus. At the same time, it is satisfactory that increased use of electrical horse-power in mines is not being reflected in an increased number of electrical accidents. Since 1938, accidents due to shot-firing have increased by 57%. There has been an increase in the amount of explosive used, and the chief cause of accidents has been failure to take proper cover at the moment of firing. Surface accidents are usually due to moving wagons or tubs, to slipping or stumbling, or to contact with moving machines.

Study of the chief inspector's report induces the depressing conclusion that far too many mining accidents are caused by negligence on the part of managements, or deliberate contravention of orders or personal carelessness on the part of men working in or about the pits. The most important preventive measure would appear to be instruction in the need for, and methods of, personal safety. Dangerous practices, such as smoking in forbidden areas, should be severely dealt with; and supervision—admittedly difficult in a mine—needs strengthening. The scope of training is, in fact, being widened; and in 1948 some 41,600 persons received preliminary instruction either at a colliery or in a training centre. The reorganisation and extension of the Mines Rescue Service and the provision of properly trained and equipped first-aid squads underground have gone far to ensure that skilled help is quickly forthcoming in the event of an accident. The establishment of pit-head surgeries is also proceeding, and 58 State-registered nurses are now employed in coal-mines, all working under medical supervision.

During the year, 4291 persons were certified as suffering from pneumoconiosis. Comparison with previous years is not easy, owing to the changed basis for notification under the National Insurance (Industrial Injuries, Prescribed Diseases) Regulations, which came into force on June 30, 1948. The employment of the pneumoconiotic miner who is able to work is one of the most serious problems confronting the country today. The industry cannot afford to lose all those who are certified as having the disease, and the provision in all collieries of sufficient working places with "approved dust conditions" demands urgent attention The chief inspector rightly declares that the prevention of pneumoconiosis depends on "effective measures being taken to limit or decrease the amount of airborne dust as a whole," and that these measures consist in devising coal-mining methods which produce the minimum of dust, and in effective methods for suppressing whatever dust is produced. Nystagmus is probably the next most important disease affecting miners. Its exact cause is still uncertain, but there is no doubt that insufficient illumination is a major contributory factor. The lighting in our coal-mines, particularly at the face, is nearly always insufficient; and, although improvements are now in train, it is doubtful whether these will be fully effective in preventing further cases.

Meanwhile, proper maintenance of existing lighting equipment, whitewashing headway surfaces, and the use of inert dusts with low absorption factors can make the most of incidental light. The chief inspector draws attention to the use in laboratories and in certain maintenance operations of such substances as benzene, carbon tetrachloride, and trichlorethylene, and he urges that attention be paid to the recommended maximum permissible concentrations and to training workers in the necessary precautions. One does not usually associate coal-mining with the use of toxic solvents, and this timely reminder provides a further example of the diversity of risks to health in an industry.

THE MEDICAL BILL

THE Medical Bill meets many of the recommendations of the British Medical Association and the two defence societies; but all these bodies, with varying emphasis, would like to see some further improvements. Thus they all favour some further increase in the number of elected members of the General Medical Council, and believe that at least a third of the disciplinary committee should be elected members. The Medical Defence Union thinks a disciplinary committee of 19 too large: it would prefer 12. All three bodies want it laid down that no member of the council who has made a preliminary examination of a case shall sit on the committee hearing that case. All again agree that (except in matters arising from court proceedings) complaints against practitioners shall not be considered unless made formally in writing—a proposal designed to prevent vague charges being made to the council by official bodies which are unwilling to substantiate them. Amendments are also suggested to prevent some future council from removing a convicted doctor from the Medical Register without holding an inquiry of their own. It is pointed out that nowadays a potential penalty of £20 is not enough to deter people from falsely representing themselves to the public as registered medical practitioners; and the M.D.U. also raises the interesting question whether a doctor should be at liberty to use a registrable qualification unless this is in fact registered by the G.M.C.

DR. R. G. GORDON, physician to the Royal United Hospital, Bath, died on April 26.

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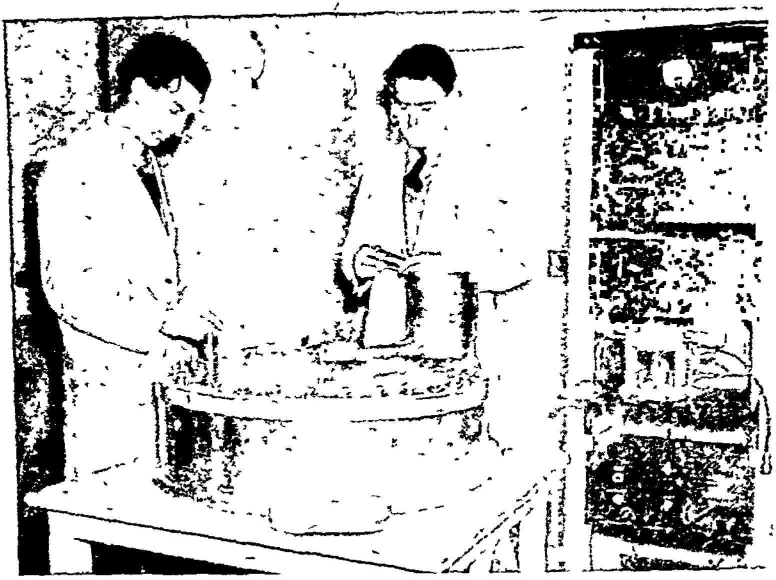
[1] Report of H.M. Chief Inspector of Mines for the Year 1948. H.M. Stationery Office. Pp. 42. 1s.

[2] Report of H.M. Electrical Inspector of Mines for the Year 1948. H.M. Stationery Office. Pp. 18. 6d.



[Keystone Press

Automatic radioactive-isotope counter.

W.H.O.'s World Influenza Centre is administered from the institute, which is also responsible for many international biological standards.

THE BUILDING

The new institute, the largest of its kind in the Commonwealth, will ultimately suffice for about 100 scientific workers and 250–300 assistants. The building, designed by Mr. Maxwell Ayrton, F.R.I.B.A., is situated on the Ridgeway, Mill Hill, at the south-east corner of the council's 40-acre estate. The building is of brick construction, with a copper roof. In form it consists of a central block with two obliquely set wings at each end—an arrangement which provides excellent light in all rooms. The centre block is of seven storeys and the wings are of three storeys, from ground level at the front. The total area of the working space is approximately 90,000 sq. ft., excluding the Fletcher Memorial Hall (at the rear of the main block) and stores. Separate buildings are being constructed for an insectarium and for work on radioactive isotopes.

The general arrangement is as follows: lower ground floor, engineering services, stores, and laboratories; ground floor, administration, fine-instrument shop, and laboratories; first, second, and third floors, laboratories and animal-house; fourth floor and mezzanine, library; fifth floor, canteen; sixth floor, club rooms.

The building is notable in several ways. Thus in the chemistry department the separate laboratories have no entrance doors, and instead open on to a central aisle; while in the biophysics division all the darkrooms (for electron microscopy, photography, &c.) are placed centrally, thus ensuring the best use of window space for lighting. There are hot and cold rooms on each floor, and the largest of the cold rooms is equipped for laboratory work. In the animal-house the cages are slung from the ceiling, thus affording free access.

The division which has perhaps gained most by the transfer is that of biophysics, which at Hampstead was both cramped and scattered. This department epitomises the spirit of integration which the council has set out to foster, for at least half the time of its workers is devoted to services to other workers in the institute and elsewhere. The division undertakes all forms of microscopy: and it contains an electrophoresis laboratory, a counting-room for radioactive isotopes, and a mass spectrometer laboratory. (In the past two and a half years the mass-spectrometer, built by the institute staff has been used for 1500 analyses a year.) The division also undertakes the freeze-drying of biological materials; and it is equipped for ultrasonic disintegration. There is a subunit of photography. The service provided here is probably unparalleled by any other single department in the world.

When the transfer to Mill Hill is completed, the Hampstead building will not be abandoned. It is to house some of the council's scattered units.

PROVINCIAL TEACHING HOSPITALS

BOARDS OF GOVERNORS

THE Ministry of Health has made the following appointments, mainly to fill vacancies caused by the retirement in rotation of a third of the members, to the boards of governors of the ten provincial teaching hospitals in England and Wales. Of 89 appointments, 69 are reappointments of retiring members. There are two appointments outstanding. The names of the medical members are shown in bold type.

UNITED NEWCASTLE-UPON-TYNE HOSPITALS

Reappointed: **H. H. Evers**, F.R.C.O.G.; Prof. **F. J. Nattrass**, F.R.C.P.; Prof. **R. Bramble Green**, F.R.C.S.; E. F. Collingwood, C.B.E., J.P.; T. A. Wright; Alderman John Chapman; Edward Colgan; F. B. Fenwick; John Walmsley.

UNITED LEEDS HOSPITALS

Reappointed: Alderman David Beevers, J.P.; Prof. **A. M. Claye**, F.R.C.O.G.; Prof. **T. Talmage Read**, F.R.F.P.S.; Prof. A. N. Shimmin; W. M. Jones; Miss Elinor Lupton, J.P.; **J. E. Rusby**, M.C., L.M.S.S.A., J.P.

New member. **Donald Watson**, F.R.C.S.

UNITED SHEFFIELD HOSPITALS

Reappointed: A. R. Martin; J. I. O. Masson, M.B.E.; Theophilus Pearson, J.P.; **H. R. Vickers**, M.R.C.P., J.P. Prof. **E. J. Wayne**, F.R.C.P.; Albert Barber, B.E.M., J.P.; J. Madin, J.P.; Percy Malby.

New members: Councillor Albert Wilde; Lieut.-Colonel N. G. Pearson, D.S.O., M.C. (until March 31, 1951).

UNITED CAMBRIDGE HOSPITALS

Reappointed: E. W. Plumpton, J.P.; **C. H. Whittle**, F.R.C.P.; Prof. **A. Leslie Banks**, F.R.C.P.; Lady Bragg, J.P.; Mrs. Ethel Hepher.

New members: Lady Rook; T. C. Wyatt; E. C. Webb, PH.D.

UNITED OXFORD HOSPITALS

Reappointed: Miss Rosemary Spooner; **C. W. Carter**, B.M.; **R. G. Macbeth**, F.R.C.S.E.; **Arthur Elliot Smith**, F.R.C.S.; Alderman Mrs. **I. D. Harrison-Hall**, M.B., J.P.; A. F. King.

New members: J. E. Grant; R. E. Warrell; Colonel Krabbe.

UNITED BRISTOL HOSPITALS

Reappointed: Prof. **A. I. Darling**, M.R.C.S., M.D.S.: Alderman J. J. Milton, J.P.; Sir Philip Morris, C.B.E.; **A. G. Palin**, F.R.C.S.E.; H. B. Stokes, M.B.E.; Lady Sinclair; Councillor Mrs. Helen Bloom; Miss I. M. Lobb.

New member: T. H. Lawley.

UNITED CARDIFF HOSPITALS

Reappointed: Alderman Joseph Dicks; Sir **Ewen Maclean**, F.R.C.O.G., J.P.; Alderman James Griffiths, J.P.; S. R. Marsh; E. E. Tompkins, J.P.; A. S. W. Johnson, J.P.

New members: Alderman J. J. Panes, O.B.E.; **David Ioan-Jones**, F.R.C.S.; **William Phillips**, F.R.C.P.

[Associated Press

A biochemical laboratory.

for initiative. I am myself convinced that, for the organisation of work on problems requiring coöperative effort for their solution—and this includes many problems of medical research as it has developed today—these are the correct principles. . . . If the organisation . . . seems to some to be ill-defined and loose in structure, this is because of the pre-eminent importance which is attached to the principles of flexibility and avoidance of departmentalisation."

DIVISIONS

When the institute first opened, its work fell into three main divisions—bacteriology, pharmacology and biochemistry, and applied physiology. Down the years there has been increasing emphasis on biochemistry and biophysics on the one hand, together with a broadening of biological research through endocrinology to more general aspects of experimental biology on the other; and today the broad categories are physiology and pharmacology, pathology, chemotherapy, biochemistry, experimental biology, and biophysics. In each of these fields workers at the institute have contributed fundamental advances.

[Keystone Press

Sterile chamber.

The physiological work is associated chiefly with the name of Sir Henry Dale, O.M., the first director, whose research has ranged from studies of anaphylaxis to the work on chemical transmission of nervous impulses for which he was awarded the Nobel prize in medicine in 1936.

The present-day use of curare and allied drugs in anæsthesia largely derives from work of chemists and pharmacologists at the institute. In pathology the principal advances have been concerned with pathogenic viruses. These include the identification of dog distemper as a virus disease and the discovery of a method for its prevention; and the isolation of the influenza virus.

[Keystone Press

Cultivation of influenza virus.

In chemotherapy the foundation was laid for the development elsewhere of stilbamidine; while in pure chemistry a theoretical contribution led to fundamental clarification of the problem of the structure of steroids. The isolation of calciferol and its identification as the substance responsible for the antirachitic activity of irradiated ergosterol was the work of a team at the institute; and the division of experimental biology has done important research on problems of the physiology of sex hormones. On the physical side ultraviolet microscopy has been greatly developed; and the institute's workers now lead in the application of electron microscopy to bacteriology and virus research.

confused recollection of being in a small ward where something amused me very much. That night I lost consciousness for about a week. I was found to have a fractured skull. When I came to, I could read a little but could not speak or even grasp what was said to me. After I had been some days in this state the matron came in on her morning round and said as usual, "Good morning, Doctor," to which she was delighted to hear me reply, "Good morning, Matron."

My senses of smell and of taste were severely affected for about six weeks after this fall; most of the food tasted peculiar and not very appetising. Swede, a one-time favourite of mine, I still cannot eat; even other vegetables cooked in the same pot taste of it, and a most unpleasant taste it is. At first I could not enjoy the taste of whisky, and both beer and stout tasted like water. Luckily I have since fully recovered my taste as far as drinks go.

I went back to my job, but after about three months my epileptic fits were obviously becoming more frequent, so I had to resign. I returned home, hoping that the better food would have the same good effect as before, but I gradually got worse and developed some new symptoms. One was a greatly increased sensitivity to noise, so that the barking of dogs would upset me badly. When their noise was more than I could stand I used to dash out into the street to try and stop them barking. Usually, of course, by the time I got there they would already have stopped. There was also a curious tendency to lacrimate for no particular reason, and without the usual emotion. But I also had become more emotional, and was much more easily moved by sad passages in films or novels. My memory had got very bad. I had to write down any instructions or messages to the most minute detail. Here, for example, are the instructions in my notebook for finding the materials for making tea. "Teapot in cupboard facing one in kitchen. Milk in frig. 5 teaspoonfuls of tea. Sugar, find." This loss of memory made my everyday life more difficult. Thus, travelling across London by Underground, I put the ticket in my pocket, but when I had to produce it for the collector I could not find it and had to pay the fare again. I must have looked several times in the wrong pocket, and of course later on I found it easily.

My fits were by no means always complete. They often stopped at a stage when I was making involuntary repetitive noises. Once when out for a walk I went through the pedestrians' wicket gate at a level crossing and noticed that the spring was rather stiff. I said to myself, "That spring is too stiff" and then my thoughts, so to speak, "stuck," so I went on thinking "that spring is too stiff," "that spring is too stiff," as if my brain was a gramophone and the needle had stuck in the groove.

Another occasional trouble was the failure of my subconscious mind to make the subsidiary decisions—for instance, when writing something down I had to stop and think out all the separate actions, instead of occupying my mind entirely with what I intended to write. There were also curious variations in appetite. Once I had three breakfasts one morning and still had an excellent appetite for lunch. Another symptom is difficult to describe. On going back to revisit a once-familiar scene, some people are conscious of a difference in the atmosphere. Everything is in its familiar place and looks the same as expected, yet there is a different feeling about it all. I used to notice this difference of "atmosphere" or "background" nearly every day, sometimes for a week at a time. I even noticed myself how stupid I was becoming.

I was then fortunate enough to visit a neurological surgeon, and after a consultation with one of his physician colleagues I was admitted to a world-famous hospital. Here I had a more detailed and complete examination than ever before, and in a few days my cerebral tumour was found. I was very pleased, for I had never been satisfied with the diagnosis of idiopathic epilepsy. The tumour—an astrocytoma—was successfully removed a few weeks later.

In the seven months which have elapsed since the removal of the tumour my initiative has greatly improved; my intelligence has become keener; and I have had no grand mal attacks. I am still taking phenobarbitone twice a day. I still have occasional attacks of confusion or failure to find the right word, and sometimes a spell of acute depression lasting a few seconds. These attacks are unquestionably becoming less frequent, and altogether I am much more cheerful than I had been for several years.

Public Health

Dysentery in England and Wales

NOTES EXTRACTED FROM A MEMORANDUM BY MEDICAL OFFICERS TO THE MINISTRY OF HEALTH

THERE have been 3938 notifications of dysentery in the first quarter of this year, and the great majority of these cases were due to infection with *Shigella sonnei*. In comparison, the figure for the first quarter of 1945 (the year with the highest recorded incidence) was 5163. The average of weekly notifications for March, 1950, was 367, compared with an average of 208 for the same month in the eight-year period 1941–1948; while in the week ended March 25 notifications numbered 427—an incidence exceeded this year only in the last week of February (445). In such circumstances it is possible that the present year, after four years of comparatively low incidence, may prove comparable to 1945.

The largest numbers of notifications have been in the North; and up till now the West Riding of Yorkshire has headed the list, with the county boroughs, particularly Sheffield, as the main contributors. Notifications in Durham, Northumberland, and Lancashire have also been high.

In recent years the greatest numbers of cases have been reported in February, March, and April, and in September and October. Notifications in the other months of the year have not been immaterial, but curiously enough the hot summer months have had low figures.

Geographical distribution is remarkable in that some counties have notified practically no cases; and since Oct. 1, 1949, Bucks, Dorset, Hereford, Herts, Northants, Rutland, Salop, Somerset, Westmorland, Wilts, and all the Welsh counties except Carmarthen, Glamorgan, and Monmouth have produced less than 10 cases apiece.

The extent to which these low figures are due to failure of notification is uncertain.

Detailed analyses are not available, but there is little doubt that the distribution of cases by age-groups is much the same as previously, and that the 0–5 age-group is sustaining the main weight of the attack. As before also, day-nurseries and nursery schools and classes have suffered particularly, although intra-family spread has been very evident.

Clinically, the disease is mild, and the death-rate has been negligible. Nevertheless, concern is justifiable on account of: (1) the week or more of lowered health after the attack; (2) the occasional severe case, and, rarely, the death of a patient; and (3) the effect on industry of absence from work of large numbers of mothers who have to remain at home to tend their sick children instead of leaving them in the care of day-nurseries, nursery schools and classes, or similar institutions.

SOURCES OF INFECTION AND INFECTIVITY

The fæces of the frank case are an obvious source of infection, but convalescents, symptomless excretors,

UNITED BIRMINGHAM HOSPITALS

Reappointed: Alderman A. F. Bradbeer; D. Bulgin; Prof. **P. C. P. Cloake,** F.R.C.P.; J. F. Crowder; Alderman Mrs. Elsie Farley, J.P.; Sir Raymond Priestley, M.C.

New members: **Ernest Bulmer,** C.B.E., F.R.C.P.; W. J. G. Sperryn; H. Busill Jones.

UNITED MANCHESTER HOSPITALS

Reappointed: **O. M. Duthie,** M.D.; Alderman Joseph Eastham, J.P.; E. C. C. Evans, M.B.E.; G. H. Goulden; Graham Halbert; Prof. **H. S. Raper,** C.B.E., F.R.C.P., F.R.S.; **Sir John Stopford,** F.R.C.P., F.R.S.; Prof. **F. C. Wilkinson,** M.D., F.D.S.

New member: H. S. Newbold.

UNITED LIVERPOOL HOSPITALS

Reappointed: Sir **Henry Cohen,** F.R.C.P., J.P.; Miss Mary Jones, O.B.E.; Thomas Keeling, J.P.; George Leather, J.P.; Thomas McDonald; Prof. **H. H. Stones,** M.D., M.D.S.

New members: Councillor H. S. Dickson; Councillor W. L. Bateson; **Philip Hawe,** F.R.C.S.

Disabilities

50. CEREBRAL TUMOUR

WHEN I was a boy of 15 or 16 I had an attack of malaise, ushered in by the most severe headaches I have ever had. The local doctor ordered me a mixture which stopped the headaches though the malaise continued for another fortnight. I think it was at this time that I saw bright spots moving about rapidly for an hour or so, with no associated pain or other discomfort.

My progress at school was uneven. I entered for the junior-grade intermediate examination when I was a year under age, and unexpectedly passed. Next year, being the right age, I went up again, and failed. My school reports often said "Could do better"—but I don't regard this as at all diagnostic! Next year I unexpectedly passed the middle grade. When I entered college I took my place at the tail of the brighter ones, or at any rate in the van of the ruck. However, I did not manage to keep this up for more than a year or so.

For many years after this I had vague symptoms which I did not take very seriously. It is so difficult to know what is the normal. From time to time I would lose my appetite, and I used to sweat a lot, especially on exertion, so that a bunch of keys in my trouser pocket was usually rusty. Occasionally I noticed the little and ring fingers of my left hand twitching, and now and then I had a feeling that some disaster was about to happen. Sometimes I was irritable, and sometimes I made caustic remarks; but many of us do.

When I was abroad, at the age of 35, I had a more severe attack of malaise, accompanied by bradycardia and giddiness, and shortly afterwards I had my first epileptic attack. In the middle of the night I was awakened by a pain in my back so severe that I had to take opium for it. In addition, my tongue was sore and my pillow bloodstained. There was no enuresis in this attack or in any subsequent one. When consulting my doctor about my back I mentioned the question of epilepsy, but he did not take the suggestion very seriously. Later my back was X-rayed and a deformity was found; I was admitted to hospital, where the final diagnosis was Scheuermann's disease. (This is of the same nature as Schlatter's disease, but in a different site.) While I was in hospital I noticed an occasional sinking feeling in the precordium, followed by a forcible heart-beat, and this symptom continued intermittently up to a few weeks ago.

About nine months after my first fit I had several more at night, and as these were noticed by other people a diagnosis of idiopathic epilepsy was made. The attacks now assumed a pattern: they nearly always occurred at night; I nearly always injured my tongue, but was never incontinent; and my muscles were always stiff afterwards. Sometimes my appreciation of colours and sounds was heightened after the fit.

Up to this time my mind had been pretty clear; but now I began to have a peculiar sensation as though my thoughts were being rapidly revolved. I could almost hear the buzz! This happened many times a day, but it was all over so quickly that it caused me little inconvenience and did not interfere with my usual activities; my train of thought continued its course practically uninterrupted. I also noticed that if I was in a brightly lit room and the light was suddenly put out, there was a subjective image of brightness which flickered about 10 times a second for several seconds. Later I lost the bright image which normally follows pressure on the eyeball—"seeing stars." I was on a poor diet, so I went home to Ireland and enjoyed unrationed food for a few months, with excellent results; I put on weight rapidly, my psychological symptoms disappeared, and I soon felt quite well. So, taking the optimistic view, I decided that the whole thing was a matter of malnutrition, and returned to work.

I now had to live in lodgings, and the war-time diet there was very poor. About two months after I had resumed work I had rather an alarming experience. While walking with some friends I suddenly felt as though a flash of lightning had passed through my brain. I did not tell anyone about it—indeed, I had become rather secretive about the whole business. A few weeks later I had a similar attack. About this time I had nocturnal cramps in my calf muscles, and I often found difficulty in emptying my bladder at one go; sometimes it took several attempts, each producing some urine, before the bladder was empty. A few months later I began to have trouble with my eyesight. I had my eyes tested and wore the glasses ordered even when using a microscope; they gave me some relief.

I now had my first epileptic attack when not in bed. I was talking to a colleague when I suddenly had the most awful feeling of terror I have ever experienced. The whole world seemed to be slipping away, leaving me isolated and helpless. When I came to, I found myself on a stretcher on my way to a ward. When I was better I went to a well-known hospital and had the routine investigations for such a case; the diagnosis was as before—idiopathic epilepsy.

Then I began to have more severe psychological symptoms. The moving lights recurred, though they did not last so long as before. Several times I felt an urgent desire to speak to anyone who happened to be close by, whether I knew them or not; I did not know what words I wanted to say, so the result was an intense mental conflict. Occasionally, after I had gone to bed, I had a feeling of acute loneliness, almost amounting to fright. In the daytime I sometimes used to sit at my desk gazing into space for long periods, unable to concentrate on my work. If I suddenly stood up, I had peculiar feelings which I cannot describe, lasting a second or two. Sometimes the same thing would happen just before I yawned. I also noted that when I took off my hat the rim left a horizontal mark on my brow which remained visible for an hour or more.

For domestic reasons I had to return home, and the day after I got back I went down to the village to make some purchases. I can remember walking out of a shop, but just after that I must have fallen heavily, striking my head such a resounding crack on the pavement that the shopkeeper came running out to see what had happened. I was taken to hospital on the fire-engine, which happened to be there at the time, and apparently I could speak on arrival, as I gave my name and address correctly. I cannot remember that part, but I have a

This appears to be the most serious outbreak of the disease since 1943, when 7007 cases occurred in Calcutta. Normally, the Calcutta curve of incidence falls off sharply in July and August, with the coming of heavy rains. During the past thirty years, the annual number of cases in Calcutta has never fallen below 1800.

Apart from the seasonal rise in incidence, the influx of refugees appears to be a factor in the present outbreak.

Parliament

Quality of Flour

On April 20 and 25 the House of Lords discussed whether the extraction-rate of our flour should be decreased from 85 to 80%. In moving for papers Lord **Hawke** called attention to the unsatisfactory quality of our present flour. It produced a dirty-coloured bread which did not keep, did not taste good, was indigestible, and required adulteration. For all this he blamed the high extraction-rate. Before the war we had an extraction-rate of 70 to 72%, producing a white bread which was acceptable to the people. In the war to save shipping the rate was put up to 85% and was subsequently reduced to 80%. In 1945 a strong committee, of which Lord Horder was a member, considered the question of the post-war loaf and recommended an 80% extraction-rate. The committee considered that a lower extraction-rate would be nutritionally satisfactory provided that it was fortified, but this the medical members of the committee were not prepared to recommend without having the results of further experience and experiments. In May, 1946, the extraction-rate was put up to 90% as a result of a world wheat shortage, but in September of the same year the rate was reduced to 85% and it had remained at that level ever since.

Owing to the higher extraction-rate, he continued, there was more phytic acid in the flour, and to offset this it was necessary to add some chalk-like substance, which was unwelcome to many. Lord Hawke held that the time had come to revert to an 80% extraction-rate, and indeed even a lower rate in the light of experiments on fortification.

Lord **Horder** said there should be made easily available for every citizen the best bread that modern milling and baking could produce. By "best bread" he meant a bread that contained a maximum amount of essential nutrients compatible with acceptability of taste, colour, texture, and digestibility. Digestibility had been specially considered and they had come to the conclusion that provided a patient could eat bread at all, he could eat and digest the national loaf—i.e., the 85% extraction loaf—equally as well as the pre-war loaf. But acceptability was important for two reasons. If bread was acceptable it was digested better and more was eaten. Also, if bread was acceptable less was wasted. The idea that bread was just a starchy food was a fallacy; it was good and a cheap source of protein as well as of other essential nutrients. It was, and deserved to be, the staff of life, and millions of our people depended on it as their main source of nutrition.

Lord Horder agreed that the interdepartmental committee set up to assist the Health, Food, and Supply departments in advising Ministers on regulations to be made when war controls were removed, had come to no decision as to the relative value of a low extraction-rate with enrichment as against a high extraction-rate without enrichment. Lord Horder thought that conclusion was wise, because knowledge of those matters at that time—in 1945—was inadequate to justify a decision. The committee had recommended an extraction-rate of 80%, which was the rate current when it met. Lord Horder asked why we should not now return to that rate, which gave a more acceptable loaf and adequate nutritional value.

Finally, Lord Horder uttered a warning against attaching too rigid a significance to the extraction-rate [illegible] when assessing the nutritive value of bread. [illegible] departmental committee had urged that further [illegible] should be undertaken, and Prof. R. A. [illegible] F.R.S., and Miss E. M. Widdowson, PH.D., had recently undertaken tests on behalf of the Medical Research Council in which groups of German children were fed with bread of 100% extraction, with bread of 85% extraction, with pre-war bread of 72% extraction enriched with vitamins, and with pre-war bread without enrichment. Each child had as much bread as it wished, and its normal ration. When the experiment began the children were all about a year behind American children in weight and one year and four months behind in height. After nine months the children had about caught up to the American standards, but in Dr. Widdowson's own words: "There was no difference whatever between the five groups . . . the children on unenriched white bread did as well as the others."

But Lord Horder added the warning that an experiment must not be taken out of the conditions in which it was made, otherwise the interpretation might be fallacious, and Professor McCance and Dr. Widdowson had definitely stated that their results applied only to the conditions in which the experiment took place. Lord Horder quoted these experiments to show we were only on the threshold of the science of nutrition. He believed it was time that the important matter of the bread of the people should be re-surveyed. He hoped that the post-war interdepartmental committee would meet again soon to consider a full report of this important work by British researchers.

Lord **Teviot** agreed that the present loaf was abominable and its keeping quality appalling, but revealed himself as a supporter of the 100% extraction loaf. Lord **Hankey**, who also supported a high extraction-rate on grounds of health, asked whether agenising of bread was being continued.

Lord **Llewellin** affirmed that it was one of his aims when Minister of Food to see that 100% extraction-rate bread was available all over the country. He himself much preferred it to the 85% extraction-rate bread. But it was clear that if the choice was left to the consumers they would prefer a whiter and less soggy loaf. The Board of Admiralty had always resisted the requests of the Ministry of Food to use a higher extraction-rate bread, and he had not noticed that the health of the Navy had deteriorated while the personnel had been living on 72% extraction-rate bread. It was easier to make good bread out of an extraction-rate flour of 80% than out of flour of 85%, and there was little doubt that with an 80% extraction-rate all the necessary nutrients could be retained.

Viscount **Alexander of Hillsborough**, Chancellor of the Duchy of Lancaster, replying for the Government, said that a large proportion of the charge for the extra wheat required to lower the extraction-rate would have to be met in dollars. A second important consideration was whether the extra milling offals would be dearer than imported feeding-stuffs. No decision had been taken by the Government about the permanent extraction-rate. The Minister of Food would consider the suggestion that he should re-convene the conference on the post-war loaf. A special subcommittee had been appointed to examine what progress had been made in investigations recommended by that conference. There had always been a waste of bread, but there was no evidence that the waste was greater now than before the war, and better use was being made of waste as feeding-stuff. It was possible that the level of the extraction-rate had contributed to the great improvement in the nation's health, but because increased food-supplies were now available the rate might be altered without lowering the average nutritional intake. Recent evidence had become available of the possible toxic effects of the commonly used improver 'Agene.' A committee on which the Medical Research Council was represented had recommended that in future chlorine dioxide should be used. This recommendation had been adopted in the United Kingdom but it would take a little time to change over the necessary plant to give effect to the new decision. Calcium was first added to bread in 1942 to offset a serious deficiency of that item in our diet which had been well-known to nutritional experts before the war. Even with the better diet we now had, the nation as a whole would not get enough calcium without this addition to their bread. The amount added was 14 oz. per 280 lb. sack. Within and other undetected and mild cases, especially in children, are probably the greatest danger, in that they may continue to excrete the organism for some weeks, and often intermittently. Chronic carriers are probably not as important an epidemiological factor in the spread of this disease as the more temporary excretors.

Adults and adolescents are not as great a risk to the community as children, but they can be dangerous as sources of infection when employed as food-handlers or in the care of young children, and particularly when their personal hygiene is not all that it should be.

The infectivity of *Sh. sonnei* is very great, and there is little doubt that comparatively few organisms are required to initiate infection in a child. The disease can in fact be classed with such highly infectious diseases as chickenpox and measles.

NOTIFICATION

Notification is an important feature in prevention, and reasonable accuracy is essential. The term " dysentery " comprises not only, as in the past, fatal cases and those severe enough to be notified on clinical grounds (usually the presence of blood and/or mucus in the stools, and tenesmus) but also any cases of diarrhœa in which the medical practitioner has reason to believe, on epidemiological or clinical grounds, that the infection is dysenteric, as well as those mild and even symptomless cases diagnosable by laboratory methods only.

Notification should always be practised on this basis, and the procedure should not vary in different areas. The fact, moreover, that a case is mild should not, in view of the danger to the community, be used as an argument for non-notification.

TRANSMISSION

The infection may be ingested with aliments contaminated directly or indirectly by individuals handling them, or through eating and drinking utensils similarly infected. Flies and dust may also at times spread the disease. Probably, however, greater importance than at present should be attached to the spread of infection by direct personal contact between children, as well as indirect through the medium of communally used toys and other articles. It is not unlikely that hand carriage of the organism is, in such circumstances, the chief operative factor. Adults, too, apart from possibly infecting food and feeding utensils handled in the course of their duties, may at times act as direct mechanical carriers of the disease to children with whom they deal.

DETECTION

In a disease so highly infective as Sonne dysentery and with such rapid spread, speedy recognition is vital. Clinically the signs and symptoms, varying widely according to the severity of the infection, are well known. From the bacteriological point of view, laboratory confirmation of a suspected case is very important, and a stool specimen should be sent at once with this end in view.

In institutions a rectal swab gives the best results, but this must reach the laboratory within 4–6 hours. This method, however, has the disadvantage that the specimen can only be taken by a medical officer or qualified nurse or health visitor, and thus difficulties arise when the disease is very prevalent. The ordinary stool specimen is often satisfactory, though care must be taken to prevent contamination of specimens from imperfectly sterilised chamber pots. The specimen should reach the laboratory within 24–48 hours. Laboratories can report the results within 24 hours with practically complete accuracy. The importance of examining fæcal specimens from contacts, or indeed from members of infected closed or semi-closed communities, will be appreciated in view of the large numbers of symptomless excretors in many outbreaks of Sonne dysentery. Outside such communities, however, this action is unlikely to be profitable except in special circumstances.

Much still remains to be learned about the natural history of Sonne dysentery.

The number of consecutive daily negative stools necessary before bacteriological cure can be guaranteed is not precisely known ; but a minimum of twelve has been suggested. However, it is usually impracticable to continue clearance tests beyond three consecutive daily negative stools.

CHEMOPROPHYLAXIS

For prevention reliance must continue to be placed chiefly on the old and tried methods applicable to any disease where the source of infection is the fæces of the case or carrier.

Chemoprophylaxis must be secondary to basic preventive measures. Here succinylsulphathiazole *B.P.*[1] is the drug of choice ; absorption of this from the bowel is only slight, and thus the risk of producing sulpha-resistant strains of streptococci and other organisms elsewhere in the body is minimal. Sulphaguanidine offers this same advantage but is possibly not quite so efficient. In infected semi-closed and closed communities there is much to be said for the mass application of sulpha-prophylaxis. In this way the delay while awaiting laboratory reports is averted. Furthermore this method overcomes the difficulty that excretion of the bacillus is often intermittent.

The suggested dosage of succinylsulphathiazole for children 2 years of age is 4 g. daily—2 g. with breakfast and 1 g. at each of the two other meals—for one week ; the dosage is greater, according to age, up to 6 g. for adults. The course may, if necessary, be repeated once or twice with an interval between courses of one week. Apparent failure of sulpha-prophylaxis may often be due to reinfection, and contact of children, after chemoprophylactic treatment, with possible excretors or carriers should be avoided as far as possible.

Most children become non-infective within a week or two of the attack ; but a few may continue to excrete the organism for several weeks, and persistent excretors of this sort may have to be segregated. There is need for further research into the efficacy of sulpha-prophylaxis.

Vital Statistics for 1949

The following provisional death-rates per million population for England and Wales in 1949 are recorded in the Registrar-General's return for the week ended April 22 :

	Males	*Females*	*Persons*
Tuberculosis :			
Respiratory	516	301	403
Non-respiratory	62	47	54
Cancer	1981	1771	1871

The maternal mortality (provisional) per 1000 total live and still births, based on deaths primarily classed to diseases of pregnancy, childbirth, and the puerperal state as arranged in the Manual of the International List (5th revision) was as follows : Postabortive infection, 0·11 ; abortion without mention of septic conditions, 0·05 ; infection during childbirth and the puerperium, 0·11 ; and other maternal causes, 0·71.

Cholera Outbreak in Calcutta

According to information reaching the headquarters of the World Health Organisation, cholera morbidity and mortality have been steadily rising in Calcutta since early March. In the first fifteen weeks of 1950—i.e., between Jan. 1 and April 15—3311 cases and 1233 de[illegible] were reported. In the last four weeks—i.e., March 19 and April 15—1768 cases and 705 d[illegible] reported.

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[1] See Vollum, R. L., Wylie, J. A. H. *Lancet*, 1

In England Now

A Running Commentary by Peripatetic Correspondents

When I was doing a locum at Market Citron last summer I got a message by the carrier to say that Mrs. Frost's little girl, aged three, at Snoring Virginibus (not to be confused with Lower Snoring) had swallowed a threepenny bit. As the carrier had a long round I didn't get the message till the day after the alleged swallowing. When I went into the village shop to ask where she lived there was a woman being served and a little girl fondly handling some cube dog-biscuits in an open sack. When I asked where Mrs. Frost lived this woman replied, "I am Mrs. Frost." I asked whether it was her little girl who had swallowed the threepenny bit. "Yes," she said, "one of them new ones with three balls on it." "Is she all right?" I asked. "Yes," was the reply, "she's all right, but she can't swallow." So without leaving the shop I rang for a Bevan Bus to take her to Eastwich, twenty miles away. In due course I got a chit: Coin removed, œsophagoscopy, at level C7–T1, just below upper end of œsophagus."

Now I feel we ought to have tables to show what coins can be swallowed at what ages. Here, for instance, 3d. into 3 just won't go. Years ago when I was going round a mental hospital a most lovable man with mania said, "Do lend me tuppence." I did so, and he promptly swallowed it. In an awful funk at my criminal carelessness I dashed him off to the X-ray room, where to my enormous relief we found he had a sort of Wallace collection inside; my pennies were indeed small change. I think we can safely say even half-a-crown goes into a maniac easily.

We peripats ought to be able to make up fairly comprehensive tables—for all the orifices.

* * *

I am tired to death of well-bred pictures. Good taste in art seems to me much more dangerous than vulgarity because it can slip so easily into polite death, while vulgarity is at all events alive and full of zest. I suppose Laura Knight's painting of Princess Elizabeth at the rebuilding of Coventry, in the Summer Exhibition at Burlington House, is a thoroughly vulgar picture. The figures are arranged as though for the footlights, with the Princess in the middle. Her gay yellow dress is set off by the robes of the Mayor and Council, and the Mayor has been caught in a moment of excitement and gesture at once lively and theatrical. This is surely going to be a historical picture which will give pleasure for many a generation to come; and need a historical picture do more? Actually it does do more: it shocks your taste and makes you laugh, two excellent things at the Royal Academy; and it displays all the technical accomplishment of Dame Laura's work. A different sort of pleasing vulgarity turns up in James Fitton's "Les Girls," three elderly and rakish ladies chatting in dashing colours over a pint. The same quality helps to make the charm of Leslie Cole's "Local Conversation," and Steven Spurrier's "Music Hall"; and I suppose that the characters in Stanley Spencer's "Resurrection," if not exactly vulgar, are on the whole pretty common: it would be hard to be less on resurrection morning. They have very much the look of people coming out of air-raid shelters, except that they seem much fresher and are moving so fast; one wonders how he kept them still long enough to paint them.

"Children at Chess" by Mary Sargant Florence is not at all vulgar—a brownish picture and rather plain children, but unusual. You *could live with it for* good, which is more than can be said for the other three: and in a way we shall have the chance, because the Royal Academy have bought *it under the Chantrey* bequest. But if I could choose pictures to live with I think I should always choose pen-and-wash drawings—like Margaret Shaw's "Interior," or her white hung "Bed"; or perhaps George Bass's "Greenwich Figureheads"; or perhaps chalk, and indian ink like Frank Dobson's "Secretary Bird"; or perhaps a lithograph like Hilary Edwards's "Dancing Class." I don't think I would choose sculpture: not, at any rate, this socking great Lady Godiva by Sir W. Reid Dick, and still less "The Sixth Day—project for colossal group" by Maurice Lambert, where the cover of "Punch" seems to have got into three dimensions with intent to cap some colossal wedding cake.

* * *

"RE POST OF PATRIOTIC REGISTRAR STOP PLEASE STATE WHETHER . . ." ran the wire.

And yet, why not a patriotic registrar? He is, I submit, a wholly credible figure: a bit shaky, perhaps, as a clinician, but ever watchful for subversive trends in the house staff or anarchy in the students; and *undoubtedly one of those worthies whose qualities were* listed by Noel Coward: "Upright. Straightforward. Downright." I feel the management committee have *defined a need. Let there be patriotic registrars*—at least one per thousand beds.

Or do they want a patriotic pædiatric registrar? If so, then they will have to search far and wide. There is something in the practice of pædiatrics which drives out the nobler virtues. Faced with the low cunning of the young, one ultimately takes the hint and stoops to the same level of duplicity—"Only a little prick, Johnny. You'll *hardly feel it at all*"—and I, for one, doubt whether the coefficient of patriotism is high in the pædiatrician; well, not so high as in, say, your neurosurgeon or your venereologist.

Anyhow, good luck to them. Theirs is a strange and altruistic quest. May they find their patriot, cherish him, and pay him well.

* * *

I am very sleepy and hungry, so I have cooked myself an omelette and taken it to bed. Propping myself on one elbow I jab it with a fork in one hand and with the other turn over the advertisement pages of THE LANCET. There is a picture of a bony fish with a profound statement above it. I feel sure it would mean *something* if I wasn't half asleep. I turn on to the small advertisements at the end. Someone is selling an electric chair. *Funny thing* to have. Might be useful if one was contemplating a private purge of one's acquaintances. It has its own charges. I see, so I suppose it is a portable for use in one's country house as well as in town. Or perhaps the charger is a horse, which carries the chair about on its back. And here is a man offering rabbits. He says that Friedman does a specialty. Is Friedman the first shaggy rabbit on record? What does Friedman do, exactly? Does he bat, like the shaggy horse, or play the piano like the shaggy frog? When I wake up again I see it says: "Friedman Does a specialty," which is a different matter. The next one is a snip for spivs. A thousand medical certificates for 21*s.* 6*d.* That seems very cheap. I have been offered more than that for *one*. But what is this? Doctor required for Tea Garden Practice. That sounds languid enough to suit me. Pay is a minimum of 2100 Rs. per mensem. *Mensa, mensa, mensam,* surely. How many Rs. to the pound? Or is it pounds to the Rs.? It is all much too confusing. I lay my head on my omelette and go to sleep.

* * *

An 82-year-old gentleman recently walked into a doctor's surgery in this neighbourhood with a knife protruding from behind the angle of his jaw. After removing the knife, which had penetrated 4 inches, the doctor admitted him to our hospital where his wound was sutured. No damage had been done to the vital structures in the neck. He seemed a kindly old man and very active and intelligent for his age. He explained that his 72-year-old wife had stabbed him, but he was apparently quite unconcerned on this account, since she had been attacking him with knives, tin-openers, and other sharp instruments every week or so for the last three years. His forearms and hands were consequently covered with scars of all shapes and sizes. The reason for her unusual behaviour, he said, was that some fifty years ago he had at times gone off with other women, and she was now getting her own back. He didn't seem to have thought of leaving her (as he easily could have done, having numerous children in the district). When she first began to attack him he took counter-measures: but in recent years he had not bothered, for he was an old soldier who had been through several wars and had thereby become accustomed to discomfort and danger.

the limits of the economic situation the Minister of Food would wish to give weight to the remark quoted by a noble Lord earlier in the debate: "a little of what you fancy does you good."

QUESTION TIME

Glasgow Smallpox Outbreak

Mr. JOHN RANKIN asked the Secretary of State for Scotland whether all hospitals in Glasgow and the West of Scotland were notified of the presence of smallpox contacts in their areas during the recent outbreak; and why the late Dr. Janet Fleming, while suffering from a virulent form of smallpox, was admitted in the ordinary way as a patient to Hairmyres Hospital, Lanarkshire, and remained there for three days under observation, during which period responsible medical authorities had in their possession official notification that she was a smallpox contact.—Mr. HECTOR McNEIL replied: It was the function of the medical officers of health to keep all known smallpox contacts in their areas under observation, and they would at once notify any hospital to which such a person was removed. As an additional precaution every hospital throughout the West of Scotland was informed by the Western regional hospital board immediately smallpox had been diagnosed in Knightswood Hospital, and they were asked to be on the lookout for possible secondary cases among new patients. Dr. Fleming was admitted to Hairmyres Hospital, suffering from a condition diagnosed as an acute abdominal one, on the morning of March 27 before anyone in Hamilton knew that she was a smallpox contact. As soon as it was known that she was a smallpox contact, the hospital authorities made special clinical and laboratory examinations. This evidence, I am assured, was thought to exclude a diagnosis of smallpox. At a later stage, however, the development of her illness indicated that she was suffering from an unusual form of smallpox and she was at once removed to the smallpox hospital, where unfortunately she died.

Mr. JAMES CARMICHAEL asked the Minister if he would examine the possibility of having all infectious diseases hospitals managed by the local authorities so that one authority would be responsible for the entire administrative duties necessary to combat and eliminate infectious diseases.—Mr. McNEIL replied: In the light of experience during the recent outbreak, I am reviewing the arrangements for cooperation between hospitals and public-health departments with particular reference to the control of infectious disease. I have, however, no reason to think that it is necessary to rearrange hospital services in the fashion suggested.

Vaccination of Hospital Staffs

Mr. L. D. GAMMANS asked the Minister if he proposed to make any investigation into the circumstances in which members of the nursing staff of the Glasgow isolation hospital contracted smallpox; and when each of them was last vaccinated.—Mr. McNEIL replied: The patient who was the primary source of infection was admitted to hospital suffering from pneumonia and the 8 nurses who contracted smallpox were direct contacts of this patient. From investigations which I have already put in hand I understand that of the 3 nurses who died none had been successfully vaccinated. The other 5, all of whom are recovering, had been vaccinated more than once, the last occasion being some years ago.

Mr. GAMMANS: When almost every country in the world insists upon vaccination before people are allowed to land, is it not quite fantastic that young women should be allowed to work in an isolation hospital with all the risks of nursing smallpox patients without being compelled to be vaccinated?—Mr. McNEIL: Of course there are two points to be made. First of all, these nurses did not know that the patient they were nursing in the first stage was a smallpox contact. I do not want to be thought hostile; I understand the hon. gentleman's concern. But we are experiencing difficulty in recruiting nurses and it would seem to me obvious that we should not impose on nurses a condition which we do not impose on the rest of the community.

Sir JOCELYN LUCAS asked the Minister what steps were taken in the fever hospitals under his control to see if vaccinations for smallpox were successful or not.—Mr. McNEIL replied: The normal procedure is that the doctor who has performed the vaccination inspects the result and if the vaccination has not been successful he repeats it. Records are kept of all vaccinations and re-vaccinations and their results so that the medical superintendents of the hospitals may have current information of the state of protection of their staffs. I am, however, reminding hospitals and local authorities of their appropriate responsibilities.

Fees for Vaccination

Mr. HENDERSON STEWART asked the Minister if he was aware that vaccinations were being carried out on a wide scale throughout Scotland, but that medical practitioners had not yet received any payment for this work, nor any indication of what payment might be offered: and if he would make a statement on the matter.—Mr. McNEIL replied: I am indebted to all medical practitioners who coöperated so zealously in vaccinating over the last few weeks. I am bound to point out, however, that vaccination is considered to be a normal part of good general practice, and so for general practitioners inside the National Health Service no special payment for these services is due. Negotiations, however, are in progress between the British Medical Association and the local-authority associations to secure agreement on a fee to be payable by the authorities for reports from practitioners giving particulars of vaccinations and immunisations carried out.

The Law of Coroners' Courts

Mr. ANTHONY MARLOWE asked the Home Secretary whether he was aware of the urgent need to introduce legislation to amend the law relating to coroners' courts; what steps he had taken consequent upon his undertaking of Feb 5, 1948, to look into this question; and whether it was intended to implement any of the recommendations on this subject contained in the report of the Lord Wright Committee made in 1935.—Mr. CHUTER EDE replied: Most of the recommendations of the Departmental Committee on Coroners could be implemented only by legislation. Although I have not overlooked the desirability of reviewing the law relating to coroners, I cannot promise to introduce legislation on this difficult and controversial question in the near future.

Earl WINTERTON: Is the Home Secretary aware that again and again, so far as it is possible to do so under the rules of the House, attention has been called to the fantastic anomaly of the present law and the extraordinary latitude allowed to these people? Why should he not bring in a Bill which provokes no party controversy, and which could be left to the discretion of the House to pass? Is he aware that two years ago he promised to give consideration to this most urgent question?—Mr. EDE: I have been giving consideration to it.

Mr. MARLOWE: Does not the Home Secretary agree that most of the controversy comes from the coroners themselves, and that it is in order to remove from them certain privileges, which they are trying to safeguard, that this House ought to act?—Mr. EDE: Coroners are also God's creatures.

Beds for the Tuberculous

Mr. H. L. D'A. HOPKINSON asked the Minister of Health whether his attention had been drawn to the increase in the number of cases of tuberculosis and the swing of incidence from persons aged 15 to 25 to those aged 45 to 75; and what action he proposed to take to accommodate chronic cases of persons in the latter age-group, who were at present often compelled to live in their own homes surrounded by children.—Mr. A. BEVAN replied: Notifications have increased through the use of mass radiography and other improved methods, but this does not necessarily imply an increased incidence. Every effort is being made to recruit staff for more beds.

Mr. HOPKINSON asked the Minister whether, in view of the lack of accommodation in tuberculosis sanatoria due to the shortage of nursing staff, he would undertake a special propaganda campaign to show that such sanatoria were less dangerous to the health of the nursing staff than ordinary hospitals.—Mr. BEVAN replied: I see no particular advantage in concentrating on this one aspect; but, with my advisory committees, I have the whole wider question under review.

Replying to Mr. SOMERVILLE HASTINGS, Mr. BEVAN gave the following figures for staffed beds in sanatoria on Dec. 31:

Number of staffed beds 22,815

Nursing staff	*Full-time*	*Part-time*
Trained nurses	1874	227
Enrolled assistant nurses	917	277
Student nurses	1186	—
Other nursing staff	918	498
	4895	1002

inducements of experience in other types of medical work and in many cases of research into unexplored fields, as well as the organisation of a unit.

It is to be hoped that some, at least, of the senior registrars who will otherwise be disappointed in the competition for posts as consultants will consider the alternative of employment in one of these capacities in the Services or in the Colonies as a career, and not only as a possible interlude until—an unlikely event—employment is available to them at home.

These posts should offer excellent professional opportunities, which may well tempt many, irrespective of their chances of appointment here. They are surely infinitely preferable to a period of waiting for the steadily diminishing chance of consultant posts at home, where the competition in the next two or three years must be extremely strong.

London, S.W.1. PHILIP H. MITCHINER.

THE THYROID AND HYPERSENSITIVITY

SIR,—The article of March 18 by Dr. Long and Dr. Miles would seem, at first sight, to provide good presumptive evidence that thyroxine enhances hypersensitivity to tuberculin in the guineapig, while, as would be expected, 'Cortisone' or adrenocorticotropic hormone peptide (A.C.T.H.P.) has the opposite effect. The results obtained are so clear-cut as to risk the wholesale acceptance of their implications. The following critical analysis in the light of recent research with which these authors are apparently unfamiliar may prevent any misconception regarding the rôle of the thyroid in hypersensitivity.

A most careful investigation[1] of the effects of thyroid feeding, thyroidectomy, and thiouracil on the histology and cytochemistry of the adrenal cortex has shown most clearly that, while thyroid feeding initially produced hypertrophy and signs of hypersecretion in the zona fasciculata, prolonged administration resulted in signs of exhaustion and cell degeneration, with the accumulation of large fatty droplets in many cells of this zone, in which recent evidence suggests most strongly that the sugar hormones are elaborated.[2] It would seem that the initial effect is hypertrophy and hypersecretion, and the late effect hypertrophy, exhaustion, and hyposecretion. This evidence is also supported by the observation that in human hyperthyroidism the corticoid excretion may be increased, normal, or decreased, and in a crisis reach the levels found in Addison's disease. In myxœdema the corticoid excretion was low, and increased in response to the administration of thyroid.[3]

Though Long and Miles state that the degree of hyperthyroidism induced was not severe, it is notable that two animals died with hæmorrhages in the cortex. In view of the large fatty droplets, mentioned above,[1] the photograph of the adrenals stained for cholesterol cannot be regarded as indicative of the state of cortical function, and no histological or cytochemical data are presented. It is therefore very probable that the increase in sensitivity resulting from the administration of thyroxine was not a direct effect of this hormone, but was indirectly due to cortical exhaustion, despite the grossly enlarged glands.

No effect was noted from the administration of propylthiouracil, but the dose was much less than that used by previous investigators,[4] who used thiouracil, not propylthiouracil. No data are given regarding the effects on the adrenals; and the effects of larger doses, which would probably increase sensitivity by causing involution of the cortex, were not ascertained.

In one group of animals bi-weekly tuberculin injections were commenced after 10 days of thyroxine treatment, so that by then any initial increase in cortical secretion would have been replaced by a decline. In those to which thyroxine was given after 28 days of tuberculin, any initial increase in sensitivity might have occurred between injections; or, as seems more likely, the repeated injections had acted as an alarming stimulus, with the result that the animals were in the resistance stage of the adaptation syndrome, and any such increase in cortical secretion was inhibited.

In the group of animals infected with B.C.G., 12 days' thyroxine increased sensitivity—an effect which can be explained in the same manner as above—but 14 days later it had decreased to half that of the controls. This may have been due to recovery of cortical function, so that the small amount of thyroxine still remaining in the body could now raise the level of secretion of the sugar hormones, and thus decrease sensitivity.

No comment whatever is made regarding the remarkable fact that in the animals which were being sensitised with tuberculin and given thyroxine, the cessation of the thyroxine was followed by the decline of the sensitivity to control level, but *not* below as in the B.C.G. group. Perhaps this discrepancy may be explained by the tuberculin-treated animals being in the resistance stage, so that the cortex did not respond to the stimulus of slight excess of thyroxine 14 days later. As B.C.G. is unlikely to have caused much general upset, and as these animals were only tuberculin-tested twice, there is no reason to suppose that they were in the resistance stage.

The finding that, in the B.C.G. group, cortisone or A.C.T.H.P. caused a well-marked decrease in sensitivity is no surprise, but the increase in sensitivity in the A.C.T.H.P.-treated group to three times, and in the cortisone-treated group to nine times, that of the controls 14 days later, is very remarkable. Though the authors suggest that hypersecretion by the thyroid may have been responsible, yet they do not appear to have examined the thyroid to find out if such was the case.

This phenomenon does not seem to be reasonably accounted for by the period of suppression of the production of endogenous A.C.T.H. which certainly followed the administration of these hormones, as this period surely could not have lasted for 14 days. This is conjecture, however, as there is no mention of the state of the adrenals in those animals. However, though B.C.G. is of low virulence in the guineapig, the effects of these powerful hormones in breaking down lymphoid tissue, or any fibrosis, plus the period of suppression of A.C.T.H. secretion which followed, and during which the non-specific resistance must have been low, may have had some effect on the infection. As there is no mention of the effects of B.C.G. infection on these animals, or the controls, this question must remain unanswered; but the fact that 3 days' administration of cortisone caused the sensitivity after 14 days to be three times that in those treated with one dose of A.C.T.H.P., would suggest that there may be some foundation for the above surmise. Unless no hormones were available, it is difficult to understand why their effects on sensitivity in those animals which had been sensitised by tuberculin were not ascertained, as the possible factor of the infection would thus be eliminated.

So far the criticism of this paper has been purely destructive, though the scanty data and inadequate investigation have necessitated much of it being hypothetical. It is therefore just and proper to suggest how the matter might be clarified.

The effect of smaller doses of thyroxine should be ascertained, as there are many contrary reports in the

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1. Deane, H. W., Greep, R. O. *Endocrinology*, 1947, 41, 243.
2. Deane, H. W., Shaw, J. H., Greep, R. O. *Ibid*, 1948, 43, 133. Bergner, D. E., Deane, H. W. *Ibid*, p. 240.
3. Daughaday, W. H., Jaffe, H., Williams, R. H. *J. clin. Endocrinol.* 1948, 8, 244. Talbot, N. B., Albright, F., Saltzman, A. H., Zygmuntowicz, A., Wixom, R. *Ibid*, 1947, 7, 331.

[illegible]mann, E. J., Marine, D. *Endocrinology*, 1945, 36, 400. [illegible] X., Money, W. L. *Ibid*, 1949, 44, 345.

Letters to the Editor

RESISTANCE TO P.A.S.

SIR,—Since 1947 we have treated more than 500 patients, with pulmonary and extrapulmonary tuberculosis, with *p*-aminosalicylic acid (P.A.S.). The results are most encouraging.[1]

In some cases, however, we have observed that the pulmonary lesions show regression for the first 4–5 months of P.A.S. treatment; then are stationary for some time; and later, about 6–8 months after the institution of P.A.S. therapy, progress again. Since January, 1949, we have routinely determined the sensitivity of tubercle bacilli to P.A.S. and streptomycin. (The determinations have been made at the State Bacteriological Laboratory by Dr. Brita Lagergren.) As is seen from the accompanying table, resistance to P.A.S. often appears after six months (the earliest being 112 days) of P.A.S. treatment. This has already been reported by others.[2] Combined treatment with streptomycin and P.A.S. is valuable both because of the additional therapeutic effect and the possible delay or prevention of resistance to streptomycin.[3]

IN-VITRO RESISTANCE TO SODIUM SALT OF P.A.S. OF TUBERCLE BACILLI ISOLATED FROM UNTREATED PATIENTS AND FROM PATIENTS AFTER THERAPY

Duration of P.A.S. treatment (days) *	No. of cultures †	Resistance ‡		Resistant (%)
		Before	After	
Nil	11	0·00015	..	..
	19	0·0015	..	..
	30	0·015	..	..
	1	0·15	..	..
12–89	20	N.D.	0·015 or less	..
	4	N.D.	0·15	..
90–174	19	N.D.	0·015 or less	..
	4	N.D.	0·15	..
	1	N.D.	15·0	4
178–264	9	N.D.	0·015 or less	..
	10	N.D.	0·15	..
	5	N.D.	1·5	34
	5	N.D.	15·0	
276–350	1	N.D.	0·015	..
	5	N.D.	0·15	..
	5	N.D.	1·5	60
	4	N.D.	15·0	
360–573	1	N.D.	0·015	..
	3	N.D.	0·15	..
	6	N.D.	1·5	77
	8	N.D.	15·0	

* The treated patients received 12–18 g. P.A.S. daily, and most of them one or more short courses of streptomycin (1 g. daily for 15–20 days). The table includes 11 cultures regarded as resistant to streptomycin.

† Total of 171 cultures tested (from 148 patients).

‡ Expressed as maximal concentration of sodium salt of P.A.S. in Dubos fluid medium (mg. per 100 ml.), which permitted growth.

N.D. = not determined.

In the treatment of tuberculosis we use P.A.S. routinely, supplemented by short courses of streptomycin when serious complications are diagnosed or suspected, and as preparatory and preventive treatment before surgical procedures. The combination of P.A.S. with streptomycin in this way does not, according to our findings, prevent the emergence of resistance to P.A.S.

Thus it is important not to postpone necessary collapse treatment too long—i.e., *more than 4–5 months of* P.A.S. therapy is dangerous, since resistance to P.A.S. after that time is not uncommon (53% of the cultures from patients treated for more than 178 days were resistant to P.A.S.). The clinical course of the disease agrees in most instances with the sensitivity of the bacilli to P.A.S. This will later be reported in detail.

Sollidens Sanatorium,
Ostersund, Sweden.

BO CARSTENSEN
K. LINDE ANDERSEN.

BRITISH SPAS AND HEALTH RESORTS

SIR,—A group of medical men interested in physical medicine, and particularly in the therapeutic powers of the British health resorts and spas, have held some preliminary meetings at 11, Chandos Street, W.1, for the purpose of discussing the methods of study and development of these resorts. It was decided not to revive the pre-war British Health Resorts Association, but to create a new organism—an association including medical and non-medical men interested in this question. As hon. secretary of these meetings I was entrusted with the task of ascertaining the views on this subject of the British medical profession, and I should be grateful to receive any comments on this plan for the development of our spas and health resorts.

Great Britain possesses some of the finest spas and health resorts of the world, and it is, in fact, in this country that modern climatotherapy originated. The renewal of interest in the methods of physical medicine, the difficulties of travel abroad, and the desire to bring into this country many overseas visitors are sufficient factors to stimulate us to more *definite action for the* development of these outstanding physical therapeutic agents.

7, Wimpole Street, London, W.1.

A. P. CAWADIAS.

THE REGISTRAR'S FUTURE

SIR,—For some time the position of senior registrars vis-à-vis consultant posts has been causing many of us grave anxiety. If the position in England is similar to that shown by recently published figures for Scotland, the number of vacancies for consultants in the National Health Service during the next few years is likely to be very substantially less than the number of senior registrars completing their training. Not only is the number of registrars now in training larger than is necessary to provide for the filling of vacancies due to retirement and casualty, but also consultants have had their retiring-age extended to 65 under the Act, while newly appointed ones are a relatively young group; so retirements in the next 10 years will be fewer than in subsequent years.

Steps are in contemplation to reduce registrar establishments to provide numbers of fully trained specialists not greatly in excess of requirements; otherwise there will be many young men fully trained as specialists who, in their middle thirties, must try to find some other form of medical employment. But these steps will be too late to help many who are now in the senior-registrar grade.

There exists a serious shortage of specialists of many sorts in the medical services of the Fighting Forces, the Colonial Medical Service, the Sudan Medical Service, &c. There are, moreover, vacancies for professors, readers, and teachers in the medical faculties not only of Colonial universities and university colleges, but in Egypt, Iraq, and similar Middle East countries where it is urgent that the tradition of British medical teaching should be maintained. The Services offer not only interesting work for which many of the senior registrars now completing their appointments are particularly well fitted, but also a career.

The university posts are comparable with those in teaching hospitals in this country, with the addit conjoined ureters face the small opening in the bowel mucosa. Two or three fine silk sutures fix the ureteric loop in position.

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[1] Carstensen, B., Sjolin, S. S. *Svenska Läkartidn.* 1948, 45, 729. Carstensen, B., Soderhjelm, L. *Nord. Med.* 1948, 40, 2039. Carstensen, B. *Amer. Rev. Tuberc.* (in the press).

[2] Delaude, A., Karlson, A. G., Carr, D. T., Pfuetze, K. H. *Proc. Mayo Clin.* 1949, 24, 341. Widstrom, G., Swedberg, B. *Nord. Med.* 1948, 40, 2225.

[3] Graessle, O., Pietrowski, J. *J. Bact.* 1949, 57, 459. Karlson, A. G., Pfuetze, K. H., Carr, D. T., Feldman, W. H., Hinshaw, H. C. *Proc. Mayo Clin.* 1949, 24, 85.

The seromuscular edges at each end of the gutter are now picked up and held in apposition by two Babcock's forceps. A little tension on these forceps facilitates the closure of the seromuscular incision and the burying of the ureteric loop by two continuous sutures of fine silk. About 2 in. of the ureteric loop is buried. The incision in the posterior peritoneum is closed so that the anastomosis is almost extraperitoneal, and the wound is closed with a fine drainage tube down to the ureterocolostomy.

The advantages of this technique over the Coffey and similar techniques may be summarised as follows. There is only one site to plan on the colon for the proposed anastomosis, whereas with a short sigmoid the placing of two may be awkward. Moreover, the optimum site can be quickly judged from the position of the junction of the two ureters when the loop is made to lie parallel with the adjacent segment of sigmoid. There is only one opening made in the colon, and the technique does not involve the additional procedure of threading the ureter into its lumen. These points contribute to a more simple operation and a much shorter operating-time.

The loop transplantation also gives an excellent functional result with immediate drainage. It is noticeable that sometimes drainage is delayed in the Coffey II transplantation, presumably because of some slight temporary obstruction. I have always held that ascending infection is more likely if the ureter is drawn into the lumen of the bowel. A small hole in the mucosa at least simulates a ureteric orifice, and would seem to be more likely to prevent intimate contact with the fæcal contents even if an actual valvular effect cannot be attained. Coffey probably had this in mind when he devised his no. III technique. Also it is possible that the combined efflux of urine at the one orifice may be a further safeguard against infection.

Chigwell, Essex.   D. LANG STEVENSON.

COST OF MEDICAL REGISTRATION

SIR,—I shared Viscount Addison's belief[1] that it cost five guineas to register. I tried it last week; I received five shillings change.

King's College Hospital,
London, S.E.5.   DAVID ADDERLEY.

SOME LIMITATIONS OF PSYCHIATRY

SIR,—I enjoyed reading Dr. Haldane's thoughtful article in your last issue. Whether psychiatrists will agree with him or not, the physician who interests himself in neuropsychiatric illness will appreciate only too well what Dr. Haldane means when he says that the psychoneurosis is only one manifestation—one outward expression—of the patient's personality.

Where, however, I differ from Dr. Haldane is in his conclusion, as I understand it, that superficial therapy —what he calls a " psychiatric placebo "—is not really worth while, because it is not likely to effect any very fundamental change in a psychoneurotic patient. His conclusion that " the symptoms of a psychoneurosis are themselves of minor import relative to the underlying disorder " has not engendered in me the feelings of therapeutic impotence that make him end his paper with the words " we must also be still more realistic and realise that at present, apart from a little palliation, many cannot be treated at all."

On the contrary, this conclusion has stimulated me in the past to concentrate more than ever on attempting to relieve the symptoms of, for example, an hysteric, rather than on trying to change the rigid attitude of mind which I have no doubt he possesses. Often all that is needed for the patient to return to a useful job of work is relief from his symptoms, and I am convinced that these people will often remain surprisingly free from the relapses which are sometimes too freely ascribed to them.

In spite of my disagreements, I should like to congratulate Dr. Haldane on his courageous challenge to physicians and surgeons. We must ask ourselves what exactly we want from the psychiatrists to whom we refer patients, and—perhaps more important—how we expect these patients to benefit from such reference. The time has indeed come when psychiatrists should protest against the tendency to use their departments as therapeutic dustbins.

Ashford Hospital,
Ashford, Middlesex.   A. BARHAM CARTER.

FAMILIAL GLOMERULONEPHRITIS

SIR,—The recurrence of glomerulonephritis in several members of a family must arouse suspicions of the presence either of some inherited intrinsic renal weakness or alternatively of a common extrinsic factor. Certainly the presence of the condition in successive generations, together with other undoubted congenital abnormalities, as described by Dr. Hawkins last week, leaves little doubt about the hereditary origin of some cases. However, instances do occur from time to time in which the presence of a common infecting organism would appear to be the most important factor in ætiology.

In May, 1946, I had under my care at St. George-in-the-East Hospital 3 members of a family of 8. These 3, who belonged to the same generation, were suffering from acute diffuse glomerulonephritis, Ellis type I. The family, consisting of mother, father, 4 children, and 2 grandchildren, all living together, had shortly before coming under observation been treated at a nearby municipal clinic for suspected scabies. When seen by me, 2 of the affected members of the family and the 2 grandchildren had typical impetiginous skin lesions from which hæmolytic streptococci were grown. The same organism was obtained from the throat of the 3rd affected member. No congenital abnormalities were present in any of the family, nor was there any history of allergic illnesses.

West Middlesex Hospital, Isleworth.   R. TEPPER.

THE MENTALLY HANDICAPPED CHILD

SIR,—I have read with great interest the article of another mother on this theme. When my boy was born he had the cord tight around his neck. He was asphyxiated, and it took 15 minutes to revive him and make him cry. When he " did not do the things which a normal baby did at his age " I knew that he had suffered a brain injury.

At 2 years the boy learned to walk and to talk, and at 3 years had a good vocabulary and liked to make conversation, but was completely unable to use his hands for any purposeful activity, and showed no interest in playing or in doing anything for himself. At 5 he learnt to feed himself with a spoon and also started to dress himself, but it took 3 more years before he could be induced to try buttoning-up things. His disability became more obvious as time went on, whereas his speech, apart from a certain abruptness, developed quite normally. He was 9 when he came to England, and quickly learned to speak English without forgetting his German. He also learned, in a few months, *to read English; but he* was never able to write, or to draw even a simple geometrical figure, and he remained unable to imitate movements or to do anything with his hands, no matter how often one showed *it to him.* Apart from a few simple movements, which he learned by having his hand guided over and over again, he was almost helpless. But he was not paralysed, and his arms and hands were well formed and well developed.

Besides his physical disability he showed strange mental limitations. He could not solve a simple form-board test, and was unable to build with bricks or to accomplish even the most simple constructional task. Labelled as " doubly literature regarding the effects of hyperthyroidism on human and animal tuberculosis.[5, 6] It is an old clinical observation that hyperthyroidism seems to have an inhibitory influence on tuberculosis, and that hyperthyroidism has many features in common with adrenal insufficiency. It has recently been shown[5] that 30 μg. of thyroxine bi-weekly (one tenth of the dosage of Long and Miles) produces an increase, and thyroidectomy a decrease, in the survival-time of the guineapig with tuberculosis. The effects of thyroidectomy or larger doses of thiouracil would therefore be of interest, as it is likely that sensitivity would be increased.

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[1] See *Lancet*, April 29, p. 825.

It might be possible to determine whether the cortex had been exhausted or not, as a result of excess thyroxine, by the administration of a minimal dose of A.C.T.H. and the observation of its effects on sensitivity. A large dose might mask the exhaustion unless it was absolute, which seems unlikely. The dosage administered by Long and Miles was, according to the data, 600 times that which would give unequivocal evidence of adrenal stimulation in the test rat.

The old theory that the thyroid and the adrenal are in opposition is not in accord with recent evidence,[7] which is more in favour of a partnership between these glands in the metabolic processes, except when the balance is grossly disturbed, as in hyperthyroidism. The hypertrophy of the cortex followed by exhaustion produced by thyroxine, and the involution following thiouracil or thyroidectomy, would seem most readily explained by the concept of increased tissue utilisation of hormones.[8] Thus, excess thyroxine, by increasing the rate of metabolism, increases the utilisation of the sugar hormones, and brings about their increased secretion to meet the demand, while the lack of thyroxine brings about decreased need for these hormones and involution of the cortex. This theory seems most logical, as there can be no doubt that it is for the purpose of supplying hormones to the tissues that the endocrine glands exist at all. The influence of the target tissues cannot therefore be ignored, as is so commonly done.

The report by Long and Miles can no more be regarded as indicative of any influence of the thyroid on hypersensitivity than this analysis can be taken as ruling out the possibility.

Edinburgh. H. MORROW BROWN.

PREGNANCY AND PULMONARY TUBERCULOSIS

SIR,—Dr. Stewart and Dr. Simmonds mentioned in their letter last week the importance of X-ray observation of pregnant women.

Jacobs,[9] at Paddington Hospital, was one of the first in this country to undertake a screen examination of the chest of all women attending an antenatal department. From January, 1943, to April, 1946, a total of 4430 women were screened. He found 27 cases (0·61%) of active pulmonary tuberculosis requiring immediate admission. There were 11 cases (0·25%) possibly active, and 30 (0·67%) probably inactive. Thus the total cases of tuberculosis were 68 (1·53%).

From January, 1946, to August, 1949, at University College Hospital 3581 expectant mothers had an X-ray examination of the chest. Among these pulmonary tuberculosis was discovered in 28 cases (0·74%)—13 active and 15 inactive. All these women had had the usual chest examination by a medical officer in the antenatal clinic. In only one were any abnormal signs discovered by ordinary physical examination.

Since routine chest radiography is being made available for large groups of the population, we would plead that priority be given to expectant mothers. Dr. Turner, in his article of April 15, has shown that one of the "danger periods" is during the first four months of pregnancy. It is the practice in this hospital for every expectant mother to have a chest X-ray examination as soon after her first visit as possible. If the mechanists have their way, then every primigravida will have a radiological examination of her pelvis. We feel there is just as strong a case for routine X-ray examination of the chest.

In view of the discussion in the medical and lay press on the allocation of beds for tuberculosis, we should like to point out that at this hospital a number of antenatal beds are reserved for tuberculous mothers.

University College Hospital,
London, W.C.1.

ANDREW MORLAND
W. C. W. NIXON.

MITCHELL-NELSON TEXTBOOK OF PEDIATRICS

SIR,—Your review of the excellent Mitchell and Nelson *Textbook of Pediatrics* (April 22, p. 766) is hardly fair in its criticism of the book. You say: "It is a little startling to find emotional growth and development discussed in less than a page." There is a 14-page section entitled Mental and Emotional Development, quite apart from the chapter on Psychological Disorders, in which mental and emotional development are inevitably discussed. I agree that the sections on emotional development and behaviour problems are inadequte, as in other textbooks of pædiatrics, but your statement is misleading.

R. S. ILLINGWORTH
Professor of Child Health.

⁂ Our comment was perhaps too emphatic. Though the passages headed *Emotional* Development occupy less than a page, a good deal is said on this subject in the rest of this section and in other parts of the book.—ED. L.

LOOP TRANSPLANTATION OF URETERS

SIR,—I have been using a modified technique for transplantation of the ureters into the colon which has certain outstanding advantages over the more commonly practised methods. A brief account of it may be of interest, since I am not aware that it has been described before.

The abdomen is opened through a left paramedian incision and the bowels are packed off. Separate incisions are made through the posterior peritoneum over each ureter, and both are mobilised up to the bladder. Each ureter is divided just above a long curved clamp such as Moynihan's gallbladder forceps, and the distal stumps are ligatured. No traumatising instrument is placed on the proximal ends, which are each wrapped in a swab. A fine silk suture is inserted through the end of the right ureter, and the silk is left long. With the left index finger as a guide, a long curved artery forceps is gently tunnelled through behind the mesosigmoid from the left incision in the posterior peritoneum to the right. The silk attached to the right ureter is picked up and drawn through to the left side of the mesosigmoid with the right ureter. The end of each ureter is cut obliquely, and the pointed extremities are then conjoined by two fine silk sutures.

A ureteric loop has now been formed by the left ureter passing downwards and inwards and the right ureter curving upwards and outwards. The ureteric loop is laid alongside the sigmoid colon so that it lies in the position of maximum ease. With the proposed anastomosis in view, a little adjustment enables the optimum site to be marked by two stay sutures on either side of the bowel wall. The segment of the colon is picked up by four Babcock's forceps to facilitate making a longitudinal incision about $1^3/_4$ in. long through the seromuscular coats of the bowel over one of the tæniæ. A very small opening is made in the protruding mucosa at the level of the marking sutures, which should also be the mid-point of the incision. The loop is now placed in the gutter thus formed so that the oblique openings of the

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5. Izzo, R. A., Cicardo, V. H. *Amer. Rev. Tuberc.* 1947, 56, 52.
6. Rich, A. R. The Pathogenesis of Tuberculosis. Springfield, 1944.
7. Reiss, R. S., Forsham, P. H., Thorn, G. W. *J. clin. Endocrinol.* 1949, 9, 659.
8. Sayers, G., Sayers, M. A. *Rec. Progr. Hormone Res.* 1948, 2, 81.
9. Jacobs, A. L. *J. Obstet. Gynæc.* 1946, 53, 369.

resting place was the steps themselves in full view of the passers by and exposed to the inclemency of the weather. Even now in my dreams, I can see that patient, plodding stream dragging their arthritic limbs up that staircase."[1]

At the present time, as Dr. Collings remarks: "The conduct of . . . the individual practitioner is inextricably interwoven with commercial and emotional considerations. . . ." How can it be otherwise? Unless the doctor is the fortunate possessor of private means, he is nowadays forced to be a head-hunter in order to live, pay his way, and maintain his wife and family. In days gone by, his income was largely composed of fees from private practice. Now, out of 48,059,201 people in this country, 45,816,426 (95·3%) have joined the National Health Service; and private practice, as a source of income, has practically ceased to exist. In Middlesex, once a fruitful source of private fees, 97% of the population are on doctors' lists; in Sussex, 91·8%; and in Surrey, 93%. To meet his commitments the practitioner needs a minimum of 2250 on his list at the present rate of remuneration; and any doctor who has that number is likely to be required to supply, on average, 45 items of service per day—slightly less in the summer, and slightly more in the winter. If he has children to bring up, he will require more money and must therefore collect more heads and get through more work.

Dr. Collings gives a devastating picture of the practitioner's workshop: "Few skilled craftsmen, be they plumbers, butchers, or motor mechanics, would be prepared to work under conditions or with equipment as bad (comparably) as that tolerated by many doctors working in industrial practices." That this is true there is no doubt, but is it always the doctor's fault? Certainly he is to blame for dirt and untidiness; but how many doctors in industrial areas can afford £1000 or so to have the place they would like? The answer is obvious: the doctor's workshop of the future must be provided by the State. Then and then only shall we be able to relegate to the museum those blots on our civilisation described by Dr. Collings, and seen by me in many parts of England.

Reviewing the administrative machinery of the National Health Service, Dr. Collings rightly describes the policy as one "of fragmentation, not integration." For instance, the responsibility for care of an expectant mother may be shared by regional hospital board, local health authority, and local executive council, before she settles down at home with her baby; and there is no direct liaison between these bodies. No wonder the machinery is creaking badly.

There is also good foundation for Dr. Collings's observation that executive councils are preoccupied with day-to-day routine work to the exclusion of planning. He attributes this to the attitude of the permanent staff, inherited from the old National Health Insurance days—what one may call "the panel mind." Can anyone in fact tell me of an executive council who have had on their agenda a debate on health centres? A local medical committee in full session will spend much of an afternoon debating such items as "is glucose a food or a drug?" when they would be better employed in considering policy for the future, leaving routine work to a small subcommittee.

What of the remedies? If able men are to be attracted to general practice they must be assured: (1) of a living wage on qualification with prospects of making a good income by the age of 40 or under; and (2) of being able to reractise their craft without having to build up a rather [illegible] connection. Remuneration should, I submit, mind whrounded as follows:

that is neeclly an expenses allowance sufficient to meet all of work is repenses (after the system of some of the public services where marriage allowance, rent, rates, fuel, light, servant, upkeep of motor-car, &c., are granted).

2. Increment for length of service up to 50 years of age.
3. Administrative, specialist, or extra-duty pay if such work is performed.
4. Locality allowance for specially difficult areas.
5. A small capitation fee as a reward for responsibility accepted, up to 2500 patients.
6. Mileage allowance as at present.

The able man would then know where he was; he would know the prospect in front of him; and he would have time to use his clinical skill free from financial anxiety. The only alternative to this method is a full-time salaried service.

It is quite obvious that some form of health centre or group practice must be provided without delay. What the practitioner needs, in order to provide a better service, is: (1) more time per patient, which would be obtainable through clerical assistance; and (2) free and rapid access to a laboratory and X-ray department. Each health centre should meet these basic requirements. The size and equipment of a centre would, of course, depend on the locality. Outlying villages might be served by a mobile centre, consisting of a large motor-van, staffed by a doctor and nurse-dispenser. Villagers have told me that such centres would be a boon to the countryside.

Finally I would suggest that one method by which integration and an improved standard might be achieved is by setting up the Central Medical Board proposed in the Coalition Government's white-paper.[2] It was a great misfortune that the idea of this board was dropped; but it did not find favour with those who believe in fragmentation rather than integration.

The board would take the place of the present Medical Practices Committee and work in close liaison with the Central Health Services Council. It would differ from the latter inasmuch as its function would be executive, not advisory; and it would see to the satisfactory day-to-day working of the medical-practitioner service. I submit that the replacement of the Medical Practices Committee by such a board is necessary in order to obtain, not only a central controlling agency, but also an employment agency and medical pool, from which casualties would be replaced as required; a posting agency for young men wishing to join the service; and a supplying agency for those authorities finding themselves short of medical personnel. It could also be used as a transfer agency for those who, for health or other reasons, wish a change of district.

In conjunction with the Central Health Services Council, the board could define the future province and function of general practice. As Dr. Collings says, so long as this is undefined, the general practitioner is in no position to defend himself against those who would debase him.

Worthing. HAROLD LEESON.

SIR,—I am becoming rather tired of reading letters in THE LANCET from doctors in general practice who wonder why no-one is going into practice. The reason is that it is practically impossible to get established in practice unless one has a large amount of capital, which nowadays cannot be borrowed.

I, like many others, am training to be a specialist in a small branch of medicine. I am doing this, not with any great confidence that I will become a specialist when my training is over in a few years' time, but because it is the only way I can find employment. I do not particularly want to be a specialist in any case, but I cannot get into general practice except as an assistant.

I have investigated carefully the methods of entry into practice. I can obtain a post as assistant to a practitioner with a large list, but beyond this the future

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H. Experiences of a Locum. Private circulation.

[2] See Leeson, H. H. Your Doctor of the Future. High Wycombe, 1944.

handicapped" he was declared "ineducable" by the authorities, and we sent him to a private school for "children in need of special care." There he became worse after a time. The principal of the school prophesied that he would deteriorate, and that he was "unlikely to live to his 20th birthday." Michael was then 15. I gave up my job as a medical officer and took the boy home, to devote all my time to his care, and to the study of his disability.

I studied brain anatomy, pathology, and physiology, conditioned reflexes, behaviour-embryology, and experimental psychology; and out of these studies a picture of the "human mind" emerged, very different from the accepted one.

First, I came to realise that what we measure in our so-called "intelligence tests" are sensory-motor performances, depending on an intact nervous system. A lesion anywhere between sensory receptor and motor effector renders these tests valueless, because the faulty or absent response to a stimulus is due to a break in the pathway of one or more sensory-motor systems. It is not the result of an "intelligence" defect, whatever that may be.

To be unable to imitate seen movement is not due to a "mental" defect, but a visual one, or better, to a defect resulting from destruction of the midbrain ganglion in which visual fibres are integrated with kinæsthetic fibres and where visual impressions are used for motor reactions. If these ganglia (the superior corpora quadrigemina) are severely injured, the ability to imitate seen movement is greatly diminished. If they are completely destroyed, imitation of movement becomes virtually impossible. In addition, destruction of these ganglia abolishes all visual reflexes, prevents the spontaneous understanding of form and space (which concepts are both based on visuokinæsthetic integrations), and deprives the child of one of the most important incentives for learning—the curiosity to find out how things are done. It tends to make large parts of human activity incomprehensible to the child.

If this handicap is recognised in time and dealt with, the child's difficulties can be overcome. All blind children suffer from the same mental handicap in an even more severe form. By taking it into account, and adjusting our teaching methods accordingly, we are able to develop their mental faculties. Nobody would expect a blind child to imitate seen movement or recognise seen shape or understand visual space or the visual aspect of human activity. Children with a visuomotor defect are educationally very much in the same position in spite of their ability to see.

When I had recognised that to teach Michael meant regarding him almost as if he was blind, he was already 19 years old. Tuition at this age, and after so many years of wrong approach is not easy; nevertheless he learned to write within 2 months, and is now slowly learning all the movements necessary for everyday life. With growing independence and understanding of space relations his "mind" is fast developing. How far he will be able to advance, being already 20, remains to be seen. But I am absolutely sure that no "intelligence" defect would ever have developed in him if 19 years ago I had known what I know today.

At the moment I am working with mentally handicapped children and am trying to put some of my educational ideas into practice through the Association of Parents of Backward Children. My observations have strengthened my belief that many mental defects are the result of unrecognised birth hæmorrhages affecting tributaries of the vein of Galen, and injuring ganglia of the mesencephalon or telencephalon. But the more children I see, the more I realise the immensity of the task and of the urgent need for intensive and unprejudiced research into the causation and educational treatment of mental handicap. Methods of investigating the brain and its reactions are rapidly advancing, and there is no justification anymore for the fatalistic attitude of: *Ignoramus et semper ignorabimus.*

London, W.1. LISE GELLNER.

GENERAL PRACTICE TODAY

SIR,—Only recently have I had time to complete my study of the Collings report and to read the voluminous correspondence that has grown up around it.

It is not for me to say to what extent Dr. Collings's strictures on general practice are in accordance with the facts. I venture to suggest, however, that to the extent that they are, both Dr. Collings himself and all your correspondents have to a large extent missed the point as to their cause and cure.

Dr. Collings writes:

> "While other branches of medicine have progressed and developed, general practice, instead of developing concurrently, has adapted itself to the changing patterns; and sometimes this adaptation has in fact been regression"

And again:

> "Through the agency of the regional hospital boards decisions of policy and principle relating to hospital and specialist services are being taken. No similar decisions are being taken on general practice."

Surely this is fundamental. Both before and after July, 1948, the specialist has been working with his colleagues to provide an organised service in hospital, whereas the general practitioner has worked in isolation and, except where a partnership exists, in competition with his fellows.

It is true that during the negotiations that preceded the National Health Service Act the G.P.s came together to oppose it. They were also concerned, quite rightly, with their remuneration under the scheme, but gave little thought to their rightful place in it or to opportunities for doing good work under it. They only asked to be left alone, and they have got what they asked.

I have always looked on G.P.s as the shock-troops of medicine—the most essential link in the health chain. However far specialisation may develop, the individual who first sees the patient, makes a diagnosis, and, if necessary, selects the specialist, must always take first place. But, for efficient service, the G.P. cannot work alone and in competition with his fellows. He must be part of an organised team for the prevention and cure of disease. Moreover, *the struggle for patients*, inevitable under a capitation system, renders true coöperation impossible. A full-time salaried service of G.P.s as an integrated part of the health service is therefore essential. This is the lesson of the Collings report as I see it.

House of Commons, London. SOMERVILLE HASTINGS.

SIR,—For five years my travels took me all over England as a G.P. From this and further experience as an examining medical officer I can assure you that the picture presented by Dr. Collings is, if anything, underpainted. One experience still haunts me:

> "The Consulting Room was on the first floor of the house, unkempt and untidy, the Doctor's desk was littered with papers of all sorts, periodicals, cuttings, advertisements from a local bookmaker, National Health forms and certificates. The drawers contained books, catalogues, patients' records, cigarettes in profusion, broken instruments, flotsam and jetsam of *all sorts, all mixed up together.* One corner was screened off to form a sort of dispensary, and here the conditions were even worse. . . . The shelves *looked* as if they had not been dusted for years and contained a heterogeneous collection of drugs, dressings, packets of cigarettes and instruments all jumbled up together. . . . Wool in open packets, dressings and bandages contended for pride of place in this motley array. A *large* tin can provided the water to fill the medicine bottles. The Waiting Room even worse. This led out of the Consulting Room ar bare, cold and depressing with about 20 chairs an ough . . . Entrance from outside was gained by a flight tæniæ. steps of the ladder pattern leading from the cosa at the ground. Thus not only had the sick ar o be the negotiate the staircase the best way they co laced in Waiting Room was full, as it often was ngs of the

centres. Teaching hospitals are usually situated in areas where there is a shortage of doctors, and the construction of such centres would relieve the pressure on the practitioners of the area. EX-STUDENT.

SIR,—Although, as a newly qualified doctor, I lack all first-hand experience of general practice, I feel I may legitimately join in the controversy aroused by the Collings report. I write from the viewpoint of one who agrees that the aim of medicine should be to keep the patient out of hospital as far as possible, and who hopes that the general practitioner may be allowed to play his full part in achieving this aim. I further believe that, in both medical and human interest, general practice, has, ideally, great advantages over other forms of practice; for in no other field can disease and sick people be studied through long periods of time and in their social context.

However, when considering a career in this field of medicine, one is faced with an impressive and depressing array of evidence of the widespread loss of professional standards and opportunities suffered in general practice, in the form of the doctors' letters brought to hospital outpatients, the warnings of one's seniors, and now the Collings report. The effect of this evidence on my contemporaries is that general practice has fallen into such disrepute that it is the career of choice of far fewer than will, presumably, be engaged in it.

The most indignant critics of the Collings report cannot deny that this situation is critical. A branch of medicine, the fundamental importance of which you, Sir, have repeatedly stressed, is threatened with extinction. To save it action is required on many fronts, of which I would suggest the following:

1. The quality of the general-practitioner service in the future will depend on the training and morale of the practitioners entering it. At present, medical education fails to give a balanced view of the rôle of medicine. Taught entirely in well-equipped hospitals where patients, isolated from their homes and jobs, are analysed in fine detail, medical students are but distantly aware of the scope of general practice, and young doctors enter it ignorant of its problems and unprepared for the effort required to maintain professional standards. Closer contact with general practice for students, in the form of lectures and some practical participation, would enable young doctors to make more balanced judgments, and would ensure an attitude of more constructive criticism among future recruits to practice. This is a question with which medical schools and the British Medical Students' Association should surely be concerned.

2. As Collings suggests, it is time that the profession reached a clearer definition of the scope and function of general practice. There is already a tendency to accept low standards as inevitable, and for hospitals to hold, and general practitioners to accept, a view of practice which reduces its functions to that of a medical sorting office. The work of good general practitioners is sufficient answer to this attitude, but the tendency to further limit the professional opportunities and facilities of general practice, which has been aggravated by the N.H.S., must be reversed, and the professional organisations should devote some of their zeal and leadership to this end.

3. As Collings brought out, at the root of much of the dissatisfaction, frustration, and inefficiency of general practice lies the question of working conditions. Part of the remedy for this lies in our own hands, in the formation of group practices, and I feel sure that among younger doctors at least there will be no lack of enthusiasm for this idea. But it is also a job for the Government; for without the provision of properly equipped medical centres of some description, no doctor who wishes to do good medicine will enter willingly a working-class practice. The conditions in the worst industrial practices, as described by Collings, would break all but the most ardent crusading spirit.

Are we to accept without strong protest the cuts in expenditure which prevent any of the promised health centres being built?

University College Hospital,
London, W.C.1. ANTHONY RYLE.

Obituary

ARTHUR BEENY APPLETON

M.A., M.D. CAMB.

Professor Appleton died on April 22 at St. Thomas's Hospital, where he held the chair of anatomy from 1934 to 1948. In the latter year he joined the staff of the new Institute of Animal Physiology which is being set up by the Agricultural Research Council. In preparation for this new work he had lately visited veterinary schools in the United States. But illness interrupted the study of the surgical anatomy of farm animals which he had already begun at the Zoological Society and on which he planned to publish a comprehensive treatise.

He was educated at the City of London School, at Downing College, Cambridge, and at St. Bartholomew's Hospital. He qualified in 1914 and almost at once joined the R.A.M.C. in which he served for the next five years. On demobilisation he held the post of medical supervisor of Ministry of Pensions orthopædic clinics in the Cambridge area, before becoming senior demonstrator in anatomy in the University of Cambridge. In 1922 he was awarded the Horton Smith prize for his M.D. thesis; in the following year he received the Symington prize for anatomical research; and in 1926 he became lecturer. Four years later he was elected a fellow of Downing College.

To these years belong his research on the muscle and nerves of the tetrapoda and on bone growth. Later, after his appointment to the chair at St. Thomas's, he investigated the development of the lung, and he was at work on his manuscripts on this subject shortly before his death. He was a member of the editorial board of the *Acta Anatomica*, and he had himself written a *Guide to Vertebrate Dissection for Students* (1929), besides collaborating with W. J. Hamilton and I. C. C. Tshaperoff in *Surface and Radiological Anatomy* (1938). His students will remember his beautiful blackboard drawing, and the talent he showed as an artist was happily linked with his other work by his appointment as professor of anatomy at the Royal Academy of Arts. His interest in posture and the locomotor apparatus was reflected by his service to the Chelsea School of Physical Education; on whose governing body he represented the University of London. He had examined for the Universities of London, Liverpool, Manchester, Cardiff, and Cambridge.

F. G. writes: "Professor Appleton will be most vividly remembered for the work which he did in London at St. Thomas's Hospital Medical School, and during the years 1948 and 1949 as president of the Anatomical Society. As secretary of the society I worked in close association with him during these two years; his great friendliness, his wide knowledge of anatomical matters, coupled with an essential modesty, made this association an experience I shall always remember with gratitude.

"It is fitting, however, that some tribute should be paid to an earlier phase of his career. I entered the old Anatomy School at Cambridge in 1920, and very soon came under his influence as a teacher. There must be many from that period who remember his enthusiasm and freshness of outlook, for, equipped with a most impressive knowledge of detailed human anatomy, he was one of the first to apply experimental methods in research in a British department of anatomy. At this time he was coöperating actively with Prof. J. T. Wilson in the establishment of the courses in anatomy for the natural sciences tripos, taking himself a large part in the teaching of vertebrate morphology. His own main interest then was in the problems of comparative myology, and here his most important influence was felt in his application to the classical morphology of an outlook which was essentially experimental and functional. It was in this enthusiastic encouragement of modern methods and their application on an unusually wide basis of detailed descriptive knowledge that the chief characteristic of his work lay. In him we have lost a fine anatomist and a valued friend, whose influence on the development of the science he had so much at heart was greater than perhaps he himself realised."

Professor Appleton married in 1918 Eva Gertrude Plewman, who survives him with a son and a daughter. He was 61 years of age.

is very uncertain and the chances of becoming a partner are small. This enables the principal to maintain a large list and have his work done cheaply by a doctor who is paid a small salary. In fact the principal can even claim income-tax rebate by employing me. I can be sacked at a month's notice if I am not prepared to work 12 hours a day.

A situation of under-employment is developing in the National Health Service at a time when more doctors than ever before are needed. This is not the fault of the service; it is due to the medical profession's main interest being money. In the end it will lead to a full-time salaried service; and the sooner this appears the better, for the present situation cannot continue indefinitely.

I do feel, however, that medical students should realise that their chances of establishing themselves are very small under the present system. I believe that many would seriously consider changing their profession while there was still time if they knew the true facts. There has been little publicity to expose the exploitation of young doctors that is now going on.

REGISTRAR.

SIR,—I qualified only recently, but I should like to discuss the problem in relation to my education, so recently concluded.

The teaching hospitals, and hospitals generally, could do a great deal to improve the situation. In the teaching hospitals the patients offered for study are highly selected; the rare and more complicated cases are encountered, and they are taught on by specialists. The standard bedside inquisition of the student passes from history to examination and from there to as many possible laboratory investigations as he cares or manages to think of in the space of sixty seconds. At the end of all this he is asked for his diagnosis, which, if he has his wits about him and possesses good eyesight, he proceeds to read from the bed-ticket. Usually no attempt is made to elicit the logical steps by which the diagnosis could have been reached, and there is no desire to limit the investigations to such as will finally settle the matter. The great man is often a very bad offender in this respect himself, and will not see the patient until all investigations, including the blood-rhubarb, have been completed. Yet after a short interval the student may become a general practitioner and will be expected to diagnose without any ancillary investigations.

There is no reason why the cases should be selected in this way. Within four miles of the institution where I have been trained there are several general hospitals which between them have ten times as many beds as there are in the teaching hospital. The patients are attended by consultants as well qualified as those in the teaching hospital; often these consultants have trained in the teaching hospital and have taught there when they were registrars; yet no attempt is made to use their patients as material for teaching, though the material is less selected and thus more suitable for instructing future general practitioners. My university is not the only one, I believe, which wastes clinical material in this way.

Not only is the material in the teaching hospital selected, but it undergoes further selection as to which cases will actually be used for teaching. Very often it is the rare case that is used; and here the registrars are worse offenders than their chiefs. I have been treated to a two-hour discourse on differentiation between various types of congenital heart-disease; I have had a half-hour talk on the treatment of multiple myelomatosis; yet no-one has told me how I can make an old lady with lobar pneumonia comfortable—in fact I have not seen a case of lobar pneumonia in the hospital.

Similarly in the final examination, in the viva I was asked about voice changes in myxœdema, and cases of pulmonary actinomycosis and rare muscular dystrophy were on show. Thus concentrating on the esoteric, the student does not graduate looking forward to helping his sick friends, who are suffering from ordinary diseases, in general practice; instead he dreams of the day when in an immaculate pin-stripe suit, and attended by a large retinue of registrars and students, he will talk learnedly about the Smith-Schmidt syndrome, two cases of which he has seen in the last thirty years. Generations of students are now growing up whose dearest wish, partly as a result of their education, is to avoid going into general practice; those with the intellect, the push, and the family connections will have their way, leaving their less fortunate brethren to labour in the outer darkness.

Dr. Collings mentions that the standard of pædiatric work and psychiatry is low in general practice. The teaching I have received in these subjects certainly does not fit me to look after children or nervous disorders. Often the task of a student in search of knowledge is complicated by house-surgeons, members of the nursing staff, and porters, who are detailed to guard the door of the sanctum. There are still consultants on the staffs of teaching hospitals who refuse to teach.

With all its shortcomings, the hospital still offers the best training-ground for doctors; but this too will become soon the province of the trainee specialist. A friend of mine, a registrar in a general hospital, once remarked in conversation that he had no intention of working for a higher qualification and that he wanted to go into general practice after he had gained more experience. Hearing of this, a consultant who had recently joined the hospital suggested to him that, if he was not working for an examination, he might leave and make room for someone who was.

Besides fulfilling the tasks already allotted to them, the hospitals and the teaching institutions could help the general practitioner in other ways. Prof. R. Platt mentioned in a recent article in the *Practitioner* how the diagnosis of a case could have been clinched quite simply by taking a proper history and doing a blood-count; instead the general practitioner gave the patient a bottle and reassured her in such a way that she became a neurotic and an invalid. The doctor could have done the blood-count himself, as some rare practitioners do; but this is not possible for one who sees thirty patients in two hours. The teaching hospital would not have been satisfied to do the blood-count and send the report to him for the next day: they would have treated the good lady, given her enough medicine for a week, and told her to go to the doctor when it was finished; and about a fortnight later the doctor would have received a letter advising him what to do. At present there seems no way in which the general practitioner—in an industrial practice anyway—can get access to laboratory facilities which would put his work on a scientific basis. Such pathological services could easily be provided by hospitals, but until that is done one can hardly blame the young doctor when he only gives as good a service as old X.Y. down the road, who qualified at the Back-of-Beyond University in 1905 and has not read a medical journal or book since.

Dr. Collings suggests that the establishment of health centres would improve conditions. In preparation for this, would it not be a good thing to build one or two such centres and attach them to teaching hospitals? Several ends would be served. Postgraduates wanting to train for general practice could do so under ideal circumstances; such centres would offer better standards of comparison for the local general practitioners than old X.Y.; and the various problems of staffing, organisation, equipment, and design could be studied at leisure in readiness for the day when economic circumstances will be favourable to large-scale building of health

Notes and News

REMUNERATION OF GENERAL PRACTITIONERS

The Minister of Health is proposing to make a further inquiry into the professional incomes and expenses of general practitioners, on the basis of information provided by executive councils and the Inland Revenue authorities. At a meeting on April 3 with representatives of the General Medical Services Committee, the Minister stated that the Government's "wage-freeze" policy could not be disregarded, and he was not prepared to make any increase in the central pool on the facts before him. The inquiry into payments would relate to earnings in the year ended March 31, 1950; this information would be obtained from executive councils. Secondly, in order to discover what the practice expenses had proved to be in the National Health Service, the Inland Revenue authorities would be asked (if the profession agreed) to produce up-to-date figures, based on accurate sampling. The inquiry would be anonymous. When the results were known the Minister would "consider with the Association the implications of those facts in the light of the conditions which then obtain." The General Medical Services Committee has offered to coöperate in collecting fresh information, provided that the Minister agrees: (1) that the investigations shall be completed by Nov. 1 this year; (2) that the Spens report remains the basis of remuneration "until, after appropriate notice, any new basis is agreed between the Minister and the profession's representatives"; and (3) "that, if the investigations reveal inadequacy of general-practitioner remuneration or an excessive margin between their remuneration and that of other comparable professions within the National Health Service and other appropriate branches of the medical profession, the Minister will make available to general practitioners any money necessary to remedy the inadequacy or to narrow the margin." The committee has also informed the Minister of its willingness to collaborate "in a search for reasonable and prudent economies in the National Health Service."

AUREOMYCIN AND CHLOROMYCETIN

On the advice of the Medical Research Council, the Ministry of Health has decided to extend the distribution of the above antibiotics for the treatment of the following additional conditions:

'*Aureomycin.*'—Severe staphylococcal infections which have proved resistant to penicillin in adequate doses.

'*Chloromycetin.*'—Acute laryngotracheobronchitis in infants.

For the treatment of these additional conditions, the two antibiotics will be made available in hospital only.

University of Oxford

On April 27 the honorary degree of M.A. was conferred on Mr. G. T. Hollis, editor of Oxford Medical Publications.

On May 2 it was proposed to confer the honorary degree of D.C.L. on Viscount Addison, and of D.SC. on Prof. M. W. Woerdeman, of Amsterdam, and Prof. G. W. Corner, of Washington.

University of Cambridge

On April 22 the degrees of M.B., B.CHIR. were conferred by proxy on F. B. Winfield and Violet L. Lutwyche.

University of London

Mr. C. G. Rob has been appointed to the chair of surgery at St. Mary's Hospital Medical School from Oct. 1.

Mr. Rob qualified from St. Thomas's Hospital in 1937, taking his M.B. Camb. the following year, and his F.R.C.S. in 1939. In 1941 he obtained the M.CHIR. He has held surgical appointments at the Royal Victoria Hospital, Montreal, the Halifax Royal Infirmary, the Royal Surrey County Hospital, and St. Thomas's Hospital where he later became senior assistant to the surgical unit. During the late war Mr. Rob was surgical specialist to the 1st Parachute Brigade and surgeon to a field surgical unit with the rank of lieut.-colonel. He was awarded the Military Cross in 1943 and he was mentioned in despatches in 1945. In 1948 he was appointed to the university readership in surgery at St. Thomas's and elected to the staff as surgeon to outpatients. He is an examiner in surgery for the university. He has published papers on abdominal wounds, and in 1946 he delivered a Hunterian lecture at the Royal College of Surgeons.

University of Birmingham

On Thursdays, May 25 and June 1, at 4 P.M., Dr. Frances Braid will deliver the Ingleby lectures on Hypothyroidism in Childhood. Further particulars will be found in our advertisement columns.

University of Glasgow

On April 29 the following degrees were conferred:

M.D.—* J. C. Brocklehurst, A. K. Brown, D. C. Devine, T. O. P. D. Lawson, Robert Love.

Ph.D.—Alexander Hutchison.

* In absentia.

University of Edinburgh

On Wednesday, May 10, at 5 P.M., Dr. James C. White, chief of the neurological service, Massachusetts General Hospital, Harvard Medical School, is to deliver a Macarthur lecture on Neurosurgical Experience in the Treatment of Intractable Pain. The lecture will be held in the surgery lecture theatre, University New Buildings, Teviot Place, Edinburgh, and Sir James Learmonth will be in the chair.

Royal College of Physicians of London

At a comitia of the college held on April 27, with Dr. W. Russell Brain, the president, in the chair, the following were elected to the fellowship:

S. L. Ludbrook, New Zealand; T. Rowland Hill, London; E. W. Skipper, Sheffield; John Dockray, Ryde, I.W.; E. T. Baker-Bates, Liverpool; A. M. Nussey, Birmingham; R. Kemball Price, Hove; A. I. G. McLaughlin, London; W. G. A. Swan, Newcastle upon Tyne; A. W. D. Leishman, Sheffield; R. W. D. Turner, Edinburgh; J. V. Hurford, Godalming; J. R. Nassim, London; P. H. Sandifer, London; J. D. Spillane, Cardiff; A. M. G. Campbell, Bristol; H. R. Vickers, Sheffield; E. G. L. Bywaters, Taplow; Ian Macpherson, Leeds; R. E. Bonham-Carter, London; C. A. Young, London; Ralph Kauntze, London; J. W. Orr, Birmingham; H. J. Anderson, London; J. R. Squire, Birmingham; W. W. Brigden, London; F. T. G. Prunty, London; Lieut.-Colonel W. H. Hargreaves, R.A.M.C.; D. R. Cameron, York; Frank Ridehalgh, Leeds; Charles Wilcocks, London.

The following were elected to the fellowship under by-law 39b which provides for the election of non-members "who have distinguished themselves in any branch of the science or practice of medicine":

R. F. Farquharson, Toronto; N. M. Goodman, London; H. J. Ritchie, Sydney.

The Baly medal was presented to Sir Edward Mellanby, F.R.S., for his services to physiology and his work on nutrition, with particular reference to the accessory food-factors.

Dr. G. E. S. Ward was reappointed as external examiner in medicine for the Faculty of Radiologists.

The following, having satisfied the Censors' Board, were elected to the membership:

M. N. Allen, M.B. Melb., I. McL. Baird, M.B. St. And., P. F. Bartley, M.B. N.Z., P. D. Bedford, M.D. Leeds, J. T. Cahill, M.D. Melb., Harish Chandra, M.B. Bombay, R. S. C. Couch, M.B. Lond., B. N. Das Gupta, M.D. Patna, Myrddin Evans, M.B. Wales, L. C. Harris, M.D. Pretoria, K. S. Henley, M.B. Durh., I. S. Hodgson-Jones, M.B. Camb., D. V. Hubble, M.D. Lond.; Philip Hugh-Jones, M.D. Camb., P. E. Jackson, M.B. Lond., K. E. Jefferson, M.B. Camb., B. E. H. Koch, M.D. Bonn, G. D. W. McKendrick, B.M. Oxfd, E. K. Macleod, M.B. N.Z., B. G. Maegraith, M.B. Adelaide, K. S. Millingen, M.B. Sydney, J. N. Montgomery, M.B. Belf., B. P. O'Connell, M.B. Sydney, M. A. Peyman, B.M. Oxfd, R. G. Pitman, M.D. Lond., E. G. Rees, M.B. Lond., R. C. Roxburgh, M.B. Camb., R. H. Seville, M.D. Leeds, W. J. Smith, M.D. Melb., P. J. D. Snow, M.B. Manc., P. R. Swyer, M.B. Camb., W. H. Taylor, B.M. Oxfd, William Walker, M.B. St. And., N. C. T. Watford, M.B. Lond., S. C. Wigley, M.B. Melb.

Licences to practise were conferred upon the following 204 candidates (156 men and 48 women) who have passed the final examination of the Conjoint Board:

D. R. H. Addenbrooke, D. J. Adderley, Rosie Ali, Anne M. Allen, J. G. Armstrong, R. A. Arthur, Pamela M. Bacon, M. A. Baddoo, Sybille E. Baer, Harry Barkley, Cynthia Barnett, J. D. Baston, J. H. F. Batstone, Robert Baxter, P. D. Bennett, Jerzy Betkowski, Margaret E. Beynon, J. B. Blomfield, A. G. Blyth, F. G. L. Brafield, J. E. Bridger, William Brooks, A. F. W. Brown, H. B. Brown, K. M. Bryant, Janusz Buchman, A. E. R. Buckle, D. M. Burley, David Burman, R. P. Butt, B. E. Caddick, J. C. Camac, D. S. H. Cannon, J. S. Cardwell, P. M. Carpenter, C. C. D. Chandler, G. C. H. Chandler, Jack Chesover, G. E. Chorley, J. A. Churcher, H. F. Clare, A. J. Clarke, C. H. Clarke, I. S. Coleman, P. J. Cook, J. T. Cope, Elizabeth McQ. D. Craig, R. Q. Crellin, J. M. D. Crook, J. D. Crowlesmith, Pauline M. Daniels, R. G. Davies, W. H. G. Davies, K. R. J. de Belder, J. J. de Caestecker, Hugh de Glanville, F. L. A. de Marnefe, Joseph Devota, George Dougan, E. R. Duchesne, M. W. F. Dunning, A. C. de B. Eksteen, Cathleen M. Elliott, F. H. Evason, Margaret D. Findlay, John Foley, R. A. V. Forrester, E. H. Franks, John Fraser, J. W. Fullerton, I. T. Gabe, Bernard Gatoff, G. A. L. G. Glazebrook, M. P. W. Godfrey, Derek Goldman, P. C. W. Greaves, N. A. Green, Katherine A. Grice, A. W. Griffiths, H. E. D. Griffiths, B. C. Hale, Antoinette I. Hallett, M. L. Hamilton, F. G. Hardman, T. S. Hart, N. E. Harvey, Willem Hertzog, B. M. Hibbard, Iris A. Hicks, R. G. Hirons, W. G. Hodges, J. W. Hughes, F. T. Hunt, J. A. Hunt, G. B. Ihringer, Sylvia R. Ingold, Sybil E. Jacob, D. C. James, David Jenkins, F. G. Johnson, J. W. Johnson, A. G. Jones, D. K. B. Jones, Eleanor M. Jones, J. L. Jones, R. T. B. Jones, Michael Kaye, G. A. Lawrence, John Lawson-Matthew, Annie M. Legge, J. C. Leonard, G. A. Levell, Melvin Lewis, Marian H. Littlejohn, Shinmen Lin, Eunice Lockey, Merton Long, M. J. R. Mackrill, E. N. Marks, G. W.

EDWARD WILLIAM HOPE

O.B.E., M.D., D.SC. EDIN.

THE death of Professor Hope on April 27 at the age of 94 breaks one of the few remaining links with the Victorian period of environmental hygiene. The 41 years during which he held office as medical officer of health for Liverpool was a time of great activity in public health, and under his guidance there was built up on Merseyside a system of hospitals for infectious diseases, an efficient and elaborate port sanitary administration, an up-to-date school medical service, and a child-welfare department.

Edward William Hope was educated at the Royal School of Mines and the University of Edinburgh, where he graduated M.B. in 1878. In 1883 he was appointed assistant to Dr. Stopford Taylor, then M.O.H. for Liverpool. At the time of the Hamburg cholera epidemic he quickly made a reputation by his handling of an infected ship which arrived from that port. He courageously remained on the vessel and accompanied the crew when they were transferred to the port sanitary hospital. Later when plague became pandemic, though its causes were little known, he organised the first line of defence against the menace.

In 1887 he was appointed medical superintendent of the Park Hill Fever Hospital, and in 1894 he was appointed M.O.H. for Liverpool, fourth in the line of succession from Duncan the first medical officer of health in England. He took office at a time when the boundaries of the city were being greatly enlarged, and his help was more than once invited when other municipalities were pressing for similar expansion. He was an able and adroit witness when under cross-examination on such occasions or during the many housing inquiries in his own city. Probably on no subject did he carry more weight or have more experience. In 1883 there were 23,690 cellars still occupied as dwellings in Liverpool, and while Hope held office over 12,000 unfit dwellings were condemned and model tenements built in their place.

Epidemiologically his term of office was also important. He saw, and did much to promote, the eradication of typhus; indeed, his own observations anticipated in large measure the discovery of its manner of spread by lice. Largely through improvements in sanitation, his period of service coincided with a reduction in the prevalence of typhoid fever from some 1500 cases a year to a few score. With this went a reduction in infant mortality especially from zymotic diarrhœa, which resulted in the saving of an even larger number of lives. At the turn of the century, following the appointment of "women sanitary inspectors" in St. Helens, he procured the appointment, with the backing of the Rathbone family, of health visitors. Their value was at once apparent, and the provision by the city of a supply of sterilised milk greatly increased their opportunities to save the lives of artificially fed infants. Nevertheless he was always a powerful advocate of breast-feeding. His observation of the effects of intemperance in causing child neglect led him to draw attention to this evil in his annual reports. In 1916 he was asked by the Carnegie Trust to write a report on infant mortality, and the trust expressed their gratitude by presenting the money to provide the Carnegie welfare centre adjacent to the Liverpool Maternity Hospital.

An outbreak of smallpox in 1902, following repeated importations from Boston and elsewhere, led to considerable expansion of the city's fever hospitals, especially at Fazakerley. Hope contested vigorously the concept of the then officers of the Local Government Board that aerial convection was responsible for its spread. A powerful rejoinder to an official report by the board's officer was considered by many to have given this theory its quietus.

From early days Dr. Hope had been associated with the university movement. In 1886 he became lecturer on public health in the university college at Liverpool, and he was appointed professor of public health in the college when it was affiliated to the Victoria University, and later in the University of Liverpool when it obtained its charter in 1903. He played a large part in the foundation of the Liverpool School of Hygiene and he was the first to arrange special courses for health visitors. He examined in public health for the Universities of Cambridge, Belfast, Manchester, Edinburgh, and London.

Throughout his work as M.O.H., Dr. Hope was on the best of terms with his medical colleagues, and this good feeling was expressed by his appointment as president of the Liverpool Medical Institution. He also served as president of the Society of Medical Officers of Health. He was appointed O.B.E. in 1918. In 1924 he retired, but new editions of his textbooks had still to be prepared and seen through the press, and in 1931 in his *Health at the Gateway* he retold his own experiences and described the special health problems of a city whose staple industry is shipping. Active in mind and body, with charm, ability, and force of character, he will long be remembered as one who played a great part in converting the black spot on the Mersey into a reasonably healthy city.

In 1899 Dr. Hope married C. Rennie, daughter of John Bowring, and a sister of a former lord mayor of Liverpool. They had a son and two daughters.

Diary of the Week

MAY 7 TO 13

Monday, 8th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Sir John Parkinson: Auricular Fibrillation and Flutter.

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
1.30 P.M. Miss D. J. Collier: Facial Paralysis.

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.45 P.M. Sir Henry Souttar: Observation, its Meaning and Importance. (Annual oration.)

UNIVERSITY OF DURHAM
5.15 P.M. (Royal Victoria Infirmary, Newcastle upon Tyne.) Dr. J. C. White (Boston): Surgical Relief of Intractable Pain. (Rutherford Morison lecture.)

Tuesday, 9th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. A. E. Clark-Kennedy: *The Patient and his Disease.* (First Croonian lecture.)

UNIVERSITY OF LONDON
5.30 P.M. (London School of Hygiene, Keppel Street, W.C.1.) Prof. F. M. Burnet, F.R.S. (Melb.): General Pathology of Virus Infection.

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. G. B. Dowling: The Sclerodermas.

INSTITUTE OF LARYNGOLOGY AND OTOLOGY
1.30 P.M. Dr. E. H. R. Harries: Respiratory Tract in Infectious Diseases.

LONDON JEW [illegible] AL SOCIETY
8.30 P.M. [illegible] er Woburn Place, W.C.1.) Prof.
A. [illegible] of the Newborn Baby.

Wednesday, 10th

INSTITUTE OF LARYNGOLOGY AND OTOLOGY
9.30 A.M. Mr. A. C. Deverell: Relationship of Dental Disease to Diseases of the Throat, Nose, and Ear.

INSTITUTE OF PSYCHIATRY
4.30 P.M. (Maudsley Hospital, S.E.5.) Dr. Denis *Hill: Post-graduate lecture-demonstration.*

LONDON [illegible] SOCIETY
3 P.M. [illegible] Winchmore Hill, N.19.) Clinical

Thursday, 11th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. Clark-Kennedy: The Patient and his Disease. (Last *Croonian lecture.)*

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. H. F. Moseley: Ruptures of the Rotator Cuff. (Hunterian lecture.)

INSTITUTE OF DERMATOLOGY
5 P.M. Dr. Brian Russell: Skin Diseases caused by Light.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Denis Williams: Neurology demonstration.

HONYMAN GILLESPIE LECTURE
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Dr. R. C. L. Batchelor: Recent Developments in Venereology.

Friday, 12th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Prof. G. W. Pickering: Cardiac Failure.

UNIVERSITY OF LONDON
5.30 P.M. (University College, W.C.1.) Prof. G. B. Wislocki (Harvard University): Cytology and *Histochemistry* of the Uterus and Placenta. (First of three lectures.)

MAIDA VALE HOSPITAL FOR NERVOUS DISEASES, W.9
5 P.M. Dr. Douglas McAlpine: Clinical neurological demonstration.

BRITISH ASSOCIATION OF PHYSICAL MEDICINE
5.30 P.M. (Royal College of Surgeons.) Dr. Frank H. Krusen (Mayo Clinic): Work of the Baruch Committee.

Saturday, 13th

SOUTH-EAST METROPOLITAN REGIONAL TUBERCULOSIS SOCIETY
11 A.M. (Kettlewell Hospital, Swanley, Kent.) Dr. E. L. Sandiland: Is Your Pneumoperitoneum Really Necessary?

Notes and News

REMUNERATION OF GENERAL PRACTITIONERS

The Minister of Health is proposing to make a further inquiry into the professional incomes and expenses of general practitioners, on the basis of information provided by executive councils and the Inland Revenue authorities. At a meeting on April 3 with representatives of the General Medical Services Committee, the Minister stated that the Government's "wage-freeze" policy could not be disregarded, and he was not prepared to make any increase in the central pool on the facts before him. The inquiry into payments would relate to earnings in the year ended March 31, 1950; this information would be obtained from executive councils. Secondly, in order to discover what the practice expenses had proved to be in the National Health Service, the Inland Revenue authorities would be asked (if the profession agreed) to produce up-to-date figures, based on accurate sampling. The inquiry would be anonymous. When the results were known the Minister would "consider with the Association the implications of those facts in the light of the conditions which then obtain." The General Medical Services Committee has offered to coöperate in collecting fresh information, provided that the Minister agrees: (1) that the investigations shall be completed by Nov. 1 this year; (2) that the Spens report remains the basis of remuneration "until, after appropriate notice, any new basis is agreed between the Minister and the profession's representatives"; and (3) "that, if the investigations reveal inadequacy of general-practitioner remuneration or an excessive margin between their remuneration and that of other comparable professions within the National Health Service and other appropriate branches of the medical profession, the Minister will make available to general practitioners any money necessary to remedy the inadequacy or to narrow the margin." The committee has also informed the Minister of its willingness to collaborate "in a search for reasonable and prudent economies in the National Health Service."

AUREOMYCIN AND CHLOROMYCETIN

On the advice of the Medical Research Council, the Ministry of Health has decided to extend the distribution of the above antibiotics for the treatment of the following additional conditions:

'*Aureomycin*.'—Severe staphylococcal infections which have proved resistant to penicillin in adequate doses.

'*Chloromycetin*.'—Acute laryngotracheobronchitis in infants.

For the treatment of these additional conditions, the two antibiotics will be made available in hospital only.

University of Oxford

On April 27 the honorary degree of M.A. was conferred on Mr. G. T. Hollis, editor of Oxford Medical Publications.

On May 2 it was proposed to confer the honorary degree of D.C.L. on Viscount Addison, and of D.SC. on Prof. M. W. Woerdeman, of Amsterdam, and Prof. G. W. Corner, of Washington.

University of Cambridge

On April 22 the degrees of M.B., B.CHIR. were conferred by proxy on F. B. Winfield and Violet L. Lutwyche.

University of London

Mr. C. G. Rob has been appointed to the chair of surgery at St. Mary's Hospital Medical School from Oct. 1.

Mr. Rob qualified from St. Thomas's Hospital in 1937, taking his M.B. Camb. the following year, and his F.R.C.S. in 1939. In 1941 he obtained the M.CHIR. He has held surgical appointments at the Royal Victoria Hospital, Montreal, the Halifax Royal Infirmary, the Royal Surrey County Hospital, and St. Thomas's Hospital where he later became senior assistant to the surgical unit. During the late war Mr. Rob was surgical specialist to the 1st Parachute Brigade and surgeon to a field surgical unit with the rank of lieut.-colonel. He was awarded the Military Cross in 1943 and he was mentioned in despatches in 1945. In 1948 he was appointed to the university readership in surgery at St. Thomas's and elected to the staff as surgeon to outpatients. He is an examiner in surgery for the university. He has published papers on abdominal wounds, and in 1946 he delivered a Hunterian lecture at the Royal College of Surgeons.

University of Birmingham

On Thursdays, May 25 and June 1, at 4 P.M., Dr. Frances Braid will deliver the Ingleby lectures on Hypothyroidism in Childhood. Further particulars will be found in our advertisement columns.

University of Glasgow

On April 29 the following degrees were conferred:

M.D.—* J. C. Brocklehurst, A. K. Brown, D. C. Devine, T. O. P. D. Lawson, Robert Love.

Ph.D.—Alexander Hutchison.

* In absentia.

University of Edinburgh

On Wednesday, May 10, at 5 P.M., Dr. James C. White, chief of the neurological service, Massachusetts General Hospital, Harvard Medical School, is to deliver a Macarthur lecture on Neurosurgical Experience in the Treatment of Intractable Pain. The lecture will be held in the surgery lecture theatre, University New Buildings, Teviot Place, Edinburgh, and Sir James Learmonth will be in the chair.

Royal College of Physicians of London

At a comitia of the college held on April 27, with Dr. W. Russell Brain, the president, in the chair, the following were elected to the fellowship:

S. L. Ludbrook, New Zealand; T. Rowland Hill, London; E. W. Skipper, Sheffield; John Dockray, Ryde, I.W.; E. T. Baker-Bates, Liverpool; A. M. Nussey, Birmingham; R. Kemball Price, Hove; A. I. G. McLaughlin, London; W. G. A. Swan, Newcastle upon Tyne; A. W. D. Leishman, Sheffield; R. W. D. Turner, Edinburgh; J. V. Hurford, Godalming; J. R. Nassim, London; P. H. Sandifer, London; J. D. Spillane, Cardiff; A. M. G. Campbell, Bristol; H. R. Vickers, Sheffield; E. G. L. Bywaters, Taplow; Ian Macpherson, Leeds; R. E. Bonham-Carter, London; C. A. Young, London; Ralph Kauntze, London; J. W. Orr, Birmingham; H. J. Anderson, London; J. R. Squire, Birmingham; W. W. Brigden, London; F. T. G. Prunty, London; Lieut.-Colonel W. H. Hargreaves, R.A.M.C.; D. R. Cameron, York; Frank Ridehalgh, Leeds; Charles Wilcocks, London.

The following were elected to the fellowship under by-law 39b which provides for the election of non-members "who have distinguished themselves in any branch of the science or practice of medicine":

R. F. Farquharson, Toronto; N. M. Goodman, London; H. J. Ritchie, Sydney.

The Baly medal was presented to Sir Edward Mellanby, F.R.S., for his services to physiology and his work on nutrition, with particular reference to the accessory food-factors.

Dr. G. E. S. Ward was reappointed as external examiner in medicine for the Faculty of Radiologists.

The following, having satisfied the Censors' Board, were elected to the membership:

M. N. Allen, M.B. Melb., I. McL. Baird, M.B. St. And., P. F. Bartley, M.B. N.Z., P. D. Bedford, M.D. Leeds, J. T. Cahill, M.D. Melb., Harish Chandra, M.B. Bombay, R. S. C. Couch, M.B. Lond., B. N. Das Gupta, M.D. Patna, Myrddin Evans, M.B. Wales, L. C. Harris, M.D. Pretoria, K. S. Henley, M.B. Durh., I. S. Hodgson-Jones, M.B. Camb., D. V. Hubble, M.D. Lond., Philip Hugh-Jones, M.D. Camb., P. E. Jackson, M.B. Lond., K. E. Jefferson, M.B. Camb., B. E. H. Koch, M.D. Bonn, G. D. W. McKendrick, B.M. Oxfd, E. K. Macleod, M.B. N.Z., B. G. Maegraith, M.B. Adelaide, K. S. Millingen, M.B. Sydney, J. N. Montgomery, M.B. Belf., B. P. O'Connell, M.B. Sydney, M. A. Peyman, B.M. Oxfd, R. G. Pitman, M.D. Lond., E. G. Rees, M.B. Lond., R. C. Roxburgh, M.B. Camb., R. H. Seville, M.D. Leeds, W. J. Smith, M.D. Melb., P. J. D. Snow, M.B. Manc., P. R. Swyer, M.B. Camb., W. H. Taylor, B.M. Oxfd, William Walker, M.B. St. And., N. C. T. Watford, M.B. Lond., S. C. Wigley, M.B. Melb.

Licences to practise were conferred upon the following 204 candidates (156 men and 48 women) who have passed the final examination of the Conjoint Board:

D. R. H. Addenbrooke, D. J. Adderley, Rosie Ali, Anne M. Allen, J. G. Armstrong, R. A. Arthur, Pamela M. Bacon, M. A. Baddoo, Sybille E. Baer, Harry Barkley, Cynthia Barnett, J. D. Baston, J. H. F. Batstone, Robert Baxter, P. D. Bennett, Jerzy Betkowski, Margaret E. Beynon, J. B. Blomfield, A. G. Blyth, F. G. L. Brafield, J. E. Bridger, William Brooks, A. F. W. Brown, H. B. Brown, K. M. Bryant, Janusz Buchman, A. E. R. Buckle, D. M. Burley, David Burman, R. P. Butt, B. E. Caddick, J. C. Camac, D. S. H. Cannon, J. S. Cardwell, P. M. Carpenter, C. C. D. Chandler, G. C. H. Chandler, Jack Chesover, G. E. Chorley, J. A. Churcher, H. F. Clare, A. J. Clarke, C. H. Clarke, I. S. Coleman, P. J. Cook, J. T. Cope, Elizabeth McQ. D. Craig, R. Q. Crellin, J. M. D. Crook, J. D. Crowlesmith, Pauline M. Daniels, R. G. Davies, W. H. G. Davies, K. R. J. de Belder, J. J. de Caestecker, Hugh de Glanville, F. L. A. de Marnefe, Joseph Devota, George Dougan, E. R. Duchesne, M. W. F. Dunning, A. C. de B. Eksteen, Cathleen M. Elliott, F. H. Evason, Margaret D. Findlay, John Foley, R. A. V. Forrester, E. H. Franks, John Fraser, J. W. Fullerton, I. T. Gabe, Bernard Gatoff, G. A. L. G. Glazebrook, M. P. W. Godfrey, Derek Goldman, P. C. W. Greaves, N. A. Green, Katherine A. Grice, A. W. Griffiths, H. E. D. Griffiths, B. C. Hale, Antoinette I. Hallett, M. L. Hamilton, F. G. Hardman, T. S. Hart, N. E. Harvey, Willem Hertzog, B. M. Hibbard, Iris A. Hicks, R. G. Hirons, W. G. Hodges, J. W. Hughes, F. T. Hunt, J. A. Hunt, G. B. Ihringer, Sylvia R. Ingold, Sybil E. Jacob, D. C. James, David Jenkins, F. G. Johnson, J. W. Johnson, A. G. Jones, D. K. B. Jones, Eleanor M. Jones, J. L. Jones, R. T. B. Jones, Michael Kaye, G. A. Lawrence, John Lawson-Matthew, Annie M. Legge, J. C. Leonard, G. A. Levell, Melvin Lewis, Marian H. Littlejohn, Shinmen Lin, Eunice Lockey, Merton Long. M. J. R. Mackrill, E. N. Marks, G. W.

Marsh, Nancy A. H. Marston, Frances E. Mather, J. R. M. Mathieson, J. M. Mayer, A. P. Melgrave, A. J. Merrifield, W. E. Miall, J. L. Milligan, Mary Mitchell, R. E. Molloy, Pamela M. Moody, Rumesh Chandra Nauth-Misir, *Patricia L. Obee, Joan E. M. O'Brien.* D. F. O'Malley, J. H. Owen, J. B. Parsons, D. J. Pearce, A. O, Peters, Anne M. Phillips, G. F. M. Pierce, Theresa Posner, R. J. Powell, Elma P. Pridham, Patience Proby, R. J. H. Raines, W. D, Ratnavale, A. M. Reader, Marion E. Record, J. H. Rees, B. G. Reynolds, C. S. Rhodes, J. A. Richards, D. M. Richardson, D. McL. Riddell, J. MacL. G. Ritchie, A. W. Roberts, Margaret G. Roberts. Margaret E. Robson, Israel Rocker, Thea G. T. Rose, Margaret M. Sander, J. R. Saunders, Diana M. Scott, A. L. Slater, B. O. Smith, Florence L. Smith, G. W. Smith, S. R. Somers, P. R. Sowerby, Gwyneth M. Stevens, Leonard Tann, J. S. Taylor, Eira Thomas, M. G. Thompson, Eleanor M. R. Till, P. A. Van der Merwe, C. B. Vaughan, M. G. S. Vercoe, D. W. Verity, M. H. Vickery, A. J. Wainwright, J. C. N. Wakeley, *Dorothy C. Wall*, J. St. G. Warmann, Mary D. B. Warnock, Brian Waters, Paula M. Watkin, Mary D. Watkins, Sheila M. Watts, Daphne E. Webber, Mary M. Weeks, Otto Weiss, Josephine P. Werren, W. N. Whamond, A. E. Wheatley, M. L. Wheatley, R. J. M. Whittle, Alfred Wiener, A. O. Wilkey, P. O. Williams, V. A. Wills, Kathleen M. Witham, R. F. Wright.

Diplomas were conferred on those named in the report of the meeting of the College of Surgeons in our issue of April 22 (p. 791).

Laboratory Animals Bureau Congress

Over 400 technicians attended this congress which took place at the Royal Veterinary College, London, on March 30 and 31. During the meeting the Animal Technicians Association was formed, under the presidency of Mr. A. S. Parkes, SC.D., F.R.S. The hon. secretary is Mr. A. E. Mundy, Research Institute, Royal Veterinary College, Royal College Street, London, N.W.1, from whom further details may be had.

North-West Metropolitan Board

At a meeting on April 17, the North-West Metropolitan Regional Hospital Board approved in principle the re-siting of the West End Hospital for Nervous Diseases "as a matter of urgency." The board agreed that at the London Lock Hospital inpatient accommodation should be provided for male patients suffering from venereal disease, and that both male and female outpatient clinics should be continued. The board also agreed that in advertising for a part-time consultant pædiatrician at the Royal London Homœopathic Hospital, no reference should be made to a need for candidates to have had experience in homœopathy. It adopted the following resolution on study leave: "That in considering applications for grants of study leave with pay for preparing for appropriate higher qualifications, grants be normally restricted to the registrar grades and granted up to a maximum of 14 days, including the period of the actual examination."

Czechoslovakia Withdraws from W.H.O.

The government of Czechoslovakia notified the World Health Organisation on April 21 that it "no longer considers itself a member of the Organisation." In a letter to Dr. Broek Chisholm, director-general of W.H.O., Mr. Viliam Siroky, vice-president of the Council of Ministers and minister for foreign affairs, states that, in the opinion of the Czech government, W.H.O. does not fulfil the aims and principles of its constitution, which Czechoslovakia signed and ratified. The letter adds: "The fundamental objectives laid down in the W.H.O. constitution have remained a dead letter. Moreover, the Organisation is subject to political influences which lead to discrimination against member States, among them Czechoslovakia. Developments within the World Health Organisation thus contradict the principles of the constitution, adherence to which was the essential pre-condition for Czechoslovak participation."

World Health Assembly

The United Kingdom's chief delegate to the World Health Assembly, which opens in Geneva on May 8, will be Dr. Melville Mackenzie, of the Ministry of Health. The other delegates will be Dr. Wilson Rae, deputy chief medical officer, Colonial Office, and Mr. T. Lindsay, of the Ministry of Health. Accompanying them as advisers will be Sir John Charles, chief medical officer designate, Ministry of Health; Sir Andrew Davidson, chief medical officer, Department of Health for Scotland; Dr. R. H. Barrett and Mr. F. Mells, of the Ministry of Health; Dr. W. S. Maclay, senior commissioner, Board of Control; Mr. A. E. Joll, of the General Register Office; Dr. Percy Stocks, chief medical statistician, General Register Office; and Miss S. N. Udell, chief nursing officer, Colonial Office. Dr. Barrett is acting as secretary to the delegation. Dr. Melville Mackenzie will also attend a meeting of the executive board of the World Health Organisation which will follow the World Assembly.

University of Wisconsin

Dr. A. M. MacKay, formerly first assistant in the Nuffield department of anæsthetics at Oxford, has been appointed to the chair of anæsthetics.

Royal Society

Prof. C. F. Cori, professor of medicine at Washington University, St. Louis, has been elected a foreign member of the society for his work on metabolism of carbohydrates in the animal body.

First International Pharmacopœia

Last Monday the W.H.O. expert committee which has been working on the first *International Pharmacopœia*, announced in New York the completion of the English edition. The *Times* (May 2) reports that the book, dealing with about two hundred drugs in general use, will be issued later this year when the French text is ready. A Spanish translation will follow. The chairman of the committee is Dr. C. H. Hampshire, secretary of the British Pharmacopœia Commission.

Charges for Spectacles

From last Monday, May 1, the varieties of spectacle frames supplied without charge under the National Health Service were reduced to four; and for the range of frames towards which the patient is required to contribute the charge (previously *1s.–8s.*) was raised to *2s.–12s. 3d.* The contribution from the patient towards the cost of repair and replacement in the contributory range is correspondingly increased, and a charge will be made for replacement and repair of frames now coming into this range.

Dr. R. R. Trail has been appointed a chevalier of the Legion of Honour of the French Republic.

CORRIGENDUM: *Penicillin in Uncomplicated Gonorrhœa.*—The second paragraph of Dr. Macdonald's letter last week (p. 833) should have begun as follows: "Owing to the anatomy of the area, every case is, to a greater or lesser extent, a closed infection, which would account for the infective latency which undoubtedly prevails for a time after penicillin therapy."

Appointments

BRETT, G. Z., M.D. Lwow: physician i.c. mass-radiography units, North-West Metropolitan Region.
CLARKE, W. E., M.D. Lond., M.R.C.P.: physician, Highlands Hospital, London.
CUDDIGAN, J. P., M.B. N.U.I., D.A.: consultant anæsthetist, Holloway Sanatorium, Virginia Water, Surrey.
HARLEY, DAVID, M.D., B.SC. Edin.: consultant physician i.c. clinic for allergic conditions, Central Middlesex Hospital.
MAGRATH, DONALD, M.B. Birm., D.P.H., D.P.M.: consultant psychiatrist, Botleys Park Hospital, Chertsey, Surrey.
MOORE, J. C. G., B.A., M.B. Dubl., F.R.C.S.E., D.O.M.S.: consultant ophthalmic surgeon, Edgware General Hospital.
SHANLY, H. M. G., M.B. Lond.: M.O., Colonial Service, Kenya.

Appointed Factory Doctors:
PARKES, TREVOR, M.B. Lond.: Rye district, Sussex.
PEARSON, G. H., M.R.C.S.: Cranborne district, Dorset.

Births, Marriages, and Deaths

BIRTHS

BARRY.—On April 27, in Edinburgh, the wife of Dr. C. T. Barry—a daughter.
BRIERLEY.—On April 28, at Worcester, the wife of Dr. D. M. Brierley—a son.
CASEY.—On April 28, at Congleton, Cheshire, the wife of Dr. M. B. Casey—a daughter.
GIBBINS.—On April 24, in Birmingham, the wife of Mr. R. E. Gibbins, F.R.C.S.—a daughter.
MONYPENNY.—On April 11, at Sheffield, to Dr. Isabelle Monypenny (née Little), wife of Dr. E. R. Monypenny—a son.
RODGERS.—On April 22, in Liverpool, the wife of Dr. T. Stanley Rodgers—a son.

MARRIAGES

CURTIS—MAYNARD.—On April 22, Derek Curtis, M.R.C.S., to Jean Maynard.

DEATHS

BOWER.—On April 24, John Alexander Bower, M.B. Edin., aged 83.
GORDON.—On April 26, at Bath, Ronald Grey Gordon, M.D., D.SC. Edin., F.R.C.P.E.
HOPE.—On April 27, at Caldy, Cheshire, Edward William Hope, O.B.E., M.D., D.SC. Edin., aged 95.
WAKELY.—On April 21, at Creech St. Michael, Taunton, Alfred Stewart Wakely, M.C., M.B. Lond., D.P.H.

CARDIAC FAILURE *

BASIL THOMAS PARSONS-SMITH
M.D. Lond., F.R.C.P.
CONSULTING PHYSICIAN, NATIONAL HEART HOSPITAL, LONDON

IN 1581 Lord Lumley and Richard Caldwell, M.D., a fellow of the college, were granted permission by her Majesty Queen Elizabeth, under the Broad Seal, to found a surgical lecture in the College of Physicians and to endow it in perpetuity. For many years the Lumleian lectureship was a life appointment; then for a short period it was reduced to five years; and since 1825 the lecturer has been nominated annually.

William Harvey commenced his Lumleian lectures at the college in April, 1616, and is generally supposed to have expounded, on that occasion, those original and complete views of the circulation of the blood which have made him the glory and the honour of British physicians. The compelling influence of Harvey can be traced throughout the whole history of the lectureship. When its conditions were reconstituted in 1827, its first holder, Peter Mere Latham, took for his subject Some Diseases of the Heart. In 1829 John Elliotson spoke on the Recent Improvements in the Art of Distinguishing the Various Diseases of the Heart, a subject in which he was singularly proficient, being one of the first British physicians to appreciate the value of the stethoscope. In more recent times a cardiological flavour has been imparted to this lectureship in the contributions of Osler, Mitchell Bruce, Horder, Carey Coombs, Parkinson, Crighton Bramwell, Geoffrey Evans, and Maurice Campbell.

* * *

As an introduction to the modern conception of cardiac failure, certain of the pioneer theories deserve special mention.

BACK PRESSURE AND FORWARD FAILURE

In the early part of last century, James Hope (1832) formulated the so-called back-pressure theory. He began by referring to the "order of succession in which the several compartments of the heart are rendered hypertrophous by an obstacle before them in the course of circulation." After which he said:

> "As an obstacle to the circulation operates on the heart in a retrograde direction, the cavity situated immediately behind it is the first to suffer from its influence.
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> "When the distending pressure of the blood preponderates over the power of the (left) ventricle, its contents, from not being duly expelled, constitute an obstacle to the transmission of the auricular blood; hence the auricle becomes over-distended, and the obstruction may be propagated backwards through the lungs to the right side of the heart and there occasion the same series of phenomena.
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> "When the mitral orifice is contracted . . . the left auricle, having to struggle against the contracted valve in front, and also to sustain the distending pressure of the blood flowing in from the lungs, invariably becomes thickened and dilated; the engorgement, extending backwards through the lungs to the right ventricle, occasions its hypertrophy and dilatation, the lungs suffering in pre-eminent degree.
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> "When the impediment to the circulation is primitively seated in the lungs, the right ventricle, situated immediately behind them, is the first to experience its influence; and when the cavity is so far overpowered by the distending pressure of the blood as to be incapable of adequately expelling its contents, the obstruction extends to the auricle.
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> "Obstruction in the right auricle, whether from this or other cause, presents an obstacle to the return of the venous blood and therefore ultimately causes retardation throughout the whole venous system; nor is this all; for the retardation is propagated throughout the capillaries to the arterial system and thus at length returns in a circle to the heart."

Hope's classical hypothesis was modified by William Stokes (1854), who stressed the significance of myocardial incompetence in cases of valvular heart-disease, thus incidentally originating the forward-failure theory which received further recognition by cardiologists a generation later. A brief extract from his treatise on *Diseases of the Heart and Aorta* summarises his views on cardiac failure:

> "It too often happens," he said, "when the existence of a valvular disease is determined, that great labour is expended in ascertaining the exact seat and nature of the affection. Long and careful examinations are made to determine whether the disease exists at the right or left side of the heart; whether it be a lesion of the mitral, tricuspid, or the semi-lunar valves; a contraction; an ossification; a permanent patency or warty excrescence. Now, though in some, we might say in many cases, these cases may be resolved with considerable accuracy, it is also true that in a large number their determination is of comparatively trifling importance; and the two great practical points to be attended to are, first, whether the murmurs proceed from an organic cause, and next, what is the vital and physical condition of the muscular portions of the heart; for it is upon these points that prognosis and treatment must entirely depend.
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> "The practical physician, having satisfied himself that a valvular disease exists, will not devote too much time in ascertaining its exact nature; but he will examine into the vital and mechanical state of the heart's cavities. He will ascertain the amount of vigour of the heart, whether its force is above or below the natural standard."

The forward-failure theory continued to attract interest, and in the early years of this century clinicians began to assess cardiac failure in terms of myocardial incompetence. Their primary concern was to estimate the degree to which the heart's driving-power and output were impaired, and in so doing they discounted the significance of the back-pressure effects hitherto generally accepted.

James Mackenzie, whose investigations will be the pride of cardiologists for all time, was a staunch advocate of the forward-failure theory. He regarded breathlessness, dropsy, engorgement of the liver, and renal congestion as indications of a deficient output into the systemic circulation, a similar discrepancy in the lesser circuit being responsible for stasis and œdema in the lungs. Mackenzie's views were approved in broad principle by his contemporaries in this country, and it is noteworthy that his distinguished friend, Thomas Lewis, summarised his interpretation of cardiac failure in the following terms:

> "Breathlessness, the first indication of failure, is due to a deficiency in flow of aerated blood to the head and neck. When the output declines, blood begins to collect at the venous side and the patient manifests signs of congested veins, enlargement of the liver, cyanosis, scanty urine, ascites and dropsy of the lower members and congestion and œdema of the lungs."

VENOUS PRESSURE

During recent years, our ideas of cardiac failure problems have been fundamentally revised, partly through the physiological work of Starling (1918) and partly through the researches of Haldane, Thomas Lewis, Lorraine Smith, McMichael, William Evans, and Sharpey-Schafer in this country, of Plesch in Germany, of Krogh and Lindhard in Denmark, of Henderson, Marshall, Grollman, Fishberg, and Harrison in America, and of many others.

Starling's monumental study of the circulatory mechanism is a landmark in cardiology. He showed that, within reasonable limits, the heart's output remained constant whatever the level of the arterial blood-pressure, and that, with an increased venous inflow, the output was proportionately augmented. He held that the compensatory mechanism governing the range of the cardiac output originated in the muscle-fibres themselves, his results being similar whether the nervous connections were severed or intact. He regarded the lengthening of the muscle-fibres as the primary manifestation of myocardial fatigue, and he found that the contractile energy of the heart increased in direct proportion to the lengthening of the fibres. His final conclusion was that lengthening of the myocardial muscle-fibres made them capable of more work, the cardiac output remaining constant at the expense of the greater diastolic volume and the raised venous pressure which usually characterise failure.

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* The Lumleian lectures delivered at the Royal College of Physicians on April 11 and 13, 1950.

As opposed to the back-pressure and the forward-failure theories, in both of which a raised venous pressure was regarded as a passive development, the modern interpretation, based on Starling's law of the heart, is that the venous filling pressure plays an active part in regulating the range of the cardiac output, and that in a failing heart the rise of venous pressure is, for a time, a compensatory mechanism.

McMichael (1938) correlated the venous pressure and the cardiac output in 24 patients with varying degrees of failure and his conclusions were as follows:

> "In the first stages of cardiac failure, the cardiac output falls with no significant change in the venous pressure. Mere lack of forward pressure, therefore, does not raise the venous pressure. The next point of importance is that, when the venous pressure does rise, the cardiac output tends to be higher than in the previous stage of the disease when the venous pressure was normal. In the later stages of failure, the heart becomes less and less responsive to a rise in the venous pressure and its output undergoes gradual diminution in proportion to the degree to which the failure process has proceeded. Thus the severity of cardiac failure bears a much closer relationship to the inability of the heart to increase its output in response to a venous pressure rise than to any change in the absolute value of the output at rest."

McMichael put forward two explanations of the raised venous pressure in congestive heart-failure: (1) venomotor changes, and (2) changes in the blood volume. He referred to the venous constriction induced by sympathetic-nerve stimulation and to the contraction which veins undergo in certain well-known vasomotor reflexes elicited by asphyxia, oxygen-lack (Gollwitzer-Meier 1931), and changes in pressure in the carotid sinus (Heymans et al. 1930). He thought it probable that analogous adjustments of venous capacity occurred in the presence of a failing circulation, and that the venous pressure near the heart was raised thereby. He also commented on the increase in the blood volume seen in cardiac congestion, which was first measured by Lorraine Smith (1902). In McMichael's opinion, an increase of the volume of blood in the veins, by relatively diminishing their capacity, probably contributes to the raised venous pressure of congestive heart-failure.

Acute Heart-failure

It will be convenient to divide cardiac failure into three clinical types—acute, congestive, and ischæmic—and to consider acute heart-failure first.

The numerous conditions sometimes directly associated with such failure include diphtheria, pneumonia, massive pulmonary embolism, pericardial effusion, paroxysmal tachycardia, angina pectoris, and coronary thrombosis. In all of these the clinical picture is likely to be complicated by collapse of the peripheral vascular system, the signs of which include pallor, a cold clammy skin, collapsed veins, and a rapid low-tension pulse.

Analysing 200 cases of *diphtheritic myocarditis*, Neubauer (1945) recorded a 3% incidence of auricular fibrillation, with partial auriculoventricular block in four of the patients and complete block in the other two. Burkhardt et al. (1938) described eleven fatal cases of auriculoventricular dissociation in diphtheria, some of which developed terminal ventricular tachycardia. Bourne (1940) described one case of diphtheritic myocarditis with auricular fibrillation in a woman aged 79. Cookson (1945) analysed eighty-three cases of diphtheria, in sixty-three (76%) of which the cardiograms were abnormal, ten showing some defect of conduction, other discrepancies including inversion of the T waves in one or more leads, displacement of the S-T segments, slurring and widening of the Q R S complexes, and bizarre P waves.

Acute cardiac failure as a complication of *pneumonia* has long been recognised clinically and confirmed post mortem.

Saphir and Amromin (1948) correlated the clinical and the necropsy findings in sixty-seven patients who died following pneumonia. In twenty-six cases they found histological evidence of recent myocarditis, and in fifteen others they observed degenerative changes in the shape of cloudy swelling and fatty degeneration of the myocardial fibres. Half the patients of the group died, and the authors commented on the lack of relation between the extent of the pulmonary affection and the degree of the myocardial changes.

It remains to mention acute *cor pulmonale*, a condition described by McGinn and White in 1935, the essential features of which include a sudden rise of blood-pressure in the pulmonary circuit, with dilatation of the right ventricle, usually caused by massive embolic obstruction of the pulmonary circulation.

The symptoms of acute cor pulmonale closely resemble those of coronary occlusion. For their differential diagnosis Rae Gilchrist (1950) has emphasised certain features:

1. The symptoms in massive pulmonary embolism reach their maximum intensity at once, whereas in cardiac infarction there is often delay before they do so.
2. The pain in massive pulmonary embolism is widespread, across the front of the chest, occasionally lateral and without characteristic radiation, whereas the pain in acute coronary occulsion is usually central and retrosternal, or occasionally epigastric.
3. In pulmonary embolism breathlessness is sudden and intense, whereas in cardiac infarction it is rarely conspicuous in the early stages of the illness.

Physical examination may reveal unequivocal evidence of pulmonary hypertension with right heart-failure, and the pattern of the cardiogram is as a rule pathognomonic. Reliable physical signs include triple rhythm and jugular stasis; also variable pulsation, accentuation of the second sound, a systolic murmur, and a friction rub over the area of the pulmonary artery. The dilatation of the right ventricle and of the pulmonary artery can best be demonstrated by radioscopy, which may reveal elevation of the diaphragm on the affected side, and, in due course, the site and the extent of the pulmonary infarction.

The cardiographic discrepancies which follow massive obstruction of the pulmonary circulation have been widely studied and the investigations of Paul Wood (1948) have established certain changes as characteristic of the disease and incidentally of right ventricular stress. These changes include prominent S waves in lead I, deep Q waves and inverted T waves in lead III, augmented P waves in lead II, absent Q waves and diphasic T waves or depression of the S-T segments in lead II, inverted T waves in lead V_1 to V_3 or V_4 and rarely, right bundle-branch block.

Congestive Heart-failure

The term congestive heart-failure refers to conditions of circulatory embarrassment in which abnormalities of the ventricular output are associated with congestion in the systemic, pulmonary, and portal circuits, singly or in combination.

In recent years certain valuable methods have been evolved to implement the principle enunciated by Fick in 1870—namely, that the cardiac output (in litres per minute) could be determined by dividing the rate of oxygen-consumption (in c.cm. per minute) by the amount of oxygen taken up by each litre of blood passing through the lungs.

The first successful application of Fick's formula was achieved by Marshall and Grollman (1928). Their method was based on the fact that acetylene is soluble in the blood (740 c.cm. in a litre) and that, by breathing an acetylene-air-oxygen mixture and analysing samples of blood at intervals, the relative rates of absorption of acetylene and oxygen can be estimated. From these findings an accurate estimate can be made of the amount of oxygen taken up by each litre of blood in its passage through the lungs.

Harrison et al. (1934) investigated a controlled series of cases by the acetylene method of Grollman et al. (1933) and concluded that:

1. The cardiac output per minute per square metre of patients with congestive heart-failure is usually lower than that of persons without cardiac disease, but may be within a normal range.
2. The disappearance of congestive heart-failure may be associated with an increase, a decrease, or no change in the output per minute, but the output per beat usually increases with clinical improvement.

These somewhat divergent findings convinced Harrison that there is no definite relation between the severity of the cardiac failure and the degree of diminution of the cardiac output. He suggested the intervention of compensatory mechanisms—particularly a rise in the venous pressure—as being instrumental in maintaining, to a varying degree, the output range of the failing heart; and this conclusion was later confirmed by Fishberg (1940).

To obviate the difficult measurement of the arteriovenous oxygen difference entailed by the respiratory technique, McMichael and Sharpey-Schafer (1944) employed the direct method of cardiac catheterisation for the analysis of the blood in the right auricle. They carried out a series of tests on normal male volunteers, and in calculating the arteriovenous oxygen difference they assumed the arterial blood to be 95% saturated. From their results they reached several important conclusions:

1. As compared with its volume in the erect position, the cardiac output increases by an average of 30% on lying down.
2. As expected from Starling's law, a reduction in right auricular pressure (by venesection or by cuffs on the thighs at diastolic pressure) leads to a fall in the cardiac output, while a rise in right auricular pressure (by saline infusion) is accompanied by an increase in cardiac output.
3. The average normal resting cardiac output in the recumbent position is 5·3 litres per minute, but in the standing position it is 25% less—i.e., 4 litres.

Further investigations enabled McMichael (1948) to recognise that venous congestion may arise not only in conditions where the output is reduced but also in conditions where the output is high. He divided cardiac failure with venous congestion into two groups: (1) failure with a low output, in hypertensive, ischæmic, and valvular heart-disease, and (2) failure with a high output, in conditions such as anæmia, emphysema, arteriovenous aneurysm, and Paget's disease, in all of which venous pressure must be maintained at a high level if adequate compensation is to be preserved.

LEFT HEART-FAILURE

With certain exceptions—notably acute rheumatic carditis, severe anæmia, thyrotoxicosis, and abnormal tachycardia—in which failure may involve the heart as a whole, the syndromes of primary left and primary right heart-failure are generally accepted nowadays as applicable to the majority of cases.

The factors responsible for left heart-failure are cardiac enlargement and myocardial incompetence resulting from such disorders as hypertension and aortic valve disease. In its early stages the condition is associated with congestion in the pulmonary circuit, the failing left ventricle being incapable of maintaining its output without a considerable rise in the filling pressure in the pulmonary veins (McMichael 1938). Though for a time it is compensatory, sooner or later venous congestion in the pulmonary circuit becomes a handicap; it is to blame for the diminished vital capacity which characterises the early stages of left heart-failure and it is a major factor in such developments as acute paroxysmal dyspnœa and pulmonary œdema which may supervene later.

Acute paroxysmal dyspnœa is usually precipitated by an emotional disturbance or by a physical effort, its course being aggravated by spasms of violent coughing and general restlessness which accelerate the venous return to the right heart, incidentally increasing the pulmonary congestion already existing. Wheezing, of varying degree, usually intensifies the urgency of acute attacks of paroxysmal dyspnœa; these attacks may be allergic in origin, the loss of cardiac reserve and the circulatory discrepancies incidental to them being the non-specific factors which initiate the bronchial spasm.

In cardiac cases, *acute pulmonary œdema* signifies an extreme degree of left ventricular failure, and its pathological background includes the interaction of three distinct processes: (1) a sudden exacerbation of pulmonary congestion; (2) an increased permeability of the lung capillaries due partly to anoxia and partly to nervous reflexes; and (3) an acute reflex dilatation of the pulmonary vessels.

The physical signs of an acute effusion of fluid into the lungs are characteristic, as also are the radiological appearances, which include patchy areas of shadowing, chiefly central in site, with the apices and bases remaining relatively clear. Pulmonary œdema is always a grave complication in patients with cardiac failure, and particularly in those with grossly enlarged hearts whose cardiograms indicate myocardial dysfunction and who during their attacks, present urgent symptoms of shock or such grave signs as triple rhythm, pulsus alternans, or a diminishing range of pulse-pressure. The serious significance of attacks of pulmonary œdema in the prognosis of patients suffering from left heart-failure is generally recognised; they express in conclusive form the unbalanced action of the two ventricles, and they frequently prelude the development of right heart-failure, after which they tend, as a rule, to subside entirely.

RIGHT HEART-FAILURE

Right heart-failure is usually secondary to high-grade decompensation of the left ventricle consequent on such affections as hypertension and valvular disease; other ætiological factors include pulmonary hypertension, diseases of the pulmonary vascular system (primary endarteritis and thrombosis of the smaller vessels (Rosenthal 1930)), chronic pulmonary diseases (emphysema, pneumoconiosis, and pulmonary fibrosis), and kyphoscoliosis.

The physical signs of right heart-failure are usually clear: they include engorgement of the systemic venous system with jugular stasis and pulsation in the upright or the semi-upright position, enlargement of the liver, œdema, ascites, and possibly also hydrothorax (usually right) if, as was noted by Bedford and Lovibond (1941), the condition is complicated by pulmonary engorgement.

Accurate assessment of the enlargement of the right ventricle is essentially a radiological problem, and an electrocardiogram is equally valuable in that it furnishes evidence of the ventricular hypertrophy and of any such myocardial dysfunction as may be associated therewith.

The term *idiopathic* or *essential pulmonary hypertension* was applied in 1940 by Terence East to a group of cases whose clinical course was typical of pure and intractable right ventricular failure. He noted particularly their relative freedom from breathlessness, and he excluded syphilis and pulmonary disease, as well as valvular defects, both congenital and acquired. The post-mortem findings always included enlargement of the right ventricle, with massive hypertrophy of its walls and thick trabeculæ, dilatation of the pulmonary artery, and a left auricle of normal capacity and thickness. In one case there were small atheromatous patches at the bifurcation of the pulmonary artery, and small ones in the first main branches; also the muscle coats of the arterioles were perhaps slightly hypertrophied. In another case there was slight atheroma of the pulmonary artery, the muscular coats of the small arterioles were perhaps slightly thickened and a few of the arterioles were partly obliterated by proliferation of the intima. No satisfactory cause for the right ventricular hypertrophy being revealed at necropsy, East suggested the existence of a primary pulmonary hypertension, the changes (both atheromatous and obliterative) in the pulmonary arteries and arterioles being secondary thereto.

A case somewhat similar to these is recorded by Armstrong (1940).

> The patient, a woman of 73, suffered from long-continued (42 years) right ventricular failure, the striking feature of her symptom-complex being a relative absence of breathlessness in the presence of a very severe degree of systemic venous engorgement. At necropsy the right ventricle was found to be extremely hypertrophied, and microscopy showed severe atheroma in the pulmonary artery and its branches, the pulmonary arterioles presenting no abnormality and no obstruction.

Judging by these findings, which excluded any evidence of obstructive disease in the pulmonary circuit, Armstrong thought that the atheroma in the pulmonary vessels was of hypertensive origin, and that it was not possible to decide whether the right ventricular hypertrophy was the cause or the result of the pulmonary hypertension.

Barrett and Cole (1946) published the clinical notes and the post-mortem record of a patient with pulmonary vascular sclerosis who died of right ventricular failure within four months of the first symptom. The morbid changes in the lungs included disintegration of the alveolar walls and destruction of the capillary bed, also widespread and severe disease of the larger pulmonary arteries and arterioles. Barrett and Cole held that these abnormalities had increased the resistance in the pulmonary circuit and were primarily responsible for the hypertrophy and the dilatation of the chambers of the right heart. They were of opinion that all the vascular lesions were probably the result of pulmonary hypertension, and that the circulatory impairment caused by the vascular lesions was responsible for the disintegration of the alveolar walls. On both clinical and pathological grounds, they believed the case could be regarded as one of malignant pulmonary hypertension; a rise of pulmonary blood-pressure had initiated malignant sclerosis of the pulmonary arterioles which had then exaggerated the pulmonary hypertension, thus setting up a vicious circle.

It is generally agreed that *chronic lung disease* usually imposes an increased demand on the right heart, in the explanation of which a variety of factors have been considered. The ill effects induced by destruction of the pulmonary capillary bed have been discounted by McMichael (1947), who found that, after obliteration of half the vascular bed in the lungs by ligature of the left pulmonary artery, the pulmonary arterial pressure was unchanged. He further noted that the pulmonary blood-pressure, as determined by cardiac catheterisation, was elevated in emphysema far less than in mitral stenosis. Other factors he emphasised are the high cardiac output characteristic of emphysema except in its terminal phases, and the reduced arterial oxygen tension—probably the result of poor ventilation and vasoconstriction—which in pulmonary heart-failure may fall to as low a figure as 33%.

Parkinson and Hoyle (1937) studied emphysema in its relation to failure of the right heart. They concluded that gross enlargement of the right ventricle was uncommon even with severe chronic hypertrophic emphysema. They regarded the cardiac signs and symptoms which often develop in emphysema patients as expressing systemic hypertension rather than any specific cardiac condition for which the emphysema could be responsible. Further, they concluded that, in the absence of cardiovascular disease, emphysema is unlikely to cause right heart-failure, except in the terminal stage.

Bernheim (1910) recognised that right ventricular failure might develop in patients suffering from compensated *lesions affecting the left heart*: the interventricular septum, bulging into the cavity of the right ventricle, materially obstructing its filling capacity. This syndrome is amply described by the term "right ventricular stenosis," and in typical cases it can nowadays be recognised clinically with fair confidence.

East and Bain (1949), discussing cases in which the underlying lesion was either hypertension or aortic stenosis, listed the following diagnostic criteria:

1. Gross congestive failure, without embarrassment of the pulmonary circulation, in the presence of a predominantly left-sided lesion.
2. Radiological confirmation of left ventricular hypertrophy, dilatation of the right auricle, and clear lung fields.
3. A grossly thickened interventricular septum encroaching on the cavity of the right ventricle.
4. Dryness of the lungs and their freedom from engorgement and œdema as proved by their normal weight at autopsy.

They emphasised the clinical similarity of right ventricular stenosis and tricuspid stenosis, in both of which there is conspicuous systemic engorgement but no pulmonary congestion. They suggested that intracardiac catheterisation might be of value in the clinical assessment of right ventricular stenosis and that the peculiar shape of the right ventricular cavity might be displayed by angiocardiography.

Bedford et al. (1946) reviewed right heart-failure secondary to *bilharzial pulmonary endarteritis* and described a typical case as follows:

> A man, aged 34, was admitted to hospital with 3 years' history of breathlessness on exertion, cough with slight expectoration, precordial pain, and hæmaturia. There was no clubbing of the fingers, and no cyanosis, œdema, or jugular stasis. Pulsation was visible and palpable in the 1st and 2nd left interspaces and the pulmonary second sound was much accentuated. The chest was emphysematous in shape but there were no added sounds in the lungs. Radioscopy showed an aneurysmal swelling in the region of the main pulmonary trunk, and the right pulmonary artery in the hilum formed a swelling of aneurysmal proportions.
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> Three weeks after admission, the patient became urgently ill. He complained of pain over the liver, the cervical veins became engorged, there was marked cyanosis, gallop rhythm was audible at the apex region, and he died a few days later. The necropsy findings included gross dilatation, thickening, and atheroma of the pulmonary trunk, with aneurysmal swellings and advanced ulcerated atheroma of both its main branches, each of which was almost occluded by antemortem thrombus. The aorta was hypoplastic, and the right auricle and ventricle were considerably hypertrophied, their cavities being dilated to about three times their normal capacity. Sections of both lungs were examined. The alveoli were normal except for slight venous congestion and extravasations of red cells. The pulmonary arterioles were much thickened

and showed obliterative endarteritis. There were numerous angiomatoids, of both the capillary and the cavernous types, typical of bilharzial pulmonary arteritis. Bilharzial ova were seen in relation to some of the arterioles. Sections from the trunk and two main branches of the pulmonary artery showed atheroma and calcification. The adventitia showed thickened vasa vasorum with perivascular infiltration by lymphocytes and plasma-cells. In the main branches there was organised thrombus of moderate age.

The authors were of opinion that, as compared with other forms of chronic cor pulmonale, the variety due to bilharzial disease affects younger subjects, and that as a general rule the patients are relatively free from cyanosis except in the final stages of the disease. The absence of cyanosis was, they suggested, due to the fact that in bilharzial lung infection the alveolar and the capillary structures remain intact and the pulmonary lesions are chiefly confined to the arterioles, so accounting for the pulmonary hypertension and the symptoms of right heart-failure. They noted too that in bilharzial disease radiography of the chest seldom shows changes in the lung fields other than vascular dilatation. They commented on the close similarity of the radiological appearances of the heart in atrioseptal defect and in cor pulmonale of bilharzial origin, both of which show gross dilatation of the pulmonary trunk and hilar branches aneurysmal in size.

Ischæmic Heart-failure

In the large majority of cases of ischæmic heart-disease the underlying pathology of failure is atherosclerosis of the coronary vessels. In a relatively small proportion the condition is due to implication of the coronary arteries in syphilitic aortitis, to anæmia, to aortic stenosis, to hypotension, to bradycardia, or to paroxysmal tachycardia.

The symptomatology of atherosclerotic heart-disease can best be illustrated by an analysis of case-histories, and I have selected a group of twelve patients for consideration here. It comprises nine men and three women, of ages ranging from 51 to 76, the average age of the women being 66, that of the men 60.

In all the patients the initial symptom was anginal pain; five complained in addition of effort breathlessness and it was noteworthy that, before the onset of these symptoms, most of the patients had regarded their general health and exercise tolerance as singularly good for their age.

The personal history of the patients was regarded as of fundamental importance in arriving at a diagnosis; for, though the physical and the cardiographic examinations revealed a variety of inconstant abnormalities, these could not be considered specific for ischæmic heart-disease.

Briefly summarised, the after-history of the twelve patients was as follows. Four died from cardiac failure following acute myocardial infarction, which occurred 2–12 years from the onset of cardiac symptoms. Five patients were alive 1–5 years after the onset, all living restricted but quietly active lives with comparative freedom from symptoms. Three patients, whose histories ranged from 1 year to 18 months, are still subject to recurrences of anginal pain both with exertion and at rest, these attacks being so protracted and severe as to simulate the syndrome of myocardial infarction.

The explanation of such attacks has been reviewed by East and Oram (1948), who analysed three hundred and sixty-seven cases in which the clinical picture and the cardiographic evidence had been thought indicative of cardiac infarction. In twenty-eight, the cardiograms, after intervals varying from days to weeks or months, reverted to a normal pattern and remained normal. In most of these the original curves had suggested an anterior distribution; the Q waves were absent or insignificant and, with two exceptions, there was no material displacement of the RS-T segments. East and Oram suggested that cardiac pain, with cardiographic discrepancies somewhat similar to those of infarction might in fact be due to local pathological changes other than infarction. Their final conclusion was that the cardiographic abnormalities in their cases were due to myocardial ischæmia caused by spasm of the coronary vessels. They quoted the experimental results of Bayley and La Due (1944) who stated that "the electrical phenomena resulting from occlusion of the anterior descending branch of the left coronary artery were entirely independent of demonstrable pathological changes and that ischæmic injury changes, though frequently associated with infarction in man, are not to be regarded as necessarily diagnostic of infarction."

TERMINATION

In the first of my four fatal cases the patient was a man aged 59, with 2 years' history of effort angina.

He woke with severe substernal pain which radiated to both arms and to the lower jaw; there was dyspnœa, restlessness, and a considerable degree of collapse, unrelieved by nitrite medication. When I saw him on the 2nd day of his illness the presenting signs were those of vasomotor collapse, with hypotension (80/60 mm. Hg), tachycardia, and triple rhythm, and the cardiograms were confirmatory of an anteroseptal cardiac infarct. The condition deteriorated rapidly, and, in addition to increasing left ventricular failure, a harsh and prolonged systolic murmur developed, of maximum intensity in the 4th space at the left sternal margin. This murmur, accompanied by a systolic thrill, persisted from the 7th to the 10th day when the man died suddenly, presumably of ventricular fibrillation.

Although necropsy was refused in this case, the clinical evidence appeared to warrant the diagnosis of a perforated septal infarct.

The second case was that of a woman, aged 60, in whom the initial symptoms included a prolonged syncopal attack, severe shock, and acute pain which continued for 36 hours.

The patient rallied gradually, but on the 6th day of her illness the pain recurred, with bradycardia, feelings of faintness, and urgent breathlessness. The cardiogram showed sinus bradycardia, rate 42, with a normal P-R interval and abnormalities in the ventricular complexes of leads II, III, and V_7, typical of a posterior myocardial infarct. Next day, after a violent attack of vomiting, the patient collapsed and died.

Cookson (1942) has reported fifteen cases of cardiac infarction in which syncopal symptoms were prominent at the onset or during the course of the illness. In ten of them syncope occurred at the onset, the presenting symptoms being peripheral circulatory failure, often combined with a slow heart-rate, or with abnormal rhythms of supraventricular origin, and rarely with ventricular tachycardia. Of these ten patients, six were dead within four months, and Cookson suggested that the principal cause of the syncopal seizures was a nervous reflex leading to vasomotor depression and to vagal stimulation with consequent bradycardia, subsidiary effects being the impaired efficiency of systole resulting from the inactivity of the infarcted area of myocardium and direct ischæmic effects on the auricles causing bradycardia and abnormal rhythms. In the other five patients, syncope or fits occurred after the onset of cardiac infarction; two had syncope and three had Stokes-Adams attacks; abnormal rhythms were recorded in four, and all the patients died within 29 days of the onset of their illness.

The two remaining patients in my group who died of heart-failure following acute myocardial infarction were men aged 71 and 58.

The first had been under treatment 10 years previously for cardiac failure of indeterminate origin, there being no history of rheumatic fever. The heart was considerably enlarged but the blood-pressure was within normal limi such myocardial dysfunction as may be associated therewith.

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> The patient, a woman of 73, suffered from long-continued (42 years) right ventricular failure, the striking feature of her symptom-complex being a relative absence of breathlessness in the presence of a very severe degree of systemic venous engorgement. At necropsy the right ventricle was found to be extremely hypertrophied, and microscopy showed severe atheroma in the pulmonary artery and its branches, the pulmonary arterioles presenting no abnormality and no obstruction.

Judging by these findings, which excluded any evidence of obstructive disease in the pulmonary circuit, Armstrong thought that the atheroma in the pulmonary vessels was of hypertensive origin, and that it was not possible to decide whether the right ventricular hypertrophy was the cause or the result of the pulmonary hypertension.

Barrett and Cole (1946) published the clinical notes and the post-mortem record of a patient with pulmonary vascular sclerosis who died of right ventricular failure within four months of the first symptom. The morbid changes in the lungs included disintegration of the alveolar walls and destruction of the capillary bed, also widespread and severe disease of the larger pulmonary arteries and arterioles. Barrett and Cole held that these abnormalities had increased the resistance in the pulmonary circuit and were primarily responsible for the hypertrophy and the dilatation of the chambers of the right heart. They were of opinion that all the vascular lesions were probably the result of pulmonary hypertension, and that the circulatory impairment caused by the vascular lesions was responsible for the disintegration of the alveolar walls. On both clinical and pathological grounds, they believed the case could be regarded as one of malignant pulmonary hypertension; a rise of pulmonary blood-pressure had initiated malignant sclerosis of the pulmonary arterioles which had then exaggerated the pulmonary hypertension, thus setting up a vicious circle.

It is generally agreed that *chronic lung disease* usually imposes an increased demand on the right heart, in the explanation of which a variety of factors have been considered. The ill effects induced by destruction of the pulmonary capillary bed have been discounted by McMichael (1947), who found that, after obliteration of half the vascular bed in the lungs by ligature of the left pulmonary artery, the pulmonary arterial pressure was unchanged. He further noted that the pulmonary blood-pressure, as determined by cardiac catheterisation, was elevated in emphysema far less than in mitral stenosis. Other factors he emphasised are the high cardiac output characteristic of emphysema except in its terminal phases, and the reduced arterial oxygen tension—probably the result of poor ventilation and vasoconstriction—which in pulmonary heart-failure may fall to as low a figure as 33%.

Parkinson and Hoyle (1937) studied emphysema in its *relation to failure of the right heart.* They concluded that gross enlargement of the right ventricle was uncommon even with severe chronic hypertrophic emphysema. They regarded the cardiac signs and symptoms which often develop in emphysema patients as expressing systemic hypertension rather than any specific cardiac condition for which the emphysema could be responsible. Further, they concluded that, in the absence of cardiovascular disease, emphysema is unlikely to cause right heart-failure, except in the terminal stage.

Bernheim (1910) recognised that right ventricular *failure might develop in patients suffering from compensated lesions affecting the left heart*: the interventricular septum, bulging into the cavity of the right ventricle, materially obstructing its filling capacity. This syndrome is amply described by the term "right ventricular stenosis," and in typical cases it can nowadays be recognised clinically with fair confidence.

East and Bain (1949), discussing cases in which the underlying lesion was either hypertension or aortic stenosis, listed the following diagnostic criteria:

1. Gross congestive failure, without embarrassment of the pulmonary circulation, in the presence of a predominantly left-sided lesion.
2. Radiological confirmation of left ventricular hypertrophy, dilatation of the right auricle, and clear lung fields.
3. A grossly thickened interventricular septum encroaching on the cavity of the right ventricle.
4. Dryness of the lungs and their freedom from engorgement and œdema as proved by their normal weight at autopsy.

They emphasised the clinical similarity of right ventricular stenosis and tricuspid stenosis, in both of which there is conspicuous systemic engorgement but no pulmonary congestion. They suggested that intracardiac catheterisation might be of value in the clinical assessment of right ventricular stenosis and that the peculiar shape of the right ventricular cavity might be displayed by angiocardiography.

Bedford et al. (1946) reviewed right heart-failure secondary to *bilharzial pulmonary endarteritis* and described a typical case as follows:

> A man, aged 34, was admitted to hospital with 3 years' history of breathlessness on exertion, cough with slight expectoration, precordial pain, and hæmaturia. There was no clubbing of the fingers, and no cyanosis, œdema, or jugular stasis. Pulsation was visible and palpable in the 1st and 2nd left interspaces and the pulmonary second sound was much accentuated. The chest was emphysematous in shape but there were no added sounds in the lungs. Radioscopy showed an aneurysmal swelling in the region of the main pulmonary trunk, and the right pulmonary artery in the hilum formed a swelling of aneurysmal proportions.
>
> Three weeks after admission, the patient became urgently ill. He complained of pain over the liver, the cervical veins became engorged, there was marked cyanosis, gallop rhythm was audible at the apex region, and he died a few days later. The necropsy findings included gross dilatation, thickening, and atheroma of the pulmonary trunk, with aneurysmal swellings and advanced ulcerated atheroma of both its main branches, each of which was almost occluded by antemortem thrombus. The aorta was hypoplastic, and the right auricle and ventricle were considerably hypertrophied, their cavities being dilated to about three times their normal capacity. Sections of both lungs were examined. The alveoli were normal except for slight venous congestion and extravasations of red cells. The pulmonary arterioles were much thickened

and showed obliterative endarteritis. There were numerous angiomatoids, of both the capillary and the cavernous types, typical of bilharzial pulmonary arteritis. Bilharzial ova were seen in relation to some of the arterioles. Sections from the trunk and two main branches of the pulmonary artery showed atheroma and calcification. The adventitia showed thickened vasa vasorum with perivascular infiltration by lymphocytes and plasma-cells. In the main branches there was organised thrombus of moderate age.

The authors were of opinion that, as compared with other forms of chronic cor pulmonale, the variety due to bilharzial disease affects younger subjects, and that as a general rule the patients are relatively free from cyanosis except in the final stages of the disease. The absence of cyanosis was, they suggested, due to the fact that in bilharzial lung infection the alveolar and the capillary structures remain intact and the pulmonary lesions are chiefly confined to the arterioles, so accounting for the pulmonary hypertension and the symptoms of right heart-failure. They noted too that in bilharzial disease radiography of the chest seldom shows changes in the lung fields other than vascular dilatation. They commented on the close similarity of the radiological appearances of the heart in atrioseptal defect and in cor pulmonale of bilharzial origin, both of which show gross dilatation of the pulmonary trunk and hilar branches aneurysmal in size.

Ischæmic Heart-failure

In the large majority of cases of ischæmic heart-disease the underlying pathology of failure is atherosclerosis of the coronary vessels. In a relatively small proportion the condition is due to implication of the coronary arteries in syphilitic aortitis, to anæmia, to aortic stenosis, to hypotension, to bradycardia, or to paroxysmal tachycardia.

The symptomatology of atherosclerotic heart-disease can best be illustrated by an analysis of case-histories, and I have selected a group of twelve patients for consideration here. It comprises nine men and three women, of ages ranging from 51 to 76, the average age of the women being 66, that of the men 60.

In all the patients the initial symptom was anginal pain; five complained in addition of effort breathlessness and it was noteworthy that, before the onset of these symptoms, most of the patients had regarded their general health and exercise tolerance as singularly good for their age.

The personal history of the patients was regarded as of fundamental importance in arriving at a diagnosis; for, though the physical and the cardiographic examinations revealed a variety of inconstant abnormalities, these could not be considered specific for ischæmic heart-disease.

Briefly summarised, the after-history of the twelve patients was as follows. Four died from cardiac failure following acute myocardial infarction, which occurred 2–12 years from the onset of cardiac symptoms. Five patients were alive 1–5 years after the onset, all living restricted but quietly active lives with comparative freedom from symptoms. Three patients, whose histories ranged from 1 year to 18 months, are still subject to recurrences of anginal pain both with exertion and at rest, these attacks being so protracted and severe as to simulate the syndrome of myocardial infarction.

The explanation of such attacks has been reviewed by East and Oram (1948), who analysed three hundred and sixty-seven cases in which the clinical picture and the cardiographic evidence had been thought indicative of cardiac infarction. In twenty-eight, the cardiograms, after intervals varying from days to weeks or months, reverted to a normal pattern and remained normal. In most of these the original curves had suggested an anterior distribution; the Q waves were absent or insignificant and, with two exceptions, there was no material displacement of the RS-T segments. East and Oram suggested that cardiac pain, with cardiographic discrepancies somewhat similar to those of infarction might in fact be due to local pathological changes other than infarction. Their final conclusion was that the cardiographic abnormalities in their cases were due to myocardial ischæmia caused by spasm of the coronary vessels. They quoted the experimental results of Bayley and La Due (1944) who stated that "the electrical phenomena resulting from occlusion of the anterior descending branch of the left coronary artery were entirely independent of demonstrable pathological changes and that ischæmic injury changes, though frequently associated with infarction in man, are not to be regarded as necessarily diagnostic of infarction."

TERMINATION

In the first of my four fatal cases the patient was a man aged 59, with 2 years' history of effort angina.

He woke with severe substernal pain which radiated to both arms and to the lower jaw; there was dyspnœa, restlessness, and a considerable degree of collapse, unrelieved by nitrite medication. When I saw him on the 2nd day of his illness the presenting signs were those of vasomotor collapse, with hypotension (80/60 mm. Hg), tachycardia, and triple rhythm, and the cardiograms were confirmatory of an antero-septal cardiac infarct. The condition deteriorated rapidly, and, in addition to increasing left ventricular failure, a harsh and prolonged systolic murmur developed, of maximum intensity in the 4th space at the left sternal margin. This murmur, accompanied by a systolic thrill, persisted from the 7th to the 10th day when the man died suddenly, presumably of ventricular fibrillation.

Although necropsy was refused in this case, the clinical evidence appeared to warrant the diagnosis of a perforated septal infarct.

The second case was that of a woman, aged 60, in whom the initial symptoms included a prolonged syncopal attack, severe shock, and acute pain which continued for 36 hours.

The patient rallied gradually, but on the 6th day of her illness the pain recurred, with bradycardia, feelings of faintness, and urgent breathlessness. The cardiogram showed sinus bradycardia, rate 42, with a normal P-R interval and abnormalities in the ventricular complexes of leads II, III, and V_7 typical of a posterior myocardial infarct. Next day, after a violent attack of vomiting, the patient collapsed and died.

Cookson (1942) has reported fifteen cases of cardiac infarction in which syncopal symptoms were prominent at the onset or during the course of the illness. In ten of them syncope occurred at the onset, the presenting symptoms being peripheral circulatory failure, often combined with a slow heart-rate, or with abnormal rhythms of supraventricular origin, and rarely with ventricular tachycardia. Of these ten patients, six were dead within four months, and Cookson suggested that the principal cause of the syncopal seizures was a nervous reflex leading to vasomotor depression and to vagal stimulation with consequent bradycardia, subsidiary effects being the impaired efficiency of systole resulting from the inactivity of the infarcted area of myocardium and direct ischæmic effects on the auricles causing bradycardia and abnormal rhythms. In the other five patients, syncope or fits occurred after the onset of cardiac infarction; two had syncope and three had Stokes-Adams attacks; abnormal rhythms were recorded in four, and all the patients died within 29 days of the onset of their illness.

The two remaining patients in my group who died of heart-failure following acute myocardial infarction were men aged 71 and 58.

The first had been under treatment 10 years previously for cardiac failure of indeterminate origin, there being no history of rheumatic fever. The heart was considerably enlarged but the blood-pressure was within normal limi and there were no signs of valvular or vascular disease. He made an uncomplicated recovery from the immediate effects of his acute myocardial infarction; but signs of congestive heart-failure became increasingly evident early in convalescence, his response to treatment was disappointing, and he died in his sleep during the 12th week of his illness.

The second patient had been treated for high blood-pressure in early adult life; his heart was enlarged, and the radiological appearances were typical of left ventricular hypertrophy with an elongated and tortuous aorta. The cardiogram, besides locating a posterior basal infarct, showed changes in the unipolar chest records which confirmed the left ventricular hypertrophy. The man's condition deteriorated rapidly; he developed increasing pulmonary congestion; and he died suddenly on the 6th day.

RADIOGRAPHY

Recent work by Harrison and Paul Wood (1949) shows the value of radiography in the pathological study of ischæmic heart-disease. On the clinical side their investigations demonstrated a 2 to 1 sex-distribution in favour of males and a later age for females. In the early stages anginal pain was usually, and dyspnœa rarely, the outstanding symptom. There was an impalpable cardiac impulse and a normal rhythm, and, in the absence of hypertension or heart-failure, the size of the heart was normal. In the presence of failure there was cardiac enlargement, the degree of the latter being proportionate to the duration of the former. Renal efficiency was usually within normal limits; fundi and valves were normal; blood-pressure was moderately raised. Sooner or later myocardial infarction occurs, after which, except in the small proportion of patients whose compensation is for a time restored, the disease progresses by stages from left ventricular failure to systemic congestion and sudden cardiac death.

For their radiographic post-mortem investigations Harrison and Wood injected the coronary arteries with radio-opaque jelly at the known diastolic pressure of the patients, after which they recorded stereoscopic skiagrams by the standard technique. The hearts were then dehydrated in alcohol and cleared in a bath of methyl salicylate, the coronary vessels being thus clearly defined in the relatively transparent tissue. The skiagrams and the cleared specimens always showed severe narrowing or occlusion of the coronary arteries, and usually both. In eight of the fifteen cases the whole coronary tree was affected, the major arteries being narrowed and irregular, often with deposits of calcium in their walls. In the other seven cases arterial narrowing was limited to one vessel, while the rest of the coronary tree was relatively normal. In thirteen of the cases there were fourteen healed infarcts, the large majority involving the left ventricle. Anastomotic vessels in relation to the distal segments of the occluded vessels were visible in all the cases and these sufficed to permit their retrograde filling. In most of the skiagrams, though the lumen of the majority of the vessels was narrowed or irregular, some segments looked normal in calibre; yet these segments showed severe atheroma microscopically. In explanation of this apparent discrepancy, the investigators argued that coronary atheroma is compatible with a normal lumen, and they noted that it was impossible, on the skiagraphic evidence alone, to decide whether a focus of narrowing was due to atheroma or to a recanalised thrombus.

A further significant finding in Harrison and Wood's series was the development in the myocardium of minute foci of necrosis leading to fibrosis. These lesions, just visible macroscopically, were observed in every stage of their development, and it was seen that they were exactly like ordinary infarcts on a minute scale. It was suggested that they should be regarded as such, and that the term ischæmic fibrosis should imply the existence of such lesions.

(To be concluded)

PERFORATED PEPTIC ULCER

AN ASSESSMENT OF THE VALUE OF NONOPERATIVE TREATMENT

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The stimulating papers by Taylor (1946) and Visick (1946) on the conservative treatment of perforated peptic ulcer, led us to treat cases in this way and to compare the results with those obtained in the same period in cases treated by the usual operative method. The number of cases is too small for our findings to be statistically significant, but the trial has given us a fair experience of the conservative method and the impressions we have gained seem worth recording.

MATERIAL

The cases treated were all emergency admissions to Addenbrooke's Hospital between January, 1947, and February, 1949. The patients treated conservatively were admitted on the "take-in days" of one of us. Cases admitted on the take-in days of our surgical colleagues were operated on and form the series for comparison; we are indebted to these colleagues for permission to report their results.

The selection was therefore based simply on which day of the week the patient was admitted to hospital, with the exception of 2 patients whose ulcers perforated in a medical ward and whom we were asked to see by their physician. We were prepared to reject any case that we considered unsuitable for conservative treatment for the reasons laid down by Taylor (1946)—i.e., a recent heavy meal, pyloric stenosis, gross flooding of the peritoneal cavity, or established peritonitis—but in fact no such rejection had to be made.

We feel that the nature of the country from which the cases were drawn is important. Some came from the immediate neighbourhood of Cambridge, but others came from the remoter areas of rural East Anglia and were subject to the delays and long journeys inevitable in such an area. This fact should be borne in mind when comparing the results as a whole with those of a series drawn from an entirely urban area.

DIAGNOSIS

A criticism which may be made in considering the results of conservative treatment is that the diagnosis of perforated ulcer may be uncertain without the confirmation of a laparotomy. Only those cases, therefore, in which the clinical diagnosis was firm have been included. Each patient was seen on admission by one, and if possible by both, of us. If anything, the diagnosis received more careful deliberation than usual because the moral support of an early operation was to be lacking. Where the patient's condition permitted, an attempt was made to support the diagnosis radiologically by demonstrating gas under the diaphragm. In many instances a barium meal during convalescence showed an ulcer or the scar of a healed ulcer. One man, who refused to attend for a barium meal because he felt so well, died some time later after a massive hæmatemesis from a large gastric ulcer, and at necropsy there was evidence of a relatively recent perforation. In several cases which were subsequently treated by gastrectomy evidence of the healed perforation was found at the operation. Therefore, though the possibility of error is admitted, the number of misdiagnoses is likely, at the worst, to have been very small. We must confess to one case which we both confidently diagnosed as a perforation but which eventually proved to be cholecystitis.

TREATMENT AND RESULTS

The details of the conservative treatment we adopted are similar to those described by Taylor (1946), with one minor modification—we did not use the wide-bore stomach-tube as a routine for preliminary emptying of the stomach. In cases where the history suggested that the stomach was empty at the time of perforation we were content to use a Ryle's tube throughout.

The results in the two groups of patients were as follows:

	All cases admitted	*Conservative treatment*	*Operative treatment*
No. of patients	59	20	37
No. of deaths	7*	3	2
Fatality-rate	11·8%	15%	5·4%

* Including 2 cases admitted moribund and unfit for any form of treatment.

The case-histories of the 5 fatal cases (excluding the 2 patients admitted moribund) may be summarised as follows.

Conservative Method

Case 1.—Man, aged 63, admitted twelve hours after perforation. Progress satisfactory for six days when symptoms developed suggestive of delirium tremens. Died ten days after admission. Necropsy showed sealed perforation; small collection of pus in subphrenic space.

Case 2.—Man, aged 60, admitted twelve hours after perforation. Progress satisfactory for forty-eight hours but then deteriorated with cyanosis. Died three days after admission. Necropsy showed perforation of duodenum 1 in. in diameter; œdema of lungs.

Case 3.—Man, aged 56, admitted seven hours after perforation. Collapsed twelve hours after start of treatment. Condition steadily deteriorated. Died fifty-six hours after admission. Necropsy showed perforated duodenal ulcer with fibropurulent peritonitis in neighbourhood of perforation, and early bronchopneumonia.

Operative Method

Case 4.—Man, aged 50, admitted fifteen hours after perforation. Collapsed during induction with thiopentone. Heart and respiration restarted with cardiac massage. Died an hour later.

Case 5.—Man, aged 39, admitted ten hours after perforation. Perforated gastric ulcer sutured under general anæsthesia. Condition was poor on admission, with cyanosis suggestive of peripheral vascular failure. Steady deterioration. Died three days after admission.

In case 1 the man was well on the way to recovery when he developed mental symptoms. Although he had a small collection of pus under the diaphragm it was not sufficient to cause death. The delirium tremens seems to have been the reason for the failure of treatment, but in our opinion this does not justify exclusion of the case from the fatality-rate.

We cannot say why cases 2 and 3 did not respond to treatment. Both were men in apparently good condition who, judging by our experience of the previous cases, should have recovered. In case 2 the necropsy revealed some œdema of the lungs, but the fluid balance was carefully controlled and we do not think his circulation was overloaded.

DISCUSSION

As a result of this experience we have come to the conclusion that the conservative method is not so good, except in special circumstances, as immediate operation, though it has a definite place in the treatment of perforated peptic ulcers. Our reasons for this conclusion are not easy to define. We did not come to it suddenly, as a result of studying figures. Rather did it arise out of a vague sense of uneasiness, not obviously justified by a catastrophe, which rapidly changed into real apprehension when two cases in quick succession failed to respond.

The *advantages* of the method are as follows:

(1) Avoidance of the physical and mental upsets of an operation.

(2) The relative comfort of the patient. On 3 occasions we used it in patients who had perforated before and been treated by operation. Without exception they found their convalescence more comfortable after conservative treatment and were enthusiastic supporters of the method.

(3) The relative freedom from intra-abdominal adhesions. Several cases have had a gastrectomy some months later, and we have been impressed by the few adhesions present compared to the usual finding after operative treatment. We were particularly impressed by this observation because it was contrary to our expectations.

(4) When the patient is a bad operative risk—in the elderly, or those with concomitant medical disabilities such as respiratory or cardiac disease—the conservative method avoids the additional strain of an anæsthetic. In the occasional case where the perforation leads to a rapid deterioration in the patient's general condition, and the response to resuscitation is slow, an anæsthetic is always hazardous, and the delay before an operation can be undertaken may be serious. Conservative treatment can be started immediately and go hand in hand with resuscitation.

(5) When medical conditions mimic a perforation. Conservative treatment is particularly valuable when it is not certain whether the patient has a perforation or a medical condition such as coronary thrombosis or diaphragmatic pleurisy. An anæsthetic, which may be fatal, is avoided.

(6) When the signs of perforation are indefinite. Where the signs suggest a severe flare-up of an old chronic ulcer, or perhaps a small leakage, one hesitates to delay operation and await developments if no other treatment is available. With the conservative method these anxieties are absent, for it is particularly successful in this type of case, and the treatment can be applied without the risk of inflicting an unnecessary operation on the patient.

(7) The average stay in hospital before transfer to a convalescent home was 12 days in the cases treated conservatively and 17 days in those treated by operation. On the whole, therefore, the conservative method was quicker than the operative. There were not enough cases to provide any statistical evidence on the incidence of complications with the two methods of treatment. Such figures as we were able to collect support our impression that there are fewer complications with conservative treatment. A point of interest is that two cases out of the twenty treated conservatively had hæmatemesis during treatment, a very rare complication when the ulcer is sutured. On the other hand, one patient, whose ulcer perforated while he was in hospital being treated for a severe melæna and was still bleeding at the time of perforation, responded well to conservative treatment and recovered without incident.

The *disadvantages* of the conservative method are:

(1) The fatality-rate for conservative treatment was 15% and for the operative method 5·4%, but the series was too small for this difference to be more than an indication.

(2) The possibility of mistaken diagnosis is the gravest objection to conservative treatment. There must be few surgeons who have not confidently diagnosed a perforated ulcer and found at laparotomy some other condition, particularly an acute appendicitis. The attempt to treat such a case by the conservative method might be disastrous. By good fortune such a mistake did not happen to us, but the possibility gave us constant anxiety.

(3) When a case does badly under conservative treatment one gets an unhappy feeling that all that might have been done has not been done. If operative treatment fails one does at least feel that all possible aid has been given. There is probably no logical reason why a fatality after operation is easier to bear than a fatality after conservative treatment, but the fact remains that this was one of the main reasons for our uneasiness.

CONCLUSIONS

Taking the advantages and disadvantages together, we came to the following conclusions:

The treatment of choice for most perforated ulcers is immediate laparotomy and closure of the perforation.

The conservative method has a definite place in the treatment when (*a*) the diagnosis is in doubt between a perforation and a condition in which operation would be contra-indicated, such as coronary thrombosis or diaphragmatic pleurisy; (*b*) the patient's condition, whether as a result of the perforation or other causes, makes an operation inadvisable; (*c*) the signs are indefinite and a large perforation with much soiling of the peritoneal cavity is unlikely; or (*d*) good surgical facilities are not immediately available, as in ships at sea.

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A TRIAL OF β-NAPHTHYLDI-2-CHLOROETHYLAMINE (R48) IN LEUKÆMIA, HODGKIN'S DISEASE, AND ALLIED DISEASES

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SINCE Gilman and Philips (1946) and Rhoads (1946) reported on the therapeutic action of the nitrogen mustards methyl-bis(β-chloroethyl)amine (HN2) and tris (β-chloroethyl)amine (HN3), these compounds have been the subject of extended trials. Published results, though differing in detail, have uniformly confirmed that the nitrogen mustards can produce considerable, but always temporary, benefit in many cases of Hodgkin's disease, lymphosarcoma, chronic leukæmia, and allied disorders, and that the factors limiting their use are depressant action on the bone-marrow and the thromboses following repeated intravenous injections. These encouraging but imperfect results naturally led to the hope that more selective and less toxic agents might be derived from the original comparatively simple compounds.

The results of clinical trials with two complex aliphatic nitrogen mustards, SK136 and SK137, were disappointing (Burchenal 1948), and Craver (1948) concluded that none of the congeners of nitrogen mustard examined at the Sloan Kettering Institute had proved superior to HN2. Haddow et al. (1948) prepared a large series of aromatic nitrogen mustards and, from a study of their inhibitory action on animal tumours, selected two of the most promising for clinical trial. Preliminary trials (Haddow 1948) soon showed that one of these compounds, bis(β-chloroethyl)aniline (R74) had an unduly depressant action on the bone-marrow. Results with β-naphthyldi-2-chloroethylamine (R48) were, however, so encouraging that clinical trials on a larger scale were organised at several centres through the Medical Research Council, and the following is a report on that carried out at Oxford.

CLINICAL MATERIAL

Seventeen patients were treated with R48. Among these were five cases of Hodgkin's disease, two of reticulosarcoma, two of acute leukæmia in adults, three of chronic myeloid leukæmia, four of chronic lymphatic leukæmia, and one of polycythæmia vera. All but one of the patients were admitted to hospital at the beginning of the trial, and a close watch was kept on the leucocyte-count. Those patients whose clinical condition permitted and in whom there had been no sharp reaction of the bone-marrow during the first 2 weeks, continued treatment as outpatients, being seen at weekly intervals.

ADMINISTRATION AND DOSAGE

R48 was given by mouth in tablets each containing 100 mg. The tablets were chewed before being swallowed and were taken after meals. The taste was inoffensive. R48 is inactivated by exposure to light, and precautions were taken to avoid this as much as possible.

The daily dose never exceeded 600 mg., and in all the conditions treated 300–400 mg. in divided doses was generally used in adults. The only child in the series, aged 7 years, was given 100 mg. daily or on alternate days. It was at first hoped that any therapeutic response might be maintained by continued smaller doses. This was not found to be possible, for such doses were either ineffective or produced toxic effects without any additional benefit. R48 was therefore given in courses with intervals during which no treatment was given. The duration of each course was determined by the response of the leucocyte-count and varied within wide limits. In patients with a non-leukæmic blood picture it was thought safe to proceed until the leucocyte-count fell to about 3000 per c.mm, though treatment was sometimes stopped above this level. In chronic leukæmia the aim, not always achieved, was to reduce the leucocyte-count to about 20,000 per c.mm. This comparatively high figure was subsequently justified for in some patients the number of leucocytes continued to fall for some weeks after treatment had been stopped. In cases where further trial was considered justified repeated courses were given—in Hodgkin's disease when the leucocyte-count had returned to normal, and in chronic leukæmia when a rise in the leucocyte-count, considered in conjunction with the clinical condition, indicated the need for further treatment. On roughly comparable doses the average duration of a course in Hodgkin's disease was 48 days (range 19–75); in chronic myeloid leukæmia 45 days (range 14–152); and in chronic lymphatic leukæmia 20 days (range 11–29). The patient with polycythæmia was given 400 mg. daily for 63 days, and the two patients with reticulosarcoma received the same dose for 11 and 36 days.

TOXIC EFFECTS

Gastric disturbances were less common and less severe with R48 than with HN2, which produces repeated vomiting in a high proportion of cases. In the present series six patients experienced no such symptoms, and a further six suffered only from slight intermittent nausea, usually confined to the first week of treatment. Of the remainder, two had an isolated bout of repeated

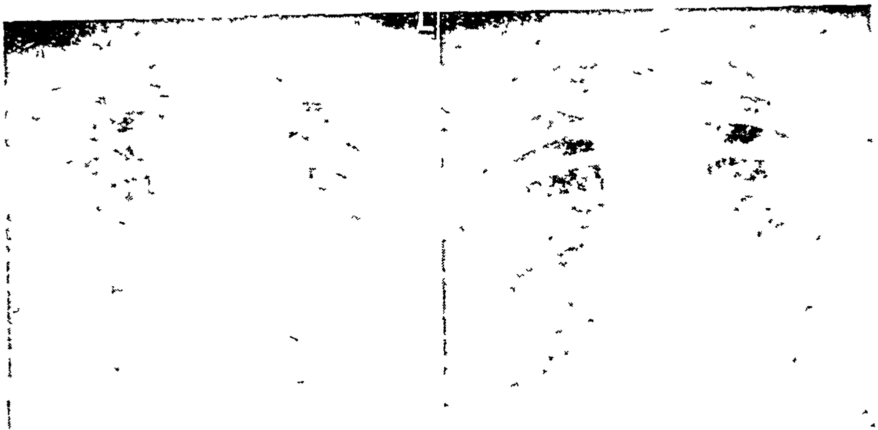

Fig. 1—Hodgkin's disease, before and after treatment with R48. Case 3 showing considerable shrinkage of mediastinal lymph-nodes.

aiting at one stage of a procted course of treatment, l one patient with acute kæmia vomited frequently ring the last few days of life, ough this could not with tainty be attributed to the 48. Two patients experienced ore protracted nausea and frequent vomiting interittently throughout treatment, d in one of them the treatent had to be stopped on this count. These gastric symptoms d not bear any fixed relation the time of swallowing the blets and were thought to be milar to the delayed vomiting fter HN2 and to radiation ickness.

Haddow (1948) reported hæmorrhagic cystitis in wo patients in his preliminary trial of R48. In the resent trial one patient developed a minor degree of ysuria with microscopic blood in the urine. The ondition cleared spontaneously and treatment was not nterrupted. Another patient, an elderly man who was known to have a mild chronic cystitis secondary to prostatic hypertrophy, experienced no ill effects from his first course of treatment but developed severe dysuria after the first dose of his second course; no blood was found in the urine, and it is doubtful if his symptoms were due to R48. Cystitis has not been reported as a complication of intravenous nitrogen-mustard therapy, and it seems possible that it is due to the aromatic radicle of R48, since β-naphthylamine is a well-known industrial hazard, producing hæmaturia and possibly carcinoma of the bladder.

A suggestive observation was that three of four women previously menstruating regularly developed amenorrhœa within a few weeks of beginning a course of R48, when their clinical condition did not suggest that this might be caused by their disease. Menstruation did not return before death, nine months later, in two patients, and was still absent a year later in the third, though she was otherwise in good clinical condition. Unfortunately it is impossible to draw any conclusion from the necropsy findings; but, in view of the profound effects of the mustards on the germ plasm and on proliferating tissue generally, it is not improbable that protracted administration of R48 might inhibit ovulation or endometrial proliferation. No effect on the size or function of the testes was observed.

Hepatic function was not tested routinely, but there was no clinical evidence that this was impaired.

EFFECTS ON PERIPHERAL BLOOD

The therapeutic effects of R48 on the leucocyte-count in leukæmia are considered below, but such effects in patients with Hodgkin's disease, reticulosarcoma, and polycythæmia are, of course, undesirable. The leucocyte-count fell in each of eleven courses of treatment in eight patients with these diseases. In ten of these courses the fall was gradual and largely calculable; hence no anxiety was experienced in seeing these patients at weekly intervals. In one man in the terminal stages of reticulosarcoma there was a precipitous fall. Treatment was stopped when the count was 2800 per c.mm., but the fall continued, reaching 550 per c.mm. three days later. One other patient developed a profound neutropenia 2 weeks after the end of a course of treatment. Both patients were given penicillin, no infection occurred, and the leucocyte-count returned promptly to normal. In general the granulocytes and lymphocytes decreased concurrently; but when treatment was stopped the granulocytes sometimes continued to decrease while the lymphocytes increased.

The platelets responded in an irregular manner, but in all cases their number fell. In one case the platelet-count fell to 55,000 per c.mm. a fortnight after treatment had been stopped; this fall coincided with an epistaxis, the only hæmorrhagic manifestation attributable to R48. Recovery to normal levels was always prompt.

In Hodgkin's disease and reticulosarcoma no significant effect on the hæmoglobin level or red-cell count was observed. No anæmia was produced, and there was no pronounced amelioration of any anæmia already present.

Sternal-marrow biopsy in a few patients before and after treatment indicated that, in common with HN2, R48 acts on the primitive cells of the myeloid series and not on the mature forms in the peripheral blood.

THERAPEUTIC RESULTS

Hodgkin's Disease

Five patients with Hodgkin's disease were treated with R48. These patients exhibited a wide range of manifestations of the disease, ranging from early disease localised in the cervical lymph-nodes to extensive radio-resistant visceral involvement. Three patients received 2 courses of treatment, and two patients a single course. Any improvement gained by the first course was maintained

RESULTS OBTAINED WITH R48 IN HODGKIN'S DISEASE

Case no	Improved	Unimproved	Duration of improvement from stopping treatment (weeks)
1	Subjective improvement, gain in weight, spleen became impalpable, peripheral nodes reduced, soft tissue tumour reduced	Abdominal masses unaffected, lesions of ribs unaffected, pleural effusion developed during treatment	4
2	Subjective improvement, spleen and peripheral nodes became impalpable	Mediastinal nodes and pleural effusion unaffected	8
3	Subjective improvement, gain in weight, fever abolished, peripheral and mediastinal nodes reduced	Pulmonary infiltration unaffected	5
4	Subjective improvement, fever abolished, peripheral nodes reduced		4
5	Peripheral nodes reduced, spleen became impalpable	Continued loss of weight	7

in the interval between courses; hence no sharp distinction can be drawn between the effects of each course, and the effects of the total treatment with R48 will be considered. This is summarised in the accompanying table, and it can be seen that some improvement, often of important degree (fig. 1), was obtained in each case. Such improvement was not usually obvious until 2–3 weeks after the start of treatment and was never so rapid as that often seen after the injection of HN2. In no case, however, was a complete clinical remission produced, and relapse occurred within a few weeks of stopping treatment. It was noted that the leucocyte-count returned to normal while any clinical improvement was still maintained. Since leucopenia seemed to be the only limiting factor in the use of R48, it was hoped that by repeated courses further regression of the disease might be obtained. It was found, however, in those cases receiving two courses, that this was not so. It seemed that R48 could produce a certain degree of improvement, but that further treatment had then no beneficial effect and finally had to be abandoned because of a return of leucopenia. The degree of improvement did not seem to be related to the degree of leucopenia.

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Three cases of chronic myeloid leukæmia were treated. In two previously untreated cases good initial clinical and hæmatological remissions were produced, with a fall in the leucocyte-count, an improvement in the differential count, a rise in hæmoglobin, a reduction in the size of the spleen, and an increase in well-being. There was no doubt that real improvement occurred, as opposed to a mere fall in the leucocyte-count, for in one patient the hæmoglobin rose 30% and the spleen was reduced by 12 cm., and in the other patient the hæmoglobin rose 40% and the spleen shrank by 15 cm. In the first of these patients a further course was required after 12 weeks, and though improvement again occurred the response was less satisfactory and the trial was abandoned.

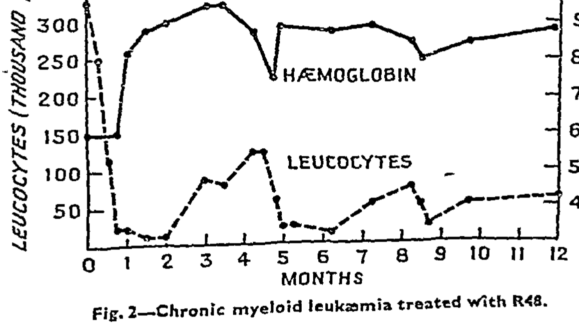

Fig. 2—Chronic myeloid leukæmia treated with R48.

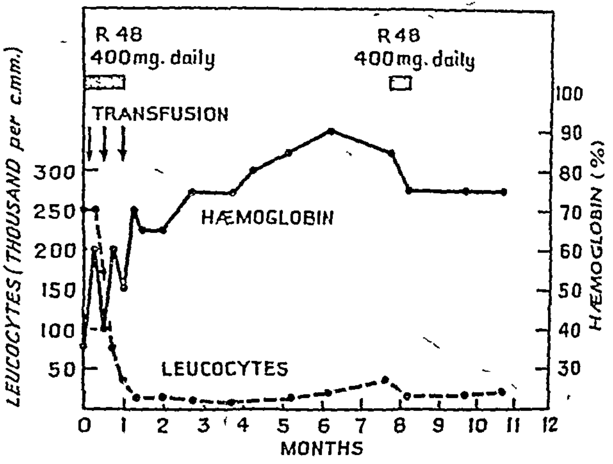

Fig. 3—Chronic lymphatic leukæmia treated with R48.

The second patient responded repeatedly, and three remissions, each of 3 or 4 months' duration, were produced (fig. 2). The third patient had previously been treated with X rays, with lessening response, and the response to R48 was also disappointing. After a long course and heavy dosage a rise of 20% in the hæmoglobin and a fall in the leucocyte-count from 290,000 to 67,000 per c.mm. were produced, but no further improvement occurred. Within 3 weeks after treatment had been stopped the patient entered the acute stage of her disease, and she soon died.

Chronic Lymphatic Leukæmia

Four cases of chronic lymphatic leukæmia were treated. In two, good and repeatable remissions were obtained. Again there was no doubt that real improvement took place, as may be seen from the following case-record.

A station-master, aged 59, was admitted to the Radcliffe Infirmary under Professor Witts with a history of fluctuating swellings in the neck, axillæ, and groins for the past year, and of recent increasing fatigue. He had a generalised enlargement of lymph-nodes, a spleen measuring 20 cm. from tip to costal margin, and an enlarged liver. He had pyrexia up to 104°F and was very weak and wasted. Before treatment his leucocyte-count was 251,000 per c.mm., nearly all lymphocytes, and his hæmoglobin 35%. He was given 11·8 g. of R48 in 29 days, with no toxic effects. When treatment was stopped, the leucocyte-count had fallen to 37,000 per c.mm., but the hæmoglobin was still barely maintained by transfusions. He was discharged from hospital and seen frequently as an outpatient. In the following months he gradually improved, and 5 months after treatment had been stopped the leucocyte-count was 18,400 per c.mm., the hæmoglobin was 90%, the spleen had shrunk by 7 cm., and there had been a general reduction in size of the lymph-nodes. He had gained 8 kg. in weight and had been in full work for two months. A subsequent rise in the leucocyte-count was treated with a further short course of R48 with good effect (fig. 3). This patient, although still presenting gross clinical and hæmatological signs of his disease, was enabled to return to full work after having been apparently moribund.

The second patient, although not so gravely ill, responded similarly. The third patient was in extremis on admission and, although her leucocyte-count fell from 860,000 to 106,000 per c.mm., she died from the effects of asthma, pneumonia, and intestinal obstruction.

The fourth patient had previously reacted with increasing severity to several courses of radiotherapy, which had produced a fall in both leucocyte-count and hæmoglobin. She was treated, perhaps unwisely, with 400 mg. of R48 daily, and there was a very rapid fall in the leucocyte-count, platelet-count, and hæmoglobin. The marrow became very hypoplastic, and, though agranulocytic angina did not develop, there can be no doubt that the anæmia produced by R48 contributed to the patient's death 6 months later. It is

possible that any form of treatment would have produced a similar reaction in view of the previous very similar response to X rays.

Polycythæmia Vera

One case of polycythæmia vera was treated. The initial red-cell count 7,700,000 per c.mm., with a hæmatocrit of 68%, was reduced to about normal figures by repeated venesection, as it was not thought wise to await any possible response to R48. A course of 24·4 g. was given in 63 days, during which the leucocyte-count fell from 16,600 to 5600 per c.mm. and the platelets from 1,100,000 to 200,000 per c.mm. The red-cell count remained at about 5,000,000 per c.mm. and the hæmatocrit at 48%. These levels were still maintained a year later and there had been no return of symptoms.

DISCUSSION

Although it was shown beyond doubt that R48 can cause partial regression of Hodgkin's disease, the therapeutic results in this condition must be considered disappointing. Such observations are difficult to control, but the results were certainly no better than those to be expected with HN2. In two patients subsequent radiotherapy produced superior results, and it seems established that R48 is unsuitable for the treatment of early localised Hodgkin's disease. Where widespread lesions are present, the comparative lack of unpleasant toxic effects may be an advantage; but dramatic results are not to be expected, and it is doubtful if R48 represents any advance in the treatment of Hodgkin's disease.

The two cases of reticulosarcoma do not comprise a full trial, for this disease is very variable in its response both to HN2 and to radiotherapy. There was, however, no evidence that R48 was of any value.

The lack of response of the two cases of acute leukæmia was not surprising and merely emphasises the resistance of the acute condition to those agents which are of value in the treatment of chronic leukæmia.

In four cases of chronic leukæmia R48 produced excellent initial remissions unaccompanied by toxic effects of any kind. After an interval of 11–28 weeks further treatment was required, and in all cases remissions were repeatable. It is here that the value of R48 seems to lie. It is not claimed that greater improvement can be obtained than with other forms of treatment, although the response in the case described above would have been gratifying with any treatment; but, when no toxic symptoms are produced, the administration of tablets which produce a smooth and easily controlled response presents obvious advantages. On the other hand, remissions are short-lived, and, if toxic symptoms develop, it is not worth while persevering with R48. It must be pointed out that these four cases were previously untreated, and there is no evidence that R48 will produce much improvement when other treatment has failed.

The one case of polycythæmia vera treated was still in remission a year later, which could scarcely be attributed to venesection at the beginning of treatment. A year's remission with no toxic effects is a worthwhile achievement, but far more experience would be required for a full assessment of R48 in this condition.

Short of cure, the aim in the development of palliative agents in Hodgkin's disease and leukæmia has been to separate their toxic and therapeutic actions. The nitrogen mustards present a large field for manipulation of chemical structure; but, so far as is known, biological activity depends on the presence of two β-chloroethyl groups attached to one or more nitrogen atoms (Anslow et al. 1947, Haddow et al. 1948). It is understandable that the chemical structure into which this group is introduced might affect its site or speed of action, but nevertheless the available evidence suggests that both the toxic and beneficial effects depend on the cytotoxic action of the mustards on proliferating tissue. The present trial suggests that the substitution of the β-naphthyl for the methyl radicle influences the speed but not the selectivity of the action of nitrogen mustard.

SUMMARY

Seventeen patients were treated with β-naphthyldi-2-chloroethylamine (R48) by mouth, the usual dose being 300–400 mg. daily.

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FLAXEDIL IN LARYNGEAL INTUBATION

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Bourne's method, with various modifications, has been used extensively during the last two years for operations requiring intubation and maintenance of anæsthesia at a light level. However, there are certain disadvantages: (1) the effect of the curare may occasionally last longer than the operation; (2) a comparatively large dose of thiopentone is required with the curare to produce satisfactory relaxation of the vocal cords: and (3) many in the interval between courses; hence no sharp distinction can be drawn between the effects of each course, and the effects of the total treatment with R48 will be considered. This is summarised in the accompanying table, and it can be seen that some improvement, often of important degree (fig. 1), was obtained in each case. Such improvement was not usually obvious until 2–3 weeks after the start of treatment and was never so rapid as that often seen after the injection of HN2. In no case, however, was a complete clinical remission produced, *and relapse occurred within a few weeks of* stopping treatment. It was noted that the leucocyte-count returned to normal while any clinical improvement was still maintained. Since leucopenia seemed to be the only limiting factor in the use of R48, it was hoped that by repeated courses further regression of the disease might be obtained. It was found, however, in those cases receiving two courses, that this was not so. It seemed that R48 could produce a certain degree of improvement, but that further treatment had then no beneficial effect and finally had to be abandoned because of a return of leucopenia. The degree of improvement did not seem to be related to the degree of leucopenia.

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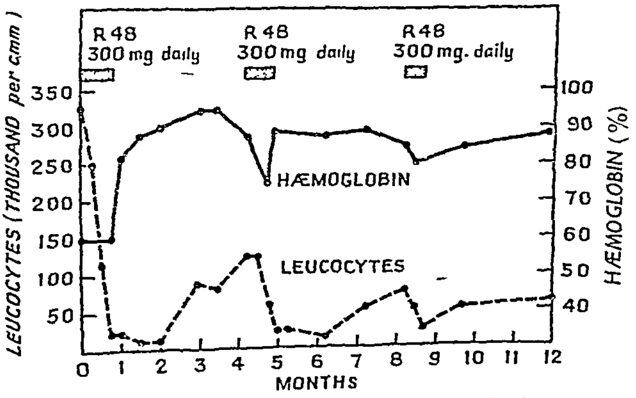

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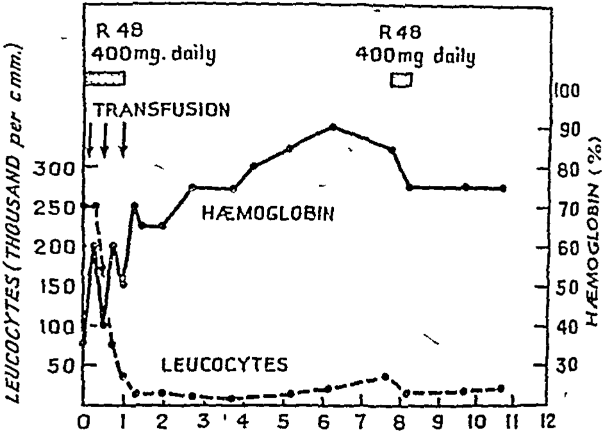

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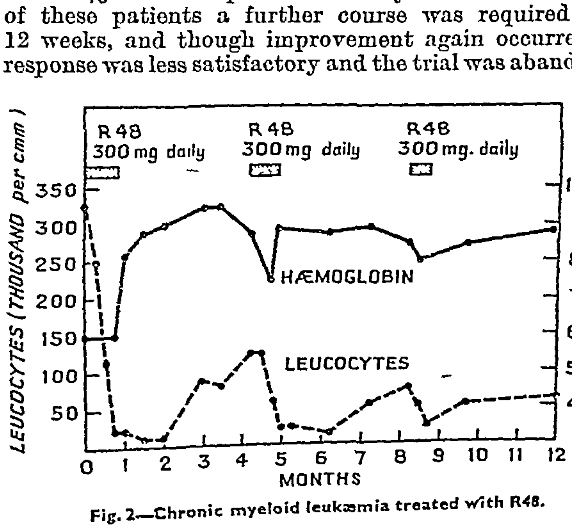

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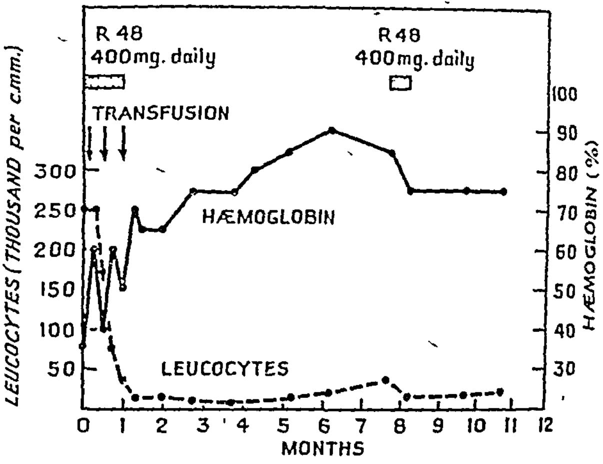

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Chronic Lymphatic Leukæmia

Four cases of chronic lymphatic leukæmia were treated. In two, good and repeatable remissions were obtained. Again there was no doubt that real improvement took place, as may be seen from the following case-record.

A station-master, aged 59, was admitted to the Radcliffe Infirmary under Professor Witts with a history of fluctuating swellings in the neck, axillæ, and groins for the past year, and of recent increasing fatigue. He had a generalised enlargement of lymph-nodes, a spleen measuring 20 cm. from tip to costal margin, and an enlarged liver. He had pyrexia up to 104°F and was very weak and wasted. Before treatment his leucocyte-count was 251,000 per c.mm., nearly all lymphocytes, and his hæmoglobin 35%. He was given 11·8 g. of R48 in 29 days, with no toxic effects. When treatment was stopped, the leucocyte-count had fallen to 37,000 per c.mm., but the hæmoglobin was still barely maintained by transfusions. He was discharged from hospital and seen frequently as an outpatient. In the following months he gradually improved, and 5 months after treatment had been stopped the leucocyte-count was 18,400 per c.mm., the hæmoglobin was 90%, the spleen had shrunk by 7 cm., and there had been a general reduction in size of the lymph-nodes. He had gained 8 kg. in weight and had been in full work for two months. A subsequent rise in the leucocyte-count was treated with a further short course of R48 with good effect (fig. 3). This patient, although still presenting gross clinical and hæmatological signs of his disease, was enabled to return to full work after having been apparently moribund.

The second patient, although not so gravely ill, responded similarly. The third patient was in extremis on admission and, although her leucocyte-count fell from 860,000 to 106,000 per c.mm., she died from the effects of asthma, pneumonia, and intestinal obstruction.

The fourth patient had previously reacted with increasing severity to several courses of radiotherapy, which had produced a fall in both leucocyte-count and hæmoglobin. She was treated, perhaps unwisely, with 400 mg. of R48 daily, and there was a very rapid fall in the leucocyte-count, platelet-count, and hæmoglobin. The marrow became very hypoplastic, and, though agranulocytic angina did not develop, there can be no doubt that the anæmia produced by R48 contributed to the patient's death 6 months later. It is

possible that any form of treatment would have produced a similar reaction in view of the previous very similar response to X rays.

Polycythæmia Vera

One case of polycythæmia vera was treated. The initial red-cell count 7,700,000 per c.mm., with a hæmatocrit of 68%, was reduced to about normal figures by repeated venesection, as it was not thought wise to await any possible response to R48. A course of 24·4 g. was given in 63 days, during which the leucocyte-count fell from 16,600 to 5600 per c.mm. and the platelets from 1,100,000 to 200,000 per c.mm. The red-cell count remained at about 5,000,000 per c.mm. and the hæmatocrit at 48%. These levels were still maintained a year later and there had been no return of symptoms.

DISCUSSION

Although it was shown beyond doubt that R48 can cause partial regression of Hodgkin's disease, the therapeutic results in this condition must be considered disappointing. Such observations are difficult to control, but the results were certainly no better than those to be expected with HN2. In two patients subsequent radiotherapy produced superior results, and it seems established that R48 is unsuitable for the treatment of early localised Hodgkin's disease. Where widespread lesions are present, the comparative lack of unpleasant toxic effects may be an advantage; but dramatic results are not to be expected, and it is doubtful if R48 represents any advance in the treatment of Hodgkin's disease.

The two cases of reticulosarcoma do not comprise a full trial, for this disease is very variable in its response both to HN2 and to radiotherapy. There was, however, no evidence that R48 was of any value.

The lack of response of the two cases of acute leukæmia was not surprising and merely emphasises the resistance of the acute condition to those agents which are of value in the treatment of chronic leukæmia.

In four cases of chronic leukæmia R48 produced excellent initial remissions unaccompanied by toxic effects of any kind. After an interval of 11–28 weeks further treatment was required, and in all cases remissions were repeatable. It is here that the value of R48 seems to lie. It is not claimed that greater improvement can be obtained than with other forms of treatment, although the response in the case described above would have been gratifying with any treatment; but, when no toxic symptoms are produced, the administration of tablets which produce a smooth and easily controlled response presents obvious advantages. On the other hand, remissions are short-lived, and, if toxic symptoms develop, it is not worth while persevering with R48. It must be pointed out that these four cases were previously untreated, and there is no evidence that R48 will produce much improvement when other treatment has failed.

The one case of polycythæmia vera treated was still in remission a year later, which could scarcely be attributed to venesection at the beginning of treatment. A year's remission with no toxic effects is a worthwhile achievement, but far more experience would be required for a full assessment of R48 in this condition.

Short of cure, the aim in the development of palliative agents in Hodgkin's disease and leukæmia has been to separate their toxic and therapeutic actions. The nitrogen mustards present a large field for manipulation of chemical structure; but, so far as is known, biological activity depends on the presence of two β-chloroethyl groups attached to one or more nitrogen atoms (Anslow et al. 1947, Haddow et al. 1948). It is understandable that the chemical structure into which this group is introduced might affect its site or speed of action, but nevertheless the available evidence suggests that both the toxic and beneficial effects depend on the cytotoxic action of the mustards on proliferating tissue. The present trial suggests that the substitution of the β-naphthyl for the methyl radicle influences the speed but not the selectivity of the action of nitrogen mustard.

SUMMARY

Seventeen patients were treated with β-naphthyldi-2-chloroethylamine (R48) by mouth, the usual dose being 300–400 mg. daily.

Five cases of Hodgkin's disease all showed some improvement, but the results were on the whole disappointing.

Two cases of reticulosarcoma and two of acute leukæmia did not respond.

Three cases of chronic myeloid leukæmia were treated, with good remissions in two.

Four cases of chronic lymphatic leukæmia were treated, with good remissions in two.

One case of polycythæmia vera was still in remission a year after treatment.

Toxic symptoms included relatively mild and infrequent gastric disturbances, and cystitis in one patient.

There was an invariable depression of the leucocyte-count and platelet-count.

It was concluded that the action of R48 was essentially similar to that of nitrogen mustard (HN2) but slower and more easily controlled.

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FLAXEDIL IN LARYNGEAL INTUBATION

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THE effect of *d*-tubocurarine chloride in facilitating intubation of the larynx was first mentioned by Gray (1946). Bourne (1947) showed that for nearly all surgery of the head and neck in adults satisfactory anæsthesia could be maintained with nitrous oxide and oxygen following intubation under thiopentone and curare. The advantages of this method are: (1) an easy atraumatic intubation; (2) toleration of the tube with gas and oxygen alone, or in a few cases with minimal intravenous or volatile supplementary agents; (3) absence of sequelæ due to a traumatic intubation or to a nauseating volatile agent; (4) non-inflammable anæsthetic mixture; (5) quick recovery of cough reflex and consciousness; and (6) a considerable saving of time.

Bourne's method, with various modifications, has been used extensively during the last two years for operations requiring intubation and maintenance of anæsthesia at a light level. However, there are certain disadvantages: (1) the effect of the curare may occasionally last longer than the operation; (2) a comparatively large dose of thiopentone is required with the curare to produce satisfactory relaxation of the vocal cords; and (3) many cases have required artificial ventilation for varying periods after intubation, and, even when spontaneous respiration has started, the respiratory excursion has been inadequate.

By the use of 'Flaxedil' (tri-(β-diethylaminoethoxy)-benzene triethiodide) in place of *d*-tubocurarine chloride, Bourne's technique has been modified to produce a method of anæsthesia for head and neck surgery which avoids the disadvantages of the former method.

Flaxedil is a synthetic curarising agent, the clinical uses of which were reported by Mushin et al. (1949). Lamoureux and Bourgeois-Gavardin (1949) found that flaxedil facilitated laryngeal intubation in 50 operation cases of various types. Mushin et al. considered that a dose of 80 mg. of flaxedil was equivalent in curarising activity to 15 mg. of *d*-tubocurarine chloride. This dose, which is contained in a 2 ml. ampoule of flaxedil, was used in all adult patients in the series described in this article, irrespective of age, weight, or physical condition.

The dosage of thiopentone given with the flaxedil requires explanation. To show that flaxedil is effective in facilitating intubation, the dose of barbiturate must be small. However, a fixed dose given to each patient would be an overdose for some and inadequate for others. It was therefore decided to adjust the dose for each patient *according to that patient's reaction to the* barbiturate. When the intravenous barbiturates were introduced, the proper induction dose was considered to be twice that required to send the patient to sleep. This was the dose used in this investigation. Thus as little as 0·25 g. and as much as 1 g. has been used in this series.

PROCEDURE

Each patient was given 5% thiopentone intravenously at a rate allowed by injecting through a no. 16 S.W.G. needle without undue pressure on the plunger. The patient was engaged in conversation. When the patient went to sleep, the amount of barbiturate injected was noted and the syringe detached from the needle. Flaxedil 80 mg. was injected through the same needle, followed by the injection of a further dose of thiopentone equal to the amount already injected. The syringe and needle were laid aside, and the patient was given pure oxygen by inhalation for half a minute. If the patient was breathing, the respirations were assisted by gentle pressure on the reservoir bag with each inspiration. If the patient was apnœic, the lungs were artificially inflated. About 1–1$^1/_2$ minutes after injection the flaxedil seemed to be exerting its full effect. The jaw was usually relaxed and the glottis open. A Macintosh laryngoscope was then passed and the larynx sprayed with 2% amethocaine. The tube was then passed and connected to a Boyle's machine, and anæsthesia maintained with nitrous oxide 75% and oxygen 25%.

Since intubation took place immediately after the larynx had been sprayed, it is unlikely that the surface analgesic had sufficient time to act and thus facilitate the intubation. The spraying, however, not only enabled the tube to be tolerated by the larynx and trachea under light anæsthesia but also, which is more to the purpose of this investigation, gave some indication of the irritability of the larynx after the thiopentone and flaxedil. In some cases the impact of the spray produced no reaction of the vocal cords, in some a slight temporary adduction, and in a few a temporary spasm. The ease of intubation and the degree of cough reaction following intubation were also noted.

RESULTS

The degree to which flaxedil facilitated the intubations and depressed the reactivity of the larynx and cough reflex was estimated by classifying each intubation into one of four groups as follows:

	Group I	*Group II*	*Group III*	*Group IV*
Cords	Open	Open	Active	
Reaction to spray	Nil	Slight	Vigorous	
Ease of intubation	Very easy	Easy	Difficult	Unsuccessful intubation
Cough after intubation	Nil	Slight, rapidly settled into rhythmical respiration	Considerable and long-lasting	

Any intubation which was not achieved at the first attempt was classified into group IV. Intubation was not abandoned, but more anæsthetic agent was given, or time was allowed for the surface analgesic to exert its effect.

In 136 cases the following results were obtained:

	Group I	*Group II*	*Group III*	*Group IV*
No. of cases	38 (27·9%)	71 (52·2%)	22 (16·2%)	5 (3·7%)

Thus it will be seen that the use of 80 mg. of flaxedil with small doses of thiopentone can produce conditions in which 80% of intubations may be regarded as easy (groups I and II).

It is obviously of interest to observe the number of cases in which apnœa persisted after intubation long enough to require artificial respiration. The manufacturers of flaxedil claim that, in contrast with *d*-tubocurarine chloride, muscular relaxation is produced without undue depression of diaphragmatic respiration. In 9 (7%) of the 136 cases artificial respiration was necessary. One case is instructive because of the comparison which it afforded between flaxedil and *d*-tubocurarine chloride:

A frail man of 59 underwent two plastic operations on his frontal sinuses. At the first operation he was intubated easily (group II) under thiopentone 0·5 g. and *d*-tubocurarine chloride 15 mg. He was apnœic for an hour after intubation. A week later he was intubated with equal ease, for the second operation, under the same dose of thiopentone aided by 80 mg. of flaxedil. On this occasion he was apnœic for only 2$^1/_2$ minutes.

SUPPLEMENTARY ANÆSTHESIA

In most cases no agent other than 75% nitrous oxide with 25% oxygen was used to maintain the patient in anæsthesia, but in long operations, or when the patient coughed persistently on the tube, a trace of ether or of trichlorethylene, or further small additions of intravenous thiopentone, were sufficient to ensure maintenance of a smooth anæsthesia.

EXTUBATION AND RECOVERY

Gillespie (1948) has warned that severe laryngeal spasm may follow extubation under very light anæsthesia. In the present series only 4% developed anything more than a transient spasm when the tube was removed. Recovery of consciousness was very rapid in those cases in which no additional anæsthetic agent was used apart from nitrous oxide. Every patient was followed up, and no sequelæ attributable to flaxedil were discovered.

SIDE-ACTIONS OF FLAXEDIL

Lamoureux and Bourgeois-Gavardin (1949) have reported that flaxedil caused a rise in the pulse-rate up to 100–110 in 40% of their cases. A transitory tachycardia may often accompany the induction of any form of anæsthesia, but it was also produced by single injections of flaxedil. Huguenard and Boué (1950) consider that flaxedil has a vagolytic action because of its inhibitory effect on the cough reflex. Lamoureux and Bourgeois-Gavardin suggest that the vagolytic action may also explain the tachycardia following the injection of flaxedil.

Of the present cases 33% showed a rise in the pulse-rate to 110 or more, and 16% showed a rise of 50% over the resting rate. The highest rate recorded was 140. No irregularities of the cardiac rhythm were observed; nor were any abnormalities noted, apart from tachycardia, on electrocardiography.

HISTAMINE-LIKE EFFECTS

Mushin et al. (1949) have shown in experiments on animals that flaxedil liberated less histamine ($^1/_5$–$^1/_2$) than did *d*-tubocurarine chloride. With the dose of 80 mg. used in this series neither fall of blood-pressure nor bronchospasm was observed. However, in a few cases only, a conspicuous flushing of the face was noted soon after injection, but it is difficult to say whether or not capillary oozing was much more than normal.

COMPARISON WITH DECAMETHONIUM IODIDE

The use of flaxedil naturally invites comparison with decamethonium iodide, the other synthetic curarising agent now in common use. Decamethonium iodide was used in 57 cases with the same technique of administration as described for flaxedil. However, to get a degree of relaxation to produce conditions for intubation comparable with those obtained with flaxedil, it was found necessary to give as a standard dose 4 mg. (equivalent in curarising activity to 20 mg. of *d*-tubocurarine chloride). In 57 cases the following results were obtained:

	Group I	*Group II*	*Group III*	*Group IV*
No. of cases	13 (*22·8%*)	24 (*42·1%*)	14 (*24·6%*)	6 (*10·5%*)

It will be seen that, even with a dose of decamethonium iodide with a higher curarising potency than that of 80 mg. of flaxedil, only 64·9% of cases fell into groups I and II (easy intubations). In addition, it was not surprising that nearly half the cases (47%) required artificial respiration for various periods following intubation. Of the 37 cases in which an easy intubation was carried out 21 (59%) needed artificial respiration. With flaxedil only 9 (8%) of 109 easy intubation cases required artificial respiration.

With decamethonium iodide the onset of relaxation of the jaw and vocal cords was slower than with flaxedil, and in many cases difficulty was caused by a severe clonus of the lower jaw, which sometimes prevented the insertion of the laryngoscope. Occasionally the clonus persisted for four minutes or more, by which time one would have expected decamethonium iodide to have exerted its full effect. With flaxedil no case showed jaw clonus, and the rapid onset of relaxation of the jaw was a pronounced feature in the use of flaxedil.

Patients intubated after decamethonium iodide showed a lower tolerance of the tube in the trachea, and most of them required more than nitrous oxide and oxygen to maintain rhythmical respiration without coughing.

A great disadvantage of decamethonium iodide (C10) is that neostigmine is not an effective antidote to it and that the advertised antidote—pentamethonium bromide (C5)—has been found unsatisfactory because of its inconstancy of action and its effect in lowering the blood-pressure. Thus in very short procedures it is possible that the operation may end before the respiratory depression has worn off, and the patient must remain in the operating-theatre under supervision until full respiratory efficiency has been regained. With flaxedil, in the one case in which an antidote was required, an injection of neostigmine 2·5 mg. with atropine gr. $^1/_{100}$ effectively restored full respiratory activity within a minute.

Decamethonium iodide seemed to have two advantages over flaxedil: (1) possibly because there is no liberation of histamine, there seemed to be no peripheral vasodilatation, and one would therefore expect less capillary oozing; and (2) the pulse-rate did not seem to be so much raised as with flaxedil—in fact in some cases there was bradycardia.

DISCUSSION

The principle of using a curarising agent with thiopentone and gas-and-oxygen in anæsthesia for head and neck surgery has aroused considerable controversy. It has been described as "using a steam-hammer to crack a nut" (Frankis Evans 1949). This criticism might have some substance if the mere passing of the endotracheal tube were the sole aim of the anæsthetist. However, it is necessary not only to intubate the patient without undue delay but also to produce a patient in a condition suitable for the surgeon to start operating. It is no advantage to intubate a patient within a minute or so of his loss of consciousness, if a further ten minutes must elapse before he will tolerate the tube without coughing, or will relax his jaw and fauces sufficiently to enable a pack to be inserted, or to enable intra-oral operations to be done.

The ideal conditions required for a rapid safe easy atraumatic intubation are: (1) a perfect view of the vocal cords; (2) an open glottis; and (3) unreactive vocal cords. After intubation the patient should settle down rapidly on the tube, there should be no tendency to cough, and light anæsthesia should be maintained. The surgeon should be able safely to use diathermy. Recovery should be rapid, there should be no sequelæ due to trauma during intubation, and post-anæsthetic nausea should be minimal.

Few would quarrel with the use of ether to produce the conditions necessary for a safe, easy, atraumatic intubation. Yet to achieve open and unreactive cords with a relaxed lower jaw, plane-III anæsthesia is required. This is a depth of narcosis well beyond that required for the ordinary head and neck operation. The patient has been subjected to the toxic effect of ether on the liver and kidneys, and is likely to suffer from post-anæsthetic nausea, simply in order to produce relaxation of the jaw and depression of the laryngeal reflexes. These aims can be attained far more expeditiously and with less cost to the patient by the use of a small dose of thiopentone and a curarising agent. In addition, with ether anæsthesia the surgeon cannot safely use diathermy, and an induction with ether to the third plane is time-consuming.

Thiopentone is used by itself extensively to achieve a rapid intubation. However, apart from the risk of a severe laryngeal spasm which may result from an attempt at intubation, a successful intubation is often followed by a vigorous reflex reaction marked by prolonged breath-holding, bronchospasm, and congestion of the head and neck. True, these reactions may subside after a time, or their subsidence may be hastened by further doses of thiopentone, but the cost to the patient after the initial severe strain on the cardiovascular system may be circulatory depression due to a large dose of thiopentone, and a delayed recovery from the anæsthetic.

Cyclopropane is not always satisfactory, for, though a relaxed jaw and open unreactive cords may rapidly be obtained, maintenance requires a circle absorber. The difficulty of securing the heavy circle tubing and obtaining a gas-tight circuit, particularly with a nasal tube, makes this method clumsy. There is also increased bleeding from the wound, the explosion risk is present, and nausea and vomiting are not uncommon sequelæ.

It is suggested that thiopentone and gas-and-oxygen, with a curarising agent, approaches the ideal more closely than any other method. Of the curarising agents now available flaxedil appears to be the most satisfactory. Its rapid action in producing relaxation of the lower jaw, and in depressing the activity of the larynx, allows an easy atraumatic intubation. In most cases its effect passes so rapidly that full diaphragmatic respiration is unimpaired. In those cases in which artificial respiration was required, only in one was it necessary for more than four minutes.

It is not maintained that the technique described for using flaxedil has been perfected. More experience is necessary to balance the dose of flaxedil and thiopentone so as to secure the best conditions for an easy intubation without unduly depressing respiration. It is emphasised, however, that the required dose of thiopentone should be commensurate with the size and physical condition of the patient, and is often rather less than one would expect. It would probably be estimated more accurately by the judgment of the individual anæsthetist, based on experience, than on the rule-of-thumb method described in this article. However, this method of estimation has been shown to be reasonably reliable in practice, and may therefore serve as a useful guide.

SUMMARY

The use of flaxedil in facilitating laryngeal intubation is described.

Its effect for this purpose is compared with that of decamethonium iodide.

The advantages of the use of curarising agents in facilitating intubation are discussed in comparison with other methods.

My thanks are due to Dr. W. D. Wylie and Dr. J. G. Bourne for their helpful criticisms and suggestions; to those members of the department of anæsthetics, St. Thomas's Hospital, who have anæsthetised the patients and kept records of the cases on which this article is based; and to Miss J. Davenport for the secretarial work which she has undertaken for me. Messrs. May & Baker Ltd. furnished me with the flaxedil used in this investigation.

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USE OF ALBUMIN-ACTIVE ANTISERA IN RHESUS TYPING

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THERE is a steady rise in the number of people who have at some time or other received a blood-transfusion, and, since the range of conditions for which transfusions are given is still widening, many of them stand a fair chance of receiving blood again later in life. On account of shortage of typing antisera many Rh-negative people have received Rh-positive blood and are in danger of developing severe reactions from sensitisation on further transfusion. The Rh typing of all patients before transfusion thus becomes increasingly necessary, but this is impracticable because the supplies of Rh-typing antisera active on saline red-cell suspensions are being largely used in testing donors to the National Blood Transfusion Service and in antenatal tests (*British Medical Journal* 1950).

In these circumstances it seems remarkable that little use has been made of the abundant supply of Rh antisera active on red cells suspended in albumin solution. These antisera containing "blocking" or "incomplete" antibodies can be obtained from a high proportion of mothers sensitised by a Rh-positive fœtus.

When we started the routine Rh typing of hospital patients in Wolverhampton in October, 1948, we tried, for reasons of economy, the Chown (1944) capillary-tube technique. This method was tried for four to six months, but our results were not sufficiently accurate to warrant its continuance. Several false-positive results were produced by clotting of the cell suspension in the capillary tube; this usually occurred with blood freshly taken from patients with postpartum hæmorrhage or some similar acute hæmorrhagic emergency. False-negative results were encountered and caused us considerable inconvenience by creating an unnecessary demand for the interim use of Rh-negative blood until the patient's Rh type had been corrected by the Regional Blood Transfusion Laboratory. In America the risk of inaccurate results with this method appears to be recognised, and DeGowin et al. (1949) say that it should be used only by experienced workers.

Since we could not obtain enough saline-active antisera (S.A.A.) for typing all hospital patients before transfusion we started using albumin-active antisera (A.A.A.) obtained locally from mothers who had recently given birth to infants with hæmolytic disease. In a year we have collected seven suitable sera. For our purposes it was sufficient to withdraw 30–40 ml. from each mother, but much large quantities could have been obtained. Most of our sera are of a fairly high titre, but one with a titre no greater than 1 : 4 against homozygous Rh-positive cells gives very satisfactory results.

METHODS

The blood is obtained within two or three weeks of parturition. It is withdrawn by venepuncture into a clean dry sterile test-tube, allowed to clot at room-temperature, and then placed in the cold room at 4°C for three or four days until the clot has fully retracted. The separated serum is next pipetted off and stored in small test-tubes in the freezing cabinet at −10°C. These conditions of storage are imperative for preserving the potency of anti-Rh sera. If the serum is stored at 4°C in the blood-bank, deterioration quickly sets in, and contamination with organisms surviving at this temperature may lead to panagglutination.

Serum for day-to-day use is withdrawn in 2–3 ml. amounts from the stock tubes as required. In doing this it is important to thaw the frozen serum at a temperature not exceeding 37°C and to mix it well before withdrawal, because anti-Rh antibodies tend to be more concentrated in the lower layers of frozen serum (Keynes et al. 1949a).

The tests are performed in duplicate for each patient with different sera. Since anti-A and anti-B agglutinins are not absorbed from the typing sera, due regard must be paid to compatibility of the patient's ABO group and that of the test sera selected. Antisera of group A can usually be used against both group-A and group-O cells, and those belonging to group AB can be used against all unknown cells.

The Test

Pipette one drop of the recipient cells from clotted blood and without freeing them from their serum, suspend the cells in 20% commercial bovine albumin to form an approximately 2% solution. To a small drop of this suspension, freed from fragments of clot, in a round-bottomed precipitin tube add an equal volume of antiserum. Incubate the suspension for an hour in a water-bath at 37°C, transfer it to a slide without a coverslip and read the result microscopically.

The results are expressed, according to the terms adopted by Mollison et al. (1948), from — to *w* (weak), +, ++, +++, and ++++ degrees of agglutination. Most of our readings fell into the categories ++ and +++, so there was little risk of confusion with rouleaux formation.

In an emergency rapid results can be obtained by using one of the higher titre sera. The same technique is used, but incubation is continued for only fifteen inutes, after which the tube is centrifuged slowly for minute before the result is read.

RESULTS

In our experience the risk of false-positive results due o rouleaux formation with albumin-suspended cells has een overrated. We have not encountered trouble rom this factor. When rouleaux are formed they can isually be dispersed by adding an approximately equal olume of saline to the sample of suspension during xamination on the microscope slide.

Of 206 hospital patients Rh tested during the past ourteen months, 29 (14%) gave Rh-negative results with our A.A.A. The different sera gave a surprisingly good conformity of results. In no single instance did cells give a positive agglutination with one serum and frank negative results with another.

From published results (Mollison et al. 1948, Keynes et al. 1949b) the incidence of Rh-negative (cde-cde) persons in the English population appears to lie between 14·78% and 15·10%, giving an average of 14·94%, which is in accordance with our findings with A.A.A. and confirmed the reliability of the method.

DISCUSSION

It is generally accepted that A.A.A. are in the great majority of cases only anti-D specific. It is comparatively rare to find anti-C, anti-E, and anti-c antibodies of this type. On the other hand, S.A.A. against the latter genes, especially anti-C, are not uncommon in association with an incomplete anti-D.

From the practical aspect of the typing of patients about to receive transfusions it is generally considered necessary to examine only for gene D in the recipient's cells. The other genes, C, E, c, d, e, are far less antigenic and very unlikely to cause sensitisation.

It thus seems that A.A.A. are very suitable on theoretical as well as practical grounds for typing patients about to be transfused. An additional advantage is that A.A.A. are more stable as regards heat and storage than S.A.A. (Keynes et al. 1949c).

The possibility that some of our antisera might contain anomalous agglutinins, giving false-positive reactions, is greatly minimised, if not entirely removed, by using two different sera for each test.

SUMMARY AND CONCLUSIONS

With albumin-active antisera (A.A.A.), obtained locally from mothers recently delivered of infants with hæmolytic disease, 206 patients were Rh typed before receiving blood-transfusions.

Sera of this type are abundantly obtainable from natural sources and much greater use should be made of them for the pre-transfusion typing of hospital patients before attempting to produce antisera artificially.

The tube-incubation technique described is rapid and gives results in fifteen minutes. It can readily be mastered by senior members of the staff of hospital pathological laboratories and is more reliable than the Chown capillary-tube technique. The interpretation of results presents no difficulty.

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MYOMATA OF THE VERMIFORM APPENDIX

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A tumour originating from unstriated muscle-fibres, the uterine fibroid, is probably the commonest of all tumours in human beings (Whitehouse 1939). In the gastro-intestinal tract, however, tumours of smooth muscle are distinctly uncommon. They may be benign (myomata) or malignant (myosarcomata), and may be composed of unstriped muscle-fibres only (leiomyomata or leiomyosarcomata) or contain a varying proportion of fibrous tissue (leiomyofibromata or leiomyofibrosarcomata).

Myomata of the digestive tract occur most frequently in the stomach (Golden and Stout 1941) and perhaps least frequently in the vermiform appendix. Of the 67 tumours collected by Norment (1932) from 45,000 appendices (0·15%), the 6 tumours found by Shelley (1937) in 2065 consecutive appendicectomies (0·29%), and the 72 tumours reported by Porter and Whelan (1939) among 26,384 appendices (0·28%), not one contained or originated from unstriated muscle-fibres. In these series the mean incidence of tumours of the vermiform appendix of all kinds is only 0·19%, which is considerably less than the usually given incidence of 0·5% (Burton 1947). Stickney (1915) collected 667 reported cases of tumours of the vermiform appendix other than myomata: up to that date 11 myomata had been reported, this being an incidence of 1·62% of all tumours of the vermiform appendix. On this basis the incidence of benign myomata of the vermiform appendix can be estimated at 0·0024% (or approximately 1 in 50,000) of all appendicectomies.

Including the case reported here, only 4 benign leiomyomata have been recorded (table I); in addition, 15 benign leiomyofibromata have also been reported in medical journals (table II). For the sake of completeness, it may be noted that of the 21 reported cases of primary sarcoma of the vermiform appendix, 4 appeared to have originated from or to contain unstriated muscle-fibres (table III).

CASE-REPORT

A housewife, aged 40, was admitted on Jan. 10, 1949, complaining of acute abdominal pain and vomiting for two days. Apart from a laparotomy for, and drainage of, "an abscess of the womb" during the puerperium of her one and only pregnancy 20 years ago, she had not had any illness of note.

Examination.—Some rigidity of the lower abdomen, with guarding in the right iliac fossa, more pronounced than in the left iliac fossa. Pain, most severe just to the right of an ugly, depressed, adherent, left lower paramedian scar. Release tenderness well marked on both sides of the lower end of the scar, where an indefinite small and slightly tender mass could be felt on bimanual examination. Tenderness on the right side on rectal examination.

Operation.—Under general anæsthesia, the adherent left lower paramedian scar was excised, and the peritoneal cavity entered to the left of the midline. The greater omentum was found to be firmly adherent to the lower end of the scar, to the uterus, and by many fine adhesions to the cæcum and colon generally. The adhesions between the omentum and uterus and the colon and omentum were separated in order to obtain access to the pelvis and to the small intestine, but the part of omentum adherent to the anterior abdominal wall at the lower end of the incision was left undisturbed. The right ovary and fallopian tube were normal; the left ovary was rather scarred and adherent to the left cornu of the uterus, but was not removed or in any way interfered with. No obstructed or strangulated bowel was found. A retrocæcal

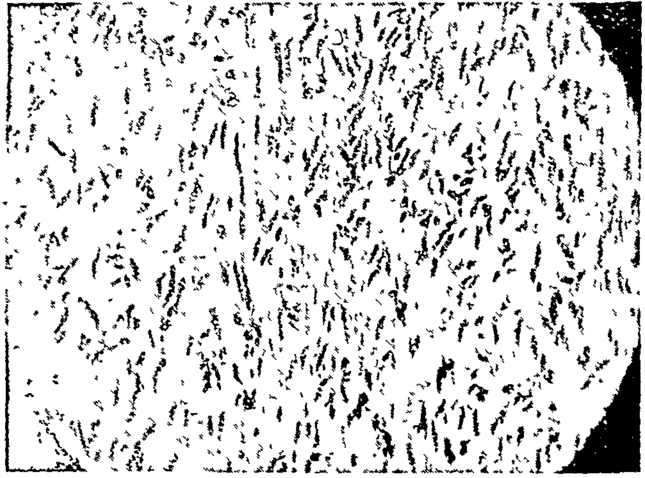

Fig. 1—The leiomyoma, showing spindle-shaped cells forming interlacing bundles. (× 160.)

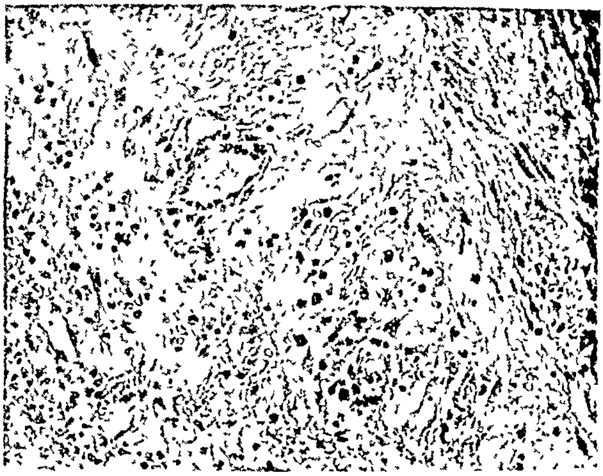

Fig. 2—Edge of the leiomyoma, showing the rough attempt at encapsulation, and also granulation tissue and acute inflammatory cells (× 160.)

vermiform appendix, firmly bound to the cæcum by strong adhesions, was seen to be covered by an abundant fibrinous exudate of apparently recent origin. It also had an expanded and bulbous tip. A retrograde appendicectomy was carried out, a small pocket of pus just proximal to the bulbous tip being discovered and carefully evacuated by means of the sucker. Penicillin-sulphathiazole powder (5 g.) was left behind the cæcum. A large hole in the great omentum was closed with catgut to prevent future mishaps, and the abdominal incision was closed in layers without drainage.

The patient was discharged on Jan. 21, and when seen one month later was very well.

Specimen.—The appendix had a very narrow lumen, completely filled in its distal quarter by a yellowish tumour, which was thought to be an example of the comparatively common carcinoid.

Pathological Report.—The appendix, 4 cm. long, has a small nodule 9 × 7 mm. at tip. Histologically this shows an overgrowth of spindle-shaped cells (exhibiting the staining reaction of smooth muscle with van Gieson's) with elongated nuclei, growing in interlacing bundles (fig. 1) and occasionally forming endothelial lined channels, some of which contain red blood-cells. There is a rough attempt at encapsulation. The adjacent portion of the appendix shows acute suppuration, with loss of lymphoid follicles and some granulation tissue (fig. 2). Mitoses are not common. *Diagnosis:* leiomyoma.

DISCUSSION

Of the 19 reported cases of benign leiomyoma or leiomyofibroma of the vermiform appendix only 1 (Oggioni 1934) was, or indeed could be, diagnosed before

TABLE I—LEIOMYOMATA

Case no.	Reported by	Year	Patient's Age	Patient's Sex	How found	Description of tumour: Number	Situation	Size
1	Moschcowitz	1908a	?	?	Operation	Single	?	?
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3	Lillie and Parcher	1927	40	M	Operation	Three	Submucous	Each 5 mm. diam.
4	Iovetz-Tereshchenko	1950	40	F	Operation	Single	Near tip of appendix	9 × 7 mm.

TABLE II—LEIOMYOFIBROMATA

Case no.	Reported by	Year	Patient's Age	Patient's Sex	How found	Description of tumour: Number	Situation	Size
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3	Steiner	1898	20	F	Autopsy	Single	Base	3 × 2·5 cm.
4	Deaver	1899	?	F	Operation	Two, one partly calcified	Calcified one at tip; other in mid-appendix	Each about 5 cm. diam.
5	Kelly	1900a, b	?	?	Operation	Single	?	?
6	Hayem *	1905	?	?	?	?	?	?
7	Moschcowitz and Moschcowitz	1907	?	?	Operation	Single	?	"Bean"
8	Moschcowitz and Moschcowitz	1907	?	?	Operation	Single	?	"Bean"
9	Corner	1909	23	M	Operation	Single	Tip	?
10	Redway	1917	36	F	Operation	Single	Tip	?
11	Redway	1917	40	F	Operation	Single	Tip	?
12	Podestá and Pividal	1923	?	F	Operation	Single	Subserous	"Hazel-nut"
13	Leorat	1924	39	M	Operation	Single	Tip	"Cherry"
14	Koontz	1929	26	F	Operation	Single	Tip	?
15	Oggioni	1934	41	M	Palpable mass. Radiography suggested tumour of cæcum or appendix	Single	Diffuse	4 × 2·5 cm.

TABLE III—LEIOMYOSARCOMATA

Case no.	Reported by	Year	Patient's Age	Patient's Sex	How found	Description of tumour: Number	Situation	Size
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3	Jones	1910	26	F	Operation	Single	Midway between base and tip	"Walnut"
4	Chaiacho	1934	66	M	Operation	Single	Distal end	?

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* Mentioned by Kelly and Hurdon (1909); all efforts to trace the original report failed; the only article on the appendix by Hayem (1897) contains no reference to any tumours.

operation or autopsy, and in only 2 cases was the tumour palpable per abdomen (in 1 it was in a hernial sac). The sex is stated in only 14 cases (9 females and 5 males), but in at least 3 of the others it was almost certainly female. (A difference in sex-incidence might be explained by the fact that more abdominal operations are performed on women than on men, and consequently the female appendix is more frequently removed.) The youngest patient was aged 20, and the oldest 56.

In 14 of the cases only one tumour was present in the appendix; in 4 cases there was more than one tumour (the largest number in a single specimen being five); and in 1 case no details were given. The smallest tumour was less than 3·5 mm. in diameter; the largest was pear-shaped and measured 9 × 6 cm. One tumour showed calcification similar to that seen in uterine fibroids.

It is possible to consider the smaller of these myomata not as true tumours, but as areas of local hypertrophy of the muscular coats of the appendix (Dr. Bernard Lennox, personal communication); but Maaløe (1908) stated that he had never seen hypertrophy of the appendicular musculature exceeding 2 mm. in thickness.

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3. In an account of a meeting of the Pathological Society of London, Kanthack and Lockwood (1895) are said to have demonstrated a case of "psammoma of the appendix and ovary." No further details being given, it has been assumed that this was a case similar to those reported by Child (1919).

4. *The first authentic case of a tumour* (histology unknown) of the vermiform appendix was reported by von Pommer Esche (1837) and *not* by Merling (1838) as is usually but incorrectly stated. Leichenstern (1876) mentions three cases of "carcinoma of the vermiform appendix," but it is not clear whether these were primary growths or secondary deposits. The first undoubted authentic case of a primary carcinoma of the appendix was reported by Beger (1882) and the first authentic undoubted case of a primary sarcoma of the vermiform appendix was reported by Glazebrook (1895). Gilford (1893) reported a case of "primary sarcoma of the vermiform appendix," but later (1925) he recognised that this had not been a true sarcoma, but was what he calls a "granuloma." Lafforgue (1893) was the first to report a myoma originating in a vermiform appendix.

5. So-called adenomyomata of the appendix are neither true myomata nor primary tumours of the vermiform appendix, and have not been considered here.

SUMMARY

The literature of tumours of the vermiform appendix, and more particularly of myomata (benign and malignant), is briefly reviewed.

The reported cases of leiomyomata, leiomyofibromata, and leiomyosarcomata of the appendix are tabulated, and a new case of leiomyoma is reported.

The findings in the 19 published cases of benign myomata are discussed.

I wish to thank Prof. Ian Aird for permission to publish this case, Dr. A. L. Wells for reporting on the specimen, Mr. E. V. Willmott for the photographs, and Mr. Fernand Perrin, Mr. G. F. Home, Mr. W. J. Bishop, Mr. A. L. Poynter, Mr. E. Cornelius, and Miss D. F. Atkins for their invaluable help in tracking down elusive articles and case-reports.

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FATAL POISONING WITH UDOLAC

(DIAMINODIPHENYLSULPHONE)

ROSEMARY DAVIES

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'UDOLAC,' manufactured by the Imperial Chemical Industries, is a paste containing $33^1/_3$ per cent. of diaminodiphenyl-sulphone; it is used in veterinary practice for the treatment of mastitis in cows. 4 : 4′ diaminodiphenylsulphone is allied clinically and pharmacologically to the sulphonamides. It is more active, but also considerably more toxic, than sulphanilamide (Buttle et al. 1937). In man it may cause methæmoglobinæmia, and its toxic action is due partly to this and partly to a direct toxic action on the brain (Francis 1949). The sulphones have been used in the treatment of leprosy (Rogers 1948), and toxic symptoms have not been encountered with blood levels of less than 2 mg. per 100 ml. Diaminodiphenylsulphone was at one time considered too toxic for use in man, but this is now known not to be the case (Lowe 1950). 'Sulphetrone' is a derivative of 4 : 4′ diaminodiphenylsulphone; it is less toxic because 90% or more is excreted in the fæces (Smith 1949).

The following is an account of the fatal symptoms which arose when a child swallowed about 15 g. of udolac (containing 5 g. of 4 : 4′ diaminodiphenylsulphone).

CASE-RECORD

A girl, aged 22 months, was admitted to hospital at about 9.30 P.M. on July 16, 1949, with a history that she had swallowed some udolac about three hours before. The child had apparently squeezed about half a tube of udolac into her mouth and on to her cheeks and clothes, but her parents

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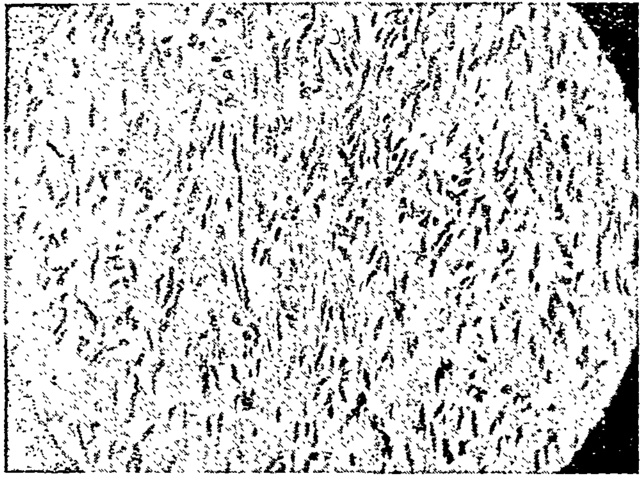

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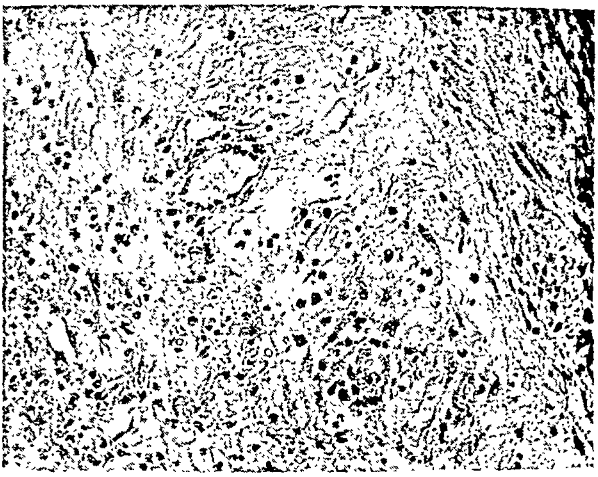

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The following is an account of the fatal symptoms which arose when a child swallowed about 15 g. of udolac (containing 5 g. of 4 : 4′ diaminodiphenylsulphone).

CASE-RECORD

A girl, aged 22 months, was admitted to hospital at about 9.30 P.M. on July 16, 1949, with a history that she had swallowed some udolac about three hours before. The child had apparently squeezed about half a tube of udolac into her mouth and on to her cheeks and clothes, but her parents

MR. IOVETZ-TERESHCHENKO : REFERENCES

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had not realised that she might have swallowed any of it until she became blue and vomited about two and a half hours later. It was estimated that she had swallowed about 5 g. of 4 : 4′ diaminodiphenylsulphone.

On admission she was deeply cyanosed, very restless, and barely conscious.

Treatment and Progress.—She was immediately given a stomach washout, after which she vomited copiously several times—the later vomit contained blood. An intravenous drip transfusion was started in the early hours of July 17, and during that day she was given intravenously 3 pints of 5% glucose in half-strength physiological saline solution. By the evening she was taking fluids well by mouth and the transfusion was stopped. She was very restless, and neither intramuscular phenobarbitone nor intramuscular paraldehyde had any appreciable effect on this. Though placed in an oxygen tent she remained cyanosed, and an abnormal pigment, with a spectrum similar to that of reduced hæmoglobin, was found in the blood. There was no spectroscopic evidence of methæmoglobinæmia. It was thought possible that absorption of the drug from the intestine was continuing; so she was given an enema on July 17 and another on the following day. On July 18 her condition was virtually unchanged, and though she drank fluids readily she took no notice of her surroundings and was still bluish-grey. Her restlessness had lessened, but she had several attacks during which she held her limbs stiffly extended for a minute or two. In the late evening she became unconscious, and crepitations were audible at both lung bases. Her respirations became shallow and irregular, and she died at 4.30 A.M. on July 19, fifty-five hours after swallowing the udolac.

Throughout her illness she passed urine freely, and this contained a trace of albumin and a few red and white cells. Spectroscopy of her urine revealed no abnormal pigment. Her hæmoglobin level remained about 70% and her blood-urea level was 82 mg. per 100 ml. on July 18. The concentration of sulphone in her blood forty-two hours after the udolac had been swallowed was 15 mg. per 100 ml., and in her cerebrospinal fluid 3·3 mg. per 100 ml. Death seemed to be due either to anoxæmia of the anæmic type or to a direct toxic effect of the drug on the vital medullary centres.

Necropsy Findings.—The *brain* was suffused, the cortex especially being greyish pink. On the floor of the left lateral ventricle was an ecchymotic area 1 cm. across, and there were smaller hæmorrhages in the occipital lobes. The cerebellum was hyperæmic, and the brain-stem was slightly congested. Microscopically there were many recent thrombi in the venules of the subcortical white matter. The Virchow-Robin spaces were moderately distended.

The *heart* was externally normal, but the valves were orange in colour, and the papillary muscle of the mitral valve had small ecchymoses upon it. There was œdema of both *lung* bases.

The *gastric mucosa* was smooth, and in the cardia and fundus there were numerous petechiæ. The bowel was collapsed in places. The *liver* was soft, friable, and yellowish brown. The liver cells showed pronounced fatty changes. There were no definite pathological findings in the portal veins, but several central and sublobular veins contained recent thrombi. The *spleen* was small and firm. The malpighian follicles were normal in size, and some showed large germinal centres containing areas of necrosis.

Both *kidneys* were soft, œdematous, and, on a cut section, terra-cotta in colour. The corticomedullary junctions were hyperæmic and the cortex relatively ischæmic. The medullæ were purple and the pyramids prominent. Microscopically the glomeruli showed swelling of the capillary endothelium, and many contained little or no blood. Some loops of the tuft were filled with a shapeless mass of clumped erythrocytes which appeared yellowish red in hæmatoxylin-eosin preparations. Here and there were tiny areas of necrosis, with nuclear débris in the glomeruli, and some amorphous material or a few erythrocytes were sometimes seen in the space of Bowman's capsule. The first convoluted tubules showed swelling and granular and hydropic degeneration of the epithelium. In the loops of Henle the epithelium was disintegrated. The second convoluted tubules, the collecting tubules, and the ducts of Bellini were normal, but some contained red cells.

Post-mortem sulphone concentrations were: blood, 13·5 mg., and urine, 40 mg. per 100 ml.; liver, 16·5 mg., and brain, 9 mg. per 100 g.

DISCUSSION

The main toxic action of udolac in this case seemed to be on the central nervous system, and treatment was therefore confined to eliminating the drug from the body and to combating the anoxæmia and restlessness. The sulphones are excreted in the urine, and this excretion may be increased by giving large quantities of fluid by mouth or intravenously to augment the output of urine. It is impossible to say how much of the restlessness was due to a direct toxic action of the drug on the central nervous system, and how much to anoxia caused by the formation of an abnormal compound of hæmoglobin. The intravenous administration of methylene-blue leads to the disappearance of cyanosis in methæmoglobinæmia (Walliker and Baxter 1949), but in the present case the abnormal pigment was not identified as methæmoglobin. Should the symptoms have been anoxæmic in origin, some relief might have been afforded by increasing the oxygen-carrying capacity of the blood by the transfusion of some fresh blood or perhaps by a replacement transfusion. The technical difficulties of transfusing an extremely restless child are, however, great; and, since the blood-sulphone level was considerably above that known to be toxic, it is doubtful whether such treatment would have been successful.

It is of interest to note that sheep develop nervous symptoms when given sufficiently large doses of sulphone, and Mr. John Francis informs me that no toxic effects were observed in animals receiving 0·1 g. per kg. of body-weight, but of four sheep receiving 0·2 g. per kg. two died and one of the others showed severe toxic symptoms. The toxic action seemed to be exerted on the central nervous system—there was a preliminary period of excitement followed by ataxia, and, in the sheep which recovered after showing these severe toxic symptoms, the symptoms were most acute seven hours after the sulphone had been given, at a time when the blood-sulphone level was 4 mg. per 100 ml.

I wish to thank Prof. J. M. Smellie and Dr. A. I. Cheyne for their help and advice, and Dr. Baar and Dr. Ian Mackenzie for the pathological reports.

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ACTIVE SPLINTING FOR RADIAL-NERVE PALSY

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THE loss of normal muscle tone and active movement in the extensors of the wrist and fingers as a result of peripheral nerve injury is a severe handicap. The object of the splint described here is to restore conditions to as near normal as possible during the period of regeneration after such an injury.

RATIONALE

If the right hand is affected, or the left hand in left-handed people, the patient's whole life is altered. Even when there is no movement the hand feels awkward. The cortical sensory pattern received from muscle, tendon, and joint sense is strange and unbalanced. Attempted movements are uncoordinated, and it is impossible to stabilise the wrist. If this state persists for a considerable time the joints become stiff, the ligaments contract, and the unopposed antagonists

become shorter. As a result of disuse the patient tends to forget how to use the hand. There is a feeling of frustration, more especially if the patient is a highly skilled technician. Rigid splinting produces a rigid hand, which in addition becomes atrophied. The hand needs movement if it is to regain normal function.

The type of active splint described here was designed to hold the hand in the position of function with a normal balance of tone reproduced by elastic. The importance of this becomes obvious when, after minor adjustments in the angle of pull and tension, the patient says " It feels right," " I don't realise there is anything wrong with my hand." When this happens, something approaching the normal sensory cortical pattern has been restored, and a striking change will then be noted in the patient's willingness to use the hand.

It is physiological that the hand should be kept in use —normal use so far as possible—until the nerve has recovered (where this is the expected result from treatment). The nutrition of the whole forearm and hand then remains almost normal. The skin is very different in appearance, temperature, and texture from that of a hand which has been held in a rigid splint. The venous and lymphatic return is maintained, and the denervated muscles are exercised by active splinting and daily interrupted galvanism. The degree of muscle wasting is much reduced by this treatment.

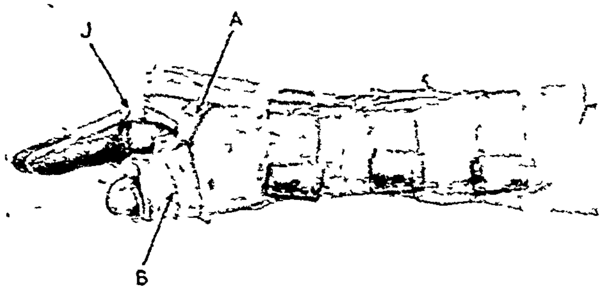

Fig. 1—Splint with wrist in dorsiflexion and fingers extended at metacarpophalangeal joints.

THE SPLINT

The splint is made of ' Perspex ' moulded from a plaster cast taken with the arm and hand in the position of function. In most cases this is the writing position, in which the heads of the metacarpal bones form a conspicuous arch, the wrist is dorsiflexed, and the forearm is partly pronated. In the case illustrated the patient's skin sensation was impaired and it was decided to allow room for padding with elephant felt, but with normal skin the perspex can be applied direct, which is more convenient since the whole splint can be washed.

Extension of the wrist is maintained by a strip of elastic $1^{1}/_{2}$ in. wide padded with felt $^{1}/_{4}$ in. thick passing round the splint and across the distal part of the palm (fig. 1A). This allows a small range of flexion against resistance, which is useful in writing.

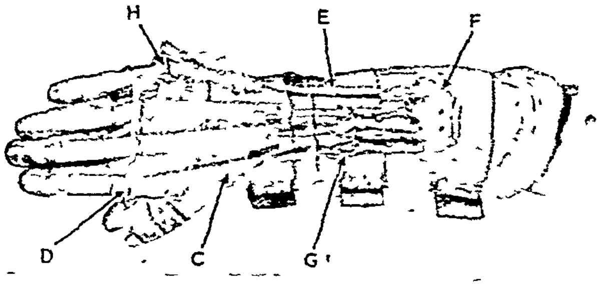

Fig. 2—Splint showing tendons, slots, extended thumb, and elastic with adjustable toggles.

Extension of the thumb is maintained by a similar piece of elastic (fig. 1B). The perspex behind the thumb holds it in full extension at right angles to the palm. This allows flexion against resistance and a limited range of adduction and abduction.

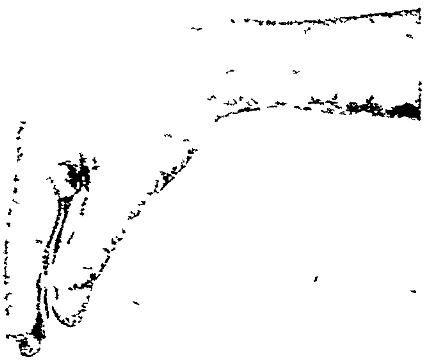

Fig. 3—Unsupported hand and wrist.

Extension of the metacarpophalangeal joints is produced by plastic "tendons" $^{1}/_{2}$ in. wide (fig. 2C) which pass through oblique slots (fig. 2D) in the perspex. These are attached to elastic $^{1}/_{4}$ in. wide (fig. 2E) which passes through a slot in a bridge (fig. 2F) placed in line with the lateral epicondyle.

Small toggles (fig. 2G) attached to the elastic allow the tension to be varied easily. When the hand is not in use, it becomes less readily tired if the tension is reduced.

The angle and position of the slots through which the tendons pass are important. With the fingers out straight the slot for the plastic "tendon" of the fifth finger must be close to the head of the fifth metacarpal but medial to it. Each slot should slope in a plane at right angles to a line passing through the corresponding metacarpal head and the radial styloid process. If this is not done the tendons pull obliquely and cut into the fingers. The distal ends of the tendons are fastened into the fingers of a thin glove, the position of pull being from near the head of the proximal phalanx (fig. 1J). The pull should not be taken from the tip of the terminal phalanx, which is unstable and easily overextended.

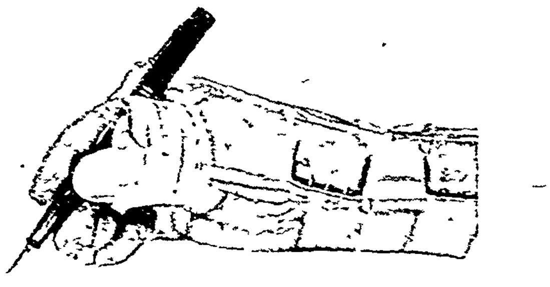

Fig. 4—Splinted hand in writing position, showing ample movement possible with thumb.

The splint is secured by three webbing straps with the buckles resting on the perspex. The tendency of the splint to ride forward is prevented by dorsiflexion of the wrist and careful moulding round the wrist. A large hole or depression should be made in the splint for the head of the ulna, to relieve pressure.

RESULTS

In the case illustrated the patient had had a useless hand (fig. 3) for two months. The radial-nerve palsy was the result of a pathological fracture of the humerus. Three days after the splint was applied he was back at work and signed over 300 documents on his first day (fig. 4). The psychological effect of this was great. The patient has time off from work for daily treatment to

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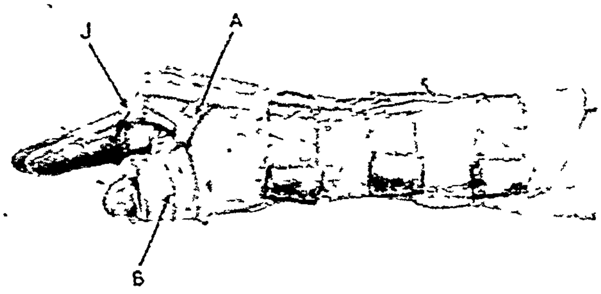

Fig. 1—Splint with wrist in dorsiflexion and fingers extended at metacarpophalangeal joints.

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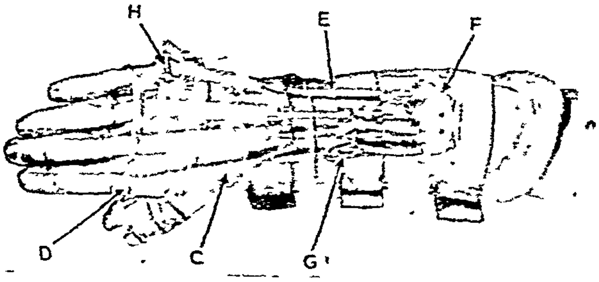

Fig. 2—Splint showing tendons, slots, extended thumb, and elastic with adjustable toggles.

Extension of the thumb is maintained by a similar piece of elastic *(fig. 1B). The* perspex behind the thumb holds it in full extension at right angles to the palm. This allows flexion against resistance and a limited range of adduction and abduction.

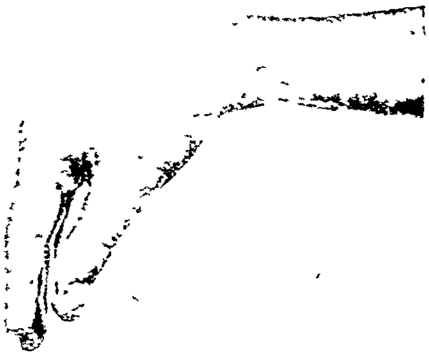

Fig. 3—Unsupported hand and wrist.

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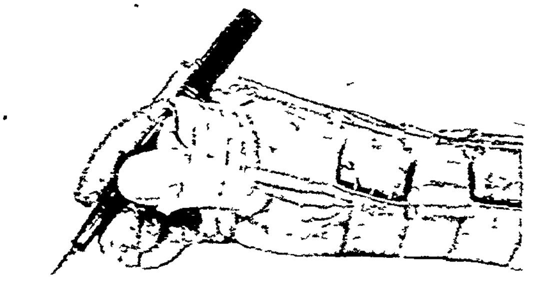

Fig. 4—Splinted hand in writing position, showing ample movement possible with thumb.

The splint is secured by three webbing straps with the buckles resting on the perspex. The tendency of the splint to ride forward is prevented by dorsiflexion of the wrist and careful moulding round the wrist. A large hole or depression should be made in the splint for the head of the ulna, to relieve pressure.

RESULTS

In the case illustrated the patient had had a useless hand (fig. 3) for two months. The radial-nerve palsy was the result of a pathological fracture of the humerus. Three days after the splint was applied he was back at work and signed over 300 documents on his first day (fig. 4). The *psychological effect* of this was great. The patient has time off from work for daily treatment to

had not realised that she might have swallowed any of it until she became blue and vomited about two and a half hours later. It was estimated that she had swallowed about 5 g. of 4 : 4′ diaminodiphenylsulphone.

On admission she was deeply cyanosed, very restless, and barely conscious.

Treatment and Progress.—She was immediately given a stomach washout, after which she vomited copiously several times—the later vomit contained blood. An intravenous drip transfusion was started in the early hours of July 17, and during that day she was given intravenously 3 pints of 5% glucose in half-strength physiological saline solution. By the evening she was taking fluids well by mouth and the transfusion was stopped. She was very restless, and neither intramuscular phenobarbitone nor intramuscular paraldehyde had any appreciable effect on this. Though placed in an oxygen tent she remained cyanosed, and an abnormal pigment, with a spectrum similar to that of reduced hæmoglobin, was found in the blood. There was no spectroscopic evidence of methæmoglobinæmia. It was thought possible that absorption of the drug from the intestine was continuing; so she was given an enema on July 17 and another on the following day. On July 18 her condition was virtually unchanged, and though she drank fluids readily she took no notice of her surroundings and was still bluish-grey. Her restlessness had lessened, but she had several attacks during which she held her limbs stiffly extended for a minute or two. In the late evening she became unconscious, and crepitations were audible at both lung bases. Her respirations became shallow and irregular, and she died at 4.30 A.M. on July 19, fifty-five hours after swallowing the udolac.

Throughout her illness she passed urine freely, and this contained a trace of albumin and a few red and white cells. Spectroscopy of her urine revealed no abnormal pigment. Her hæmoglobin level remained about 70% and her blood-urea level was 82 mg. per 100 ml. on July 18. The concentration of sulphone in her blood forty-two hours after the udolac had been swallowed was 15 mg. per 100 ml., and in her cerebrospinal fluid 3·3 mg. per 100 ml. Death seemed to be due either to anoxæmia of the anæmic type or to a direct toxic effect of the drug on the vital medullary centres.

Necropsy Findings.—The *brain* was suffused, the cortex especially being greyish pink. On the floor of the left lateral ventricle was an ecchymotic area 1 cm. across, and there were smaller hæmorrhages in the occipital lobes. The cerebellum was hyperæmic, and the brain-stem was slightly congested. Microscopically there were many recent thrombi in the venules of the subcortical white matter. The Virchow-Robin spaces were moderately distended.

The *heart* was externally normal, but the valves were orange in colour, and the papillary muscle of the mitral valve had small ecchymoses upon it. There was œdema of both *lung* bases.

The *gastric mucosa* was smooth, and in the cardia and fundus there were numerous petechiæ. The bowel was collapsed in places. The *liver* was soft, friable, and yellowish brown. The liver cells showed pronounced fatty changes. There were no definite pathological findings in the portal veins, but several central and sublobular veins contained recent thrombi. The *spleen* was small and firm. The malpighian follicles were normal in size, and some showed large germinal centres containing areas of necrosis.

Both *kidneys* were soft, œdematous, and, on a cut section, terra-cotta in colour. The corticomedullary junctions were hyperæmic and the cortex relatively ischæmic. The medullæ were purple and the pyramids prominent. Microscopically the glomeruli showed swelling of the capillary endothelium, and many contained little or no blood. Some loops of the tuft were filled with a shapeless mass of clumped erythrocytes which appeared yellowish red in hæmatoxylin-eosin preparations. Here and there were tiny areas of necrosis, with nuclear débris in the glomeruli, and some amorphous material or a few erythrocytes were sometimes seen in the space of Bowman's capsule. The first convoluted tubules showed swelling and granular and hydropic degeneration of the epithelium. In the loops of Henle the epithelium was disintegrated. The second convoluted tubules, the collecting tubules, and the ducts of Bellini were normal, but some contained red cells.

Post-mortem sulphone concentrations were: blood, 13·5 mg., and urine, 40 mg. per 100 ml.; liver, 16·5 mg., and brain, 9 mg. per 100 g.

DISCUSSION

The main toxic action of udolac in this case seemed to be on the central nervous system, and treatment was therefore confined to eliminating the drug from the body and to combating the anoxæmia and restlessness. The sulphones are excreted in the urine, and this excretion may be increased by giving large quantities of fluid by mouth or intravenously to augment the output of urine. It is impossible to say how much of the restlessness was due to a direct toxic action of the drug on the central nervous system, and how much to anoxia caused by the formation of an abnormal compound of hæmoglobin. The intravenous administration of methylene-blue leads to the disappearance of cyanosis in methæmoglobinæmia (Walliker and Baxter 1949), but in the present case the abnormal pigment was not identified as methæmoglobin. Should the symptoms have been anoxæmic in origin, some relief might have been afforded by increasing the oxygen-carrying capacity of the blood by the transfusion of some fresh blood or perhaps by a replacement transfusion. The technical difficulties of transfusing an extremely restless child are, however, great; and, since the blood-sulphone level was considerably above that known to be toxic, it is doubtful whether such treatment would have been successful.

It is of interest to note that sheep develop nervous symptoms when given sufficiently large doses of sulphone, and Mr. John Francis informs me that no toxic effects were observed in animals receiving 0·1 g. per kg. of body-weight, but of four sheep receiving 0·2 g. per kg. two died and one of the others showed severe toxic symptoms. The toxic action seemed to be exerted on the central nervous system—there was a preliminary period of excitement followed by ataxia, and, in the sheep which recovered after showing these severe toxic symptoms, the symptoms were most acute seven hours after the sulphone had been given, at a time when the blood-sulphone level was 4 mg. per 100 ml.

I wish to thank Prof. J. M. Smellie and Dr. A. I. Cheyne for their help and advice, and Dr. Baar and Dr. Ian Mackenzie for the pathological reports.

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ACTIVE SPLINTING FOR RADIAL-NERVE PALSY

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THE loss of normal muscle tone and active movement in the extensors of the wrist and fingers as a result of peripheral nerve injury is a severe handicap. The object of the splint described here is to restore conditions to as near normal as possible during the period of regeneration after such an injury.

RATIONALE

If the right hand is affected, or the left hand in left-handed people, the patient's whole life is altered. Even when there is no movement the hand feels awkward. The cortical sensory pattern received from muscle, tendon, and joint sense is strange and unbalanced. Attempted movements are uncoördinated, and it is impossible to stabilise the wrist. If this state persists for a considerable time the joints become stiff, the ligaments contract, and the unopposed antagonists

become shorter. As a result of disuse the patient tends to forget how to use the hand. There is a feeling of frustration, more especially if the patient is a highly skilled technician. Rigid splinting produces a rigid hand, which in addition becomes atrophied. The hand needs movement if it is to regain normal function.

The type of active splint described here was designed to hold the hand in the position of function with a normal balance of tone reproduced by elastic. The importance of this becomes obvious when, after minor adjustments in the angle of pull and tension, the patient says "It feels right," "I don't realise there is anything wrong with my hand." When this happens, something approaching the normal sensory cortical pattern has been restored, and a striking change will then be noted in the patient's willingness to use the hand.

It is physiological that the hand should be kept in use —normal use so far as possible—until the nerve has recovered (where this is the expected result from treatment). The nutrition of the whole forearm and hand then remains almost normal. The skin is very different in appearance, temperature, and texture from that of a hand which has been held in a rigid splint. The venous and lymphatic return is maintained, and the denervated muscles are exercised by active splinting and daily interrupted galvanism. The degree of muscle wasting is much reduced by this treatment.

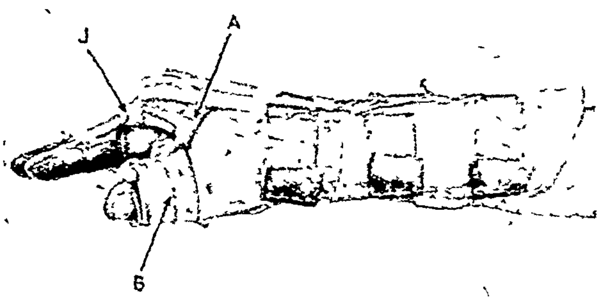

Fig. 1—Splint with wrist in dorsiflexion and fingers extended at metacarpophalangeal joints.

THE SPLINT

The splint is made of 'Perspex' moulded from a plaster cast taken with the arm and hand in the position of function. In most cases this is the writing position, in which the heads of the metacarpal bones form a conspicuous arch, the wrist is dorsiflexed, and the forearm is partly pronated. In the case illustrated the patient's skin sensation was impaired and it was decided to allow room for padding with elephant felt, but with normal skin the perspex can be applied direct, which is more convenient since the whole splint can be washed.

Extension of the wrist is maintained by a strip of elastic 1$^1/_2$ in. wide padded with felt $^1/_4$ in. thick passing round the splint and across the distal part of the palm (fig. 1A). This allows a small range of flexion against resistance, which is useful in writing.

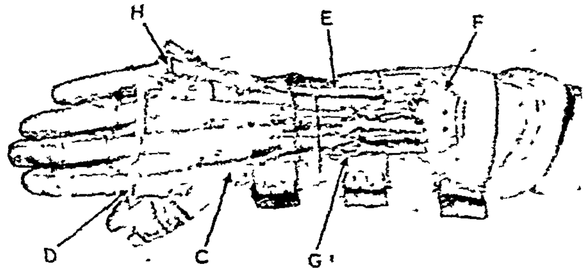

Fig. 2—Splint showing tendons, slots, extended thumb, and elastic with adjustable toggles.

Extension of the thumb is maintained by a similar piece of elastic (fig. 1B). The perspex behind the thumb holds it in full extension at right angles to the palm. This allows flexion against resistance and a limited range of adduction and abduction.

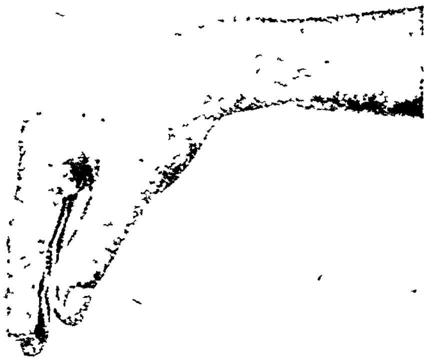

Fig. 3—Unsupported hand and wrist.

Extension of the metacarpophalangeal joints is produced by plastic "tendons" $^1/_2$ in. wide (fig. 2C) which pass through oblique slots (fig. 2D) in the perspex. These are attached to elastic $^1/_4$ in. wide (fig. 2E) which passes through a slot in a bridge (fig. 2F) placed in line with the lateral epicondyle.

Small toggles (fig. 2G) attached to the elastic allow the tension to be varied easily. When the hand is not in use, it becomes less readily tired if the tension is reduced.

The angle and position of the slots through which the tendons pass are important. With the fingers out straight the slot for the plastic "tendon" of the fifth finger must be close to the head of the fifth metacarpal but medial to it. Each slot should slope in a plane at right angles to a line passing through the corresponding metacarpal head and the radial styloid process. If this is not done the tendons pull obliquely and cut into the fingers. The distal ends of the tendons are fastened into the fingers of a thin glove, the position of pull being from near the head of the proximal phalanx (fig. 1J). The pull should not be taken from the tip of the terminal phalanx, which is unstable and easily overextended.

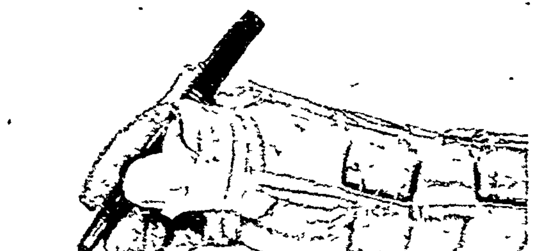

Fig. 4—Splinted hand in writing position, showing ample movement possible with thumb.

The splint is secured by three webbing straps with the buckles resting on the perspex. The tendency of the splint to ride forward is prevented by dorsiflexion of the wrist and careful moulding round the wrist. A large hole or depression should be made in the splint for the head of the ulna, to relieve pressure.

RESULTS

In the case illustrated the patient had had a useless hand (fig. 3) for two months. The radial-nerve palsy was the result of a pathological fracture of the humerus. Three days after the splint was applied he was back at work and signed over 300 documents on his first day (fig. 4). The psychological effect of this was great. The patient has time off from work for daily treatment to the paralysed muscles, which show complete reaction of degeneration, with fibrillation action potentials and no voluntary action potentials on electromyography.

CONCLUSION

As a principle the aim should be to produce normal or as near normal action as possible in a paralysed limb. The tendency to adapt a machine to fit a patient's disability usually produces abnormal and clumsy movement. Active splinting "feels right" and enables the patient to reproduce something very like the existing coördinated movements without a great effort of concentration.

I am indebted to Mr. H. J. B. Atkins, F.R.C.S., director of surgery, Guy's Hospital, for permission to photograph this patient, and to Prof. James Whillis, M.D., of Guy's Hospital Medical School, for advice on the anatomy of the hand.

LIVER CHOLINE-ESTERASE IN MALNOURISHED INFANTS

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A REDUCTION in total choline-esterase of the serum was found by McCance and his colleagues (1948) in undernourished Germans. It has also been known for some years that plasma or serum esterase is reduced in liver disease, particularly cirrhosis. Many recent papers have described the high incidence of liver disease in the tropics, in infants and children as well as in adults. There is strong evidence that this liver damage may, in part at least, be caused by malnutrition. A logical link between these two effects attributed to malnutrition—liver damage and a low serum-esterase level—would be a reduction in the esterase activity of the liver cell. Preliminary findings in malnourished African infants are in agreement with this expectation: a low esterase activity of the liver has been found, accompanied by histological evidence of early liver damage.

METHODS AND FINDINGS

In 20 infants admitted to the research ward at Fajara with malnutrition the average plasma-esterase concentration was 22·5 units (1 unit = the amount of enzyme liberating 1 c.mm. of CO_2 per ml. of plasma per minute). This is lower than in the lowest group described by McCance et al., in which the mean level was 29 units.

In 2 of these babies, both of whom had œdema with hypoproteinæmia, we have measured the esterase activity of the liver and studied its histology. Liver tissue was obtained by aspiration biopsy through the pleural sac by the method of Iversen and Roholm (1939). A first biopsy was done soon after admission, and a second four to five weeks later. In the interval the babies were fed on millet pap and cow's milk. Case 1, which was 2 years old, took an average of 37 oz. of milk a day. Case 2, which was 15 months old, was still being breast-fed, and in addition took 31 oz. of cow's milk daily.

Enzyme Activity

All enzyme measurements, both on liver and plasma, were made by the Cartesian diver microgasometric technique of Linderstrom-Lang and Holter (1943), with modifications described by Waterlow and Borrow (1949). Esterase was measured by the liberation of CO_2 from bicarbonate in divers filled with 5% CO_2 and 95% O_2. The substrate was 2·5% acetylcholine. About 2 mg. fresh weight of liver was weighed on a quartz-fibre balance and homogenised in 23 c.mm. of Ringer-bicarbonate solution; 1·5 c.mm. of homogenate was used for each estimation. The mean difference between duplicate measurements on the same homogenate was 5·5%. Cytochrome oxidase was measured with ascorbate as substrate at two levels of tissue concentration. Lactic-dehydrogenase activity was measured in case 2 by the oxygen-uptake in the presence of lactate, methylene-blue, cyanide, and cozymase. All the liver-biopsy findings are expressed as O_2-uptake or CO_2-output per mg. dry weight per hour.

The values found for liver esterase and for plasma protein and plasma esterase are shown in the accompanying table. In both babies the initial level of liver esterase was low, compared with 4 controls, but there was an increase of more than 100% after the period of feeding on a high milk diet. Case 2 was removed from hospital by its mother before recovery was complete, as judged both by clinical standards and by the figures for plasma and liver esterase.

In spite of the large sampling and other errors involved in these measurements, the increase in liver esterase activity between the initial and final biopsies is thought to be significant. Comparison with the results for the other enzyme systems shows that the low level on admission was not a non-specific effect, caused, for instance, by dilution with fat. The low cytochrome-oxidase activity in the first specimen of case 2 is of doubtful significance. The errors in this assay were relatively large, because the measurement had to be made at two different tissue concentrations. The fall in lactic-dehydrogenase activity has been confirmed in 2 other cases. It would seem that this enzyme is relatively stable under conditions of malnutrition.

Histology

The microscopical appearances of the samples of liver were substantially the same in the two babies. There was a small amount of fat in large droplets, irregularly distributed at the periphery of the lobules. The Kupffer cells and portal tracts contained heavy deposits of malarial pigment. In and round the portal tracts were cells resembling fibroblasts. Silver-impregnation showed an outgrowth of fine and moderately thick fibres from the edges of the tracts into the parenchyma, in places forming a network round small groups of liver cells.

LIVER-BIOPSY AND PLASMA FINDINGS IN 2 MALNOURISHED AFRICAN BABIES, ON ADMISSION AND AFTER FOUR TO FIVE WEEKS ON HIGH-MILK DIET

Subjects	In liver (c.mm./mg./hr.)			In plasma	
	Esterase (CO_2-output)	Cytochrome oxidase (O_2-uptake)	Lactic dehydrogenase (O_2-uptake)	Total protein (g. per 100 ml.)	Esterase (units)
Case 1					
Initial ..	4·0	18·1	—	4·45	11·7
Final ..	8·85	16·8	—	7·1	58·7
Case 2					
Initial ..	2·3	8·3	8·7	4·7	23·2
Final ..	5·85	12·8	5·1	6·95	44·7
Four controls					
Mean ..	8·8	14·3	5·4	—	—
Range ..	7·4–13·2	10·6–17·0	4·9–6·4	—	—

In case 2 only a small amount of tissue was obtained at the second biopsy, and none was set aside for histological examination. In case 1 the most striking change between the initial and final biopsies was the increase in size of the liver cells. In sections from the first biopsy 260 hepatic cell nuclei were counted in a standard area, compared with 192 in the second, which indicates a decrease of some 35% in the volume of the liver cells. This decrease is of the same order as the loss of labile cytoplasm demonstrated by Kosterlitz (1944) in protein-starved rats.

COMMENT

Miller (1948), Schultz (1949), and Williams and Elvehjem (1949) have found that in animals during starvation or feeding on a diet low in available amino-acids here is a selective loss of cathepsin and of xanthine oxidase from the liver. The results of the present study suggest that the so-called "pseudo"-choline-esterase should be added to this list. Since the liver cells are reduced in size, the reduction in enzyme concentration per cell is greater than appears from the figures based on dry weight. In case 1 the relative activity per cell can be roughly computed from the results of the nuclear counts given above. Such a calculation shows that between the initial and final biopsies the esterase activity per cell increased $3^1/_2$ times. This fall in the esterase activity of the cell in malnutrition is interesting, in view of the possibility (Lipmann 1946) that esterase may be concerned with the acetylation of amino-acids as a stage in the synthesis of protein.

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CLEANLINESS OF SURGEONS' APRONS

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IN most operating-theatres the surgeon and his assistants, having changed into freshly laundered theatre clothes, put on surgeons' aprons and work through the list.

The surgeon's apron has always reminded me of the frock-coat of the earlier surgeons—something rather dirty. When I anticipate a dry operation I have the apron taken off after scrubbing up. If I feel I am likely to need its protection I have the splashes on the apron from scrubbing up dried by a towel, because I feel that any organisms from the apron will be able to penetrate a wet operating-gown.

The method of cleaning aprons at the Radcliffe Infirmary was to take them to the sink-room after the surgeon had finished using them. The aprons were then washed by porters with soap and water, using a scrubbing-brush, and subsequently soaked in 2% lysol for a few minutes. They were then rinsed in water and hung out in the open to dry before being returned to the surgeons' room for further use.

To test the surgical cleanliness of the aprons, cultures were taken early one morning last summer from six aprons waiting to be used in the surgeons' room. The aprons were swabbed with a throat-swab moistened in sterile ampoules of distilled water, and making a Z-shaped wipe once over an area of about a square inch. There was a heavy growth from all the swabs. The variety of organisms cultured increased from the neck-band to the lower part of the apron:

Neck-band: *Staphylococcus aureus*.

Front upper part of apron: *Proteus*.

Middle lower part of apron: *Staph. aureus* and *Staph. albus*.

Bottom part of apron: *Staph. aureus*, *Staph. albus*, *Proteus*, and aerobic spore-bearers.

Inner surface of apron: micrococci.

From the boots were grown *Staph. aureus*, *Staph. albus*, and aerobic spore-bearers.

The matter was reported to the standing health and hygiene committee of the infirmary. On the advice of Dr. R. L. Vollum the length of time the aprons are soaked in 2% lysol was increased to an hour. Care is taken by the porters to see that the whole apron is covered by the lysol; otherwise the cleansing routine remains the same.

During the past three months, on about the first day of the month, six swabs have been taken from aprons waiting to be used. The only positive culture has been slight growth of *Staph. albus* from a waist-band on one occasion.

My thanks are due to Mr. Victor Pearse, F.R.C.S., for taking the swabs, and to Mr. R. L. Vollum, D.PHIL., for bacteriological advice and help.

Reviews of Books

Penicillin

Its Practical Application. (2nd ed.) Editor: Sir ALEXANDER FLEMING, F.R.C.P., F.R.C.S., F.R.S. London: Butterworth. 1950. Pp. 491. 30s.

THIS is the second edition of a book which has already proved its value. It is not a continuous textbook but a series of independent contributions made by many specialists, each showing how penicillin can best be used in the field of medicine on which he is an authority. During the three years since this book first appeared penicillin has become so plentiful as to be available for all needs, even trivial ones, and experience has been gained so that treatment has now become more standardised. In addition, commercial penicillin has become purer. For all practical purposes, penicillin of good quality is no longer toxic, and all the toxic effects recorded in man have been of a minor nature; on the other hand various allergic reactions to repeated injections have been described, chiefly urticaria and erythema-vesicular eruptions.

The first part of the book has general chapters about the chemistry, manufacture, pharmacology, and administration of penicillin. Then there are chapters on the application of penicillin to special sites and conditions, in which its uses in surgery are particularly well represented. Other chapters cover the use of penicillin in general practice, and also in dentistry and in veterinary practice. There is a chapter on streptomycin and brief notes on 'Chloromycetin' and 'Aureomycin.' Throughout, the book is written mainly for the practising doctor, whether in general practice or in one of the specialties. It is convenient in size and format; and well deserves recommendation.

Brucellosis (Undulant Fever)

Clinical and Subclinical. (2nd ed.) HAROLD J. HARRIS, M.D., F.A.C.P., with the assistance of BLANCHE L. STEVENSON, R.N. New York: Paul B. Hoeber. 1950. Pp. 617. $10.

ALL students of undulant fever will be grateful to Dr. H. J. Harris for the new edition of this valuable work. It includes information culled from 742 papers by almost as many authors, and from his own observations of about 700 cases between 1932 and 1950. The formidable nature of the task is illustrated by the fact that in spite of his efforts some important contributions have escaped attention. Thus his otherwise admirable exposition of the history of his subject does not mention the case of undulant fever in Rhodesia in which Bevan[1] found an agglutination titre of 1 in 200 for *Brucella abortus*, suggesting that the infection was contracted from cattle. Similarly overlooked is Orpen's[2] evidence in 1924 that in Rhodesia *abortus* and not *melitensis* is the cause of undulant fever.

Dr. Harris's critical examination of the known facts is refreshing, and nowhere is his scientific approach more welcome than in the section on so-called "chronic brucellosis." The very definition of this condition raises difficult questions which have caused some to doubt its existence. The evidence he gives of the survival of brucella in milk products under laboratory conditions (for instance, "butter yielded *Brucella abortus* after storage at 8°C for one hundred and forty-two days") tends perhaps to suggest a more serious danger than really exists; but his comments on interhuman infection are admirably critical: e.g., "It seems all but impossible to evaluate human transmission since no individual can be proved to be uninfected prior to the suspected human contact, so inapparent and obscure may have been a previously acquired infection." Only two short paragraphs are devoted to the interesting question of sex-incidence, though a table in another section, showing mortality-rates in the United States for the years 1940–45, brings out the large preponderance of males over females. This preponderance, not only in mortality but also in incidence, has been reported from many countries including our own.[3]

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[1] Bevan, L. E. W. *Trans. R. Soc. trop. Med. Hyg.* 1921, **15**, 215.

[2] Orpen, L. J. J. *Ibid*, 1924, **17**, 521.

Almost every aspect of this obscure but fascinating disease has been considered; and the many fine illustrations include coloured photographs of skin rashes and intradermal reactions. Dr. Harris's book is an indispensable reference work. We condole with him on the misfortune that this edition appeared just too soon to include reference to the astonishing, though not yet critically evaluated, results of medication with 'Aureomycin' and chloramphenicol.

Lectures on Medicine to Nurses

A. E. Clark-Kennedy, M.D., F.R.C.P., dean of the medical school, London Hospital. Edinburgh: E. & S. Livingstone. 1950. Pp. 282. 15*s.* 6*d.*

Dr. Clark-Kennedy's lectures for nurses are written in his own style with all his customary skill and originality. The lectures are designed to give nurses an outlook on medicine which will enable them to think out what is happening when nursing sick patients. He has not used the method of the textbook, which—since he hates catalogues—he describes as "frightfully dull," but has preferred to try to make his audience think for themselves. His teaching is largely by analogy, and ranges from elephants in Piccadilly to motor-cars, and from the London blitz to British Railways. The light friendly spirit in which the book is written should leave nurses with a vivid and lasting memory of these lectures. The book is divided into 18 chapters, some of which are especially good, and cover the whole range of medical teaching in general, without attempting to be fully inclusive. Dr. Clark-Kennedy has not modified in any way his informal talks to the more formal style of the printed word.

Chemical Constitution and Biological Activity

W. A. Sexton, B.SC., PH.D., F.R.I.C. London: E. & F. N. Spon. 1949. Pp. 412. 55*s.*

This valuable monograph provides a detailed review (up to the middle of 1947) of the broad field of scientific investigation indicated in its title. Though intended primarily for chemists, it will be valued as a book of reference for pharmacologists and for all concerned in the study or teaching of applied biochemistry. A brief historical introduction gives the chief landmarks in the study of the mechanism of the action of drugs, indicating the contribution of many sciences. Systematic investigation of the biological activities of series of derivatives has made it possible to predict how a desired property may possibly be achieved by chemical modification, often starting from a natural substance which has been used empirically with success. More recently, biochemical studies have given indications of the types of substance likely to be effective as inhibitors of metabolic reactions. The first of the five chapters on general principles supplies a brief survey of structural biochemistry. Others discuss the chemical mechanisms of drug action, the effects of physicochemical factors, and the changes undergone by drugs in living organisms. The account of the effects of specific chemical groupings on biological activity is especially notable. The remaining sixteen chapters deal with such things as the structure and functions or reactions of the components of the vitamin-B complex, of vitamin K, of choline and derivatives, and of porphyrins. The sulphonamides and antibiotics are briefly reviewed, and so are many dyes and other substances active against bacteria, fungi, protozoa, insects, and parasitic worms. Antigens [illegible] and substances related to [illegible] is appropriate that the section on antimalarial drugs should be extensive, for the author is a director of research in the laboratories of the firm responsible for the synthesis of proguanil ('Paludrine').

Intestinal Intubation

Meyer O. Cantor, M.S., M.D., F.A.C.S., *assistant attending surgeon, Grace Hospital, Detroit.* Springfield, Ill: C. C. Thomas. Oxford: Blackwell Scientific Publications. 1949. Pp. 333. 55*s.*

Just over forty years ago Einhorn and Gross first demonstrated the method of obtaining duodenal secretion by means of a small metal olive attached to a long thin rubber tube which could be swallowed and allowed by its own weight to pass beyond the pylorus. Twenty years later Wangensteen began to apply this method to the treatment of certain cases of intestinal obstruction; and since then many varieties of tube have been introduced —notably the double-lumen tube, tipped with an air-filled balloon, now called the Miller-Abbott tube. Dr. Cantor is well known for his work on intestinal intubation, and all gastro-enterologists will welcome this authoritative and exhaustive book. Beginning with the history of his subject, and offering detailed instructions for the practical use of the various types of intestinal tube, Dr. Cantor covers every aspect of this important method of treatment and investigation. Much that he says will interest general physicians and surgeons, and many of his points are certainly not fully appreciated by all those who advocate intestinal decompression for every form of abdominal distension. The sound physiological and scientific background is satisfying, and even if he is perhaps too enthusiastic at times about the merits of intestinal intubation all will agree that he has done a fine piece of work in collecting and summarising present knowledge on this subject.

The Psycho-analytic Study of the Child

III/IV. Managing Editors: Anna Freud; Heinz Hartmann, M.D.; Ernst Kris, PH.D. London: Imago Publishing Company. 1949. Pp. 493. 35*s.*

"Clear and distinct ideas" have perhaps never had any great appeal to the Anglo-Saxon mind; the extent to which the works of Freud have been accepted is proof, if proof is needed, of how well we can get on without sharp definition. Nevertheless, some of the Latin virtues might have saved some misconceptions and some schisms and heresies, even in this field. Now that the time has come for restatement of Freudian developments, might it not be more precise statement? This is just what we do not get in the papers, by various authors, collected in this volume. Instead there is this kind of thing: "If certain regularities do occur in the course of this procedure we will consider them in the nature of approximations, an orientation, as it were, within the map of the ontogenesis of sexuality." And this is no isolated example. There are only three papers offering any quantitative statements: those by Dorothy Burlingham, on twins, J. Louise Despert, on the dreams of preschool children, and Rene A. Spitz, on autoeroticism in the first year of life; and of these only the last could be called statistical. Mill's methods are applied, and the conclusion, reached in terms of concomitant variation, is that the better the relationship between the mother and child, the more likely the child is to show autoerotic behaviour. If true, this is interesting; but it is a pity that this group "showing excellent mother-child relationships" contains only 17 members. Two of the best papers in the book come from the West Sussex Clinic. The late Dr. Kate Friedlander distinguishes between antisocial and neurotic children. Antisocial children come from homes generally recognised as bad, whereas the boarding-out officer or welfare worker may pass as good the home where appearances are kept up to conceal a reality of "sado-masochistic" horror, richly productive of neurosis. Miss Lydia Jacobs writes intelligently on the problem of advising mothers in a child-guidance clinic. Many of the other papers contain very interesting material, but the uncertainty about what it all means is, in the end, too much of a deterrent.

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[3] Dalrymple-Champneys, W. *Lancet,* March 11, p. 429.

THE LANCET

LONDON: SATURDAY, MAY 13, 1950

Hardship

Of the doctors whose fortunes were changed by the coming of the National Health Service, one group was particularly hard hit financially. These were the general practitioners with numerically small practices. They were working either in the countryside or in towns where, before the appointed day, private practice had been relatively remunerative. The number of patients they looked after was below the average number in a doctor's care throughout the country; but their load of work was not proportionately less, because more attention was expected of them by their patients.

The Act gave all principals established in general practice the right to continue in practice in their own area—a wise decision not only because it was obviously undesirable to uproot a proportion of the established doctors, but also because a man who has served for some years in a community is a greater asset to that community than he could for some time be to any other. Most practitioners exercised their right to stay in their own practice area, and many then found that the almost universal acceptance of the national service by their patients reduced their income without reducing the load of work. This situation had been foreseen in so far as sparsely populated and truly rural areas were concerned, and early adjustment of the mileage and inducement funds did much to ease initial hardships here. But these measures offered the urban practitioner with the small practice no relief at all, and it became harder and harder for such practitioners to meet their fixed commitments. A few of the younger ones gave up practice in the well-doctored areas where they had been practising and sought places as partners or assistants to doctors in underdoctored areas, many of whom now found their practices exceeding the statutory size. It was not so easy, however, for older men to do this. Their personal and family ties were stronger in the towns they had so long served, and even when they were willing to move it proved hard to find alternative places in which to practise. The busy doctor looking for help with an impossibly large practice prefers a young and energetic assistant to someone his own age or older —particularly someone who has grown up in the less hurried atmosphere of a small practice. Even executive councils have shown themselves unwilling to award a vacant practice to an older man if a capable younger man is available, as he almost always is. So most of the doctors with small practices stayed on, trusting that relief might come when the negotiations for the increase in the practitioners' pool were completed. As their hopes of help from this quarter fell, and the continued hardship they were experiencing became more apparent to all, it was decided last year that claims might be made against the moneys remaining in the Inducement Fund to alleviate this hardship. If the doctors would send in a statement of their incomes and expenses before and after the appointed day, and would make a claim for help, their position would be considered, and where appropriate a grant would be made. But this was all rather vague, and it savoured too much of charity. Nobody had any clear picture of what constituted hardship, and few practitioners seemed willing to appeal for this type of help. Moreover, those that did appeal often found obstacles in their way. Some were told that the area in which they were practising was not an "inducement area" and so they did not qualify for grant. Others who had experienced heavy falls in income were regarded as not suffering hardship, because their net income still exceeded an empirically fixed basic minimum. Even when a claim was agreed, it was not very clear how the sums granted were assessed, except that they were expected to be sufficient to bring the doctor's income back to this same universally applied invariable minimum. Altogether the scheme was felt to be neither equitable nor sufficient, and it was little used.

The Ministry of Health, after consultation with the General Medical Services Committee, has now placed these hardship grants on a very different and much more satisfactory basis. But, though a circular letter has gone out from executive councils notifying all practitioners of the new conditions of grant, it does not seem that the advantages of the altered scheme are yet well appreciated by many of those whom it is meant to help. The important changes that have been made are that claims will now be entertained from all areas, and not only from areas which would normally attract an inducement payment; that hardship will be measured not on net income remaining but on the difference in net income before and after the appointed day; and that the amount of relief given will bear a definite relation to this fall in net income.

> "The intention," to quote from the circular letter, "is to assist a practitioner who has suffered a severe loss of income as a result of the introduction of the Service, by making good some part of the loss and so helping to tide over a difficult transitional period. The circumstances of all such cases will be reviewed annually, and, though it is recognised that payments may have to be made in certain cases over a number of years while the doctors adjust themselves to the new circumstances, it is contemplated that such payments will be on a descending scale."

This quotation shows clearly the purpose of the grants. They are meant to give immediate assistance to the general practitioners who have been hit most hard. The claims are to be dealt with in the greatest possible confidence by a small subcommittee of the executive council and the local medical committee, and retrospective payments back to the appointed day are contemplated.

It is to be hoped that as many doctors as are entitled to benefit from this award will apply to their executive councils for the appropriate claim forms, and will make their claims without delay. But these grants, however welcome as short-term relief, are in no way a permanent solution of the problem of enabling the doctor giving diligent service to a smaller-than-average list to earn an adequate income. For one thing they are on a diminishing scale and so give no lasting help; for another they apply only to established doctors who can prove loss of net income, and will therefore be of no avail to the newcomer to practice. The eventual answer will probably be found to lie in a graded capitation fee, allowing proportionately more for the first 1000 (or other agreed figure) on a principal's list of patients. This seemed to be within reach, and would have been introduced if money had been available to augment the practitioners' pool. But even without such augmentation the Conference of Local Medical Committees must soon consider whether in equity it should not still propose modification of the distribution scheme so as to alleviate the lot of the doctors in areas where lists are small and static. The new grants should be a very present help, but they will not in themselves banish that sense of hopelessness and frustration felt by so many who find themselves working quite as hard as before, and usually harder, to earn an income which persistently remains below their needs. Such men and women can fairly expect that ways will be found to pay them properly for their work. If this were done, hardship grants would not be needed, for real hardship would no longer exist.

Aureomycin and Growth

THE borderland between bacteriology and nutrition is attracting many investigators these days, and their findings seem likely to have valuable practical applications in stock-breeding as well as in medicine. Last year STOKSTAD and his co-workers[1] in New York reported that the addition to the diet of a factor obtained from cultures of *Streptomyces aureofaciens*, the organism which produces 'Aureomycin,' would enhance the growth of chicks receiving a feed with soybean meal as the source of protein and an adequate amount of vitamin B_{12}. The same effect was observed by others in young pigs[2] and young turkeys.[3] Now, at the national meeting of the American Chemical Society in Philadelphia, STOKSTAD and JUKES have reported some important further work on this subject.

The growth-promoting effect was observed with whole cultures of the aureomycin-producing mould, with fractions that contained and others that did *not contain aureomycin*, and, though less regularly, with crystalline aureomycin in very small quantities —12 mg. of aureomycin in 1 lb. of food produced a well-marked response. The effect was quite distinct from that attributable to vitamin B_{12}, which cultures of the mould contain. This was clearly established by including adequate amounts of vitamin B_{12} in the experimental diets, and also by showing that aureomycin enhanced the growth of animals fed on diets with fish meal as the source of protein and therefore rich in "animal-protein factor," with which vitamin B_{12} seems to be identical. In seeking to explain how aureomycin increased the growth of young chickens, pigs, and turkeys, STOKSTAD and JUKES observed that the growth response was greatest when aureomycin was added to diets providing suboptimal amounts of vitamin B_{12}. This led them to think that aureomycin somehow reduced the animals' requirement for vitamin B_{12}. Following up the observation of MOORE et al.,[4] that succinylsulphathiazole hastened the growth of animals given a synthetic diet, STOKSTAD and JUKES confirmed that succinylsulphathiazole also increased the growth of chicks given one of their experimental diets, though the response was less than with aureomycin. By analogy, therefore, STOKSTAD and JUKES argue that aureomycin may act not by supplying an unknown nutrient but by altering the intestinal microflora so that a smaller amount of vitamin B_{12} has to be supplied in the food.

The economic importance of this work is clear, for in 3–4 weeks young, rapidly growing animals receiving a small quantity of aureomycin were in most experiments 25–50% heavier than those not given aureomycin. The scientific implications are also important. Nutrition is a meeting-ground of many scientific disciplines, and this work is a challenge to the inadequacy of our understanding of the rôle of the intestinal microflora in nutrition. Here the problem is to devise adequate methods of characterising the bacterial population of the intestinal tract, and so identifying the changes that result from alterations in the diet. In this difficult task, as MASSON[5] and NASR[6] demonstrated to the Nutrition Society at Aberdeen, there is much to be learnt from the proper use of modern microscopical and histochemical methods. BAKER[7] has long insisted that the application of such methods, and an intelligent interpretation of their results, is the most helpful starting-point and an essential control for the cultural and biochemical studies necessary to complete our knowledge of the nutritional consequences of changes in the intestinal microflora. At present these consequences seem more often to be vaguely postulated than demonstrated.

Protomedicus Anglorum

IF the preposterous Austrian title of *protomedicus* were revived for England and Wales, the man with the best claim to it would be, of course, a Scot Sir WILSON JAMESON, chief medical officer to the Ministries of Health and Education, retired on May 11 after ten years' service covering the most profound changes in medical organisation that this country has seen. Happily, when he took office in November, 1940, at the shortest notice, he had qualifications not even exceeded by those of his first and most distinguished forerunner, Sir JOHN SIMON. Well grounded in the practice of local public health through service in four London boroughs, in his period as dean of the London School of Hygiene and Tropical Medicine and professor of public health in London University he had been brought into personal touch with both the academic and administrative sides of medicine to an extent hitherto unknown. Add to that a wide experience as medical adviser to the Colonial Office (an experience by no means limited to a desk in Whitehall); the co-authorship of the standard textbook on public health; a gift for establishing har-

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1. Stokstad, E. L. R., Jukes, T. H., Pierce, J. V., Page, A. C. jun., Franklin, A. L. *J. biol. Chem.* 1949, 180, 647.
2. Cunha, T. J., Burnside, J. E., Buschman, D. M., Glasscock, R. S., Pearson, A. M., Shealey, A. L. *Arch. Biochem.* 1949, 23, 324.
3. McGinnis, J., Stephenson, E. L., Lovadie, B. T., Carver, J. S., Garibaldi, J. A., Ijichi, K., Snell, N. S., Lewis, J. C. *Abstr. Amer. chem. Soc.* September, 1949, p. 42.
4. Moore, P. R., Evenson, A., Luckey, T. D., McCoy, E., Elvehjem, C. A., Hart, E. B. *J. biol. Chem.* 1946, 165, 137.
5. Masson, Marjorie. *Brit. J. Nutrition*, 1950, 4. Proceedings of the 60th Scientific Meeting of the Nutrition Society (in the press).
6. Nasr, Hamed. *Ibid* (in the press).
7. Baker, F., Nasr, H. *J. R. microscop. Soc.* 1947, 67, 27.

monious relationships; and a real sympathy with those, however junior, worried by personal and other problems, and it is clear that he combined at least many of the ingredients needed for success.

In the dark days of 1940 and 1941, the new chief medical officer might well have thought it enough to cope with the urgent and immense problems that arose day by day. But from the beginning JAMESON strove to make permanent improvements in machinery and relationships and to use each crisis for an advance. Out of the food situation came a permanent policy for protecting the nutrition of the "exposed" classes; and the success of this policy was recognised by the Lasker award given by the American Public Health Association to the British Ministries of Health and Food in 1947. Similarly, war-time epidemiological and other health problems were used to establish close and happy relations with the other Allies, notably with the U.S.A.; and Sir WILSON's famous broadcast on venereal diseases in October, 1942, did much to break down barriers which till then had prevented these diseases being treated on their epidemiological merits. He withstood the official and other fears expressed before this broadcast, and the result was his complete justification, the public reaction being for more and franker information. Other noteworthy changes included the establishment of a nursing division in the Ministry of Health; the entry of the Ministry into the field of health education of the public, notably in the "coughs and sneezes" and the anti-V.D. campaigns; and the integration of the medical branches in other departments by means of informal weekly conferences with their chiefs. As a member of the Goodenough Committee and otherwise, he showed his continued interest in medical education, and his frequent pleas for interchange of doctors between the British and the Colonial medical services, and for free movement of young doctors around the Commonwealth, were a reminder that medicine does not begin and end at home.

His Harveian oration of 1942[1] expressed his philosophy of war as an opportunity as much as a disaster for public health, and in it he showed how international coöperation might be aided by preventive medicine, as had happened before. Even at that early stage he predicted the changes that might follow:

> "Most of us who served in the period 1914–18 can recall how we looked forward to the time when we should return to the kind of life we had been leading before enlistment, to the practices or the appointments we had left, eager to get back to things as we knew them before the war clouds burst. Not so in this war. There is everywhere a conviction that great changes lie ahead of us and a desire so to plan the measures designed to meet the national emergency that some permanent good may be derived from them when the world is once again at peace."

Great changes did indeed come; and the end of the war brought not comparative relaxation but even heavier—and more complex—work and responsibilities. During the troubled period of the inception of the National Health Service JAMESON's gift for what may be called "organising understanding" stood the country and the profession in good stead. He had to explain the doctors' point of view to Ministers and administrators and in turn to present to the doctors the sometimes unpalatable proposals of the politicians. He had at once a strong belief in the ultimate benefits of an organised service and a deep loyalty to the profession, and he worked incessantly to reconcile the two. As the chief representative of medicine in the Ministry, he did all he personally could to ensure that, in HARVEY's words, doctors should "for the honour of the profession continue in mutual love and esteem among themselves." The split which he so much dreaded was avoided, and if the service today has grave defects, especially in the balance between its branches, he has never been one of those who expected immediate success in so great and complex an undertaking. In particular, his policy of broadening the Ministry of Health by the introduction of part-time specialist advisers of high calibre, and his insistence that the rewards of clinical skill should not be subordinate to those of the administrator, have gone far to build a sound basis for the future, and it is ill luck that national policy should have created a temporary crisis in his own department at the time of his departure.

The many people who like to call themselves his friends will be glad that JAMESON is relieved of his ten years' strain of office; but it would be a great pity if the experience and good sense he possesses were not retained in the counsels of the nation. It is easy to think of at least one other place where he could continue, in part, the kind of public service in which he has excelled.

Annotations

THE KING AT MILL HILL

NOWADAYS there are none too many big new buildings to be opened, and the inauguration of the National Institute of Medical Research at Mill Hill on May 5 was a national event, receiving full recognition as such. Before a distinguished assembly in the Fletcher memorial hall, Viscount Addison, F.R.C.S., as chairman of the Medical Research Council, gave the King and Queen a brief account of the project and asked His Majesty to perform the inauguration. In so doing, the King said that the institute exemplifies "that spirit which inspires the State and science to work together for the health and happiness of mankind. The results of this union are available to all without distinction of race, colour, or creed; and many families here at home, and indeed throughout the world, have reason to be grateful for the benefits which have been brought about by medical research." After the ceremony, Sir Charles Harington, F.R.S., director of the institute, presented to their Majesties members of the staff of the Medical Research Council, with the heads of divisions and others chiefly responsible for the researches of the institute. Later the King and Queen saw some of the departments. The building, which was described in our last issue, will ultimately accommodate about 100 qualified scientific workers and 250–300 ancillary staff, and it surprised some of the visitors by its size; its working conditions will be the envy of most investigators elsewhere in this country. The opening, very properly, was as notable an occasion as it could be made; for the institute's past record suggests that its staff will make the most of the new opportunities they are offered. As one guest said on leaving, "This place is for use, not show. Great things are going to be done here."

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[1] *Lancet*, 1942, ii, 475.

THE CHANGING FACE OF NURSING

IN a realistic survey[1] of the nurse's social and economic position, the Nursing Reconstruction Committee of the College of Nursing have avoided concrete recommendations and contented themselves with summarising matters of broad principle. This committee was set up in 1941, with Lord Horder as chairman, and has already published sections of the report dealing with the assistant nurse, education and training, and recruitment. In the new section, demand and supply are properly considered in relation to the population and the labour market. The committee note that by the end of 1951, in Great Britain, the number of women between 15 and 39 (the ages at which most women seek employment) will probably be at least 230,000 lower than at the end of 1946; and that this shrinking pool will have not only to carry the current load of work done by women but will have to replace the young people withdrawn from the labour market by the raising of the school-leaving age, supply more teachers to the schools and county colleges, and replace youths called up for National Service. Moreover in 1939 there were over 6 million women gainfully occupied, of whom perhaps 500.000 were doing work demanding standards of intelligence and education not lower than those required in nursing. Since the Nursing service alone now demands some 200,000 people, the committee press home the important lesson that the time has come to economise our experts in nursing to the utmost. We can no longer afford to use qualified women in posts which make no demands on their skill, or even to admit large numbers of students who will never complete their training. It seems clear to them that we must find out how much of the work at present assigned to nurses, trained and in training, can be done by other people. In hospitals, for instance, domestic and clerical duties come under this heading; in welfare clinics, babies can be weighed and food supplements handed out by someone other than a State-registered nurse. They conclude that a large body of subsidiary workers is essential, though they hesitate to assert that these should be either assistant nurses or orderlies. Which are employed, they say, can only be decided by experiment, and will often depend on the kind of workers available in a given neighbourhood. They hope that the revised and shortened training for assistant nurses will help us to develop a large stable element in our nursing service; and they speak warmly of part-time nurses, who in just over three years have increased from 3000 to 26,000. Part-time nursing, begun as a temporary expedient for the care of the chronic sick, bids fair to become a permanent contribution to the health service; but it will only do so, they imply, if part-time nursing schemes are adequately prepared and administered with sympathy and understanding. The rates paid to part-time nurses are based on the salary and emoluments of comparable grades of full-time nurses; and the committee note that undervaluation of the hospital nurse's emoluments has brought the hourly rate of pay of even fully qualified part-time nurses below that of a home help—an anomaly which they say is in course of correction.

Since nursing is a profession, the committee believe that hours of work should be subject to negotiation but not legislation. Where overtime is necessary, it should not be compensated by extra pay, but by a return in time off duty later; and they make the important point that when a hospital finds itself unable to "pay back" overtime to its nurses, then it is offering service beyond its powers. This point has never been given sufficient weight in the past, and the custom of laying every new load on the nursing staff has been one of the causes of wastage from the profession. They believe that the financial prospects in each field of nursing should be such as to retain those who would choose it on professional grounds. The ward sister, for example, should not have to give up her chosen field of work if she seeks advancement. Additional qualifications should be recognised financially; and nurses should if necessary receive a bonus as an inducement to work in unpopular fields. Nurses are placed at a considerable disadvantage, it seems, by the undervaluation of their emoluments already mentioned; among other things it means that they get a smaller pension on retirement than would otherwise be the case, and that the nurse who tries to live out is not able to meet her running expenses out of the sum allowed in lieu of emoluments. Today, the committee consider, the hospital must revise its views on the need for stable resident staff: indeed, they even go so far as to say that nursing may soon be regarded as a non-resident profession like any other: and for this reason the basic salary should always be the gross salary. A more realistic evaluation of emoluments they say, together with the introduction of the straight-shift system of working hours, would enable many more nurses to live out if they wished—advances which we have long advocated. They even think that there may be a growing tendency for student nurses to live at home, though they note the demand of home distractions on time and energy. The committee believe, too, in the principle of equal pay for equal work from men or women, coupled with dependants' allowances. In discussing the nurse's health they say that whether or not communicable diseases, especially those causing long incapacity, should be "scheduled diseases" must depend on the facts. In the case of tuberculosis for instance, if it can be proved to be an occupational hazard then the nurse should be adequately covered against the risk.

The report goes far beyond anything so far published about the state of the nursing service; and the committee, in their readiness both to face contemporary facts and to look for ways of turning them to good account, make a refreshing and practical approach to a well-worn problem.

RHINELAND EPIDEMIC OF ENCEPHALITIS

THE great advances in our knowledge of the many kinds of non-suppurative encephalitis in the 34 years since Economo described encephalitis lethargica have mainly resulted from virus research and the correlation of neurohistological and experimental findings with clinical features.[1] Epidemiological investigations have contributed to the understanding of some forms, such as Russian spring-summer encephalitis and St. Louis encephalitis, but until the last few years there has been no opportunity for such investigations in Europe since the world-wide epidemic at the end of the first world war, apart from the study of postvaccinal encephalomyelitis in Holland.

Lately, Bader and Hengel[2] have reported on a small epidemic which occurred in the Rhine area in 1947. Its time-relationship to the second world war and the fact that it coincided with a large epidemic of influenza at first suggested that it was identical with encephalitis lethargica. But the Rhineland disease was more benign and apparently did not leave parkinsonism as a sequel. There were also some significant differences in epidemiology between the two. Lethargic encephalitis spread rapidly and widely, and its incidence was highest in the colder months; it attacked people of all ages, in town or country, and contact infection, though rare, was established on several occasions.[3] The 1947 epidemic was almost entirely restricted to a small area on the left

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1. Section IV: Social and Economic Conditions of the Nurse. Royal College of Nursing. Pp. 83.

1. Leading article, *Lancet*, 1949, i, 1163.
2. Bader, R. E., Hengel, R. *Ann. Inst. Pasteur*, 1950, 78, 481.
3. MacNalty, A. S. Annual Report of the Chief Medical Officer to the Ministry of Health, 1919–20, Appendix 7. Zinsser, H. *Arch. Path.* 1928, 6, 271. Netter, A. *Bull. Soc. méd. Hôp. Paris*, 1920, 44, 1030.

bank of the Rhine. The infection showed a preference for rural areas and the peripheries of towns. Sporadic cases were the rule; among the 53 cases studied there were only 2 instances of more than one patient being in the same street or the same building, and there were no examples of multiple cases in a family. The incidence was highest in the hot months, and none of the patients were under 7 years old. Case-to-case spread was excluded and contact infection from domestic animals seemed highly unlikely. The conclusion drawn from the epidemiological observations was that the reservoir of the virus was among the wild field animals and the disease was transmitted by insect vectors. This view was supported by the observation of a tick engorged with blood on the arm of one fatal case, but the tick appeared to play only a minor part in the spread of the disease, the main vectors being thought to be mosquitoes, such as *Aedes vexans, Culex*, and *Theobaldia*. The epidemic had many features in common with forms of "summer encephalitis" such as louping-ill, Siberian and Japanese B encephalitis, and especially St. Louis encephalitis. Some of the viruses of these varieties of summer encephalitis are immunologically related though not identical. Thus, the serum of mice immunised against the virus of Japanese B encephalitis has some protective action against the St. Louis virus.[4] In the Rhineland epidemic all attempts at animal transmission were unsuccessful, and the neutralisation of herpes virus by the sera of 3 of the patients is, as Bader and Hengel point out, of no significance.

EUTHANASIA

THE Dean of St. Paul's having told the Voluntary Euthanasia Legalisation Society that its proposals accord with the Christian conception of human right and duty, the Archbishop of Canterbury has expressed his personal disagreement. Public opinion, it is clear, has not yet reached that certainty which is indispensable to the success of the campaign to change the law.

Apart from the religious and the civic aspects of the matter, it presents a special problem to the medical profession. This is illustrated by the recent trial of Dr. Hermann Sander in New Hampshire. He was charged with murder, in that he had made four injections of air into the veins of a patient suffering from incurable cancer. After a three weeks' hearing he was acquitted. This, however, was not the end of the case. The New Hampshire State Board of Registration in Medicine revoked his licence to practise, though he is allowed to apply for reinstatement in two months' time. The board's decision, given in some detail by the *New York Times* of April 20, may be summarised as follows. The records of the hospital concerned indicated that Dr. Sander injected air into the patient's body last December; at a hearing by the board last month he admitted the fact, though he did not positively state whether or no he actually penetrated the vein. He told the board that he thought the patient was dead when he made the injection; his counsel described this as a senseless act for which no adequate explanation was possible. Dr. Sander contended that he had done no wrong because he was sure that he had not killed his patient. The board state that they are not concerned with the question whether the patient was alive or dead; it is common medical knowledge, they say, that such an injection of air into the body can serve no useful purpose and that every precaution is taken to avoid introducing air into a human vein; a physician's moral obligation to his patients and his profession is to engage only in medical practices which are designed to cure or alleviate; "any act of a physician which is not so designed fails to meet the moral standard of the medical profession": no physician can be allowed to perform a senseless act for which no adequate explanation is possible. Thus the board find that Dr. Sander's "moral character," within the meaning of the section in the relevant statute, is such as to require the revocation of his licence to practise.

Euthanasia, it was once observed in the *Spectator*, is no more demoralising than capital punishment. Its ethical problem is akin to that of suicide which so long divided the ancient philosophers. Lecky in his *History of European Morals* collects their contradictory opinions. To Pythagoras and Aristotle, for instance, self-destruction was an antisocial act comparable with a soldier's desertion from his post. Virgil in the *Aeneid* depicted the awful fate of suicides. Seneca and others, on the other hand, saw no harm in the deliberate escape from intolerable conditions. In this country we call it manslaughter if a person, having the care of a child, causes or hastens its death by failing to provide proper medical aid, or if he or she, having undertaken to look after anyone who is helpless through old age, unsound mind, or other infirmity, causes death by culpable neglect. Euthanasia is not yet classified among the justifiable homicides.

CHILL AND THE LIVER

LATTERLY the emphasis laid on nutrition in the animal economy has diverted attention from physical environmental factors such as cold, damp, and draughts. Hence it is good to hear of some observations by Howie and his colleagues[1 2] at the Rowett Research Institute. From birth till weaning at eight weeks, three different groups of pigs were kept (A) in open pens in cold, draughty, and often damp byres with non-insulated floors, (B) in warm wooden ark shelters or electric hoovers, and (C) under the same warm conditions as the group B, with the addition of an outdoor concrete run. By fifteen weeks after birth there had been 16 deaths among the 30 pigs in group A, and 5 among the 21 in group B, but none among the 16 in group C. The principal necropsy findings were ascites (150 to 700 ml.) and severe "nutmeg" change of the liver. Microscopically the liver showed severe sinusoidal congestion, some fatty change, centrilobular necrosis, and some fibrosis—the last being most advanced in the animals surviving longest. Naftalin and Howie[2] call attention to the similarity of their findings to those of McGowan[3]; but, unlike McGowan, they were unable to prevent the lesions by a supplement of iron, and they conclude that physical factors in the environment are primarily responsible. Despite the striking loss of appetite observed in the animals of group A from about the seventeenth day onwards, the lesions are quite distinct from those observed in experimental nutritional deficiency.[4] On the other hand, very similar lesions are found in the liver in severe passive congestion; and, since the other organs were in general unaffected in their pigs, Naftalin and Howie suggest that vascular disturbance within the liver was a major cause. The frequency of ascites, without œdema or effusion elsewhere, supports this hypothesis. It is true that, wherever liver necrosis is found, the action of a toxic agent must be considered; but Wallach and Popper,[5] have drawn attention to several histological minutiæ which help to distinguish toxic lesions from those of passive congestion, and both the illustrations and description of the lesions in the pigs conform to the "congestive" or ischæmic type. The evidence so far obtained thus tends to incriminate the richly muscular hepatic vascular tree, which may be presumed to go into spasm when the bare abdomen is applied to cold damp concrete. Anæmia (present in most of the affected animals), and the increase in metabolic rate associated with exposure to cold, could

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4. Kudo, M., Uraguchi, K., Matsuda, S., Hashimoto, H. *J. Immunol.* 1937, 32, 129.

1. Howie, J. W., Biggar, W. A., Thomson, W., Cook, R. *J. agric. Sci.* 1949, 39, 110.
2. Naftalin, J. M., Howie, J. W. *J. Path. Bact.* 1949, 61, 319.
3. McGowan, J. P. *Ibid*, 1924, 27, 201.
4. Glynn, L. E., Himsworth, H. P. *Ibid*, 1944, 56, 297.
5. Wallach, H. F., Popper, H. *Arch. Path.* 1950, 49, 33.

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[7] Report of the Departmental Committee on Children and the Cinema. H.M. Stationery Office. Pp. 107. *3s.*

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Reconstruction

THE FUTURE OF GENERAL PRACTICE *

R. J. F. H. PINSENT
M.A., M.D. Camb.

THE general practitioner is not normally a vocal person, and formerly his problems seldom found expression in the medical journals; but over the past five years there has been first a trickle, then a current, and lately a spate of articles, letters, and editorials drawing attention to the gross shortcomings which can exist in general practice nowadays. Many of these deficiencies existed before the passing of the National Health Service Act; the effect of this Act on the difficulties has been to alleviate a few, increase many, and create some fresh ones. It is now recognised that the practitioner lacks two things—time, and facilities for the proper conduct of his work. The concept of the health centre arose from the desire to remedy this lack.

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The need to earn a livelihood forces the doctor to take a large number of patients. The larger his list, the more thinly will his skill be spread. The danger of this dilution will continue until remuneration is based on the quality, and not the quantity, of his professional responsibility. The primary need, therefore, is for limitation of lists to, say, 2000 patients, with remuneration appropriate to the practitioner's work and status.

Much of the practitioner's day is spent on non-professional work; and the greatest cause of misused time is certification. Table III shows the experience in the practice under review. In the Welfare State the doctor has almost ceased to be a medical adviser, and instead has become a Mother Hubbard whom you "get something from," whether it be a certificate for sick benefit or extra rations, or a prescription for twenty aspirin tablets: consultations degenerate into requests for "my note" or a signature to a document. To justify himself the patient will enlarge on any symptoms he may have, causing the doctor to make some—probably negative—examination, thus taking further time. Yet the cause of that patient's attendance is simply the need for an administrative certificate "and another for my works, too, Doctor." The remedy lies in convincing administrators that the doctor should not be used as a filter between the patient's demands and available supplies, whether these be for insurance benefit or extra petrol. At the same time the public must be weaned of their belief that a doctor's "line" will procure almost anything.

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The need for time-saving in clerical work is now acknowledged. Perhaps the one good thing to come out of the National Health Service, so far as general practice is concerned, is the universal medical-record envelope which, if the record is properly kept, could ultimately provide the statistician with invaluable material. But for the practitioner the increased number of cards means more filing, more replacing of cards, and more correlation of specialist reports—all of which takes professional time that could be better spent. However highly the ability to talk and write simultaneously may be developed, the records kept in a busy practice without clerical assistance cannot be accurate enough for serious statistical investigation, or even for helping the doctor to handle his own patients.

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HELP FROM NURSES

The long-term solution must be to reinforce general practitioners with nurses, even if this means reducing the number of nurses in hospitals; if the practitioner were enabled to do his work properly, far fewer patients would need hospital nursing. Possibly in future there will be devolution of work not necessarily requiring a doctor's care to suitably trained nurses, working in close collaboration with doctors, as in industrial medicine. It would be an advantage if nurses engaged on this work could have some secretarial training; and they should also be empowered to sign many of the documents which are at present valid only when signed by the doctor himself.

The procedure might be as follows. All new patients would be seen by the doctor, along with those told to see him on that day; and the nurse would see and attend to patients who had been told to report to her for a dressing, an injection, or, in the case of protracted illness, a repeat certificate. The nurse would refer back to the doctor any patient of whose progress she was in doubt, and other patients at intervals decided by the doctor. He would also see all patients for their final certificate on discharge.

Similarly, the nurse, if provided with means of transport, could lighten the doctor's visiting-list. The doctor, having answered all first calls, would delegate certain visits to the nurse, perhaps to give penicillin or to check an evening temperature; and some elderly patients who might otherwise remain unvisited could be added to the nurse's list for more or less routine visits, the doctor being kept informed of any change in the patients' condition. Though highly desirable, it would be economically unsound for practitioners to have the full-time help of a nurse, unless their lists were large; and then the work done by a suitable nurse might obviate the need for a medically qualified assistant, who would be released for independent practice elsewhere.

The nurse who is to assist the practitioner—much in the way that the houseman aids the specialist—would need to be selected from among those who are experienced and able to accept responsibility. Experience of district nursing should be an essential preliminary, and the existing home-nursing service should be retained as a training medium for these " general-practitioner nurses," and also as an aid to doctors whose lists do not warrant the employment of a full-time worker.

After a stipulated period " on the district," the nurse would be apprenticed to an individual doctor or a health-centre team, and thereafter she would sit for an examination comparable to that for the diploma in industrial nursing; by passing this examination she would qualify as a " general nursing practitioner," with improved status. Such a qualification might empower the holder to sign statutory certificates in her own right. It might also lead to the acceptance in a court of law of her testimony as that of an expert witness, thereby raising her status further in the eyes of her colleagues.

Her value would be greatest in the home, where the need for education of the patient is greatest. In time, perhaps, patients would recognise her as the first person to consult on minor ailments.

AIDS TO DIAGNOSIS

Whether working single-handed or with a general nursing practitioner, the doctor cannot give of his best if he is denied the diagnostic and therapeutic facilities whose use he mastered as a student. During the year under review, 19% of all patients referred to hospital were sent to a casualty department; and the reason was lack of facilities and time. In the same way some patients were referred to consultants because only they could order the investigations needed to establish a diagnosis which otherwise could have been made in the surgery. The remedy here would seem to be adequate radiological and pathological equipment of the new health centres; for it is doubtful whether the existing laboratory services could meet the demands of the many frustrated practitioners who are now forced to send their patients to specialists even to obtain a blood-count. In advance of health centres, small subsidiary laboratory and X-ray units might be set up in thickly populated and under-doctored areas. The practitioner's experience in sharing such a diagnostic unit with his colleagues might stand him in good stead when later they met at the health centre itself.

In the long run it might be well to include in health centres a ward annexe where the general practitioner could have charge of a few beds of his own. In such an annexe, which would be lightly staffed, the general practitioner would undertake the preliminary investigation of his own patients, with the help of the centre's radiological and pathological departments. Visits from hospital consultants would afford miniature refresher courses and bridge the gap between specialist and practitioner.

At present the practitioner is unable to offer the best service of which he is capable. A little breeze is beginning to blow through the valley of dry bones that is general practice. Our aim should be to fan this into a tempest about the ears of the administrators in whose hands practitioners placed themselves on July 5, 1948.

Special Articles

HISTORY OF NURSING

(FROM A CORRESPONDENT)

GREAT advances have taken place in nursing in the last ninety years. The Nightingale impetus has enabled the profession to meet the demands of a rapidly expanding hospital system in Great Britain and in Northern Europe, and in a rather different form in America. Its influence has spread through the older Continental systems and to a large extent drawn them into its own pattern. This country is proud of its central position in this world-wide movement, and in her *General History of Nursing*, a second edition of which has recently been published,[1] Mrs. Seymer quite properly reflects this sense of achievement. As one turns the pages one feels the onward march—the first training schools, the first attempts at organisation on a national basis, and the culmination (in Great Britain) of State registration in 1919, itself the starting-point of a series of similar enactments all over the world in ever-widening circles. On and on; how hospital nursing has been adapted to the various branches of public-health work; how the nurses rose to further heights under the stress of war; how there are now even paratroop nurses—here all is set out with much interesting detail and pleasant illustrations.

Many, however, are conscious today, as they were not twenty or thirty years ago, that behind this sense of achievement there is ground for anxiety. The rise in numbers has not been accompanied, it is whispered, by a rise in the quality of the nurses or of nursing; there has even, despite all the forward movement, been a real shortcoming. Apart from the numerical difficulty, the ideal that seemed within our grasp in the '20s has not been realised in its fullness. There has been criticism from outside, and attempts by working parties and others to offer solutions, but the keys offered have rattled in the lock. What light can history throw on all this?

It is here that the standard histories, of which Mrs. Seymer's is the most notable example, fail us. The history of nursing has not yet passed out of the stage of the chronicle into that of critical history. "Today," said Maitland, "we study the day before yesterday, in order that yesterday may not paralyse tomorrow." For such guidance we turn to Mrs. Seymer largely in vain. Is it possible, we must ask, to get below the surface and analyse the mistakes which have been made in years gone by, and to relate the history of nursing intelligibly to the social history of our times? If we could get the history right, we might be within sight of finding real and not pseudo-solutions to our problems.

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[1] A General History of Nursing. (2nd ed.). By L. R. SEYMER, M.A. Oxfd, S.R.N. London: Faber & Faber. Pp. 317. 21s.

THE STATE EXAMINATION

Here we cannot hope to do more than look for pointers: let us try to test the matter by one or two examples. It is a defect in most of the accounts to be found on the shelves of a hospital library that the case against State registration by State examination is glossed over. It is coming to be forgotten by the younger generation that there is a possible alternative course backed by no less an authority than Miss Nightingale herself. We have to remind ourselves that her opposition extended to the whole conception of examination—"you cannot select the good from the inferior by any test or system of examination." The much-vaunted "Register" would not, she thought, raise the profession of nursing; it would do an injury to the better nurses by putting them on a level with the inferior, and to the profession by stereotyping a minimum standard. We have to remind ourselves too that here and there today there are to be found good judges who hold the same view.

How is the matter handled in this most widely read and most authoritative of the histories of nursing? Mrs. Seymer is too honest to pass without notice the long opposition to State registration, and she duly notes that "on no other subject in all nursing history has such controversy raged or such acrimonious discussion taken place"; but she quickly makes up her mind and proceeds to set out the "basic principles which lie behind all State interference"; to wit, "that on the one side the graduate nurse has a right to have her professional status and interests legally safeguarded, and on the other that the public ought to be protected against the semi-trained or untrained woman." On these questionable foundations she builds up the case for State registration, and the reader is referred to other sources for the views of the antiregistrationists.

Now here surely was matter for the most serious critical discussion; how far, in the light of subsequent events, was Miss Nightingale right, and how far was she wrong? Is it not at least arguable that she was more right than wrong; that a very small dose of State control—i.e., the inspection and approval of training schools—would have proved the better plan and have avoided most of the troubles under which we now labour? Impossible, says the nursing world with almost one voice; but is this not possibly because it has been led to think so by a selective presentation of the historical background? The group of ideas which carried the day in 1919 owed much to assimilation from non-nursing sources and was closely bound up with the movement for political emancipation for women. They have usurped the place of the Nightingale tradition in our historic perspective. Let us at least be clear that State examinations and "student status" itself—as contrasted with apprenticeship—have no claim to be considered part of the Nightingale tradition.

CURRICULA

Let us try a different tack. Speaking generally the medical profession has for many a year been critical of the amount of book-learning required of a nurse. An American doctor, writing as long ago as 1912, speaks of the modern curriculum which "not one pupil in a hundred in the training schools" can possibly master. "The builders of these curricula feel within themselves that the training schools are not up to modern demands [i.e., those of 1912] and they are attempting to correct this fault by setting up courses of study that would fill the want, but their pupils cannot measure up to them." How modern this sounds! Now the *General History of Nursing* is silent about this persistent difference of opinion; it is not even mentioned that in Great Britain the proportion of failures in the State examinations has often been high and has been the cause of concern, and this at a time when the numerical shortage was itself also serious. Of entrants who survive the preliminary training schools about 30% fail annually in the preliminary State examination and some 20% fail in part II or in the final. The total of those eliminated from continuing in nursing by examinations thus amounts to 44%. They can become assistant nurses, but that is another matter. The deterrent effect of these failures on recruitment to the profession can be well imagined.

Of course there is much to be said for at least some theoretical instruction; but the fact of this long-standing difference of opinion is passed over by Mrs. Seymer. It would not be fair to criticise her on this account, for she is but reflecting a very general attitude. But we must ask what sort of a history is it that can close its eyes in this way when it chooses? Is it well that those who, in a decade or more hence, will be our legislators on the General Nursing Council should get their history from sources which leave such large questions as this undiscussed?

THE AMERICAN SYSTEM

Or let us look across the water and see what has been happening in America. It is one of the merits of the book that it sets out plainly the distinguishing features of four systems of nursing organisation: the Nightingale system, the American system, the Motherhouse system, and the Continental system.

In earlier days the American system differed from the Nightingale rather in detail than in principle. The position of the matron is different, and corresponds to a different type of internal organisation in the hospital; but the apprenticeship principle was common to the two systems. What is important for the historian is rather the point at which the American tradition began seriously to diverge from our own. This it did when it yielded pride of place to the schools run on university lines, thereby abandoning the apprenticeship principle. Here surely is rich material for the historian; the new approach was already in full swing by the time of the Goldmark report in the '20s.

Much information has been brought back to this country by nurse visitors who have inquired pretty closely into the results of the system: they have found cause for anxiety about what is happening across the Atlantic. It is certainly of great importance for our own future that the end-results of a system superficially so attractive should be properly assessed. Does it not mean that the bulk of bedside nursing gets delegated to a secondary grade of nurse? Are we right, or are we wrong in seeing the multiplication of university schools on the American model in other parts of the world as a not unmixed blessing? Mrs. Seymer is content to record the approach towards the university as though it were but another step on towards the ultimate goal: "on the whole connections between training schools and universities seem to be multiplying and their cooperation in the teaching of nurses will doubtless be of increasing value." One would feel happier if this advance were chronicled with a more critical pen. The story of nursing since Florence Nightingale cannot be told intelligently without a grasp of the developments which have been going on in the outer world, and an assessment of the manner in which they have obtruded themselves into the handling of nursing questions. A good example of such is the over development of university-ism in America, and its effects upon nursing in the American hospitals. It is sad that it should be accepted uncritically over here.

OPPORTUNITY

We in Britain have now an opportunity unparalleled in the history of nursing. We have the better elements of the old tradition still with us, and we are now about to reverse one, if not both, of the two great mistakes made thirty years ago. Nursing education was then tidied up without the provision of educational funds, and thereby to a large extent stultified: and a single State examination was adopted with scarce a thought given to the alternative policy of control through the training schools. Within the framework of the new Act we have the power to embark upon experiments. Are our minds sufficiently clear to make good use of this opportunity? Or is our whole conception of what is open to us so choked by a firm belief in progress since 1919 that we cannot see that we may have to retrace our steps before we can advance?

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"Now" said Mr. Bevan, "we have to show that our administrative machinery is sufficiently gripping to enable us to say with some degree of predictability what the Health Service is likely to cost. Therefore we must have economies in order to have expansions. If the Health Service is to live within its estimates any improvement in any particular part of the service must necessarily come out of the economies in some other part. Next year is an exceedingly important one. If at the end of it we can say—and I am sure we shall—that this vast apparatus is entirely within our management and control we shall have won the most important battle in the development of the service."

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WHEN the Medical Bill was considered in Committee in the House of Lords on May 4, Lord WEBB-JOHNSON moved an amendment to clause 2 to avoid the rigid laying down of a period of not less than 12 months for intern service. He hoped this might enable the reform to be put into operation earlier. It would also leave the General Medical Council free discretion in times of difficulty—when dealing with demands for doctors for the Forces, for example—to vary the regulations and the period according to need.

Lord SHEPHERD, speaking for the Government, pointed out that the Goodenough Committee were firmly of the opinion that the period ought to be not less than 12 months. Moreover, he believed that the supporters of Lord Webb-Johnson's amendment did not consider twelve months to be too long but merely wished to solve possible difficulties at the beginning of the scheme, or in times of national stress. In that spirit he was authorised to accept the amendment, and it was agreed to.

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Lord MORAN said that doctors felt very strongly about many of the matters that came before the G.M.C., and therefore he felt that those who were in possession of greater detachment, and could dispassionately review these matters, were of great value. For that reason he supported Lord Hacking. Lord SHEPHERD said that the Government had a good deal of sympathy for the object behind the amendment, but they could not accept the full demand which Lord Hacking had made. The disciplinary committee must be predominantly a committee upon which medical experience figured. If Lord Hacking would alter his amendment to allow for two laymen to be appointed the Government would accept it. On the suggestion of Lord LLEWELLIN it was agreed that the amendment should read "at least two" in order that the council could appoint more laymen if they wished to do so. In this form the amendment was accepted.

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Lord SHEPHERD was able to report that as a result of discussions between representatives of the two bodies an agreement had been arrived at that the university inspectors would act also for the G.M.C. Lord LLEWELLIN pointed out that this agreement might not last permanently. He thought it would be helpful if the matter were placed in the hands of the Government of the day. Lord SHEPHERD said that if Lord Moran would withdraw his amendment he would undertake to look at the matter again before the report stage in the light of what Lord Llewellin had said, and the amendment was by leave withdrawn.

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POWERS OF INSPECTION

On clause 20, Lord MORAN moved an amendment to avoid unnecessary multiplication of inspections of medical schools. It was not, he said, that he believed that such inspections served no useful purpose. On the contrary, during the 25 years he was dean of a medical school he was convinced that these inspections quickened the pulse of a school which had become indolent and led to a review of things left undone. But there was already efficient machinery for securing those benefits. If this clause was passed as drafted the London schools would be inspected by three different bodies—the University Grants Committee, the University of London, and the General Medical Council. There were three bodies governing the policy and that was bound to create confusion. Quite apart from that disadvantage, everybody with educational interests was convinced, he thought, that the hold of London University over its constituent medical schools should be strengthened. That hold would certainly not be strengthened by setting up a rival method of inspection. He suggested that, so far as the University of London and the G.M.C. were concerned, there should be one inspection and not two. That could readily be brought about if the external inspector of London University also represented the G.M.C.

Lord SHEPHERD was able to report that as a result of discussions between representatives of the two bodies an agreement had been arrived at that the university inspectors would act also for the G.M.C. Lord LLEWELLIN pointed out that this agreement might not last permanently. He thought it would be helpful if the matter were placed in the hands of the Government of the day. Lord SHEPHERD said that if Lord Moran would withdraw his amendment he would undertake to look at the matter again before the report stage in the light of what Lord Llewellin had said, and the amendment was by leave withdrawn.

Lord WEBB-JOHNSON moved a new clause to increase from £20 to £500 the penalty imposed by the Medical Act, 1858, on any person falsely pretending to be a registered medical practitioner; and this was agreed to. The committee stage of the Bill was concluded.

National Assistance Regulations

In the House of Commons on May 3 Dr. EDITH SUMMERSKILL, Minister of National Insurance, moved that the draft National Assistance (Determination of Need) Amendment Regulations, 1950, be approved. She said that the increased purchasing power would go to the least fortunate in the community. The scale for a single adult—there was no sex differentiation—was increased by 2s. and for a married couple by 3s. 6d. With the increase now proposed for children the scale would range from 8s. for a child up to the age of five to 12s. for a child over eleven. The increase in indexed prices was something like 4%, but the increase in the scale was much higher. In March there were rather fewer than 1,200,000 cases, of whom only 700,000 were pensioners.

Dr. Summerskill pointed out that the National Assistance Act placed a duty on the board regarding blind persons and people suffering from pulmonary tuberculosis. The 1948 regulation accordingly included a special scale of allowances for these people. Broadly, that special scale provided an additional 25s. for a husband and wife both of whom were blind or undergoing treatment, and 15s. if one of them was affected. Under these special scales the board was now paying at these rates to about 45,000 blind persons and 25,000 tuberculosis cases. The tuberculosis allowances were a national investment which returned dividends of incalculable value. Not only was the worker enabled to leave his work and obtain treatment as soon as possible, but a source of infection was removed from the family. The new regulations would maintain the existing difference between the new scale and the old. The ultimate cost of these new proposals would be something in the order of £10 million. The regulations were agreed to.

QUESTION TIME

Consumption of Milk

Mr. MAURICE WEBB, Minister of Food, replying to a question, stated that it was estimated that 1,015,000,000 gallons of milk would be consumed this year by private purchasers, apart, of course, from the Welfare Scheme. The corresponding figure for last year, when for a great part of the year the non-priority allowance varied between two and three pints a week, was about 980,000,000 gallons. It would not be practicable to have a scheme for selling a fixed allowance to all consumers at a subsidised price and any balance at a higher price.

Petrol Tax and Doctors' Remuneration

Dr. CHARLES HILL asked the Minister of Health if he was aware that the increase in taxation on petrol would result in a reduction in net remuneration of general practitioners in the National Health Service, whose State remuneration was gross, and inclusive of practice expenses; and whether he would arrange for the appropriate addition to be made to the central pool for general practitioners' remuneration, so as to maintain the net remuneration at the level laid down by him.—Mr. ARTHUR BLENKINSOP replied: I cannot regard the imposition of a new tax as constituting grounds for an addition to remuneration.

Medical Students and Risk of Infection

Mr. J. H. MCKIE asked the Secretary of State for Scotland whether, in view of what happened in the recent smallpox outbreak in Glasgow, he would ensure that in future no medical student was exposed to unnecessary risk in fever cases.—Miss MARGARET HERBISON replied: Medical authorities are fully conscious of the need to control and prevent the spread of infection, and I am assured that all practicable measures are taken to reduce to a minimum the inevitable risks which medical students, like doctors and nurses, must take in their contacts with patients.

Results of Vaccination

Mr. T. G. GALBRAITH asked the Secretary of State for Scotland how many of the 14 patients recovering from smallpox had ever been vaccinated.—Miss HERBISON replied: All the patients who are recovering from smallpox had been successfully vaccinated either in infancy or later. The number concerned is 12, the diagnosis of smallpox not having been confirmed in the other 3 patients who are recovering.

Mr. GALBRAITH asked the Secretary of State for Scotland what was the percentage of infants who were vaccinated during the past twelve months up to the latest convenient date; and what was the yearly average of infants vaccinated over the 10 years previous to this.—Miss HERBISON replied: In the year ended Dec. 31, 1949, some 18% of the infants under one year of age are known to have been vaccinated, but the figures are not complete. For the ten years 1938-47 the yearly average percentage of infants vaccinated was 53

Mr. GALBRAITH: In view of the fact that all those who died of smallpox had not been successfully vaccinated what does the department intend to do to halt this decrease in the number of young people who are now being vaccinated?

Miss HERBISON: The figure of 18% is by no means the average figure for 1949. The returns from local health authorities showed a figure of 18%, but there is discussion going on now between the local health authorities and the general practitioners about their returns which have not yet been made. We hope that at the meeting to be held in the near future some arrangements will be made and the returns will come in. Until they do come in we cannot get the correct percentage. As regards future action, we must wait until we have the complete figures, although we realise the seriousness of the position and are hoping that the recent smallpox scare will make the public realise how important this is. Every step will be taken by the department, as in the case of diphtheria immunisation, to have children vaccinated.

Waiting-list for Hearing-aids

Replying to a question Mr. BEVAN stated that the size of the waiting-list for hearing-aids amounts to about 86,000. Distribution facilities were being increased, and would be further increased as circumstances allowed; but he was not prepared to adopt arrangements which did not include adequate instruction in the use of deaf-aids.

Colonial Medical Service

Commander A. H. P. NOBLE asked the Secretary of State for the Colonies what was the number of vacancies existing for medical officers in the Colonial Medical Service.—Mr. JAMES GRIFFITHS replied: There are 213 vacancies for medical officers in the Colonial Medical Service.

Suppression of Dust in Mines

Dr. BARNETT STROSS asked the Minister of Fuel and Power what use had been made of chemical detergents in the suppression of dust in coalmines; and how far they had been proved to be of value.—Mr. P. NOEL-BAKER replied: The use of chemical detergents as wetting agents in the suppression of dust is under experimental trial at many coalmines. They are giving promising results, particularly in the consolidation of deposits of dry dust on mine roadways and in mines where the underground conditions make it desirable to use as little water as possible. The National Coal Board and H.M. Inspectors of Mines continue to give close attention to the matter.

Coroners' Powers

Mr. ANTHONY MARLOWE asked the Home Secretary how many coroners had no legal qualification; under what authority they admitted hearsay evidence; in what circumstances they might exclude the press from an inquest or hold an inquest in camera; whether they were required to make and preserve records of evidence given before them; and what steps were taken to ensure uniformity of procedure in coroners' courts.—Mr. CHUTER EDE replied: The information asked for in the first part of the question is not available. The coroner's discretion as to what evidence should be admitted at an inquest is vested in him by Common Law. While a coroner's court is ordinarily open to the public the High Court confirmed in 1827 that the coroner has a discretion under the Common Law to hold an inquest in private for reasons which appear to him necessary and proper. Coroners are by statute required to take depositions in cases of murder and manslaughter. It is generally accepted that they should keep these records and should also keep records of the evidence in other cases. Coroners are independent judicial officers who are not answerable to any Government department, but are bound by the Common Law and the provisions of the relevant Acts and rules made thereunder.

Mr. MARLOWE: Does not the Minister think that all this discloses a rather unsatisfactory condition in coroners' courts and that it is time legislation was introduced to secure some form of uniformity? In view of his answer last week [1] that his would arouse controversy, does he not think that each f these suggestions could pass through this House without ny political controversy? Mr. EDE: I am not sure that ave "noncontroversial" matters would not develop into ontroversy.

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[1] See *Lancet*, May 6, p 876.

Mr. LESLIE HALE: In view of the fact that no verdict of a oroner's inquest can be mentioned at subsequent proceedings, and that it is now general to adjourn pending proceedings, does he think that coroners' courts now serve any purpose to the community?

Mr. EDE: Oh yes, I think they have their uses.

Earl WINTERTON: Is the Minister aware that there is a very considerable depth of feeling, legal and otherwise, that this whole matter needs review by this House? Mr. EDE: I think it is a matter which, when there is time, might advantageously be considered.

Reciprocal Arrangements for National Insurance

Replying to a question, Dr. EDITH SUMMERSKILL, Minister of National Insurance, stated that reciprocal arrangements were in operation with Northern Ireland and the Isle of Man for national insurance, industrial injuries insurance, and family allowances, with the Irish Republic for sickness, maternity, and unemployment benefits and for the insurance of seamen, with New Zealand for family allowances, and with France for national insurance and industrial injuries insurance. It was hoped that a multilateral agreement on social security, signed by the five Brussels Treaty Powers, would be ratified by this country next month. Negotiations were taking place for further agreements with Australia, New Zealand, the Irish Republic, France, Belgium, the Netherlands, Luxembourg, and Denmark.

Hospital Accounts

In answer to a question, Mr. A. BEVAN stated that, as required by the National Health Service Act, summary hospital accounts would be presented to Parliament annually and the first such account would be available shortly.

Air Commodore A. V. HARVEY: Would it not be better for all hospitals to publish their own accounts, which would lead to greater efficiency and understanding among the staffs? Mr. BEVAN: If hospitals published accounts to the public before they were published for the benefit of the House of Commons, it would be a breach of privilege. Mr. GEOFFREY COOPER: Would the Minister consider making the fullest financial information available to hospital management committees? They cannot carry out their job unless they have the fullest access to financial details. Mr. BEVAN: I should be astonished to learn that hospital management committees do not know of their own accounts. That is entirely different from the public having access to the accounts before they are presented to Parliament.

Replying to Sir RALPH GLYN, Mr. BEVAN said that in the last few weeks he had addressed conferences of chairmen of boards of governors of teaching hospitals, regional hospital boards, and hospital management committees at which he had reported that the Ministry were now issuing standard accounts. Mr. R. S. HUDSON: When the accounts have been published for the benefit of Parliament, will the accounts of local hospitals be available locally? Mr. BEVAN: I will look into it, but I see no special reason why they should not be, because I am hoping to encourage local hospitals to hold annual open meetings at which they can discuss their affairs.

Mass X-ray Examination of School-children

Mr. ARTHUR LEWIS asked the Minister if he would arrange for mass X-ray units to carry out a regular examination of all school-children.—Mr. BEVAN replied: I am advised that mass radiography can most usefully be applied to adults, but so far as possible examinations of children, particularly at school-leaving age, are also undertaken.

Reciprocal Medical Services

Sir WALDRON SMITHERS asked the Minister, in view of the fact that free health services were extended to foreigners coming to this country, with which countries he had now arranged for the giving of reciprocal facilities.—Mr. BEVAN replied: A convention on social and medical assistance with Belgium, France, Luxembourg, and the Netherlands has been signed and awaits ratification. Another agreement on details has also been signed. The arrangement is that nationals of any one of these countries, who are without sufficient means and who lawfully reside in the territories of another, can benefit by the medical and social legislation of the country in which they are.

In England Now

A Running Commentary by Peripatetic Correspondents

"PATRIOTIC PÆDIATRIC REGISTRARS MOVE ON ADAM STREET. RIOTS IN THE STRAND."

Newspaper headlines? Well, not quite, but the peripat last week (p. 877) who said "There is something in the practice of pædiatrics which drives out the nobler virtues" ought to have visited Windermere in his wanderings. The annual meeting of the British Pædiatric Association recently held there was far from lacking in the nobler virtues, if friendliness, encouragement of juniors, and simplicity of outlook, with the welfare of the child as the underlying interest of all present, are worthy of being called noble. The timing of his alleged telegram and of his communication are both suspicious. Can it be that he failed to secure election to membership of the B.P.A.? If an intense concern about the younger members of the community is not patriotism there is something wrong with terminology. The reasons given for the fall in infant mortality range from better feeding to the disappearance of horses from the streets; it is seldom that anyone pats the pædiatrician on the back. And now this peripat expresses doubt whether the coefficient of patriotism is high among us. It's almost as bad as the House of Lords. Perhaps Lord V—t is a secret peripat? Hoots, toots, as Sir Robert Hutchison used to say when someone made a stupid diagnosis. Our pædiatric registrars are patriotic to a man. Of course it *is* a difficult word for the uneducated. There was that dreadful year when the menu card called us "Pæderastic." Fortunately women had not been admitted to membership then. But patriotic!—You only have to look at the name of the Association.

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So far, in the journals or standard textbooks, I have seen no mention of Steinharger disease, which occurs in two forms, acute and chronic. Acute attacks used to be quite common, especially around Hogmanay, but in these days of heavy taxation a classical case is becoming a rarity. I am therefore describing an epidemic which occurred in Germany in recent years, even though the data are incomplete.

Just after the surrender of the German Army it was reported to higher authority that, in a group of villages, one of which was called Steinharger, not far from the city of Bielefeld, there were a large number of gin factories. The inhabitants were said to be running them at high pressure and selling the product on the black market, chiefly to their fellow villagers, who were suffering terribly as a result and were causing a serious annoyance to the Allied troops, who were trying to live a quiet life and forget all the violence and other unpleasantnesses of war.

A battalion of troops was therefore sent to the district to garrison the villages and prevent the liquor being produced. Meanwhile, the brass-hats devised plans to ensure that, when the factories were restarted, the finished product would be directed through the proper channels—namely, the digestive channels of the officers, W.O.s, and sergeants of the B.L.A.

Unfortunately, when the battalion arrived all ranks became unconscious within a few hours, and the manufacture of the liquor proceeded at a steadily increasing rate as neighbouring units discovered that it was to be had for a cigarette a bottle.

When the garrison of Steinharger had failed to indent for its liquor ration for the second month in succession, it was realised that something was really wrong. A staff officer was sent to investigate. He returned some days later with his vehicle badly damaged, looking very ill. In due course he made his report.

As a result of this report a new battalion (shall we call them the Loamshires?) was detailed to take over the garrison duties and to assist the present garrison (the Blankshires?) to bury their dead, evacuate their sick, and transport the survivors to quarters where they might rest and recuperate. The C.O. of the Loamshires was also instructed to convey to his opposite number in the Blankshires the compliments of a certain very high officer, together with a bowler hat.

Unfortunately, on their arrival, the Loamshires were unable to identify any individual member of the Blankshires; nor could they distinguish the dead from the dying. So they loaded the Blankshires into the Blankshires' transport, together with such articles of the Blankshires' equipment as the Loamshires had no need for, towed the whole unit to a nearby bit of waste land, and left it there.

Then they all returned to their new quarters and were almost immediately struck down. Within 3 hours, no-one was conscious except one Irishman, who was roaring round in a manic state looking vainly for someone to fight. So then the Loamshires were replaced and several more units took their turns, with similar results.

Between the parties, the staff had been working on the "*Steinharger Plan*," which would render a garrison unnecessary. With the coöperation of the Military Government they rationed the raw materials to the factories of the Steinharger Group and demanded such a vast quantity of the finished product (containing 25% ethyl alcohol) that they were sure that the manufacturers would soon exhaust their stocks and then they could institute a rigid system of control with each potato and each spoonful of gin accounted for in triplicate.

In those happy days German manufacturers never dreamt of disobeying an order from a high military authority. So they produced quarts out of pint pots week after week, and yet still had plenty left for their friends at an exorbitant price. How this was done has never been divulged, but some economists contend that the phenomenon was in some way connected with the high price of potatoes on the neighbouring black market at that time.

Thus we have a series of localised, independent yet connected outbreaks of acute Steinharger disease in comparable communities of 500–800 healthy young adult males. Oddly enough, though a good many doctors were present throughout the epidemics, none of them has been reported, and this communication has had to be based entirely on information from non-medical sources. The explanation may be that in each epidemic the doctor was among the first to succumb. And after this disease there is always a total amnesia covering the period of the illness. It says a lot for the spirit of these doctors that, though each must have known what was in store for him when he arrived in the Steinharger area, there is no record of any doctor trying to avoid such a posting. On the contrary, the local A.D.M.S. received many offers from medical men willing to fight the Scourge of Steinharger.

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I am surprised that none of the writers replying to Dr. Learoyd's "carnage on the roads" article has expanded his "small psychological point . . . which is the basis of a big proportion of road accidents."

This "display of superiority" is the manifestation in motorists of a syndrome which is of growing psychiatric interest elsewhere. The possession of a motor-car has an effect on an unstable personality exactly like that which comes from the possession of a gun, a uniform, or political office. It insulates him from personal contacts, it gives him a sense of power and exhilaration, and it provides a platform for psychopathic gestures against other people. If one is aggressive as a pedestrian and jostles people, or shouts abuse at those who don't move, one is faced with the possibility of remonstrance—on wheels, one is insulated. A windscreen is a very good Iron Curtain. How far this dissociation and release can go was illustrated, for me at least, by a professional colleague of mild deportment who, when rudely overtaken, let go of the wheel, placed his thumbs in the corners of his mouth, prolonged that orifice in the direction of his ears, and stuck out his tongue. For that matter, I myself have on two occasions made fat bacon at other motorists, a gesture typical of small boys and delegates to the League of Nations. Insulation, power, and a platform. One finds them in a car or in becoming a national leader. We might make a few candidates for office drive from Land's End to John o' Groats under unobtrusive photographic observation.

Letters to the Editor

SYMPATHECTOMY IN HYPERTENSION

SIR,—Physicians frequently adopt a rather gloomy attitude towards surgical therapy, and Professor Platt and Dr. Stanbury, in their article of April 8, are no exception. Their bland assurance that the better results claimed by others may be due to fundamental misconceptions may be somewhat misleading. Could it possibly be that Platt and Stanbury themselves have made the wrong approach?

It can never be too strongly stated that a small, rapidly performed, subdiaphragmatic denervation is sufficient for symptomatic relief in hypertension, and that it is both unnecessary and very risky to expose the advanced brittle type of hypertensive to more. One would have thought that this fundamental fact was now well known, and that the pursuit of the mirage of normal tension in such cases was long abandoned. At the same time this symptomatic relief is one of the greatest blessings conferred by sympathectomy, and the mode of its production is one that Professor Platt might profitably consider, more particularly because the relief is certainly not functional and non-specific.

His criteria for operability in the early case—always a difficult decision, even with many years' experience—are far in excess of those generally allowed in other reports. This applies particularly to the high diastolic figure of 120 mm. Hg as a necessary minimum prerequisite to operation. Careful consideration of the patient's symptoms and his family history will be of far greater importance than any such arbitrary level. Symptoms determine the operability—one does not operate in their absence, but one frequently operates for their alleviation alone. This is a simple but *well-proven* axiom. The early case suffering the ill effects of hypertension can have his blood-pressure reduced to normal and his symptoms relieved. In the late case symptomatic relief is all that one can expect.

Professor Platt's paper, with its grim operative mortalities, is an example of what can happen when the right operation is applied to the wrong person. Professor Boyd's well-known skill would have been better applied to less damaged cases. That simple little maxim—the small operation for the late case, the large operation for the early one—is worth considering in the sphere of hypertensive sympathectomy.

I find myself in agreement with the views expressed in the letters of Professor Wells and Mr. Shucksmith (April 22). My experience of these operations now extends over six years and over a hundred cases.

Only 3 have died, and only 1 died within six months of the operation. In many cases symptomatic relief and abolition of visceral damage (the latter largely ignored in Platt's paper) was all that was sought. In nearly half the cases a reduction to normal or near-normal was aimed at, generally by the classical Smithwick procedure. The results are very satisfactory in both groups, and certainly merit continuation of the procedure, at least until the introduction of some adequate and simple medical therapy. This was originally reported in 1946,[1] and a further article is being prepared.

My anæsthetist colleagues would like me to comment on the blood-pressure chart exhibited by Professor Platt and Dr. Stanbury to demonstrate the analeptic action of 'Methedrine' in such cases. We have been using this drug to maintain the blood-pressure unshaken during operation and for 36 hours afterwards for over four years. Indeed, I thought this was a widely established routine, as it should be. It is regrettable that Professor Platt did not discover its value until late in his series. No oubt with this and some further modifications in his pproach to the problem, his next series will be more appily in keeping with general world statistics.

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[1] FitzGerald, P. A. *Irish J. med. Sci.* April, 1946, p. 109.

Dublin. PATRICK FITZGERALD.

AMNIOTIC GRAFTS IN CHRONIC SKIN ULCERATION

SIR,—The interesting paper last week by Mr. Troensegaard-Hansen suggests by its title a basic misconception. The word graft means "transplanted living tissue," and it is quite certain that amnion which has been "boiled for seven minutes in normal saline" is in no sense living. The use of amnion, boiled or dried, to repair dural defects or to enclose repaired tendons offers no support for Mr. Troensegaard-Hansen's ingenuous assumption that this membrane "possesses some specific healing power." Neurosurgeons also use 'Tantalum' plates, and other surgeons use sterile 'Cellophane'; but these, though inert, are certainly without "specific healing power." Amniotic membrane was at one time widely used for conjunctival lesions, such as lime burns, but ophthalmologists have now generally abandoned it in favour of better methods that involve the use of living tissues.

The good results which Mr. Troensegaard-Hansen reports are encouraging, but they are notably similar to those claimed by others for the Bunyan-Stannard envelope and for aluminium foil, though neither of these materials have ever been miscalled a "graft." It would, however, be a pity if these useful methods excluded the proper application of autogenous skin, either as a free graft or as a cross-leg flap. This, in conjunction with the necessary sympathetic or vein surgery, must remain the best method for the worst ulcers, and is often the only procedure likely to command success.

The Queen Victoria Hospital,
East Grinstead, Sussex. C. R. MCLAUGHLIN.

P.A.S.

SIR,—In view of recent advertisements in the medical press for a newly introduced brand of sodium *p*-aminosalicylate, it may be opportune to summarise some facts about the various forms of P.A.S. available for the treatment of tuberculosis.

This drug is obtainable in a high state of purity in the form of the free acid and its sodium salt. For the guidance of clinical workers it should be stated that the sodium salt is not an innovation of recent months, but has been in use in this country for two to three years. It is, in fact, the form of P.A.S. most widely used in Great Britain and various other countries.

Little has so far been published on the toxic effects of long-continued administration in the high dosage employed, nor does the literature indicate that *Mycobacterium tuberculosis* is unable to develop strains resistant to the drug.[1] Toxic effects believed to be due to a disturbance of sodium-potassium levels have recently been observed in a number of cases following administration of the drug over a long period in the form of its sodium salt.[2] Accordingly, until more clinical experience has been reported, the sodium salt should be used with discretion.

On the positive side, clinical literature indicates that the drug has value as a tuberculostatic agent, particularly when given in combination with streptomycin.[3]

Herts Pharmaceuticals Ltd.,
Welwyn Garden City. D. E. SEYMOUR
Research Manager.

Ward, Blenkinsop & Co. Ltd.,
London, W.1. A. A. GOLDBERG
Research Manager.

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[1] E.g., Delaude, A., Karlson, A. G., Carr, D. T., Feldman, W. H., Pfuetze, K. H. *Proc. Mayo Clin.* 1949, 24, 341; Carstensen, B., Linde Andersen, K. *Lancet*, May 6, p. 878.

[2] E.g., Cayley, F. E. De W. *Lancet*, March 11, p. 447.

[3] E.g., Medical Research Council Preliminary Statement. *Ibid*, 1949, ii, 1237.

DEOXYCORTONE WITH ASCORBIC ACID IN MENTAL DISORDER

SIR,—The use of deoxycortone with ascorbic acid in psychiatric practice may well be widely promoted by the deduction of Dr. Cranswick and Mr. Hall (March 25) of "a close correlation between the reaction of patients to this form of treatment and to electro-convulsive therapy" in the experiment they describe. (One presumes this correlation is deduced from more than the two cases they actually state were given E.C.T. during the investigation "to compare the clinical and biochemical changes.")

It might be assumed that the benefits of E.C.T. may be obtained by this method without the convulsion, memory disturbance, and so forth, which would indeed be an advance; and I therefore feel that it is urgently necessary to record, briefly, entirely contrary results, obtained in December, 1949, with this combination of substances.

The trial by Cranswick and Hall consisted in injecting a number of individuals with the combination and noting any effects. Here, in 9 subjects, of whom 8 were selected (accurately as it transpired) as likely to benefit from E.C.T., the reactions to deoxycortone with ascorbic acid were compared with those to distilled water similarly injected and with those to E.C.T. For the purposes of a letter the following results may be sufficiently illustrative:

1. A middle-aged Polish man, admitted following a determined, mutilating, suicidal attempt, in depressive stupor, inaccessible, immobile, requiring tube-feeding and continuous nursing, remained absolutely unchanged over five days while given daily treatments thrice with deoxycortone and ascorbic acid, according to Lewin and Wassén's technique. He was then given E.C.T. with immediate improvement and ensuing remission.

2. A middle-aged man in his second attack of depression, retarded, with mask-like face, pessimistic, self-reproaching, remained unchanged over five days while given daily treatment thrice with deoxycortone and ascorbic acid and once with distilled water. He was then given E.C.T., responding immediately with subsequent remission.

The pitfalls in assessing therapies in psychiatry are notorious, and it is doubtful if transitory emotional and behavioural reactions of a miscellaneous series of cases to one or a few injections can lead even to any "suggestive" conclusions.

How potent suggestion can be and how easy it might be to make a case for distilled water as meriting "cautious systematic trials," for which Cranswick and Hall plead on behalf of deoxycortone and ascorbic acid, is clear from the example of a long-standing paranoid schizophrenic. She said she was suffering with "Bright's disease, coronary thrombosis, pulmonary T.B., hypertension, and heart block" and had to be given the distilled-water injections with more than verbal persuasion, opposing it as an attempt to put her out of the way. By the next day she was remarkably changed, up and out of bed, friendly, helping in the ward work, and, though presenting the same delusions, subjectively better. Her description was that after the injections she felt worn out and faint with pain over her heart, later in the day becoming aware of distinct benefit.

Almost any treatment, provided that it can be coupled with enthusiasm, will bring brief improvements and occasional successes in psychiatric cases, and there is nothing in Cranswick and Hall's uncontrolled experiments that does not exemplify this or that indicates any specific benefits with deoxycortone and ascorbic acid.

Deoxycortone is expensive (5s. per 5 mg. ampoule) and not free from dangers, and it will be a pity if mental-hospital funds are diverted on any large scale to its purchase with so little justification.

Netherne Hospital,
Coulsdon, Surrey. HAROLD BOURNE.

indeed, the outlook is grim. This method, in my experience, is suitable for only a small proportion of private patients, and is, in effect, null and void for psychiatric outpatients. When sufferers from chronic anxiety, however, seek help, they seem to deserve more dextrous consideration than can be provided by common-sense clichés or irrelevant physical methods in psychiatry; and this holds, despite the fact that only a minority of these invalids are able to benefit from profound psychological interference.

Subacute episodes, arising in patients with an established background of mild persisting anxiety, are common events in psychiatric practice. Competent management of these cases requires a skilled technique founded on special knowledge. In many of these instances, given adequate handling, recovery can be achieved, and—even more important—the effects of anxiety-dictated outbursts, which bring such material and spiritual distress in their train, avoided. It is in this sphere, perhaps, that the medical psychologist makes his practical contribution to therapeutics in general. Total psychotherapy elicits new facts, and this is of immense importance; but the significance of the information so obtained is of interest only to those with special equipment.

Practitioners of every variant have a common concern in the results of treatment; this is, perhaps, the most secure basis for a modus vivendi between a psychotherapist and his colleagues. Protestants against psychiatric departments being converted into "therapeutic dustbins" have, to my knowledge, waxed eloquent for a quarter of a century; there is still no sign of a second Reformation.

London, W.1. MURDO MACKENZIE.

PURIFICATION OF VACCINE LYMPH

SIR,—Dr. McClean's article[1] and the subsequent correspondence[2] prompts me to add my own experience in vaccine-lymph production, with emphasis on methods of reducing the bacterial count.

For some years none of the methods in use to achieve this result gave me satisfaction. These included the use of clove-oil, chloroform, and phenol. The first was almost useless, and the second in our experience difficult, time-consuming, and definitely destructive of potency of the lymph. Phenol, 0·5% with glycerin-saline, proved useful, but still failed to reduce the count sufficiently unless allowed to act over a long period of time. I finally devised and used a method based on a suggestion made to me in 1934 by Dr. James Craigie, who at the time was working in the Connaught laboratories of the University of Toronto. This method proved so completely satisfactory that it was incorporated into routine usage in the Bacteriological Institute, Hong-Kong, and was still our standard practice until my retirement in 1947. I made a brief report of the method to the Congress of the Far Eastern Association of Tropical Medicine at Hanoi in 1938.[3]

Briefly, this method consists in the addition of 2% anæsthetic ether to the fully prepared and diluted lymph. The mixture is vigorously shaken for a few minutes and placed in the refrigerator for 10–14 days. The bacterial count after this period will invariably prove to be somewhere in the region of 2000 per ml. or less. There is no loss of potency. At first we used to remove the ether by bubbling air through the lymph, but found that this was unnecessary; instead we plugged the container with a cotton plug and allowed normal evaporation to take place.

Anything simpler than this method would be hard to imagine, and I would be most interested to hear of other workers' experience with it.

Barbados, British West Indies. A. V. GREAVES.

GENERAL PRACTICE TODAY

SIR,—I was surprised and pained by the number of your correspondents who interpreted Dr. Collings's report as a slap in the face for British general practice. No-one can yet tell whether or not it surveyed a representative sample. I myself, since I have decided to return to England to take up general practice, sincerely hope it was not, but I cannot suppress an inner fear that it may be.

Anyone who has worked in an industrial practice such as Dr. Collings describes with Dickensian vividness, as did one of my brothers, will accept his report. Those who regard him as unsympathetic to British general practitioners can only have gained such an impression by dipping into the report here and there to read his more lurid examples of practices encountered.

Canadian and American doctors have lost much of the British general practitioner's skill in human relationships and ability to help in family problems affecting the patient; but that seems no reason for us to sneer at the first-class organisation and equipment of the average Canadian doctor's "office." Clerical and technical assistance, with facilities for simple investigations, such as blood-counts and erythrocyte-sedimentation rates, are the rule rather than the exception.

The strenuously maintained medical myth that a salaried person cannot do his work conscientiously is preventing the most logical solution to the problem of over-large lists. This idea seems absolutely fantastic to the vast numbers of competent, conscientious, professional men who earn their income by salary in this modern world. As far as the doctor himself is concerned, the present system of payment seems to perpetuate most of the disadvantages of the old system, while I very much doubt that it squeezes any additional public service from him. The quality of service rendered by a doctor in a given environment is influenced solely by his conscience, training, and sensitivity to public opinion—roughly in that order.

Department of Bacteriology,
University of Saskatchewan,
Saskatoon, Canada.

A. G. RICHARDS.

SIR,—Until it is decided what constitutes a G.P.'s work and how many patients he can adequately treat, we shall get nowhere. At one end of the scale are the men with small practices, suffering financial hardship but trying to practise good medicine with as many investigations as they can; at the other end are the four-thousand odd being given the best service that can be expected from overworked and harassed doctors. Quality brings bankruptcy: quantity does have some financial reward.

Mr. Somerville Hastings (May 6) would like to see a full-time salaried service—*after* health centres are established, I hope. Where are our promised health centres with the equipment we need? At hospital, porters, nurses, sisters are there with a specified task. The doctors take one history whilst other patients undress. A clinical examination made, the appropriate investigation is then ordered. Nurses clean the instruments used or attend to dressings. Many persons take part in giving service which is expected of the G.P. single-handed. No hospital doctor pays for his own equipment, clerical assistance, or nursing. Neither does he maintain a car for the sake of his patients; there are ambulances. He does not pay for electricity, heating, cleaning, telephones, postage on pathological specimens, or stationery. All these are essential for five hundred or four thousand patients.

There has been a big revolution in our conception of diagnosis and treatment for the individual patient. The old surgery and waiting-room are things of the past. We cannot work without the health centre and its

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1. McClean, D. *Lancet*, 1949, ii, 476.
2. Rao, R. S. *Ibid*, Feb. 18, p. 328. McClean, D. *Ibid*, March 4, p. 421.
3. C.R. Xe Congrès F.E.A.T.M. Hanoi, 1940; vol. II, p. 305.

tendant equipment and assistants. If we G.P.s will only ut our house in order and demand this, we might begin get a solution to our difficulties.

Wigmore, Kent. GORDON STRONG.

SIR,—"Ex-Student's" criticisms last week of his own medical education point to some of the difficulties of the process. That it should have led him to state that "there seems no way in which the general practitioner . . can get access to laboratory facilities which would put his work on a scientific basis" is greatly to be deplored. It is the kind of sentence with great implications which is too readily acceptable. There is no difference in kind between hearing râles through a stethoscope and counting white blood-cells through a microscope. They are both observations of certain degrees of accuracy, though neither is as accurate an observation as measuring the circumference of a limb with a tape-measure. Scientific medicine is the treatment of such observations by the scientific method, and is therefore by no means beholden to the laboratory alone.

In saying this, I do not in the least wish to diminish the point your correspondent had in mind—namely, that laboratory facilities should be available in general practice.

Dunn Laboratories, St. Bartholomew's Hospital, London, E.C.1. C. J. LONGLAND.

"VARICOSE ULCER"

SIR,—One is rarely afforded the opportunity of criticising two articles in a single issue of your journal, but the papers by Dr. Bull and Dr. Fraser (myxœdema from resorcinol ointment) and Mr. Troensegaard-Hansen (amniotic grafts), both of May 6, contain two small related items which provide an apt demonstration of a confusion of clinical thought which is all too common.

Boyd[1] has said that surgery may be divided into two parts—before John Hunter and after. In the same way, ulcers of the leg may be divided into two groups—varicose ulcers and others, or, as some of us like to think, before Dickson Wright and after. Varicose ulcer is a simple, clear-cut entity. It is due to circulatory stasis and tissue malnutrition caused by the back-pressure within varicose veins (and by "varicose veins" I mean not just "visible veins," but veins with an incompetent valve, commonly the saphenofemoral, between the superficial and deep venous systems of the lower limb). Dickson Wright,[2] who showed this clearly in 1931, also forcibly demonstrated that true varicose ulcers can be healed by properly applied pressure bandages with the patients ambulatory and performing their normal work—not laid up in bed for ten weeks. A varicose ulcer will heal with the patient confined strictly to bed, the foot of which is raised.

But what of the other group—the non-varicose ulcers? Here we have a different story. The causes are almost as numerous as the ulcers themselves, and they must be treated according to their lights, if the impenetrable gloom which surrounds them is to be illuminated by a shaft of epithelium. Dr. Bull and Dr. Fraser, in case 3, describe a "left white leg which soon became complicated by a varicose ulcer." Had they said "complicated by a post-thrombotic gravitational ulcer," it would have been more in keeping with the high standard of their carefully documented paper. Mr. Troensegaard-Hansen is as bad an offender. Cases 1 and 2 had "intermittent claudication with varicose ulceration"; surely the ulcers were due to the poor arterial blood-supply, not venous back-pressure. Case 3 had diabetic gangrene of the toe, as well as his "varicose ulcer"—this speaks for itself.

My point, Sir, is simply this: it is surely a retrograde step to advise amnion grafting and ten weeks' rest in bed for varicose ulcers (in the true sense) and to ignore the straightforward ambulatory treatment, during which the harder the patients work the better. This is not to say that I do not welcome Mr. Troensegaard-Hansen's work on amnion grafting, which may, in time, be shown to have a valuable place in the treatment of chronic non-varicose leg ulceration, which often fails to respond to ambulatory treatment. But we must get away from the promiscuity of diagnosis in which all ulcers of the leg are haphazardly labelled "varicose" according to their site rather than their underlying pathology.

Varicose Vein Clinic, Metropolitan Hospital, London, E.8. S. M. RIVLIN.

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1. Boyd, W. Surgical Pathology. London, 1947; p. 1.
2. Wright, A. D. *Lancet*, 1931, i, 457.

ANEURINE IN CARDIOLOGY

SIR,—After ten years' experience with aneurine (vitamin B_1) in the treatment of cardiac conditions I have come to recognise certain indications and contra-indications for its use.

Indications

(1) Extrasystoles of all three types, such as are caused by increasing age, organic heart-disease, tobacco, over-exertion, dyspepsia, generalised infections, and digitalis.

(2) Auriculo-ventricular block with lengthened P–R interval.

(3) Simple tachycardia with lowered exercise tolerance—e.g., "flabby heart" as in mild post-rheumatism cases, neurocirculatory asthenia, and heart-failure.

(4) Paroxysmal tachycardia associated with mitral stenosis.

All these conditions respond slowly but surely to aneurine 9 mg. by mouth daily. If, moreover, the patient has hypotension and a pulse-pressure less than 40 mm. Hg, a good result will be obtained within three months, but maintenance doses of 1·5–3 mg. daily seem advisable for years. Chronic alcoholics respond only to intramuscular injections—e.g., 3 mg. on alternate days. Large doses—e.g., 100 mg. t.i.d.—seem to be no more effective than small ones and can cause trouble.

Contra-indications

Only very small doses of aneurine should be given in cases of hypertension with a pulse-pressure more than 60 mm. Hg—i.e., not more than 3 mg. a day for the first week. Special care should be taken to avoid giving aneurine with riboflavine. I have seen severe anginal pain and even slight coronary thromboses follow a few days' sense of well-being as a result of high initial doses (more than 90 mg. a day) in such cases.

Aneurine should not be given within four weeks of a patient's changing to a much more bracing atmosphere.

Random Cases

The following two cases illustrate typically the value of aneurine.

CASE 1.—A woman, aged 23, had had rheumatic fever at the age of 18, when she had been confined to bed for six months. Since then she had been well but not energetic. During the past year she had noticed a gradual decrease in exercise tolerance, having had to give up tennis mid-season, and now being very tired before her day's work was done. Her heart was slightly enlarged, with soft hæmic murmurs, no organic lesions, no anæmia, and blood-pressure 100/70 mm. Hg. Simple tachycardia was diagnosed. She was given 'Bemax' 1/2 oz. daily. Four months later she could play tennis for 2 or 3 hours and work after it. Her heart was still slightly enlarged, but the murmurs had disappeared. Her blood-pressure was 120/65, and her pulse-rate at rest 65. She continued to take bemax, and seven years later she was well, and had given birth to two babies by the natural passages, without any ill effects.

CASE 2.—A man, aged 65, could walk only 50 yards on the level before the onset of dyspnœa and pain suggesting coronary atheroma. He had first had dyspnœa at the age of 46. He had auricular extrasystoles with irregularly dropped pulse beats. His blood-pressure was 130/100. Aneurine 3 mg. t.i.d. was prescribed. Three months later his pulse was regular, he had no extrasystoles, he could walk three miles or more without distress, and his blood-pressure was 150/90. He continued to take aneurine 3 mg. daily. He was seen twenty months later for recurrence of dropped beats and dyspnœa, after he had stopped taking aneurine for two months and had been digging in his garden a lot.

He was given aneurine 3 mg. t.i.d. for four months, and then 3 mg. daily from Dec. 29, 1948. On March 21, 1949, he had right lower lobar pneumonia with dry pleurisy. On April 6, 1949, he was well and ambulant, with no cardiac damage. On Jan. 6, 1950, he was still well, with blood-pressure 140/70.

Aneurine thus seems to restore the cardiac cells to normality, and may have a beneficial effect on conduction in the bundle of His.

Cromer. A. HENRY GREGSON.

VITAMIN B_{12} IN MEGALOBLASTIC ANÆMIAS

SIR,—In referring to the effect of vitamin B_{12} in megaloblastic anæmias without gastric atrophy, Dr. Tuck and Dr. Whittaker (April 22, p. 757) incorrectly abbreviate a report[1] of my remarks at the British Association meeting last year which was already too condensed to be accurate. These anæmias are a "mixed bag" and the response to vitamin B_{12} varies widely. It is true that megaloblastic anæmias of pregnancy and the puerperium in temperate climates did not respond,[2] but Patel and Kocher[3] report good results in a tropical variety of the syndrome.

Megaloblastic anæmias associated with intestinal disorders—even those encountered in this country—have not always failed to respond to vitamin B_{12}.[4 5] On the other hand, a state refractory to vitamin B_{12} may exist temporarily even in a patient presumed to have gastric atrophy. Such cases are rare. In one instance the anæmia became responsive to vitamin B_{12} only after small amounts of folic acid had been supplied.[4] This recalls the pigs of Heinle, Welch, and Pritchard,[6] which were so depleted of hæmopoietic factors that folic acid had to be given before liver extract would work, and vice versa.

The Royal Victoria Infirmary,
Newcastle upon Tyne.
C. C. UNGLEY.

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SIR,—In your issue of April 1, Dr. F. Heyman and his colleagues describe their experiences with tetraethylammonium bromide. That relief of pain, and therefrom increased motility, should be given by this remedy is in complete harmony with the theory of pain production which I give in the second edition of my *Treatment of Some Chronic and Incurable Diseases* (1947). This is an extension of Mackenzie's theory to embrace the autonomous system, especially its vasomotor system. The whole is too long to embody in a letter, but an important paragraph is:

> "Now it was pointed out above that pain stimuli pass also by the autonomous nerves which are present in all tissues; it is the stimuli which are conducted by them which I think important as pain producing, for they induce vaso-constriction in the myotome concerned and so tend to produce this local ischæmia of the nerve endings which, as a result, register pain" (p. 260).

My thesis is, in brief, that local trauma induces an adrenergic overplay causing ischæmia in the affected myotome; thus also giving a reason for so-called referred pain. In addition the theory gives help in the understanding of relief of arthritic pain from ascorbic acid with deoxycortone, both of which would tend to correct overplay of the adrenal medulla by assisting the cortex—i.e., Hallion's "law": the administration of a gland extract causes increased action of that gland. In two cases of Addison's disease I found that massive ascorbic acid resulted in considerable lightening of pigmented skin and mucosa.

But there is one aspect of pharmacologic knowledge which is lacking at present as regards drug action. Why should a vasodilator, for example, act maximally on the pathologically constricted blood-vessels and not on al the blood-vessels? It would almost seem that drug action may operate in direct proportion to the intensity of the nervous impulses in activity.

Bristol. A. T. TODD.

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SIR,—I was particularly interested in Mr. Mitchiner's letter last week because the association of which I have the honour to be president is most concerned with this problem at the moment.

Registrars at non-teaching hospitals, though they gain a very large experience, find that when they apply for promotion to a consultant post, even in a non-teaching hospital, they are severely handicapped as the appointment committee is very largely composed of teachers, and if a registrar from a non-teaching hospital is competing against a registrar from a teaching hospital the latter, though possibly junior and with less practical experience, will probably get the job. Young men tend, therefore, to hang about the teaching hospitals fearful to venture into the periphery lest they quit irrevocably the ladder of promotion.

If this state continues the non-teaching hospitals, in spite of the practical experience they afford, will be unable to get satisfactory applicants for registrar posts, and a general decline in efficiency will result. Furthermore, the disadvantages of inbreeding within the teaching hospitals will be accentuated. I am sure it would be a great advantage to both teaching and non-teaching hospitals if consultants on both had the widest experience, and I feel that registrars should be encouraged to widen their experience by a term of service in a regional hospital, not because of pious exhortations to clear the congestion at the centre and by so doing diminish the field of applicants for promotion, but because such experience would be regarded as an asset, if not an essential qualification, when appointments of consultant rank were made in either teaching or non-teaching hospitals.

H. J. MCCURRICH
President, Regional Hospitals' Consultants and Specialists Association (Non-Undergraduate Teaching Hospitals).
45, Lincoln's Inn
Fields, W.C.2.

SIR,—Mr. Mitchiner's letter last week is of importance not only to registrars but also to all those who are concerned with the staffing of medical posts abroad. In the past such posts have very largely been filled by men who chose to spend twenty or thirty years of their lives in Africa, India, or the East. Similar posts are available now. Most posts advertised for short terms of service are unattactive owing to the uncertainty as to what will happen when the contract ends.

But there are, I believe, some posts—and the number of these may increase—to which those who have special experience and higher qualifications would be welcomed for periods of from four to six years. I am thinking particularly of general physicians, general surgeons, orthopædic and ophthalmic surgeons, gynæcologists, anæsthetists, psychiatrists, and those who practise physical medicine. Here again the main problem is that of reabsorption in this country when their period of foreign service is over. I can only suggest that some or all of the regional boards, with the concurrence of the Ministry of Health, might be willing in the interests of British medicine to increase their specialist or consultant establishments to include some supernumerary posts, so as to allow of secondment of a limited number at a time for work abroad. This would involve financial arrangements being worked out between the two employers. But it is no new thing to second men in established posts in Government service in this country to Government

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1. *Brit. med. J.* 1949, ii, 646.
2. Ungley, C. C., Thompson, R. B. *Ibid*, April 22, p. 919.
3. Patel, J. C., Kocher, B. R. *Ibid*, p. 924.
4. Ungley, C. C. *Proc. R. Soc. Med.* (in the press).
5. Cooke, W. T., Peeney, A. L. P., Hawkins, C. F. *Lancet*, April 29, p. 834.
6. Heinle, R. W., Welch, A. D., Pritchard. J. A. *J. Lab. clin. Med.* 1948, 33, 1647.

posts abroad for limited periods without loss of status and pension rights, &c., on return. It might even be possible for one particular regional board in this country to develop a special liaison with one Dominion, Colonial, or Protectorate government on these lines.

The matter is urgent and demands very early consideration, though some delay seems inevitable until the various regional boards have at last been able to declare their consultant establishments.

H. C. SQUIRES
Consulting Physician to the Sudan Government.

London, W.1.

Public Health

Epidemics in Schools

IN 1929 the Medical Research Council appointed a committee to investigate epidemic and other illness in schools. An interim report, based on detailed morbidity statistics from a number of boys' and girls' public schools and some Naval schools, was published in 1938.[1] An analysis of the data collected during the years 1935–39 now appears as a sequel.[2] Taken together, the two reports present a detailed picture of the illnesses that affected a sample school-age population during ten years.

Some of the most interesting findings relate to the large, ill-defined, and ubiquitous group of nasopharyngeal infections. Influenza is shown to have been an epidemic disease essentially belonging to the spring term, with a universally high attack-rate in 1937: this presumably reflected a generalised epidemic since Influenza Deaths in Great Towns showed a corresponding peak. There was no evidence that infection in this year conferred any immunity towards a second epidemic two years later. Other nasopharyngeal infections (sore throat, colds, chills, coughs) were the commonest causes of sickness, and these also showed highest attack-rates during the spring term. An interesting finding here was an attack-rate on girls' schools 150–300% higher than on boys' schools: the difference was especially evident in the case of colds and did not apply to sore throat. A high correlation was shown between the attack-rates of otitis media and sore throat in both boys' and girls' schools, and between otitis media and all nasopharyngeal infections in boys' schools. In girls' schools, however, there was a negative correlation between otitis media and all nasopharyngeal infections. The incidence of sinusitis showed a precisely similar behaviour. The report suggests that these apparently anomalous findings were connected with the much higher attack-rate, already mentioned, in girls' schools of nasopharyngeal infections; the coughs and colds were perhaps treated more seriously and in consequence the complications were fewer. Non-muscular rheumatism, though often associated in the individual case with a history of sore throat, did not show a correlation with attack-rates of sore throat; but scarlet fever and non-muscular rheumatism showed a high correlation. In this connection it seems a great pity that no test for correlation between sore throat and scarlet fever was made, since the occurrence of cases of scarlet fever as incidents in a wider epidemic of infectious sore throat must be a common experience.

Turning to the exanthemata and mumps and whooping-cough, it is shown that these occurred more often in the spring and summer terms than in the winter term, with the exception of chickenpox. The sex-incidences did not differ significantly, except in the case of whooping-cough which occurred more often in girls. Measles showed a significantly larger number of single-case outbreaks in girls' than in boys' schools; the report suggests that this again is connected with the higher incidence of nasopharyngeal infection, already noted, in girls' schools: if the minor catarrhs are put to bed earlier, cases of measles will be more often isolated in the early infectious stages. The association between herpes zoster and chickenpox was again observed.

Another finding worth mentioning was the much lower incidence of tinea cruris in those schools that practised isolation of this complaint. The sceptical, however, may ask whether the latter finding is not due to a high rate of concealment, since isolation for what is usually a trivial complaint will not appeal to the schoolboy.

On the whole it must be admitted that this report does not throw much new light on the general problems of epidemiology. Perhaps one reason for this is that the residential school is a "semi-isolated community" only in a very limited sense, since its inmates form part of the general community for a third of the year; and no epidemic runs a natural course, because of the disruption of the community at the end of term. On the other hand the report (with its predecessor) fulfils two important purposes. In the first place it provides statistical proof of a number of phenomena which, though well recognised by many workers in school medicine, have existed only as general impressions unchecked by figures. In the second place it provides a work of reference of great value for all future workers in this field.

Smallpox

Certain cases of smallpox or suspected smallpox have come to light:

1. A girl who arrived in this country by air from Switzerland on April 28 attended the outpatient department of a London teaching hospital with a generalised rash which raised a suspicion of smallpox. All precautions were taken accordingly, pending laboratory investigations. These ultimately proved the case to be one of generalised vaccinia.

2. On May 5 a man was taken off an aeroplane due to depart from Northolt for Renfrew, with signs and symptoms of an acute illness accompanied by a rash. The airport medical officer considered there was the possibility of the case being one of smallpox, and the man, after being seen by a smallpox consultant, was removed to isolation. This man had earlier the same day landed at London Airport from Calcutta, which he had left on May 3. All the necessary administrative action was taken, including notification of the circumstances of the case to countries to which contacts were proceeding. Laboratory examinations do not confirm the original suspicion, and the case is not now regarded as one of smallpox.

3. On May 4 and 5 two patients from Halifax and one from Sowerby Bridge, adjacent to Halifax, were taken into isolation as cases of smallpox. The normal preventive measures were at once put in hand by the local authorities concerned.

Infectious Diseases in England and Wales

Disease	Week ended April				
	1	8	15	22	29*
Diphtheria	67	65	58	55	55
Dysentery	461	363	303	291	275
Encephalitis:					
Infective	1	2	3	3	1
Postinfectious	1	1	5	2	—
	29	62	57	39	73
	6320	5508	7890	6866	6380
	36	26	30	35	28
	56	28	55	39	45
	—	3	4	1	7
Pneumonia, primary or influenzal	941	703	722	660	548
Poliomyelitis:					
Paralytic	13	18	16	19	21
Non-paralytic	7	1	5	5	5
Puerperal pyrexia and fever	82	81	85	77	74
Scarlet fever	1751	1319	1386	1165	1124
Smallpox	—	—	—	1†	—
Typhoid fever	1	1	5	1	3
Whooping-cough	2488	2129	2457	2811	3276

* Not including late returns. † Imported case.

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[1] *Spec. Rep. Ser. med. Res. Coun., Lond.* no. 227. 1938.

[2] Epidemics in Schools. *Spec. Rep. Ser. med. Res. Coun., Lond.* no. 271. H.M. Stationery Office. 1950. Pp. 96, 3s.

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President, Regional Hospitals' Consultants and Specialists Association (Non-Undergraduate Teaching Hospitals).
45, Lincoln's Inn Fields, W.C.2.

SIR,—Mr. Mitchiner's letter last week is of importance not only to registrars but also to all those who are concerned with the staffing of medical posts abroad. In the past such posts have very largely been filled by men who chose to spend twenty or thirty years of their lives in Africa, India, or the East. Similar posts are available now. Most posts advertised for short terms of service are unattactive owing to the uncertainty as to what will happen when the contract ends.

But there are, I believe, some posts—and the number of these may increase—to which those who have special experience and higher qualifications would be welcomed for periods of from four to six years. I am thinking particularly of general physicians, general surgeons, orthopædic and ophthalmic surgeons, gynæcologists, anæsthetists, psychiatrists, and those who practise physical medicine. Here again the main problem is that of reabsorption in this country when their period of foreign service is over. I can only suggest that some or all of the regional boards, with the concurrence of the Ministry of Health, might be willing in the interests of British medicine to increase their specialist or consultant establishments to include some supernumerary posts, so as to allow of secondment of a limited number at a time for work abroad. This would involve financial arrangements being worked out between the two employers. But it is no new thing to second men in established posts in Government service in this country to Government

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1. *Brit. med. J.* 1949, ii, 646.
2. Ungley, C. C., Thompson, R. B. *Ibid*, April 22, p. 919.
3. Patel, J. C., Kocher, B. R. *Ibid*, p. 924.
4. Ungley, C. C. *Proc. R. Soc. Med.* (in the press).
5. Cooke, W. T., Peeney, A. L. P., Hawkins, C. F. *Lancet*, April 29, p. 834.
6. Heinle, R. W., Welch, A. D., Pritchard, J. A. *J. Lab. clin. Med.* 1948, 33, 1647.

could still recognise the good companionship and courage of their old friend."

A big man—he was over six foot and broad in proportion—Corner had done a good deal of mountaineering in his youth. Later he had turned to his other interests of mycology and architecture. He married in 1903 Miss Henrietta Henderson, who survives him with a son and two daughters.

HUBERT JOHN STARLING

M.D. LOND.

Dr. H. J. Starling, consulting surgeon to the Norfolk and Norwich Hospital, died on April 10 at the age of 76.

He was born in Bombay, where his father, the late Matthew H. Starling, was clerk of the Crown; and his elder brother was E. H. Starling, the physiologist. He returned to England for his education, and from St. Paul's School he went to Guy's Hospital where he graduated M.B. in 1897, taking his M.D. two years later. He held house-appointments at Guy's and served as a civil surgeon with the South African Field Force before settling in general practice in Norwich in 1902. For some years he was also medical officer to the Norwich prison.

Early in the 1914–18 war he was rejected for service on medical grounds, but in 1917 he was given a commission in the R.A.M.C. and attached to Colchester Military Hospital, where he worked under Sir Thomas Lewis. Here he undertook investigations into the problems of disordered action of the heart (" D.A.H.") and this interest led him to specialise in cardiology. For a time he studied under Sir James Mackenzie, and when he returned to Norwich after the war he gave up general practice to become a consultant. He was appointed to the staff of the Norfolk and Norwich Hospital and consulting cardiologist to the eastern division of the Ministry of Pensions. He was also on the staff of the Norfolk Mental Hospital and of St. Andrew's Hospital, Thorpe.

Starling's enthusiasm for cardiology continued and he became a member of the cardiac branch of the Association of Physicians and he was a founder member of the Cardiac Club. He also wrote many interesting and erudite papers on angina pectoris and coronary occlusion, and the Starling-Ford stethoscope is named after him. His practice was not however limited to this specialty and he had a wide practice in consulting medicine in East Anglia. Soon after he retired from his hospital appointment under the age-limit, in 1939, he was invited to become chairman of the Norwich medical board of the Ministry of Labour and National Service and he held this office till last year.

A colleague writes: "Starling was notable for his energy and keen interest in his profession and for his chin, indicative of thrust and determination. He had a somewhat acid wit, but he was kindly and considerate and companionable. In his latter days he was troubled by a fibrositis which curbed his energies, but his keenness and interest in his profession persisted."

Dr. Starling was prominent in Norwich musical circles and he served on the committees of the Norfolk and Norwich triennial festival and of the Norwich Philharmonic Society. He married a daughter of the late Dr. Thomas Fairbank, of Windsor, and she survives him with two sons, one of whom is Dr. Evelyn Starling, of Eccleshall, Staffs.

ERNEST MARTIN

M.B. DURH.

Dr. Martin, who died at his home in Didsbury, Manchester, on April 17, joined the staff of the Ministry of Health in 1925. After graduating M.B. from Durham University in 1906 he built up an extensive general practice in Oldham, where he was secretary to the Oldham Medical Society. On joining the Ministry he was posted first to Newcastle and then to Nottingham. He then became deputy divisional medical officer in the North-Eastern division at Leeds, and in 1936 he was appointed divisional medical officer in the North-West division. During the 1939–45 war, he was mainly concerned with the supervision of National Service medical boards in the North-West Region of the Ministry of Labour and National Service. In 1945 he successfully undertook the difficult task of setting up the regional medical service. After his retirement in 1946 he still continued to work on medical boards for the Ministry of Pensions.

B. B. writes: " Those of us who worked with Ernest Martin during the war years, and were in close touch with the man and his methods, will feel a real sense of loss at his passing. The medical boards gave full play to his remarkable organising ability, and he was immensely proud of the work they were doing, and took an intense personal interest in his doctors. Most of us were in general practice, and already overworked; boards were many and the strain was great; but he cheerily moved among us, and his advice and help were there for the asking. He was keen on efficiency, he expected a great deal and he got it. I went North with him on several occasions when he visited other boards, and I could not help being impressed by the warmth and affection with which he was always greeted, not only by his colleagues but by the whole staff. I had known him slightly for 30 years, but an ever deepening friendship began when I began to work with him. His last illness was borne with fortitude, and greatly eased by the devotion of his wife and two daughters."

Diary of the Week

MAY 14 TO 20

Monday, 15th

Royal College of Physicians, Pall Mall East, S.W.1
5 P.M. Dr. Geoffrey Evans: Arthritis of the Spine.
West London Medico-Chirurgical Society
8.30 P.M. (1, Wimpole Street, W.1.) Admiral Lord Mountevans: Antarctic Exploration. (Cavendish lecture.)

Tuesday, 16th

Royal College of Physicians
5 P.M. Sir Charles Symonds: Migraine.
University of London
5.15 P.M. (Bedford College, N.W.1.) Prof. Winifred Cullis: Women in Medicine. (Fawcett lecture.)
5.30 P.M. (University College, W.C.1.) Prof. H. Piéron (Paris): Les problèmes fondamentaux de la psychophysique dans la science actuelle. (First of two lectures in French.)
Institute of Dermatology, 5, Lisle Street, W.C.2
5 P.M. Dr. D. I. Williams: Sex Hormones in Dermatology
Edinburgh Post-Graduate Board for Medicine
5 P.M. (University New Buildings, Teviot Place.) Dr. William Evans: Common Faults in the Diagnosis of Heart-disease.

Wednesday, 17th

University of London
5.15 P.M. (University College.) Prof. F. Bremer (Brussels): Physiology of the Central Nervous System. (First of three lectures.)
North-East London Clinical Society
8 P.M. (Prince of Wales's General Hospital, Tottenham, N.15.) Dr. F. E. Camps: Clinical Application of Forensic Medicine.

Thursday, 18th

Royal Society of Tropical Medicine and Hygiene, 26, Portland Place, W.1
7.30 P.M. Prof. R. M. Gordon: Problem of Loiasis in West Africa.
Institute of Ophthalmology: Judd Street, W.C.1
5.30 P.M. Dr. D. Slome: Referred Pain.
St. George's Hospital Medical School, S.W.1
4.30 P.M. Dr. Partridge: Psychiatry demonstration.
British Medical Students Association
5.30 P.M. (Royal Free Hospital School of Medicine, W.C.1.) Dr. J. Thwaites: The Why and Wherefore of Medical Ethics.
Honyman Gillespie Lecture
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Dr. J. J. R. Duthie: Clinical Trials of Adrenocorticotrophic Hormone.
University of Dublin
4.30 P.M. (Trinity College.) Prof. L. J. Witts: The Life of the Red blood-cell. (Frederick Price lecture.)

Friday, 19th

Royal College of Physicians
5 P.M. Prof. A. A. Moncrieff: Growth and Disease.
Royal College of Obstetricians and Gynæcologists, 58, Queen Anne Street, W.1
5 P.M. Dr. Linton Snaith: Habitual Abortion.
Faculty of Radiologists
3.30 P.M. (Royal College of Surgeons, Lincoln's Inn Fields, W.C.2.) Dr. C. G. Teall: Malignant Disease in Childhood from the Viewpoint of the Diagnostic Radiologist. (Skinner lecture.)
Maida Vale Hospital Medical School, W.9
5 P.M. Dr. Helen Dimsdale: Clinical neurological demonstration.
Middlesex County Medical Society
3 P.M. (Chase Farm Hospital, Enfield.) Mr. J. A. Dunlop, Dr. G. Doel: Pseudo-obstruction of the Colon (Ogilvie's Syndrome). Dr. R. M. Millen: Essential Hypertension in Pregnancy.
Biochemical Society
2 P.M. (Physiology Institute, Newport Road, Cardiff.) Short papers.

Obituary

RONALD GREY GORDON

M.D., D.SC. EDIN., F.R.C.P.E.

Dr. R. G. Gordon was a man of wide medical experience. His first specialty was neurology, from which had grown his interest in hydrology and later in psychiatry and child guidance. This manysidedness was reflected in his appointments. He was physician to the Bath and Wessex Orthopædic Hospital, consulting physician to the Royal National Hospital for Rheumatic Diseases, and neurologist to the Stoke Colony for Mental Defectives, and he retired last year from the staff of the Royal United Hospital, on reaching the age limit, only to become geriatrician to the Bath clinical area.

Born in 1889, the son of Mr. Alexander Gordon of Broughty Ferry, he was educated at Charterhouse and Edinburgh University where he graduated M.B. with second-class honours in 1911, taking his M.D. two years later. After holding house-appointments at Edinburgh Royal Infirmary and Paddington Green Children's Hospital he settled in practice in Bath in 1913. But almost immediately he had to leave for four years' service in the R.A.M.C. On his return to Bath in 1919 he was appointed neurologist to the Ministry of Pensions south-western area, and the following year he joined the staff of the Royal Mineral Water Hospital. Appointments to his other hospitals quickly followed, and he was soon engaged in a thriving consultant practice.

When the British Medical Association meeting was held at Bath in 1925 Gordon, owing to the illness of others, had more or less to run the occasion at short notice. His ability and talent for organisation were quickly recognised and he was welcomed to the council of the association. In 1934 he succeeded Sir Robert Bolam as chairman of the journal committee of the association which he guided with skill and wisdom during a period of development and reconstruction. He was also a valued member of many other committees of the association, notably those on medical education, mental deficiency, lunacy law, the care of the elderly and infirm, and research into the cause and treatment of arthritis. He was also one of those responsible for the *Charter of Health*, and still more recently he had served on Sir Henry Cohen's committee on general practice and the training of the general practitioner. Membership of these committees made full use both of his extraordinary kindness and knowledge of human nature and of the quietly balanced judgment that he gave to people and things. It also entailed an extraordinary amount of work, and he would never have been able to accomplish all he did, with repeated journeys between Bath and London, but for his power of concentration. A colleague recalls him absorbedly writing a report oblivious of the children who played happily around him.

To this period also belonged his books on *Personality* (1926), and the *Neurotic Personality* (1927), while with F. G. Thomson he wrote *Physiological Principles of Hydrology* (1926), with R. J. A. Berry *The Mental Defective* (1931), with Maud Forrester-Brown *Paralysis in Children* (1933), and with Noel Harris and J. R. Rees an *Introduction to Psychological Medicine* (1936). In 1937 he delivered the Morison lectures to the Royal College of Physicians of Edinburgh, who had elected him to their fellowship in 1926. *The Uses and Limitations of Psychotherapy* and *The Philosophy of a Scientist* were more recent monographs in which he ably summarised his attitude to life and medicine.

In 1938 Gordon formed the 4th Southern General Hospital (T.A.), and when it was disbanded in 1942 he was appointed to the command of a general hospital in West Africa. Of his time there D. R. A. writes: "Gordon was one of those who can adapt themselves to a change of environment and make the most of the opportunities that present to an inquiring mind. His interests were chiefly centred round the medical work of the hospital, and by arranging clinical meetings and ward-rounds he was able to keep a lively atmosphere in spite of adverse conditions of climate. But his interests extended into the colony as a whole and he soon arranged for clinics in the larger villages of the colony. This added tremendously to the work of the hospital, and it is the best testimony to his enthusiasm to say that the extra work was undertaken with great willingness by the officers under his charge. His spare time was spent writing articles on subjects which ranged from Shakespeare's plays to psychological medicine. He also found time to cultivate a garden in the wilderness, the like of which has probably never been seen before or since; indeed everything he undertook was carried through with the utmost zest and enthusiasm. He was a man of infinite tact and great ability." In 1944 he was invalided home with amœbic dysentery and since then his health had not been good. He died on April 26 as he would have wished while still at work.

G. D. K. adds: "In a happy community of medical men there is usually one leader or father physician to whom all turn when any difficult decision is necessary. Such was the position of R. G. Gordon in Bath after we lost F. G. Thomson during the war. But perhaps he will best be remembered for his abilities in organising and his work in connection with the B.M.A., of which he was for many years a member of council. As a chairman of any committee he was difficult to revile, and he had the rare knack of knowing when to be patient, when to intervene, and what to say in summing up any difficult discussion. As a man he was admired and respected by all, and there could be no more pleasant colleague with whom to work."

Dr. Gordon married in 1913 Agnes Theodora Henderson, and they had two sons, both of whom are doctors.

EDRED MOSS CORNER

M.CHIR. CAMB., B.SC. LOND., F.R.C.S.

Mr. E. M. Corner, consulting surgeon to St. Thomas's Hospital and late surgeon to the Hospital for Sick Children, Great Ormond Street, died on May 2, after many years of ill health which had led to his premature retirement.

Born in 1873, the son of Francis Mead Corner, J.P., he was educated at Epsom College, where he was head prefect. A scholar and prizeman of Sidney Sussex College, Cambridge, he obtained a first-class in the natural sciences tripos in 1894, took his B.SC. Lond. the same year, and went on to St. Thomas's Hospital to complete his medical studies. As a student he had a distinguished career and he is believed to be the only candidate to be placed first in every subject of the Cambridge M.B. examination. He qualified in 1898 and obtained the F.R.C.S. in the following year.

After holding house-appointments at St. Thomas's Hospital and at Leeds he was appointed to the staff of St. Thomas's in 1900 and settled in consultant practice in Harley Street. In 1904 he was Erasmus Wilson lecturer at the Royal College of Surgeons, and in 1906 he proceeded to the M.CHIR. Camb.

During the 1914–18 war he served as a temporary major in the R.A.M.C. and he was also a consulting surgeon to Queen Mary's Hospital at Roehampton. In 1919 he delivered the Arris and Gale lectures at the Royal College of Surgeons and in the same year he gave the Harveian lecture to the Harveian Society, of which he was vice-president. He was also a vice-president of the Medical Society of London and of the Board of Advanced Studies of London University. He was for some time a visitor for King Edward's Hospital Fund. His first scientific paper was published in 1895 and he was a prolific and lucid writer. Besides many papers in surgical journals he published a number of books dealing with aspects of abdominal surgery, diseases of the male generative organs, and appendicitis.

A colleague writes: "Before he fell a victim to a familial degenerative nervous disease Edred Corner had shown every promise of a brilliant surgical career. As a student his ability was conspicuous, and later as a popular demonstrator and lecturer at the medical school at St. Thomas's his gifts of original observation and lucidity were well shown. The incipient nervous failure declared itself while he was still an assistant surgeon at St. Thomas's, and although slow and insidious it led to his resignation while he was still on the assistant staff. He showed great fortitude, and those who saw him latterly up to Dec. 14, 1949: but there was a production tax levied not merely on the cost of the books but on the postage, besides a charge on the parcel, and in some cases a transaction tax as well. Moreover when the bookseller has sold the books he has to pay a turnover tax and a local tax; and in December the French government re-imposed an import duty on all leather-bound books. Iceland, which prided itself on not taxing books, now levies a duty; Italy, Norway, and Switzerland all tax them; the Philippines let in U.S. publications free of charge but tax all others. Before the war hardly any country taxed books except the United States, which confined its taxes to books in English—thus in effect discriminating against books from the British Commonwealth; and this custom continues.

Sir Stanley points out how adversely the taxation of books affects students: "British medical and technical works have in large measure displaced German textbooks, but in some parts of the world where they are most needed the flow is reduced to a mere trickle. A doctor in Spain or an engineer in Japan may thus be kept waiting indefinitely for information readily available from British books." The remedy, he implies, must lie with an informed public opinion: "... no government finds it easy to defend the taxation or obstruction of knowledge when once it is publicly challenged. ..." Since the war more English books have been translated into other languages than ever before, largely owing to the work of the British Council in spreading knowledge of our way of life. If we believe that we have something useful to tell other nations, not merely about technical advances but also about living together in a community—and seeing how closely packed we are we manage with astonishingly little friction—then we can fully support Sir Stanley in this very reasonable protest.

University of Oxford

On April 27, the following degrees were conferred:

D.M.—A. H. James, *M. H. Hughes, *A. J. Wilmot.
B.M.—*R .C. Farrow.

* In absentia.

University of London

Mr. J. B. Hunter has been reappointed to the senate by the faculty of medicine, and Dr. E. R. Boland has been appointed in place of Sir Archibald Gray.

Sir Harold Boldero has been reappointed by the general medical schools.

The following have been recognised as teachers of the university in the faculty of medicine:

W. E. Gibb, medicine, St. Bart's; W. W. Brigden, medicine, London Hospital; E. J. Moynahan, dermatology, F. N. Glover, surgery, and A. R. F. Thompson, dental surgery, all at Guy's Hospital; M. D. Nosworthy, anæsthetics, J. Bishop Harman, medicine, Herbert Spencer, pathology, R. J. V. Battle, surgery, R. J. Furlong, orthopædics, and J. B. Kinmonth, surgery, all at St. Thomas's; F. J. G. Jefferiss, venereal diseases, St. Mary's; E. W. Hart, children's diseases, P. H. Newman, orthopædics, Middlesex; E. F. King, ophthalmology, Westminster; F. F. Cartwright, anæsthetics, King's College Hospital.

At recent examinations for the D.P.M., the following were successful:

C. F. Allfrey, A. S. Clenaghan, J. P. Crawford, Kalika-Charan Dubé, K. C. S. Edwards, H. V. W. Elwell, E. J. Harrison, Marie S. Paterson, B. H. Smith, A. D. Weatherhead, R. H. Wheeler, Lionel Wolman.

Royal College of Obstetricians and Gynæcologists

At recent examinations for the diploma in obstetrics, the following were successful:

G. W. E. Aitken, D. F. Alexander, C. L. S. Archer, Joseph Armstrong, Ahmed Abdel-Fattah Atallah, Dorothy J. Ball, D. C. Barker, Mary E. Barton, Margaret R. Bate, B. F. M. Bond, D. G. Bonham, D. C. Bracken, Malcolm Brown, T. W. Brown, Helen L. Burns, J. D. Bury, R. G. C. G. Carlson, Roma N. Chamberlain, O. W. W. Clarke, Isobel J. Cochrane, K. W. Cochrane, Maureen D. Connolly, V. H. Cooper, Margaret L. Cox, Denis Craddock, D. A. Davey, E. J. L. Davies, Joan M. S. Dawes, Sheila M. Dineen, N. A. Duncan, Evelyn S. Elliott, M. W. Elliott, B. F. Elton, M. W. Fordham, M. T. Gallagher, R. M. Gaunt, Edwina E. Green, P. B. Guastalla, Helen E. E. Gunn, Wladyslaw Guzdziol, T. S. Hall, G. A. Hanks, Joan Harper, I. R. Henderson, Margaret I. Hendric, Valentine M. Husband, G. J. G. Irvine, Kilpatrick Jack, P. D. C. Jackson, Beryl M. Joles, A. E. Kingston, J. H. Kuhn, Edward Lacy, Jean Learoyd, G. A. Lewis, Margaret S. V. Lewis, J. D. Llwelyn-Jones, Derrick Lonsdale, Eileen V. A. McGill, Christine R. Macgregor, D. A. Macleod, F. R. L. Makin, Joan Marshall, D. M. Maxwell, D. T. Methuen H. J. Messawer, Max Miller, G. W. Morrison, Margaret E. Murison, C. J. Murphy, Jean Murray-Jones, T. S. Nicol, Catherine Nolan, E. P. D. O'Neill, P. F. O'Neill, J. T. Paton, Margaret M. Platts, Harry Rees, W. J. St. E.-G. Rhys, R. P. Robertson, M. G. Rolfe, G. A. H. Sandilands, D. G. Scott, J. E. Senanayake, S. F. Shilliday, J. C. Smart, Cecily F. Statham, Sara I. Stinson, J. R. Sudbury, Audrey Sutherland, Tharmapuram Krishnasami Sundaram, J. J. Troy, Jehangir Sohrab Vazifdar, Helen B. Walker, F. E. Welch, Elizabeth J. Welford, Audrey M. Wells, Sheila M. Wheeler, David Wilkes, I. U. Young.

Royal College of Physicians of Edinburgh

At a meeting of the college held on May 2, with Sir David Henderson, the president, in the chair, Dr. Kenneth Cameron was elected to the fellowship. The following were elected to the membership:

G. M. Fyfe, Nathan Smith, Samuel Wayburne, K. L. G. Nobbs, R. C. Jackson, Marion B. Bethune, M. B. Feldman. S. B. Griffiths, D. H. Dracup, R. J. Fassina, G. W. Csonka, Nathan Sher, Velva Schrire, A. K. Sen, Lionel Stein, H. M. G. Shanly, J. N. C. Cooke, D. J. Ellison, R. L. Lyon, D. H. Abbott, V. V. Kalbian, P. O. Crossfield.

The Cullen prize "for the greatest benefit done to practical medicine during the four preceding years" was awarded to Prof. John McMichael, director of the department of medicine, Postgraduate Medical School of London.

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty on May 1, with Dr. W. R. Snodgrass, the president, in the chair, C. J. Patel and D. K. Rao were admitted fellows of faculty *qua* surgeon.

London Nursing Exhibition

In connection with the conference for nurses and midwives which the *Nursing Mirror* is organising, an exhibition of nursing will be held at Seymour Hall, Seymour Place, W.1, from Oct. 23 to 27.

London County Medical Society

The next clinical meeting of the society will be held at Highwood Hospital, Brentwood, Essex, on Thursday, June 1, at 3 P.M. Further information may be had from the hon. secretary, Mr. J. Gabe, F.R.C.S., St. Alfege's Hospital, S.E.10.

Guild of Hospital Librarians

The annual general meeting of the guild will be held at Chaucer House, Mallet Place, London, W.C.1, on Wednesday, May 17, at 6 P.M., when the speaker will be Mr. Douglas Woodruff, editor of the *Tablet*.

Sir Wilson Jameson

A complimentary dinner was given on May 3 by some of the senior Aberdeen medical graduates in London to Sir Wilson Jameson on his retirement from the Ministry of Health. Those present included Vice-Admiral C. E. Greeson, medical director-general of the Navy, and Lieut.-General Sir Neil Cantlie, director-general of Army Medical Services, and it was noted that three of the premier administrative posts in the medical services have been filled simultaneously by Aberdeen graduates. After the toast of the evening had been proposed by Prof. Andrew Topping, supported by Dr. J. Watt and Dr. Adam Gray as old classmates, and by Dr. D. D. Reid as the youngest graduate present, Prof. Robert Cruickshank presented Sir Wilson with a small memento of affection and esteem. In his reply, Sir Wilson recalled his student days in Aberdeen and spoke of Ministers and administration. The administrator, he said, must be a good listener.

On May 11, at the Ministry of Health, Sir William Douglas and Sir John Charles made a presentation to Sir Wilson Jameson on behalf of the lay and medical staff.

King Edward's Hospital Fund for London announces that Sir Wilson is joining its staff, on a part-time basis. from June 1.

Fertility Conference

A conference on fertility, which will also be the inaugural meeting of a new Society for the Study of Comparative Fertility, will be held in the house of the Zoological Society of London, Regent's Park, London, N.W.1, on Friday and Saturday, June 16 and 17. On the first day Mr. Kenneth Walker will speak on the diagnosis and treatment of male infertility; Dr. R. G. Harrison and Dr. A. G. Oettlé on pathological changes in the rat testis following ischæmia; Mr. A. S. Parkes, F.R.S., on storage of mammalian spermatozoa at low temperatures; Dr. C. A. Joël on comparative studies on semen ejaculate and testis biopsies; and Mr. C. Polge on artificial insemination in the fowl. On the following day Dr. Samuel L. Siegler will give an address on aspects of infertility and show a film on *Sterility: Its Causes, Investigations and Treatment*. Mr. I. W. Rowlands, PH.D., will speak on the breeding of dogs, and Dr. Margaret Hadley Jackson on the significance of round-cell infiltration as seen in endometrial biopsy sections; Dr. Claude Béclère will show a film on *Hysterosalpingography in the Diagnosis and Treatment of Sterility*; Mr. A. Walton, PH.D., will speak on activity of spermatozoa in vitro; and Dr. Bethel Solomons will sum up with some conclusions about infertility. Further particulars may be had from Dr. G. I. M. Swyer, Obstetric Hospital, University College Hospital, Huntley Street, London, W.C.1.

Notes and News

INTERNATIONAL TRAINING CENTRE FOR ANÆSTHETISTS

AN international centre for training in techniques of anæsthesia was opened on May 3 at the Rigshospital, Copenhagen. This centre, operated jointly by the faculty of medicine of the University of Copenhagen and by the World Health Organisation, will provide a one-year course for Scandinavian and other European postgraduates. Twenty-one doctors, supported by W.H.O. fellowships, have arrived at the centre from Iceland, Norway, Sweden, Finland, Austria, Yugoslavia, and Denmark. The instructors include Dr. Stuart G. Cullen (U.S.A.), Dr. Ralph Waters (U.S.A.), and Dr. Phyllis Edwards. In many Scandinavian centres the responsibility for the direction of an anæsthetic still rests with the surgeon, and there is a general desire to establish an anæsthetic specialty. An additional 50 anæsthetists are said to be needed in Denmark.

TEACHING OF PUBLIC HEALTH

" MANY promising public health students are being diverted from a chosen career as medical officer of health, and in time to come, the unhappy circumstances of today may well have repercussions on the efficiency of our public health services." This conclusion is reached by Prof. J. M. Mackintosh in the report for 1948–49 of the London School of Hygiene and Tropical Medicine. Of 46 students who were awarded the diploma in public health during the year, 22 were British students without ready-made commitments. Yet six months after the diploma examinations, only 7—all men—had taken appointments in local government. Of the remainder, 6 had taken posts in industry, 4 in academic and research work, and 5 in general practice and other clinical posts. " What it comes to is that, though the School has 90 diploma graduates to its credit for the last two years, it has supplied only 15 recruits to our own public health service in this period."

For their elective studies in 1948–49 diploma students were offered the choice of special courses in industrial hygiene, tropical hygiene, or hospital administration. The purpose of the course in industrial hygiene, Professor Mackintosh insists, is not to provide training for consultants in industrial medicine, but to offer opportunities for the making of good general practitioners in industrial health. " We believe, like our American colleagues, that industrial health is an integral part of public health." As to tropical hygiene: " In the past there has been a recognised combination of clinical work in the tropical service with the practice of hygiene, so far as the latter could be fitted in to the clamant needs of caring for the sick. The union has been lopsided, and in consequence our knowledge of the factors affecting the public health is singularly deficient."

TUBERCULOUS PATIENTS' WASHING

WHILE a tuberculous patient is in hospital his wife or other relative is entrusted with the job of taking away his soiled personal linen and getting it washed. The ways in which she may undertake this task were discussed in our columns last year.[1] Brompton Hospital gives patients and relatives a printed set of instructions which go far to ensure that infected clothing taken home will not be a source of danger to other members of the household. They are as follows:

RECOMMENDATIONS TO TUBERCULOUS PATIENTS FOR DEALING WITH PERSONAL CLOTHING

1. All such articles must be washed separately from those belonging to others.
2. No cooking utensil should be used for washing.
3. Handkerchiefs should be placed in a cotton bag in boiling water for twenty minutes.
4. Other linen articles should be boiled for not less than ten minutes.
5. Woollen and other shrinkable articles should be aired, preferably out of doors, for twenty-four hours and then washed in the ordinary way.
6. Suits and dresses should be aired for forty-eight hours, preferably out of doors, and then sent to the cleaners.

The phrase " preferably out of doors " perhaps allows for some careless practice, for airing indoors may mean hanging the garments on to one of those overhead airing-racks, generally slung above the kitchen table; and in any case airing of infected clothing inside a crowded or overcrowded home should be discouraged. Most people can find a place for outdoor airing, if they are obliged to; and perhaps the word " preferably " should be omitted. Nevertheless these directions are clear, easy to follow, and thoroughly sensible; and similar instructions might well be handed to visiting relatives at other hospitals.

A NEW JOURNAL ON FERTILITY

Fertility and Sterility,[1] the official journal of the American Society for the Study of Sterility, replaces *Human Fertility*, another American publication, which—as the *Journal of Contraception*—started life in 1935, sponsored by the Margaret Sanger Clinical Research Bureau, and under the editorship of Dr. Abraham Stone. Those who witnessed the birth of the journal and its development will be sad to see it go; but in this first number, the new publication, edited by Pendleton Tompkins, promises to be a worthy successor. In the original journals the trend was gradually away from contraception and its practical application, and towards the investigation and treatment of infertility; hence the change of name in 1940. Now the emphasis has swung still further: the new journal will be entirely concerned with fertility and with infertility and its causes both in man and animal.

Among eight papers of varying merit in this issue, some deserve special mention. The article on dating the endometrial biopsy, by Dr. R. W. Noyes, Dr. A. T. Hertig, and Dr. J. Rock, based on their own series of 8000 biopsies and illustrated by excellent photomicrographs, is a sound piece of work and a valuable guide to other workers. In a short paper Dr. S. H. Sturgis ably discusses the mechanism and control of primate ovulation, pointing out that in each cycle a number of follicles mature but that commonly in primates only one discharges an ovum, the rest becoming atretic. The thecal cells of these atretic follicles produce œstrogen, which helps to maintain the production of luteinising hormone by the pituitary. It thus appears that these " lost " follicles have a function, but the mechanism whereby all but one or two follicles are forced into atresia has still to be elucidated. Dr. S. L. Israel and O. Schneller describe the thermogenic effect of giving progesterone to a series of 26 female castrates and 6 regularly menstruating women. Dr. J. H. Nodine and Dr. W. H. Perloff describe what they believe to be an improved technique for the quantitiatve determination of hyaluronidase in human semen. A paper on luminescent phenomena in the external female genitalia, and their correlation with sex-hormone levels, by Dr. P. A. Macdonald and Dr. M. Sydney Margolese, presents new work; the method requires somewhat elaborate apparatus and preparation; its clinical value must remain sub judice. Useful abstracts and reviews complete an interesting opening number.

TAXATION OF BOOKS

THERE is a story that Elizabethan Englishmen, visiting a foreign country, excited amusement by their passionate search for new books to take home; and we still retain enough of this traditional enthusiasm for new learning to keep the import of books reasonably free from taxation. Books from the Dominions (other than Canada) and from the Colonies and most of the sterling and soft-currency areas, Sir Stanley Unwin [2] tells us, can be freely imported under open general licence. Importation from hard-currency countries is limited, but even so we are free to import twice as much from the United States as before the war.

When it comes to selling books abroad, however, the restrictions imposed by Governments are exceedingly daunting; and he gives several examples. In Belgium books are taxed by weight. In Brazil there is a tax on all books in cloth or leather binding, plus handling charges which amount to 10% or more of the value of the whole consignment, and consular invoices costing upwards of £5 for all packets worth £9 or more; and a fine is imposed if the consular invoices are not provided. It is often cheaper, Sir Stanley remarks, to pay the fine instead of the consular charge. If a few catalogues are included, the consignment becomes liable for the import duty on foreign publicity material. The Brazilian government seems to be against reading altogether, for bookshops are classified in the same high income-tax category as brothels. Canada has an 8% sales tax on imports, from which books are not exempt, though pornographic magazines, it seems, are. Cuba has an array of taxes for everything except textbooks, and like Finland first imposes an import duty, and then adds a tax on the duty-paid value—thus taxing a tax. France had, in theory, no duty on books

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1. *Lancet*, 1949, ii, 1138.

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1. Published by P. B. Hoeber, New York.
2. How Governments Treat Books. London: George Allen & Unwin. 1950. Pp. 9. *6d.*

up to Dec. 14, 1949; but there was a production tax levied not merely on the cost of the books but on the postage, besides a charge on the parcel, and in some cases a transaction tax as well. Moreover when the bookseller has sold the books he has to pay a turnover tax and a local tax; and in December the French government re-imposed an import duty on all leather-bound books. Iceland, which prided itself on not taxing books, now levies a duty; Italy, Norway, and Switzerland all tax them; the Philippines let in U.S. publications free of charge but tax all others. Before the war hardly any country taxed books except the United States, which confined its taxes to books in English—thus in effect discriminating against books from the British Commonwealth; and this custom continues.

Sir Stanley points out how adversely the taxation of books affects students: "British medical and technical works have in large measure displaced German textbooks, but in some parts of the world where they are most needed the flow is reduced to a mere trickle. A doctor in Spain or an engineer in Japan may thus be kept waiting indefinitely for information readily available from British books." The remedy, he implies, must lie with an informed public opinion: ". . . no government finds it easy to defend the taxation or obstruction of knowledge when once it is publicly challenged. . . ." Since the war more English books have been translated into other languages than ever before, largely owing to the work of the British Council in spreading knowledge of our way of life. If we believe that we have something useful to tell other nations, not merely about technical advances but also about living together in a community—and seeing how closely packed we are we manage with astonishingly little friction—then we can fully support Sir Stanley in this very reasonable protest.

University of Oxford

On April 27, the following degrees were conferred:

D.M.—A. H. James, *M. H. Hughes, *A. J. Wilmot.
B.M.—*R .C. Farrow.

* In absentia.

University of London

Mr. J. B. Hunter has been reappointed to the senate by the faculty of medicine, and Dr. E. R. Boland has been appointed in place of Sir Archibald Gray.

Sir Harold Boldero has been reappointed by the general medical schools.

The following have been recognised as teachers of the university in the faculty of medicine:

W. E. Gibb, medicine, St. Bart's; W. W. Brigden, medicine, London Hospital; E. J. Moynahan, dermatology, F. N. Glover, surgery, and A. R. F. Thompson, dental surgery, all at Guy's Hospital; M. D. Nosworthy, anæsthetics, J. Bishop Harman, medicine, Herbert Spencer, pathology, R. J. V. Battle, surgery, R. J. Furlong, orthopædics, and J. B. Kinmonth, surgery, all at St. Thomas's; F. J. G. Jefferiss, venereal diseases, St. Mary's; E. W. Hart, children's diseases, P. H. Newman, orthopædics, Middlesex; E. F. King, ophthalmology, Westminster; F. F. Cartwright, anæsthetics, King's College Hospital.

At recent examinations for the D.P.M., the following were successful:

C. F. Allfrey, A. S. Clenaghan, J. P. Crawford, Kalika-Charan Dubé, K. C. S. Edwards, H. V. W. Elwell, E. J. Harrison, Marie S. Paterson, B. H. Smith, A. D. Weatherhead, R. H. Wheeler, Lionel Wolman.

Royal College of Obstetricians and Gynæcologists

At recent examinations for the diploma in obstetrics, the following were successful:

G. W. E. Aitken, D. F. Alexander, C. L. S. Archer, Joseph Armstrong, Ahmed Abdel-Fattah Atallah, Dorothy J. Ball, D. C. Barker, Mary E. Barton, Margaret R. Bate, B. F. M. Bond, D. G. Bonham, D. C. Bracken, Malcolm Brown, T. W. Brown, Helen L. Burns, J. D. Bury, R. G. C. G. Carlson, Roma N. Chamberlain, O. W. W. Clarke, Isobel J. Cochrane, K. W. Cochrane, Maureen D. Connolly, V. H. Cooper, Margaret L. Cox, Denis Craddock, D. A. Davey, E. J. L. Davies, Joan M. S. Dawes, Sheila M. Dineen, N. A. Duncan, Evelyn S. Elliott, M. W. Elliott, B. F. Elton, M. W. Fordham, M. T. Gallagher, R. M. Gaunt, Edwina E. Green, P. B. Guastalla, Helen E. E. Gunn, Wladyslaw Guzdziol, T. S. Hall, G. A. Hanks, Joan Harper, I. R. Henderson, Margaret I. Hendrie, Valentine M. Husband, G. J. G. Irvine, Kilpatrick Jack, P. D. C. Jackson, Beryl M. Joles, A. E. Kingston, J. H. Kuhn, Edward Lacy, Jean Learoyd, G. A. Lewis, Margaret S. V. Lewis, J. D. Llwelyn-Jones, Derrick Lonsdale, Eileen V. A. McGill, Christine R. Macgregor, D. A. Macleod, F. R. L. Makin, Joan Marshall, D. M. Maxwell, D. T. Methuen H. J. Messawer, Max Miller, G. W. Morrison, Margaret E. Murison, C. J. Murphy, Jean-Murray-Jones, T. S. Nicol, Catherine Nolan, E. P. D. O'Neill, P. F. O'Neill, J. T. Paton, Margaret M. Platts, Harry Rees, W. J. St. E.-G. Rhys, R. P. Robertson, M. G. Rolfe, G. A. H. Sandilands, D. G. Scott, J. E. Senanayake, S. F. Shilliday, J. C. Smart, Cecily F. Statham, Sara I. Stinson, J. R. Sudbury, Audrey Sutherland, Tharmapuram Krishnasami Sundaram, J. J. Troy, Jehangir Sohrab Vazifdar, Helen B. Walker, F. E. Welch, Elizabeth J. Welford, Audrey M. Wells, Sheila M. Wheeler, David Wilkes, I. U. Young.

Royal College of Physicians of Edinburgh

At a meeting of the college held on May 2, with Sir David Henderson, the president, in the chair, Dr. Kenneth Cameron was elected to the fellowship. The following were elected to the membership:

G. M. Fyfe, Nathan Smith, Samuel Wayburne, K. L. G. Nobbs. R. C. Jackson, Marion B. Bethune, M. B. Feldman. S. B. Griffiths, D. H. Dracup, R. J. Fassina, G. W. Csonka, Nathan Sher, Velva Schrire, A. K. Sen, Lionel Stein, H. M. G. Shanly, J. N. C. Cooke, D. J. Ellison, R. L. Lyon, D. H. Abbott, V. V. Kalbian, P. O. Crossfield.

The Cullen prize "for the greatest benefit done to practical medicine during the four preceding years" was awarded to Prof. John McMichael, director of the department of medicine, Postgraduate Medical School of London.

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty on May 1, with Dr. W. R. Snodgrass, the president, in the chair, C. J. Patel and D. K. Rao were admitted fellows of faculty *qua* surgeon.

London Nursing Exhibition

In connection with the conference for nurses and midwives which the *Nursing Mirror* is organising, an exhibition of nursing will be held at Seymour Hall, Seymour Place, W.1, from Oct. 23 to 27.

London County Medical Society

The next clinical meeting of the society will be held at Highwood Hospital, Brentwood, Essex, on Thursday, June 1, at 3 P.M. Further information may be had from the hon. secretary, Mr. J. Gabe, F.R.C.S., St. Alfege's Hospital, S.E.10.

Guild of Hospital Librarians

The annual general meeting of the guild will be held at Chaucer House, Mallet Place, London, W.C.1, on Wednesday, May 17, at 6 P.M., when the speaker will be Mr. Douglas Woodruff, editor of the *Tablet*.

Sir Wilson Jameson

A complimentary dinner was given on May 3 by some of the senior Aberdeen medical graduates in London to Sir Wilson Jameson on his retirement from the Ministry of Health. Those present included Vice-Admiral C. E. Greeson, medical director-general of the Navy, and Lieut.-General Sir Neil Cantlie, director-general of Army Medical Services, and it was noted that three of the premier administrative posts in the medical services have been filled simultaneously by Aberdeen graduates. After the toast of the evening had been proposed by Prof. Andrew Topping, supported by Dr. J. Watt and Dr. Adam Gray as old classmates, and by Dr. D. D. Reid as the youngest graduate present, Prof. Robert Cruickshank presented Sir Wilson with a small memento of affection and esteem. In his reply, Sir Wilson recalled his student days in Aberdeen and spoke of Ministers and administration. The administrator, he said, must be a good listener.

On May 11, at the Ministry of Health, Sir William Douglas and Sir John Charles made a presentation to Sir Wilson Jameson on behalf of the lay and medical staff.

King Edward's Hospital Fund for London announces that Sir Wilson is joining its staff, on a part-time basis, from June 1.

Fertility Conference

A conference on fertility, which will also be the inaugural meeting of a new Society for the Study of Comparative Fertility, will be held in the house of the Zoological Society of London, Regent's Park, London, N.W.1, on Friday and Saturday, June 16 and 17. On the first day Mr. Kenneth Walker will speak on the diagnosis and treatment of male infertility; Dr. R. G. Harrison and Dr. A. G. Oettlé on pathological changes in the rat testis following ischæmia; Mr. A. S. Parkes, F.R.S., on storage of mammalian spermatozoa at low temperatures; Dr. C. A. Joël on comparative studies on semen ejaculate and testis biopsies; and Mr. C. Polge on artificial insemination in the fowl. On the following day Dr. Samuel L. Siegler will give an address on aspects of infertility and show a film on *Sterility: Its Causes, Investigations and Treatment*. Mr. I. W. Rowlands, PH.D., will speak on the breeding of dogs, and Dr. Margaret Hadley Jackson on the significance of round-cell infiltration as seen in endometrial biopsy sections; Dr. Claude Béclère will show a film on *Hysterosalpingography in the Diagnosis and Treatment of Sterility*; Mr. A. Walton, PH.D., will speak on activity of spermatozoa in vitro; and Dr. Bethel Solomons will sum up with some conclusions about infertility. Further particulars may be had from Dr. G. I. M. Swyer, Obstetric Hospital, University College Hospital, Huntley Street, London, W.C.1.

International Dental Congress

The 11th International Dental Congress of the Fédération Dentaire Internationale will take place in London from July 19 to 26, 1952, under the presidency of Dr. Wilfred Fish. Further information may be had from the organising secretary, 13, Hill Street, London, W.1.

St. Thomas's Hospital Musical Society

This society will perform Faure's requiem, and anthems by Weelkes, Gibbons, and Purcell in St. Sepulchre's Church, Holborn, on Tuesday, May 23, at 8.30 P.M. The conductor will be Dr. W. Dykes Bower, and the organist Mr. J. Dykes Bower, D.MUS. No tickets are required.

Newsholme Lectures

These lectures were endowed by the late Sir Arthur Newsholme, and Sir Henry Cohen will deliver the first course at the London School of Hygiene, Keppel Street, W.C.1, on May 22, 23, and 24, at 6.15 P.M. His subject is to be the Clinical Contribution to Public Welfare. Dr. H. P. Newsholme will take the chair at the first lecture.

W.H.O. Antibiotics Programme

The W.H.O. expert committee on antibiotics, which met in Geneva last month under the chairmanship of Mr. E. B. Chain, PH.D., F.R.S., recommended that the organisation should sponsor antibiotic research programmes and grant fellowships for long-term research. Several institutes, it was proposed, should be asked to provide research and training facilities. The committee proposed, too, that type culture collections should be deposited in certain institutions; and the scientific abstracting services should be asked to publish a combined issue containing abstracts of all available reports on antibiotics. The committee expressed the opinion that W.H.O. should organise controlled investigations of new drugs.

Presentation to Prof. Carl Browning

On April 28 a bronze bust of himself was presented to Prof. Carl Browning, F.R.S., on his retirement from the chair of bacteriology in the University of Glasgow, which he has held for 30 years. In making the presentation Sir Robert Muir, F.R.S., said: "Many teachers of the present day would benefit if they knew both what bacteriology was and how much Browning thought it necessary to teach the ordinary medical student. If they cut their courses accordingly I think it would be of great importance in the medical curriculum." The bust, which was executed by Mr. Benno Schotz, R.S.A., was afterwards accepted by the university for inclusion in their fine arts collection. Prof. D. F. Cappell presented Mrs. Browning with a gift of cutlery.

Committee on Internal Administration of Hospitals

The Central Health Services Council has appointed a committee, with 17 members, "to consider and report on the existing methods of administration in individual hospitals with particular reference to (1) matters of finance, staff, and supplies; (2) the extent to which differences in the work undertaken at different hospitals call for differences in their administrative organisation; and (3) the extent to which administrative duties should be undertaken by medical and nursing staff." Alderman Bradbeer is the chairman, and the medical members are Sir Ernest Rock Carling, Dr. A. A. Cunningham, Dr. H. G. Dain, Dr. W. G. Masefield, Dr. J. R. Murray, and Dr. J. Watt. Any person or body wishing to submit evidence should give notice to the joint secretaries of the Committee, Room 28, First Floor, Ministry of Health, S.W.1.

Retirement of Dr. M. C. Hogarth

Dr. Margaret Hogarth is to retire on June 30 from her post as a senior medical officer in the public-health department of the L.C.C.

Dr. Hogarth has served with the council since 1912, except for a period between 1925 and 1929 when she held an appointment at the Ministry of Health. In 1929 she surveyed district nursing in London; and her recommendations deali
and general conditions were accepted as a
country. When appointed, in 1931, as
medical officer, she was engaged on school health work. Later, as a divisional medical officer, she was in charge of the northern
division of the council's school
became responsible for residenti
work. In 1937 she served as the
Nutrition Committee of the Lea
she took charge of the council
under the
Health Se
from the
and child-welfare services.

Appointments

Carpenter, W. H. K., M.B. Brist.: deputy medical superintendent, Stoke Park Colony, Stapleton, Bristol.

Edge, May, M.B. Glasg., D.P.H.: asst. county M.O., North-West Kent.

Gold, S. C., M.A., M.B. Camb., M.R.C.P.: asst. physician, skin department, St. George's Hospital, London, and consultant dermatologist, Hammersmith Hospital, and senior lecturer in dermatology at the *Postgraduate Medical School*.

Graf, K. A., M.D. Vienna, D.P.M.: asst. psychiatrist (S.H.M.O.), Brentwood Mental Hospital.

Griffin, B. P., M.A. Camb., M.R.C.S.: deputy medical superintendent, Hortham Colony, Almondsbury, Bristol.

Hesling, A. G., M.B. Lond., M.R.C.P., D.C.H.: consultant pædiatrician, Blackpool and Preston hospital centres.

Lee, Constance, M.B. Lpool, D.OBST.: asst. M.O., maternity and child welfare, Manchester.

*Lochhead, Helenor, M.B. Edin.: house-physician, Hospital for Sick Children, Gre on.

McCaughan, D. V., M.B. se, and throat surgeon, Antrim, Larne, and Magherafelt, Northern Ireland.

MacKeith, S. A., O.B.E., M.R.C.S., D.P.M.: consultant psychiatrist, Hellesdon Mental Hospital.

McKirdy, A. A., M.B. Glasg., M.R.C.O.G.: surgical officer (B1), gynæcological unit, Stoke Mandeville Hospital.

Montuschi, Elio, M.D. Florence, M.R.C.P.: physician, Italian *Hospital, London.*

Raffle, P. A. B., M.D. Lond., D.P.H., D.I.H.: senior asst. M.O., London Transport.

Savage, O. A., O.B.E., M.R.C.P.: consultant, rheumatism department, *West London Hospital*.

Steiner, R. E., M.B. N.U.I., D.M.R.: radiologist, department of radiodiagnosis, Hammersmith Hospital.

Turner, J. G. S., C.M.G., M.B., B.SC. Glasg., D.T.M., D.P.H.: asst. county M.O. and M.O.H. no. 4 health area, Cornwall.

Willey, C. B. I., M.B.E., M.C., M.A., B.M. Oxfd, M.R.C.P.: senior registrar in general medicine, Norfolk and Norwich Hospital.

* Amended notice.

Births, Marriages, and Deaths

BIRTHS

Dobree.—On April 29, in London, the wife of Mr. John Dobree, M.S.—a son.

Gauld.—On April 29, the wife of Dr. G. O. Gauld—a daughter.

Gill.—On April 30, at Godalming, the wife of Mr. W. G. Gill, F.R.C.S.—a son.

Glaser.—On May 4, at Cambridge, the wife of Dr. M. Glaser—a daughter.

Gurling.—On May 6, the wife of Dr. Kenneth Gurling—a son.

Harcourt.—On April 23, in London, the wife of Dr. R. G. Harcourt—a daughter.

Hutchison.—On May 1, the wife of Mr. J. B. Hutchison, F.R.C.S.—a son.

Johnson.—On May 4, the wife of Dr. Peter Johnson—a son.

Jones.—On May 3, in London, the wife of Mr. H. O. Jones, F.R.C.S.—a daughter.

Lutton.—On April 28, at Ashton-on-Mersey, the wife of Dr. R. A. Lutton—a son.

Wetherell.—On May 4, at Birkenhead, the wife of Dr. Geoffrey Wetherell—a son.

Wright.—On April 29, in London, the wife of Dr. John Wright—*a son.*

MARRIAGES

Beswick—Welch.—On April 29, at Over Whitacre, Joseph Hubert Beswick, M.B., to Sylvia Joan Welch.

Mayne—Doy.—On May 6, at Brighton, Cyril Frederick Mayne, O.B.E., F.R.C.S., to Gladys Lillian Doy.

DEATHS

3, at West Worthing, Frank Marsden Burnett, aged 80.

at Beaconsfield, Edred Moss Corner, M.A., M.B., M.CHIR. Camb., B.SC. Lond., F.R.C.S.

Edwards.—On May 4, at Bromley, Frederic William Edwards, M.R.C.S., aged 80.

Galt.—On May 4, William James Galt, M.A., B.M. Oxfd.

Gellatly.—On May 6, at Bramhall, Cheshire, David Gilbert Gellatly, L.R.C.P.E., aged 72.

Goodfellow.—On May 1, at Chesterfield, James Anderson Goodfellow, M.B. Glasg., aged 85.

Gray.—On May 1, at Driffield, Yorks, Thomas Gray, M.B. Glasg., aged 31.

Hay iverpool on May 2, Ronald John Gwynne R.C.S., aged 38.

Low Lancaster, Richard Charles Lowther, M.B. Edin.

Mackworth.—On May 3, at Dyce, Aberdeenshire, Norman Walter Mackworth, M.B. Aberd., F.R.C.S.E., lieut.-colonel, I.M.S. retd.

McLeay.—On April 30, Charles William McLeay, B.A., M.D. West. Univ. Ont., D.P.H.

Pike.—On May 6, in London, Douglas Reginald Pike, M.A., B.M. Oxfd.

Mr. Victor Bonney has been elected an honorary fellow of the Association of Surgeons.

Prof. John McMichael, under the auspices of the British Council, is making a lecture tour during May in Denmark, Sweden, Finland, and Norway at the invitation of Scandinavian medical organisations.

VALUE OF ELECTROMYOGRAPHY IN CLINICAL NEUROLOGY

FRANK SARGENT
M.D. Lond., M.R.C.P.
SENIOR REGISTRAR, WEST END HOSPITAL FOR NERVOUS DISEASES; REGISTRAR, ELECTRODIAGNOSTIC SECTION, ST. THOMAS'S HOSPITAL; NEUROLOGIST, ST. STEPHEN'S HOSPITAL, CHELSEA

THE application of electromyography is limited to the lower motor neurones and the voluntary muscles. Although still in the experimental stage this method of investigation can supply information which may be of considerable importance in the solution of certain neurological problems. As with electrocardiography in heart-disease and radiography in pulmonary disease, electromyography should be used as an aid to diagnosis only after full and careful clinical examination. Without a clear clinical picture in his mind the physician may often find machines more misleading than useful in any branch of medicine.

Beginning as an experimental method in the physiological laboratory, electromyography was applied with great success in the diagnosis and prognosis of peripheral nerve injuries during the war. It has now been developed to a point where it can be relied on for special information in a wide range of everyday neurological disorders.

A brief description of some of the phenomena encountered in electromyography is necessary, but for a full description of all the reactions and relevant theories the reader is referred to the many excellent articles that Buchtal (1949) mentions in the report of the International Neurological Congress. Technical details of apparatus and its operation are beyond the scope of this communication; they, also, can be found in the various contributions that have appeared (Tyler 1950, Richardson 1950).

Maximal contraction of normal voluntary muscle produces a low-pitched rumble in the loud-speaker, and a sustained interference pattern on the cathode-ray screen (fig. 1). This pattern may be modified and attenuated by disease or injury until discrete motor-unit potentials only are seen (fig. 2), and, finally, no spikes at all appear on the screen and the loud-speaker is silent. Normal muscle is silent at rest.

Fibrillation in denervated muscle is seen on the screen as rhythmically repetitive potentials (fig. 3) of short duration and small amplitude (1–2 millisec., 50 μV) and is demonstrated as regular staccato ticking in the loud-speaker.

Synchronisation means the simultaneous occurrence of potentials from separate electrodes in different parts of the muscle on minimal contraction; such potentials are large—i.e., about 5–10 millisec. and up to 200 μV (fig. 4). Opinions differ about the cause of synchronisation, but all workers agree that it is seen so often in association with diseases of the spinal cord—e.g., anterior poliomyelitis—that it may be taken as strong evidence of a lesion affecting the anterior-horn cells.

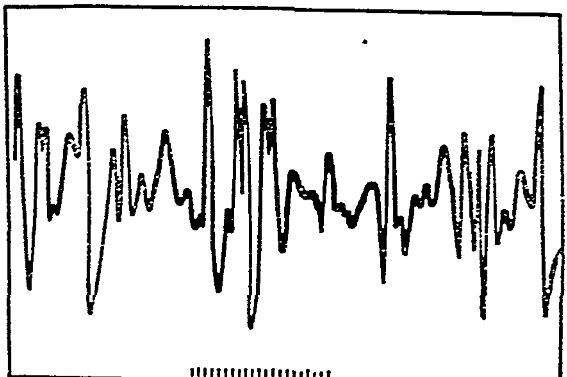

Fig. 1—Normal sustained pattern of motor-unit activity (scale: millisec.).

Other terms in common use will be explained below as they arise.

As Bauwens (1948) has pointed out, electromyographic examination should always be preceded by muscle-testing with a suitable rectangular-wave stimulator, because a combination of the two procedures gives a much more complete picture than either alone, and often indicates which muscles demand investigation. The plotting of an intensity-duration curve (fig. 5) has now taken the place of the "reaction of degeneration" test.

The cases described here all presented some point of doubt or difficulty which was considerably clarified by electromyography. For convenience of discussion the cases are grouped anatomically.

SPINAL CORD

Case 1.—A retired tailor, aged 74, complained of weakness of both arms and legs of gradual onset during the preceding eighteen months with pins-and-needles in the hands.

On examination there was gross wasting and weakness of deltoid, spinati, biceps, triceps, brachioradialis and flexors and extensors of wrist on both sides. The small muscles of the hands were not affected. Arm-jerks were normal except for a slight exaggeration of the triceps-jerks. Knee and ankle jerks were normal, the plantar reflexes were flexor, and the abdominal reflexes were present. No fasciculation was seen. Radiography of the cervical spine showed some osteo-arthritis. Total protein in the cerebrospinal fluid (C.S.F.) was 60 mg. per 100 ml.; the fluid was otherwise normal.

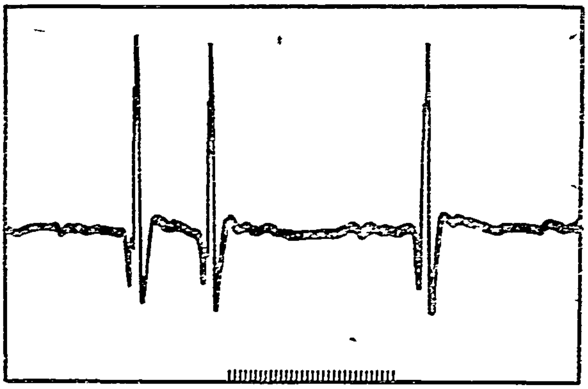

Fig. 2—Discrete motor-unit activity (scale: millisec.).

Muscle-testing revealed complete denervation (fig. 5c) of left deltoid.

Electromyography.—Needle electrodes showed decreased motor-unit activity on volition in left biceps and extensor digitorum communis, with definite synchronisation in these two muscles; and fibrillation potentials were detected in the extensor digitorum communis at rest.

Diagnosis.—These findings were considered to be compatible with a diagnosis of motor-neurone disease (progressive muscular atrophy).

Case 2.—An electrician, aged 24, complained that he could not hold a screwdriver because of weakness of the right hand which had begun four months previously; his left hand was also becoming weak. He had noticed some difficulty with speech for two and a half months and had slight pain in both knees. He had lost a stone in weight and had had a severe attack of tonsillitis three months previously.

On examination he was found to have dysarthria; weakness of the left side of the soft palate; bilateral wasting and fibrillation of the tongue; weakness and wasting of all muscles of the hands, arms, and forearms, more pronounced on the right side; arm-jerks brisk; continuous fasciculation in the right arm and shoulder muscles; no wasting or weakness of the lower limbs, but tone increased; knee and ankle jerks much exaggerated; plantar reflexes flexor; and ankle-clonus present on both sides.

Electromyography.—Surface electrodes on the right biceps and on the tongue revealed fasciculation potentials (fig. 6).

International Dental Congress

The 11th International Dental Congress of the Fédération Dentaire Internationale will take place in London from July 19 to 26, 1952, under the presidency of Dr. Wilfred Fish. Further information may be had from the organising secretary, 13, Hill Street, London, W.1.

St. Thomas's Hospital Musical Society

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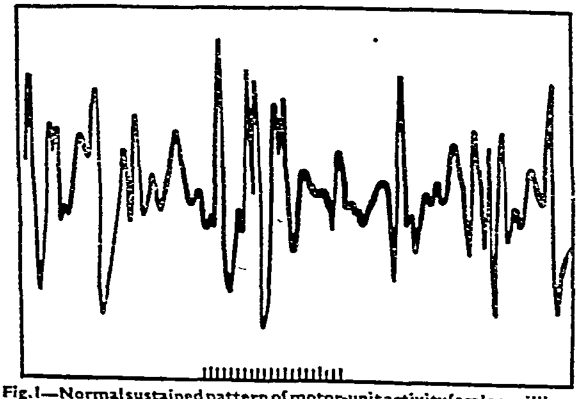
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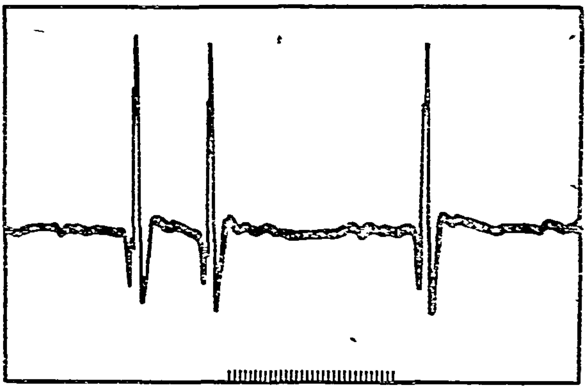
Fig. 2—Discrete motor-unit activity (scale: millisec.).

Muscle-testing revealed complete denervation (fig. 5c) of left deltoid.

Electromyography.—Needle electrodes showed decreased motor-unit activity on volition in left biceps and extensor digitorum communis, with definite synchronisation in these two muscles; and fibrillation potentials were detected in the extensor digitorum communis at rest.

Diagnosis.—These findings were considered to be compatible with a diagnosis of motor-neurone disease (progressive muscular atrophy).

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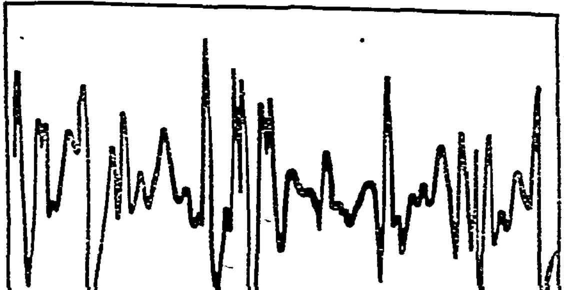
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On examination there was gross wasting and weakness of deltoid, spinati, biceps, triceps, brachioradialis and flexors and extensors of wrist on both sides. The small muscles of the hands were not affected. Arm-jerks were normal except for a slight exaggeration of the triceps-jerks. Knee and ankle jerks were normal, the plantar reflexes were flexor, and the abdominal reflexes were present. No fasciculation was seen. Radiography of the cervical spine showed some osteo-arthritis. Total protein in the cerebrospinal fluid (C.S.F.) was 60 mg. per 100 ml.; the fluid was otherwise normal.

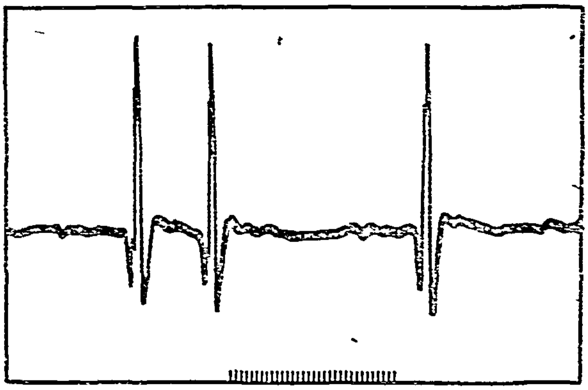
Fig. 2—Discrete motor-unit activity (scale: millisec.).

Muscle-testing revealed complete denervation (fig. 5c) of left deltoid.

Electromyography.—Needle electrodes showed decreased motor-unit activity on volition in left biceps and extensor digitorum communis, with definite synchronisation in these two muscles; and fibrillation potentials were detected in the extensor digitorum communis at rest.

Diagnosis.—These findings were considered to be compatible with a diagnosis of motor-neurone disease (progressive muscular atrophy).

Case 2.—An electrician, aged 24, complained that he could not hold a screwdriver because of weakness of the right hand which had begun four months previously; his left hand was also becoming weak. He had noticed some difficulty with speech for two and a half months and had slight pain in both knees. He had lost a stone in weight and had had a severe attack of tonsillitis three months previously.

On examination he was found to have dysarthria; weakness of the left side of the soft palate; bilateral wasting and fibrillation of the tongue; weakness and wasting of all muscles of the hands, arms, and forearms, more pronounced on the right side; arm-jerks brisk; continuous fasciculation in the right arm and shoulder muscles; no wasting or weakness of the lower limbs, but tone increased; knee and ankle jerks much exaggerated; plantar reflexes flexor; and ankle-clonus present on both sides.

Electromyography.—Surface electrodes on the right biceps and on the tongue revealed fasciculation potentials (fig. 6).

Needle electrodes in the right biceps revealed a normal sustained interference pattern on volition, and at rest there were spontaneous polyphasic potentials; in the extensors of the left wrist *volitional contraction produced only* discrete motor-unit activity.

Diagnosis: myelopathic lesion in anterior-horn cells—motor-neurone disease.

The diagnosis of motor-neurone disease in these two cases was fairly obvious, but there were some unusual clinical features in each. In case 1 there were the late onset, absence of fasciculation, sparing of the small muscles of the hands, and the slight increase of total protein in the C.S.F. In case 2 there were the onset at rather an early age, the possible relation to infection, and the rapid progress and widespread distribution. The electrical examination provided evidence that was sufficiently convincing to confirm the diagnosis. If fasciculation potentials can be demonstrated they suggest strongly that anterior-horn cells are being slowly destroyed; it happened in these two cases that the electromyograph gave no more information about fasciculation than was available clinically—i.e., its absence in case 1 and its presence in case 2. Not infrequently, however, fasciculation can be detected readily on electrical examination when it is imperceptible on clinical observation. The presence of fibrillation merely indicated that there was a degree of denervation in the muscles tested (additional evidence of this was provided by the rectangular-wave stimulator in case 1); but synchronisation placed the lesion in the anterior-horn cells.

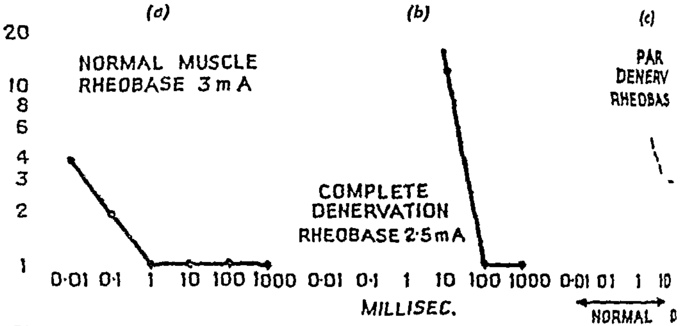

Fig. 5—Intensity-duration curves; muscle-testing with rectangular-wave sti

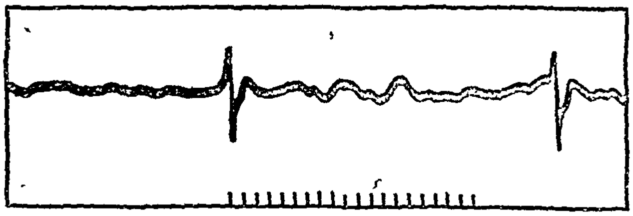

Fig. 3—Fibrillation potentials (scale: millisec.).

Case 3.—A draper's assistant, aged 17, complained of pain in his left knee when standing at the counter, together with weakness and wasting of the left thigh since childhood. He had had an illness, presumed to be acute poliomyelitis, at the age of 12 months during an epidemic in La Linea.

On examination there were nystagmoid jerks, more pronounced on looking to the left than to the right; some unsteadiness of the left hand on performing the finger-nose test; wasting and weakness of all muscles of the left thigh; bilateral pes cavus; and no sensory changes. No family history of nervous disorder could be obtained.

Muscle-testing.—The intensity-duration curve in the left rectus femoris was normal (fig. 5*a*).

Electromyography.—Needle electrodes inserted to
muscle revealed a reduced pattern of motor-unit
on minimal voluntary contraction defin secretaries
appeared. istry of Health,

Diagnosis: anterior-horn le
poliomyelitis.

Case 4.—A boy, aged re on June 30 from her post
we previously held the public-health department of
senior medic
he L.C.C.

Dr. Hogarth has served with the council since 1912, except for period between 1923 and 1929 when she held an appointment at he Ministry of Health. In 1929 she surveyed district nursing in ondon; and her recommendations dealing with staffing, nursing, nd general conditions were accep
ountry. When appointed, in
edical officer, she was engaged
divisional medical officer, she
ivision of the council's school
ecame responsible for residenti
vork. In 1937 she served as the
Nutrition Committee of the Lea
he took charge of the counci
under the Midwives Act, 1936.
Health Service Dr. Hogarth took
rom the Metropolitan boroughs, including supervision of materni
nd child-welfare services.

reduced to a discrete pattern, with polyphasic pot rapid fatigue, and definite synchronisation; at rest th spontaneous fibrillation potentials in this muscle.

Diagnosis.—Electrical examination confirmed the d of anterior poliomyelitis, affecting especially the right compartment muscles and peronei. A month later, stim of the right lateral popliteal nerve at the knee el response from the extensor hallucis longus as well tibialis anticus; the findings were otherwise the sa on the first occasion.

Synchronisation in the paralysed muscles of these patients pointed to a myelopathic lesion, almost cert anterior poliomyelitis, and this result coincided wit clinical histories. It was of considerable help to this point, because case 3, the young man with wasted thigh, resembled a *forme fruste* of Friedr ataxia, and the absence of a reliable family hi rendered the problem more obscure. When it demonstrated that the thigh muscles had atrop because of poliomyelitis, the other symptoms could be ascribed to the same cause. In case 4, the boy foot-drop, it was possible not only to confirm the nat of the infection but also to state which muscles w affected, with much more precision than was possi clinically, and finally, by means of successive exami tions, to forecast the amount of recovery that could expected.

Case 5.—A clerk, aged 40, had gradually lost power in hands for two years; at the same time he had noticed of appreciation of heat and cold in his right leg.

On examination he had nystagmus, diminution of pain sensation in the left hand, loss of pain and temperature sense from the right hip downwards, fasciculation in the chest muscles and left hand, poor grip in the right hand, increase of all tendon-jerks, extensor plantar responses and absent abdominal reflexes. The C.S.F. yril Frederick Mayne,
test showed a slow m Doy.

DEATHS

pril 28, at West Worthing, Frank Marsden Burnett, nd., D.P.H., aged 80.

NER.—On May 2, at Beaconsfield, Edred Moss Corner, M.A., M.B., M.CHIR. Camb., B.SC. Lond., F.R.C.S.

EDWARDS.—On May 4, at Bromley, Frederic William Edwards, M.R.C.S., aged 80.

GALT.—On May 4, William James Galt, M.A., B.M. Oxfd.

GELLATLY.—On May 6, at Bramhall, Cheshire, David Gilbert Gellatly, L.R.C.P.E., aged 72.

GOODFELLOW.—On May 1, at Chesterfield, James Anderson Goodfellow, M.B. Glasg., aged 85.

GRAY.—On May 1, at Driffield, Yorks, Thomas Gray, M.B. Glasg., aged 34.

HAYTON-WILLIAMS.—At Liverpool on May 2, Ronald John Gwynne Hayton-Williams, L.D.S. R.C.S., aged 38.

LOWTHER.—On April 30, at Lancaster, Richard Charles Lowther, M.B. Edin.

Norman Walter
MACKWORTH.—On May 3, at I.M.S. retd.
Mackworth, M.B. Aberd., A., M.D. West.

MCLEAY.—On April 30, Char
Univ. Ont., D.P.H.

PIKE.—On May 6, in London, Douglas Reginald Pike, M.A., B.M. Oxfd.

Mr. Victor Bonney has been elected an honorary fellow of the Association of Surgeons.

Prof. John McMichael, under the auspices of the Briti Council, is making a lecture tour during May in Denmar Sweden, Finland, and Norway at the invitation Scandinavian medical organisations.

Electromyography.—Needle electrodes were inserted into the left thenar and right hypothenar muscles and the flexors of the forearms. On volition motor-unit activity was decreased in the left thenar eminence; it was discrete in the right hypothenar eminence, and here spontaneous fibrillation potentials were present at rest; in the flexor muscles of the left forearm motor-unit activity was decreased and there was definite synchronisation (fig. 4).

Diagnosis.—These findings pointed to a disease of the spinal cord, which justified the diagnosis of syringomyelia.

Case 6.—A male student, aged 27, presented with four years' history of weakness of the left hand and leg and two months' history of loss of sensation on the left side of the face and neck.

On examination he had Horner's syndrome on the left side; loss of pain and light touch sense in the area of C2–C4 segments, with variable thermal sense but no true dissociated anæsthesia; hyperæsthesia just below the clavicles; diminution of vibration sense in the left arm and leg; gross wasting of the left shoulder-girdle muscles, slight wasting of the left deltoid and all muscles of the left upper limb, including the hand; a completely powerless left arm; exaggerated knee and ankle jerks (left more than right); plantar reflexes extensor; abdominal reflexes absent; and fasciculation round the left shoulder. The C.S.F. contained 3 lymphocytes and total protein 220 mg. per 100 ml.

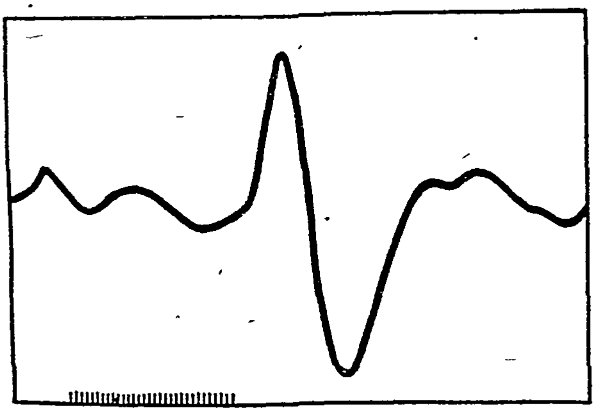

Fig. 6—Fasciculation potentials, diphasic wave, from surface electrodes (scale: millisec.).

Operation.—Laminectomy was subsequently performed; the spinal cord bulged when exposed and, when it was incised, tumour tissue welled up, which on biopsy proved to be that of glioblastoma multiforme; the tumour extended above and below the field of operation (C2–C4).

Electromyography with needle electrodes showed decreased motor-unit activity in most muscles of the left arm. There were polyphasic complex potentials (fig. 7) in the left deltoid and biceps; but no synchronisation was elicited.

Case 7.—A housewife, aged 56, was admitted with multiple bruises, hæmoptysis, and hæmatemesis, as a result of chronic lymphatic leukæmia. When the hæmorrhagic condition cleared she developed left foot-drop, and all forms of sensation were diminished in the left leg. She also complained of pain in the right leg; both legs were weak, particularly the muscles of the left anterior compartment.

Electromyography.—Needle electrodes were inserted into the left tibialis anticus. Motor-unit activity on volition was reduced, and there was synchronisation; spontaneous bursts of polyphasic discharges and fibrillation occurred at rest.

Diagnosis.—Both the spontaneous activity and synchronisation point to a myelopathic origin of the symptoms, and fibrillation indicates denervation.

These three cases are grouped together because all the patients had intramedullary lesions. The diagnosis of syringomyelia in case 5 was never in doubt, and the electromyograph was of use only to confirm the presence of anterior-horn lesions; it is described mainly for comparison with cases 6 and 7. In case 6 a spinal-cord tumour had already been diagnosed and operation performed before electromyography; but a subsequent investigation threw some light on the anatomical distribution of the lesions. It might have been expected that a case with lower motor-neurone lesions due to an intramedullary tumour would show synchronisation; the fact that it did not suggested that the wasting was due not to direct involvement of the anterior horns but to compression and kinking of the anterior roots consequent on the swelling of the cord. The polyphasic complex potentials were taken to mean that some recovery of function in these roots had followed decompression and deep X-ray therapy. The only point in doubt in case 7 was whether the hæmorrhages or leukæmic deposits causing the neurological lesions were within or outside the spinal cord; it is suggested that the presence of synchronisation pointed to a lesion in the substance of the cord, in the anterior horns, rather than external to the cord.

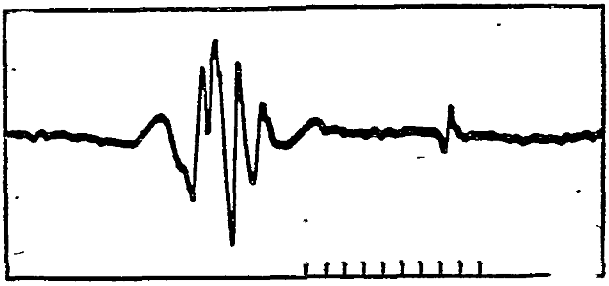

Fig. 7—Polyphasic complex "recovery" potential (scale: millisec.).

Electromyography did not afford any help in the treatment of these three patients, but it did throw some light on the pathological and anatomical pictures.

NERVE-ROOTS

Case 8.—A bricklayer, aged 38, complained of pain in the back of his neck, which had begun fairly suddenly twelve months before (he thought at the time that he must have sat in a draught); after a month the pain had radiated down the right arm to the wrist, back of hand, and fingers, which tingled; symptoms had persisted ever since without remission. The pain was aggravated by coughing; both rotating and inclining the head caused pain and tingling in the right arm. There was no demonstrable sensory loss, and power was unimpaired. Radiography of the cervical spine showed fusion of 4th and 5th vertebræ but no obvious cause for the pain. A "probably prolapsed intervertebral disc but not typical" was diagnosed. Manipulation and traction did not give any relief.

Electromyography.—The electromyograph was silent with surface electrodes on the right deltoid and biceps at rest, but on the triceps and extensor carpi radialis there were spontaneous rhythmic discharges strongly suggesting root irritation.

Diagnosis: pressure on the root of the 7th cervical nerve. At operation a small piece of prolapsed disc material was found in contact with the 7th cervical root and was removed. A month after the operation electromyographic examination was repeated, and the right triceps was now silent at rest.

Case 9.—A caterer's assistant, aged 60, complained of "agonising" pain down the outer border of his right arm as far as the hand. He sat in the outpatient department leaning over a couch with his head in his hands, moaning faintly.

On examination no evidence of organic disease was found. Radiography showed some lipping and beaking of the lower four cervical vertebræ, with osteophytic narrowing of the intervertebral foramina, but the changes were no more than are often seen in films of patients who make no complaint referable to the spinal cord or the nerve-roots. There was a strong suspicion that this patient's symptoms were largely psychogenic.

Electromyography.—When needle electrodes were inserted into the right deltoid, irritation potentials (spontaneous rhythmic spikes) (fig. 8) were seen; motor-unit activity on volition was within normal limits.

Diagnosis irritation of the 5th and 6th nerve-roots by osteo-arthritis of the vertebral column. Suitable physiotherapy relieved the symptoms.

Case 10.—A temporary civil servant, aged 46, had five months' history of weakness of the right hand; he had also experienced pins-and-needles in this hand for four years, although this symptom was not prominent. During the past

Needle electrodes in the right biceps revealed a normal sustained interference pattern on volition, and at rest there were spontaneous polyphasic potentials; in the extensors of the left wrist volitional contraction produced only discrete motor-unit activity.

Diagnosis: myelopathic lesion in anterior-horn cells—motor-neurone disease.

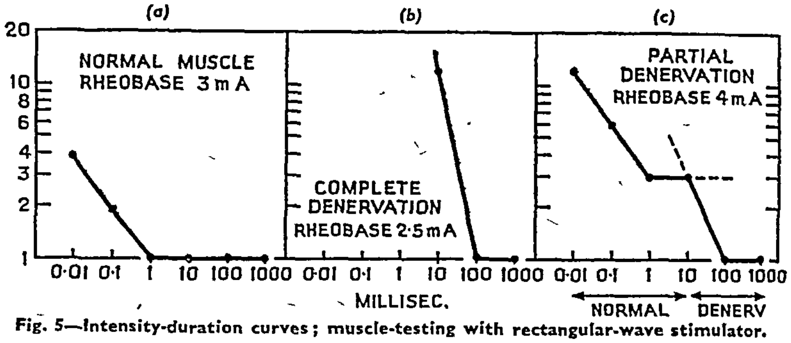

Fig. 5—Intensity-duration curves; muscle-testing with rectangular-wave stimulator.

The diagnosis of motor-neurone disease in these two cases was fairly obvious, but there were some unusual clinical features in each. In case 1 there were the late onset, absence of fasciculation, sparing of the small muscles of the hands, and the slight increase of total protein in the C.S.F. In case 2 there were the onset at rather an early age, the possible relation to infection, and the rapid progress and widespread distribution. The electrical examination provided evidence that was sufficiently convincing to confirm the diagnosis. If fasciculation potentials can be demonstrated they suggest strongly that anterior-horn cells are being slowly destroyed; it happened in these two cases that the electromyograph gave no more information about fasciculation than was available clinically—i.e., its absence in case 1 and its presence in case 2. Not infrequently, however, fasciculation can be detected readily on electrical examination when it is imperceptible on clinical observation. The presence of fibrillation merely indicated that there was a degree of denervation in the muscles tested (additional evidence of this was provided by the rectangular-wave stimulator in case 1); but synchronisation placed the lesion in the anterior-horn cells.

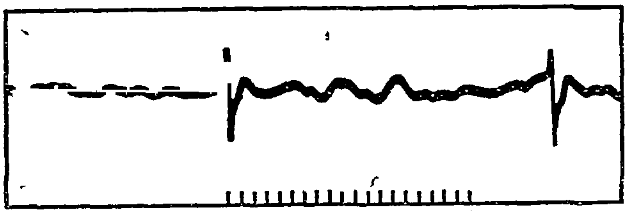

Fig. 3—Fibrillation potentials (scale: millisec.).

Case 3.—A draper's assistant, aged 17, complained of pain in his left knee when standing at the counter, together with weakness and wasting of the left thigh since childhood. He had had an illness, presumed to be acute poliomyelitis, at the age of 12 months during an epidemic in La Linea.

On examination there were nystagmoid jerks, more pronounced on looking to the left than to the right; some unsteadiness of the left hand on performing the finger-nose test; wasting and weakness of all muscles of the left thigh; bilateral pes cavus; and no sensory changes. No family history of nervous disorder could be obtained.

Muscle-testing.—The intensity-duration curve in the le rectus femoris was normal (fig. 5*a*).

Electromyography.—Needle electrodes inserted and muscle revealed a reduced pattern of motor-unit isation on minimal voluntary contraction defi resulting from appeared.

Diagnosis: anterior-horn les had right foot-drop. Seven poliomyelitis. vague febrile illness, followed

Case 4.—A boy, ag kness in his right leg. eviously h ed weakness and wasting of all the muscles of the right leg; there was trable sensory loss.

esting.—Stimulation of the left lateral popliteal the knee elicited a normal response in all the muscles d by this nerve, but on the right side the only muscle contracted was the tibialis anticus. No response was obtained from stimulation of the right medial popliteal nerve, but the tibialis posticus muscle could be stimulated directly at the ankle. The right tibialis anticus and *peronei contracted* sluggishly.

Electromyography.—Needle electrodes in the right tibialis anticus revealed that motor-unit activity on volition was reduced to a discrete pattern, with polyphasic potentials, rapid fatigue, and definite synchronisation; at rest there were spontaneous fibrillation potentials in this muscle.

Diagnosis.—Electrical examination confirmed the diagnosis of anterior poliomyelitis, affecting especially the right anterior-compartment muscles and peronei. A month later, stimulation of the right lateral popliteal nerve at the knee elicited a response from the extensor hallucis longus as well as the tibialis anticus; the findings were otherwise the same as on the first occasion.

Synchronisation in the paralysed muscles of these two patients pointed to a myelopathic lesion, almost certainly anterior poliomyelitis, and this result coincided with the clinical histories. It was of considerable help to settle this point, because case 3, the young man with the wasted thigh, resembled a *forme fruste* of Friedreich's ataxia, and the absence of a reliable family history rendered the problem more obscure. When it was demonstrated that the thigh muscles had atrophied because of poliomyelitis, the other symptoms could well be ascribed to the same cause. In case 4, the boy with foot-drop, it was possible not only to confirm the nature of the infection but also to state which muscles were affected, with much more precision than was possible clinically, and finally, by means of successive examinations, to forecast the amount of recovery that could be expected.

Case 5.—A clerk, aged 40, had gradually lost power in his hands for two years; at the same time he had noticed loss of appreciation of heat and cold in his right leg.

On examination he had nystagmus, diminution of pain sensation in the left hand, loss of pain and temperature sense from the right hip downwards, fasciculation in the chest muscles and left hand, poor grip in the right hand, increase of all tendon-jerks, extensor plant and absent abdominal reflexes. The C.S. mal, and Queckenstedt's test showed a slow and fall.

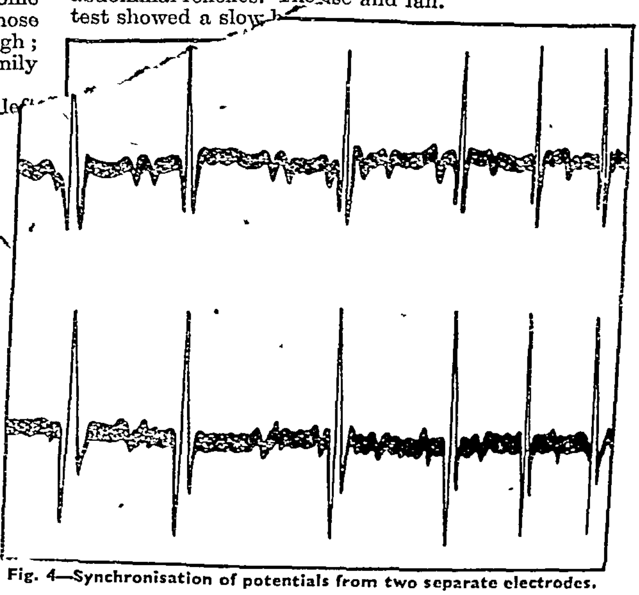

Fig. 4—Synchronisation of potentials from two separate electrodes.

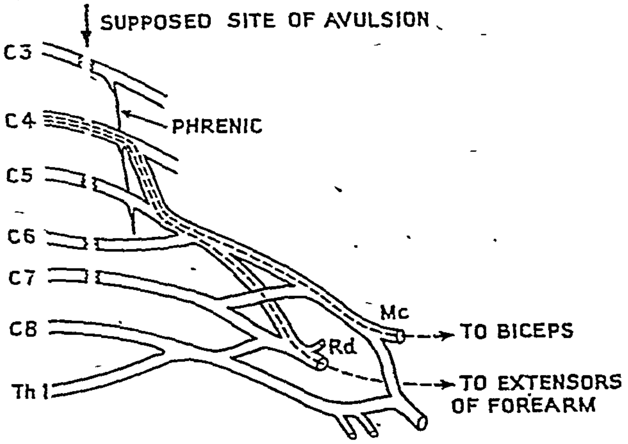

Fig. 9—Brachial plexus, showing path of regenerating fibres (dotted lines) intended for phrenic but actually reaching nerves to biceps and extensors of forearm : Mc, musculocutaneous ; Rd, radial.

Case 13.—A journeyman-carpenter, aged 18, had difficulty in holding his work with his left hand, because of weakness of the left arm from birth.

On examination he showed weakness and wasting of the trapezius, deltoid, spinati, biceps, triceps, brachioradialis, and wrist extensors, with wrist-drop ; the flexors of the wrist and the small muscles of the hand had escaped. The disability was far greater than was to be expected from the degree of wasting present. Rhythmical fasciculation was noted in the biceps, but its significance was not appreciated at the time. There was no sensory loss.

Muscle-testing.—It was possible to stimulate all the muscles of the arm, forearm, and hand electrically except the extensor carpi radialis.

Electromyography.—When needle electrodes were inserted into the left biceps, spontaneous motor-unit activity occurred in time with the respiration ; a similar phenomenon was noted in the extensor digitorum communis. No spontaneous activity was found in the right arm muscles. It was now obvious that the fasciculation referred to above was part and parcel of a response to a stimulus synchronous with respiration causing motor-unit activity which had been unmasked by the electromyograph. On volition all the muscles of the left arm and forearm except the extensor carpi radialis produced a normal sustained pattern of motor-unit activity, thus confirming the clinical observation that the disability was far in excess of what was to be anticipated from the condition of the muscles.

Diagnosis : birth injury to the brachial plexus, affecting all the cervical nerves from C3 to C7 ; crossed reinnervation, probably from roots of the phrenic nerve to nerves of supply to the biceps and extensor digitorum communis.

Some puzzling features in case 12 were the lapse of two years between the supposed trauma and the onset of symptoms, the radiological report, and the exact localisation of the lesion. The electrical investigation suggested that the lesion was in the brachial plexus (it was unlikely to be a prolapsed disc, because several roots were involved) ; the history of violence was inescapable ; and the radiological picture appeared to be more than a mere " red herring." The most probable explanation of this case is that a traction injury of the plexus started the trouble, but that it did not become severe enough to attract the patient's attention until some additional factor, possibly the osteo-arthritis, aggravated it sufficiently to cause actual disability.

Case 13 is an interesting example of crossed reinnervation. The types of birth palsy named after Erb and Klumpke are due to traction lesions of the upper and the lower parts of the brachial plexus respectively. This case, however, is one of a third type, in which most of the cervical nerves are involved and the lesion is situated close to the vertebral column. When regeneration took place, many of the down-growing fibres found their way into the wrong Schwann tubes. This is a well-known cause of residual disability in peripheral nerve injuries. In this case it was possible to demonstrate the crossed reinnervation, owing to the fact that some of the fibres originating from root C4, normally destined for the diaphragm via the phrenic nerve, had insinuated themselves into the musculocutaneous and musculospiral nerves and so reached the biceps and extensor digitorum communis muscles (fig. 9). It must be confessed that the correct diagnosis could have been made on clinical grounds alone, for, after the electromyograph had clearly shown the relationship between motor-unit activity in the biceps and the rhythm of respiration, the fasciculation was seen obviously to coincide with inspiration. Moreover, when a stethoscope was placed on the biceps, a harsh crackling sound was heard in time with respiration, in contrast with the normal rumbling sound on voluntary flexion of the elbow (Buchtal 1949). Nevertheless it was the electrical examination which pointed the way to the recognition of these facts and rendered the clinical picture more comprehensible.

PERIPHERAL NERVES

Case 14.—A porter, aged 64, had a complete right-sided facial palsy following an eruption with reddening and pain in the right ear. Repeated electrical examinations were made, but no conduction could be demonstrated in the facial nerve at its cranial exit, even after three months. Needle electrodes in the right frontalis, levator anguli oris, and mentalis showed no motor-unit activity at all on volition, but spontaneous fibrillation potentials at rest were profuse. It was decided to decompress the nerve in the facial canal. Six weeks after operation there was still no nerve conduction, but a needle electrode in the levator anguli oris revealed discrete motor-unit activity and highly polyphasic " recovery " potentials on volition. After a further six weeks, discrete motor-unit activity on volition was detected in two more muscles—frontalis and orbicularis oculi—and nerve conduction to frontalis had returned.

Case 15.—A carpenter in a flour mill, aged 71, complained that he had cut his fingers at work without noticing it.

On examination there were sensory loss in the distribution of both median nerves and severe wasting of the lateral half of the thenar eminence in both hands. The patient had noticed this for some years. There was arthritis of both wrists. Diagnosis : carpal-tunnel syndrome (local thenar atrophy).

Muscle-testing.—On stimulation of the median nerve at the wrist there was no response from the thenar muscles supplied by the median nerve, but the lumbrical muscle of the index finger contracted well. (Stimulation of the ulnar nerve at the wrist had proved that this was not a case in which all the lumbricals were supplied by the ulnar.)

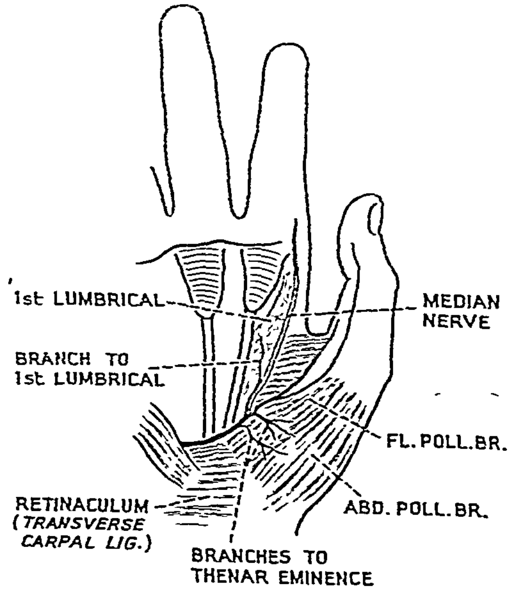

Fig. 10—Innervation of thenar and 1st lumbrical muscles.

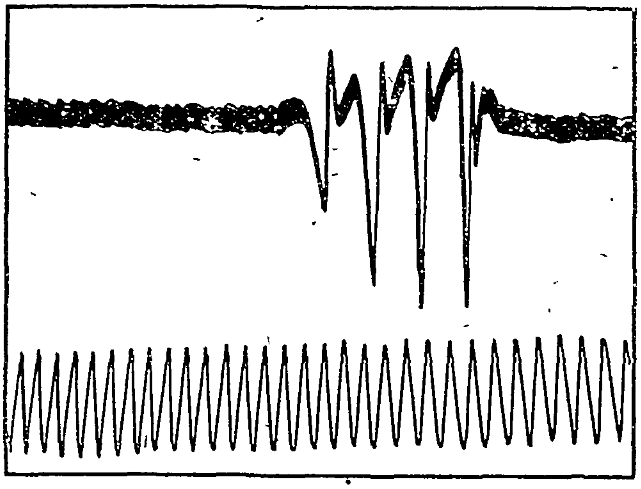

Fig. 8—Group motor-unit potentials, indicating irritation (time: 500 cycles per sec.)

five years he had sometimes felt pain in the neck and round the right shoulder.

On examination there were slight diminution of pain sense in the right little finger, and a similar patch on the right thigh; wasting of all the small muscles of the right hand, especially the 1st dorsal interosseous, with loss of power and poor grip, although the wrist muscles appeared to be normal; left biceps-jerk brisker than the right; other reflexes normal. Radiography showed bilateral cervical ribs and loss of space between the lower cervical vertebræ. Thoracic-outlet syndrome was tentatively diagnosed, although the clinical impression was that ulnar neuritis could not be ruled out.

Electromyography.—Needle electrodes in the right hypothenar eminence revealed discrete motor-unit activity on volition, but no spontaneous activity at rest; in the 1st dorsal interosseous there was spontaneous activity, both fibrillation potentials and rhythmic diphasic potentials; spontaneous diphasic potentials were found in the extensor carpi ulnaris.

Diagnosis: nerve irritation coupled with destruction of some nerve-fibres.

Operation.—Surgical exploration was undertaken; the cervical rib did not seem to be pressing on any nerve structure in its neighbourhood, and it was consequently left intact. Scalenotomy was performed.

Subsequent electromyography some months after operation revealed that spontaneous irritation potentials had disappeared from the right 1st dorsal interosseous and the extensor carpi ulnaris (the muscles in which they had been detected at the previous examination before the operation).

Case 11.—A housewife, aged 66, complained of pain down the outer border of the left arm as far as the thumb for four months, accompanied by pins-and-needles, and weakness of the arm and hand. There had been wasting of the small muscles of both hands for nearly forty years, and a cervical rib had been removed from the right side, with relief of symptoms, in 1911.

On examination there was slight diminution of pain sense on the inner side of the left arm, and some wasting of the thenar muscles of the left hand. There was loss of pain sense in the right thumb, index and middle fingers, and considerable atrophy of the right hand muscles, although the patient did not complain about this hand. The blood-pressure was 195/110 mm. Hg. Radiography showed a left cervical rib.

Muscle-testing.—Intensity-duration curves of the left abductor pollicis brevis, 1st dorsal interosseous and abductor minimi digiti were normal.

Electromyography.—Needle electrodes inserted into the left abductor minimi digiti and thenar muscles showed normal sustained pattern of motor-unit activity on volition and no spontaneous activity.

Diagnosis: no electrical abnormality.

The special interest of these four cases lies in the electromyographic detection of signs of nerve irritation in the first three, and absence of it in the fourth (case 11). Rhythmic diphasic potentials, which produce a characteristic "chugging" sound in the loud-speaker, suggest irritation, and when found in muscles supplied by roots suspected of being subjected to pressure from disc material, &c., may help materially to settle a diagnosis that is in doubt.

In case 8 it was possible to state exactly which nerve-root was affected, owing to the silence in the two muscles supplied by C5 and C6 (biceps and deltoid), and the presence of irritation potentials in two supplied by C6 and C7 (triceps and extensor carpi radialis). It was the more convincing for the subsequent demonstration of the disappearance of signs of irritation. This was a case in which all the necessary information was obtained with surface electrodes only, without using needle electrodes.

Owing to the pronounced psychoneurotic element in case 9 it was considered unwise to make any further electrical examination, especially since the symptoms subsided under treatment; there is little doubt that the irritation potentials detected earlier would have disappeared.

Case 10 was not examined electromyographically for some months after the operation. It was not easy to assess the result clinically, because the patient was going through rather a miserable time, having lost his job, and being in despair about finding another; this circumstance naturally made him most pessimistic about everything, especially his disability. As was to be expected, there was as yet no change in the paræsthesiæ and muscular wasting, and he felt that his scalenotomy had been in vain. In these circumstances it was most fortunate that a second electrical examination showed that pressure on the nerves had been relieved, and that signs of irritation were no longer present. The patient was much encouraged by this report and at his next attendance at the neurological clinic appeared almost jubilant, having secured a better job (which he had at first thought beyond the power of his wasted hand). The pain had abated, and he thought his hand was filling out.

Case 11 was deceptive. The symptoms suggested pressure on the lower portion of the brachial plexus, and the radiogram and previous history of cervical rib seemed to support this assumption. But the electrical examination and report of normal responses were justified by subsequent events; further observation and questioning betrayed the fact that the pain in the patient's arm was brought on by exertion and relieved by rest. This case proved to be one of hypertensive heart-disease with angina of effort.

BRACHIAL PLEXUS

Case 12.—A man, aged 54, had four months' history of weakness and wasting of his right hand and forearm, and six months' history of numbness on the inner side of the arm and forearm. Two years before, he had volunteered to go up on the stage at a variety show and be swung round by a man on roller-skates holding him under the armpits; a month later he had a sudden pain in the right shoulder, radiating down the arm, while he was sitting having his tea. There was no more trouble until he noticed that his hand was beginning to lose power and appeared to be wasting, four months before he came for advice.

On examination were found loss of sensation to pinprick on the inner side of the right arm and forearm but no other sensory change; wasting and weakness of the flexors of the right wrist and all the small muscles of the right hand; the right forearm was 1 in. smaller than the left. The C.S.F. was normal. Radiography showed narrowing of the lower cervical intervertebral foramina by osteophytes. The clinical diagnosis lay between radiculitis and spinal-cord tumour.

Electromyography showed that conduction in the median and ulnar nerves at the wrist was reduced but equal. Electromyography with needle electrodes revealed reduced motor-unit activity on volition in the flexors of the wrist and all the small muscles of the hand; spontaneous fibrillation potentials were present in the flexors of the wrist at rest.

Diagnosis: denervation of the muscles supplied by the lower part of the brachial plexus.

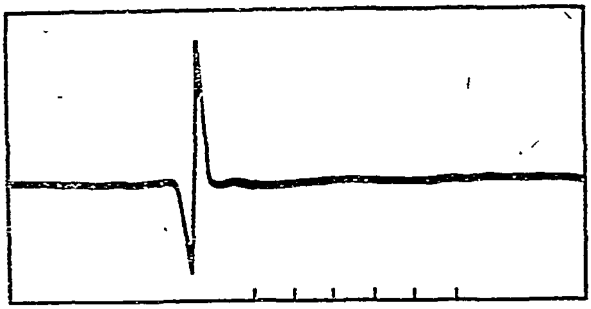

Fig. 12—Short-period potential, as seen in myopathy (scale: millisec.).

Case no.	*Clinical diagnosis*	*Electromyography*	*Conclusion*
1	Atypical progressive muscular atrophy	Synchronisation	Diagnosis confirmed
2	As in case 1	"	"
3	? Friedreich's ataxia ? Poliomyelitis	"	Probably poliomyelitis
4	? Poliomyelitis ? Infective neuritis	"	"
5	Syringomyelia	"	Diagnosis confirmed
6	Lymphatic leukæmia, drop-foot	"	Intramedullary lesion
7	Glioma of cord	No synchronisation "recovery" potentials	Suggestions about pathology
8	Atypical cervical disc lesion	"Irritation"	Lesion localised, postoperative investigation
9	? Osteo-arthritis ? Cervical disc ? Functional	"	Organic lesion diagnosed and treated
10	? Ulnar neuritis ? Cervical rib	"Irritation" and fibrillation	Scalenotomy. postoperative investigation
11	? Cervical rib	No electrical abnormality	Final diagnosis: angina of effort
12	? Radiculitis ? Cord tumour	Fibrillation of hand and flexors of wrist	Suggested combined ætiology of osteo-arthritis and trauma
13	Birth palsy C3–7	Activity in biceps in phase with respiration	Crossed reinnervation from root C4 to musculocutaneous and radial
14	Ramsay Hunt syndrome	No signs of recovery after 3 months	Facial nerve decompressed, recovery
15	Carpal-tunnel syndrome	Fibrillation in thenar muscles, lumbrical of index normal	Suggested mechanism of production of lesion
16	? Lumbar disc ? Lateral popliteal palsy	Fibrillation in tib. ant. and peronei; "recovery" in biceps femoris (short head)	Lateral popliteal injury at level of hip; recovering
17	? Peroneal muscular atrophy	Trains of high-frequency oscillations	Peroneal muscular atrophy with myotonia

CONCLUSION

This list of cases is, of course, far from exhaustive, and is not intended to be a complete representation of disorders in which electromyography is of value. No mention has been made, for instance, of myopathy, in which the mechanical inefficiency, coupled with normal, albeit decreased, electrical reactions but short-period potentials (fig. 12), renders the electromyograph an invaluable means of distinguishing this disorder from those of myelogenic or neurogenic origin; nor has myasthenia gravis been included, although electromyography is now regarded in some countries as an indispensable method of assessing the severity of the disease (rapid fatigue can be measured in this way with a degree of accuracy impossible by clinical methods alone). But the variety of diseases represented will, it is hoped, indicate that electromyography can no longer be regarded as of purely academic interest, with no clinical value.

It has been stated already that the method is still in its infancy. For this reason it is more than ever desirable to correlate the clinical condition with the electrical findings. When patients have been sent for electromyography it would be greatly appreciated if the follow-up scheme could be made to include a note on progress for the electrodiagnostic department concerned; it is only by means of such information that obscure electrical phenomena can be understood and correctly interpreted.

It is a pleasure to acknowledge the help and advice of Dr. Philippe Bauwens, who made the electrical examinations in the department of physical medicine at St. Thomas's Hospital and permitted the use of the photographic tracings, which were prepared by his technical assistant, Mr. Peter Styles.

Ten of the patients were from the West End Hospital for Nervous Diseases, four were from St. Thomas's Hospital, and three from St. Stephen's Hospital, Chelsea. I wish to thank the physicians concerned for their permission to publish the various case-records, especially Dr. C. Worster-Drought, whose encouragement and guidance have been invaluable.

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CARDIAC FAILURE *

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(*Concluded from p. 894*)

Treatment

The rational treatment of patients suffering from heart-failure should take into consideration, whenever possible, the factors responsible for its development and the extent to which these can be removed or controlled.

Reviewing fifty cases I found that in the majority (31) the failure was due to acute intercurrent infections or to the natural progress of various cardiovascular diseases. In the more favourable cases (19), the ætiological factors comprised: overstrain, physical or mental, singly or combined; indulgence, idleness, and intemperate living; severe anæmia; thyrotoxicosis; and pregnancy. Recognition of these factors was of great help alike in treatment, in prognosis, and in rehabilitation.

Within reasonable limits it is usually advisable to mould the programme of treatment—whether medicinal, dietetic, or any other—according to the age, constitution, and personality of the individual. In giving our opinion, followed by our advice, the tone as well as the substance of our statement must be deliberately considered. The sensitive must be treated with kindness; the weak encouraged; the obstinate firmly handled; the careless warned; the disobedient threatened or even alarmed. At times we must appeal to the intellectual, at times to the emotional, side of the patient's mind, in setting before him his condition, his prospects, and his duty. According to the individual, an important factor in his treatment will be to yield at the right time, or on the contrary to decline to compromise, and to make promises—which incidentally are very valuable means of treatment—with great caution.

CONGESTIVE FAILURE

The specific remedies for congestive heart-failure will probably include rest, digitalis, and mercurial diuretics: and. in addition, palliative treatment is usually needed for complicating symptoms. Pain, anxiety, insomnia, faintness, breathlessness, and flatulence may be attended with distress or danger which calls for immediate relief.

There is general agreement nowadays regarding the curative properties of *digitalis* in cardiac failure with congestion. Mackenzie (1911) emphasised its action in failure with auricular fibrillation, and its value in cases

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* The Lumleian lectures delivered at the Royal College of Physicians on April 11 and 13, 1950.

Electromyography.—Needle electrodes inserted in the thenar muscles revealed denervation by the reduced pattern of motor-unit activity on volition and the presence of spontaneous fibrillation potentials at rest.

Diagnosis confirmed, and escape of 1st lumbrical noted.

Case 16.—A railway coachmaker, aged 48, stated that he was perfectly fit until Jan. 25, 1949, when, while kneeling to fix a railway-carriage seat in position, bending forward, lifting and pulling, he suddenly felt a shooting pain in the right lower lumbar region; this was followed by aching pain in this region for a month. Next he got cramp in his right toes, and the foot felt numb, and he could not use his right foot properly. It had remained weak ever since, but the pain had gone. There had not been any sciatic pain at any time.

On examination nine months after the original complaint, the patient had a complete lower motor-neurone paralysis of all the muscles supplied by the lateral popliteal nerve, but no other signs, either motor or sensory.

Muscle-testing revealed denervation of the right anterior-compartment muscles and peronei.

Electromyography.—Needle electrodes inserted into these muscles revealed grossly diminished motor-unit activity on volition, with spontaneous fibrillation potentials at rest; and in the short head of the biceps femoris decreased motor-unit activity on volition, with polyphasic complex "recovery" potentials. The long head of the biceps femoris showed a normal sustained pattern of motor-unit activity on volition, and no spontaneous activity at rest.

These three cases of peripheral nerve lesion were of different ætiology, case 14 being due to infection combined with pressure, case 15 to a pressure lesion possibly aggravated by arthritic swelling of the carpal joint, and case 16 probably to a traction injury.

The Ramsay Hunt syndrome, of which case 14 was typical, is almost certainly due to infection of the geniculate ganglion with the zoster virus, but the inflammatory swelling spreads distally in the nerve, with the result that there is often compression in the narrow facial canal. The electromyograph was instrumental in showing that in this case no recovery was to be hoped for without surgical interference; the subsequent electrical examinations proved that treatment had been successful, long before it was possible to determine any clinical improvement.

The point of interest in case 15 lies in the anomalous response to stimulation of the median nerve at the wrist. If, as is generally supposed, the carpal-tunnel syndrome were due to compression of the entire median nerve in the carpal tunnel between the carpus and the retinaculum, one might expect the two radial lumbricals to be involved as well as the thenar muscles. The lumbricals often escape, however, even in cases in which the usual preliminary testing of the median and ulnar nerves at the wrist has shown clearly that these muscles are supplied by the median nerve. The anatomy of this region seems to explain the electrical findings. The branches of the median nerve to the abductor and flexor pollicis brevis hook over the sharp distal edge of the retinaculum close to its attachment to the ridge of the trapezium, and run back to reach these muscles, while the branch to the lumbricals pursues a straight and untrammelled course distally; the branch to the opponens usually pierces the retinaculum between its attachments to the ridge on the trapezium and the tuberosity on the scaphoid, where it may be subjected to pressure or squeezing (fig. 10). It is perhaps not unreasonable to suppose that the syndrome is caused not only by the narrowing of the tunnel which follows fracture or severe arthritis but also to a considerable extent by the sawing effect of the distal edge of the retinaculum. This is a case in which electrical investigation draws attention to the mechanism of production of a well-known syndrome that would be very difficult to establish from clinical examination alone.

Case 16 was at first justifiably suspected of being an example of prolapsed intervertebral disc, but the final distribution of the motor paralysis suggested a lateral popliteal lesion; this was difficult to reconcile with the history of pain in the lower portion of the back. The sciatic nerve often divides into its two terminal branches (medial and lateral popliteal) as high up as the sacral plexus, and when it does so the lateral popliteal invariably pierces the piriformis muscle (the larger medial branch passing under this muscle as usual). In this position the lateral popliteal branch is much more vulnerable, especially when the patient is in a squatting posture. If it were torn by stretching while gripped in the substance of the piriformis, pain in the lumbar region would naturally result, as well as motor paralysis. This is possibly what happened in the case here described. It is usually considered that lateral popliteal palsy is caused by compression against the head of the fibula; but by electromyography it is possible to show that the short head of the biceps (the only muscle in the thigh innervated by the lateral popliteal) is sometimes denervated in these cases, and in such instances the point at which the nerve is damaged must lie above the knee; the point of exit from the pelvis seems the most likely place.

MUSCLES

Case 17.—A cornchandler, aged 71, complained that his legs were wasting; his hands had been wasted for thirty years. He was married but had no children. A brother was afflicted with similar muscle wasting.

On examination the patient was bald and with poor vision, but no lens opacities were discernible on ophthalmoscopy. There was wasting of all the small muscles of both hands and of the anterior-compartment muscles and peronei of both legs, with bilateral pes cavus. Peroneal muscular atrophy was diagnosed. Reactive myotonia was present in the brachioradialis and extensors of wrists on both sides, but no active myotonia.

Electromyography.—Needle electrodes in the left thenar eminence, left extensor digitorum communis, and right and left peronei, revealed decreased motor-unit activity in all these muscles; there were spontaneous fibrillation potentials at rest in all but the peronei and trains of high-frequency oscillations (fig. 11) ("dive-bomber" sounds) in all muscles tested. These spontaneous high-frequency discharges are characteristic of myotonia. Their origin is obscure.

Diagnosis: peroneal muscular atrophy with myotonia.

Case 17 presented the usual features of peroneal muscular atrophy, although the involvement of the legs at such a late age is somewhat uncommon; there were no obvious sensory changes; dystrophia myotonica was a possible diagnosis, but there was no active myotonia detectable clinically, but only reactive myotonia in the muscles specified. Moreover, there was no pronounced wasting of those muscles most often and prominently wasted in dystrophia myotonica—i.e., sternomastoids, muscles of mastication, and facial muscles. The high-frequency oscillations detected in the loud-speaker on insertion of the needle electrodes into the muscles demonstrated myotonia which, being purely reactive, would clearly be overlooked on clinical examination.

SUMMARY OF CASES

To sum up, the 17 neurological cases which have been presented to illustrate the uses of electromyography may be tabulated as follows.

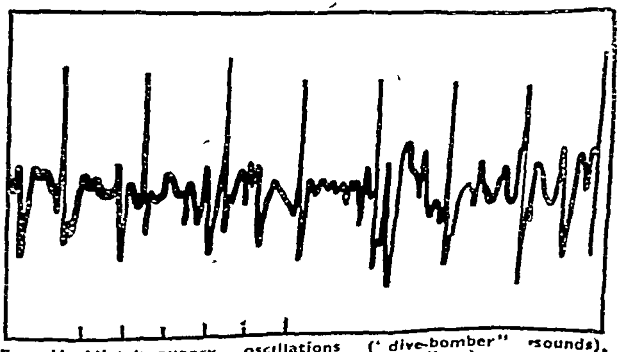

Fig. 11—High-frequency oscillations ("dive-bomber" sounds), suggesting myotonia (scale: 10 millisec.).

are essential items of the diet, which includes specified amounts of various ordinary foods (all without added salt). The fluid intake is limited to about 50 oz. daily in uncomplicated cases, an increase being indicated if the blood-urea is high or rising.

Hayward (1949) states that, in cases complicated by renal dysfunction, fever, or excessive perspiration, a low-sodium diet may precipitate symptoms of salt depletion including muscle cramps, colic, nausea, and vomiting, with a rising blood-urea, and he refers to four deaths attributed to this cause by Soloff and Zatuchni (1949).

In patients with long-standing heart-failure—particularly those with tricuspid incompetence and hepatic congestion—hypoproteinæmia may be responsible for œdema. Here a *high-protein diet* may restore a normal or an approachingly normal level of plasma-proteins, and the patients may then respond to diuretic medication.

Intractable œdema and serous effusions may need *mechanical drainage*: Bedford (1949) advises that if a hydrothorax fails to clear in 1–2 weeks it should be aspirated, since long-continued pulmonary collapse may lead to secondary changes such as brown induration, pleural thickening, or even atelectatic bronchiectasis.

As an extrarenal method of depleting the body sodium Leiter (1948) has suggested *peritoneal dialysis* with 5% glucose. He recorded one case of massive œdema in which, all the conventional remedies having failed, he carried out continuous peritoneal irrigation with 5% glucose at the rate of 500 ml. per hour for 6 days. The œdema cleared rapidly: the fluid draining from the peritoneal cavity contained 312–331 mg. sodium per 100 ml.

For patients with congestive heart-failure whose compensation remains impaired after a long course of medicinal remedies, *therapeutic myxœdema* should be considered.

Total thyroidectomy in the treatment of congestive heart-failure and ischæmic heart-disease was introduced by Blumgart and his colleagues (1933), who thought that it would lower the oxygen-consumption of the body, and consequently the output and work of the heart. Blumgart et al. (1935) reported on fifty patients, aged 18–69, of whom twenty-four recovered and were able to work 2–18 months after the operation and six regained compensation after recurrences of heart-failure; there were six operative deaths, and six subsequent deaths, two patients were unrelieved, and at the time of the report it was too early to decide on the effect the remaining six patients.

In the experience of my colleague Evan Bedford (1949) the value of induced myxœdema in certain types of anginal and congestive heart-failure has been amply confirmed. He stresses its controlling action on the circulatory mechanism, but also the complications—including anæmia, fluid retention, and mental dysfunction—for which it may be responsible.

The selection of suitable cases for therapeutic myxœdema is admittedly difficult. It is contra-indicated in patients with uncontrollable œdema, in those with rapidly progressive disease, and in those whose range of circulation is greatly reduced by high-grade mitral or aortic stenosis. Bedford believes that total thyroidectomy is a more certain and probably a safer method of producing and maintaining myxœdema than is thiouracil, and that it is the preferable remedy for those patients whose general condition admits of operation. He suggests that therapeutic myxœdema is indicated in:

1. Chronic left heart-failure without appreciable systemic œdema (especially where there is paroxysmal dyspnœa and anginal pain).
2. Auricular fibrillation or flutter in which digitalis fails to control the average ventricular rate.
3. Chronic right heart-failure which can be kept more or less dry by mercurial diuretics when the patient is at rest but which persistently recurs when he is ambulant.

As an alternative to thyroidectomy, Sharpey-Schafer (1946) tried long-term thiouracil treatment in twelve cases of severe cardiac failure, seven of the low-output and five of the high-output type. He estimated the cardiac output and the right auricular pressure by cardiac catheterisation, and he calculated the work of the heart from the product of the cardiac output and the blood-pressure. Thiouracil reduced the basal and the resting oxygen consumption; but, as the arteriovenous oxygen difference sometimes decreased with the fall in oxygen consumption and the blood-pressure was sometimes unchanged, he was of opinion that the cardiac output and the work of the heart might be unaffected by thiouracil. He noted, however, that, as judged by a fall in venous pressure and an improved exercise tolerance, definite improvement occurred in the majority of the cases in both the tests.

Bedford (1949) reported thirty-five cases of failure treated by thiouracil, the results being good and worth while in about half and slight in about a quarter. Agranulocytosis developed in three of the patients, of whom one died and two recovered, both later undergoing total thyroidectomy.

ANGINAL PAIN

The treatment of patients in whom anginal pain is the dominant symptom of coronary atheroma must include both precautionary measures and symptomatic remedies. It is fundamentally important that patients shall personally assess their pain threshold, below which they must endeavour to plan their routine of life and habits; also that they shall be encouraged to take easy forms of exercise according to their tolerance and to reduce their weight if this is deemed to be excessive.

Apart from nitrites, the medicinal treatment of angina pectoris secondary to coronary atheroma is singularly disappointing. Many drugs have been recommended, and, though certain xanthine preparations appear to be helpful at times, the results have otherwise been insufficiently convincing. Mild sedatives are indicated for the obviously nervous and excitable patients, the frequency and severity of whose attacks may be further controlled by occasional courses of short-wave diathermy. In severe cases it may be desirable to prescribe a long period of complete rest with a rigidly restricted diet and light general massage, adequate sedation being maintained in order that patients shall have the maximum of relaxation, both mental and physical.

The value of thiouracil in intractable cases has been under consideration recently. Hollander and Mandelbaum (1948) treated ten patients, whose histories ranged from 5 months to 7 years, the dosage of 6-propylthiouracil being increased gradually from 50 to 200 mg. daily. In four the substernal pain was relieved after 8 weeks' treatment, the basal metabolic rates, though lowered in three, remaining within normal limits. One case with a basal metabolic rate of − 8% became free from anginal attacks when the level fell to − 26%, and three with raised initial levels improved while their rate was still above normal limits. Seven patients developed breathlessness and œdema of the legs owing to water retention, but toxic effects on the blood were excluded in all these cases. The investigators noted that, to obtain relief of anginal pain, the basal metabolic rate need not be lowered to myxœdema levels.

Two surgical remedies—total thyroidectomy and paravertebral sympathetic block—are available for carefully selected patients whose condition is little, if at all, relieved by medical remedies and whose painful seizures are so frequent and severe as to disable them almost completely.

Paravertebral sympathetic block, first practised by Mandl (1925) and Swetlow (1926), is now recognised as a safe and successful means of relieving intractable anginal with regular rhythm was subsequently recognised (Janeway 1913, Christian 1922, Luten 1924, Marvin 1927, Gavey and Parkinson 1939, Paul Wood 1940).

Gavey and Parkinson (1939) investigated a group of patients in whom failure with normal rhythm was secondary to various conditions including hypertension, rheumatic valvular disease, and syphilitic heart-disease. They regarded breathlessness, liver enlargement, and œdema (with or without hydrothorax) as the criteria of failure, and they considered that relief in these respects, in conjunction with adequate diuresis, was satisfactory evidence of improvement under treatment. Their general conclusions were:

1. In heart-failure with normal rhythm, digitalis is helpful in rather more than half the cases.
2. The heart-rate in failure with normal rhythm is, as a rule, moderate (the average rate in their series before digitalis was 85).
3. Whatever the initial rate, digitalis often reduces it; but a reduction in heart-rate is not always accompanied by clinical improvement.
4. Good clinical results may be obtained without any reduction in rate.

Paul Wood (1940) investigated twenty cases of congestive heart-failure with normal rhythm, including twelve cases of hypertensive heart-disease, three of chronic cor pulmonale, one of mitral stenosis, one of ischæmic heart-disease, and three with unknown ætiology. Eighteen of the cases (fourteen with right, and four with left, ventricular failure) responded to digitalis; improvement in right failure was judged by a decline in the venous pressure, and in left failure by significant lowering of the arm-to-tongue circulation-time. In all but three of the long-period studies the pulse-rate fell with digitalis, on an average from 98 to 85 per minute; but observation showed that the fall in venous pressure following intravenous digoxin was not due to slowing of the heart.

The accepted opinion nowadays is that the value of digitalis therapy differs in the different forms of heart-failure. Striking benefit is obtained in right-sided failure, in isolated failure of the left ventricle with pulmonary engorgement, in hypertensive failure, and in the treatment of certain arrhythmias, notably auricular fibrillation and auricular flutter.

Though digitalis appears to be beneficial in those cases of emphysema heart-failure which are complicated by auricular fibrillation, Howarth and her colleagues (1947) have shown that it is otherwise contra-indicated in this condition. They noted that emphysema cases with a normal blood-pressure differ from cases of low-output failure in that their resting output is increased: when the venous filling pressure is reduced by digitalis or by venesection the cardiac output usually falls. Other conditions in which digitalis is contra-indicated include the heart-failure which occurs in shock, in thyrotoxicosis, in severe anæmia, and in the acute stages of carditis.

Apart from thyrotoxicosis cases, the heart-failure of auricular fibrillation is usually *well controlled by digitalis*, the dosage being so regulated that the average ventricular rate is maintained reasonably near the normal. For those patients, however, who are persistently heart-conscious and materially incapacitated in spite of full digitalisation, an attempt should be made to restore the normal rhythm with *quinidine*. This drug is not infallible; but, so long as the patient is not suffering from acute carditis or severe cardiac failure, and has no history of embolic accidents, it can be used with reasonable confidence. Success is most likely when the fibrillation is of recent origin, in cases in which it has followed acute infections, and in thyrotoxic patients in whom normal rhythm does not return after thyroidectomy.

Though sometimes permanent, the quinidine cure of auricular fibrillation may be of limited duration. Further courses may be indicated if the fibrillation recurs, and as a rule the patient will again respond to the same dosage. In successful cases a short period of complete rest, followed by a quietly organised convalescence, will usually suffice to consolidate the cure, and the quinidine medication may cease entirely, its subsequent value in prophylactic dosage being negligible.

Recent investigations by Howarth and her colleagues (1946, 1947) have confirmed the value of two other remedies in heart-failure of the congestive type—namely, venesection and theophylline. It was observed that in cases of low-output failure intravenous injections of *theophylline* reduced the venous filling pressure and increased the cardiac output, and that they did this more rapidly than intravenous digoxin. It was suggested that, as the effect of theophylline on the right auricular pressure may not be maintained, digoxin and theophylline should sometimes be prescribed in close succession, to secure summation of their actions. In all the cases of low-output failure with right auricular pressure above the sternal angle, *venesection* induced a fall in the venous filling pressure and a rise in the cardiac output, and usually there was a fall of blood-pressure. Though closely similar results were obtained with venesection and with digitalis, the former usually lowered the blood-pressure, whereas with the latter the blood-pressure was maintained and often raised. Comparing the value of the two remedies Howarth et al. suggested that the chief difference was in the long-term effects; whereas after venesection the right-auricular pressure tends to rise again, digitalis often maintains the filling pressure of the heart at a lower and better level for an indefinite period.

In congestive heart-failure the retention of sodium is known to promote peripheral œdema and transudation into the serous cavities. For these conditions we can combine two reliable remedies, mercurial diuretics and a low-sodium diet. *Mercurial diuretics* induce excretion of large quantities of water and sodium chloride, and —except in cases of renal dysfunction, where they are contra-indicated—their curative value has been amply confirmed. Particularly effective in right heart-failure with systemic venous engorgement and peripheral œdema, mercurials are also useful in gross pulmonary venous congestion secondary to failure of the left ventricle.

Following the pioneer work of Karell (1866), Schemm (1942), Kempner (1946), and others, a *restricted intake of salt* is now regarded as an essential item in the management of patients with congestive heart-failure, in addition to which a diet suitably low in calories is prescribed to reduce metabolism and decrease the work of the heart.

Opinions differ on the composition of a safe and reasonably palatable low-sodium diet. The basis of the Karell milk cure is a severe limitation of fluid, together with a low-calorie diet and a restricted intake of sodium (0·4 g. per day). Though temporarily valuable in the preliminary treatment of well-nourished patients and those with hypertensive failure, the Karell diet is *regarded as excessively rigorous for congestive failure* of average severity. The Kempner rice diet, valued at 2000 calories, consists of rice, fruit juices, sugar, and 0·2 g. of sodium, together with vitamins and ferrous sulphate. This diet is unpalatable, monotonous, and difficult to arrange, and the consensus of opinion is this country is that patients respond favourably to a mixed diet of approximately 2000 calories containing 0·5 to 1·0 g. of sodium.

I am indebted to Dr. Shirley Smith (1950) for particulars of the low-sodium dietary régime he has formulated for patients with congestive failure and a tendency to fluid retention. He recommends modified diets of slightly varied composition, the average value of which is 1816 calories, and the average *sodium content 0·529 g.* Measured quantities *of low-salt bread and salt-free* butter

Harken and his colleagues prefer the creation of an atrial shunt for those patients whose cardiac output is within normal limits, and, if the condition is complicated by uncontrolled tachycardia or anginal pain, they recommend cardiac denervation.

Swan (1949) suggested the creation of a pulmonocaval venous shunt by the anastomosis of a proximal segment of the azygos with the right inferior pulmonary vein. Bland and Sweet (1949) performed this operation in five cases of advanced mitral stenosis in which pulmonary venous hypertension caused recurring attacks of pulmonary œdema and hæmoptysis. In three of the cases it was very successful; in another (operated on recently) the early progress was satisfactory. In no case was there any clinical evidence that reduction in the left auricular pressure impaired the peripheral circulation. Bland and Sweet regarded the operation as a compromise, not as a cure, suitable patients being those with small strong hearts and a tendency to circulatory complications in the lungs.

Cossio and Perianes (1949) advocate two surgical remedies—tricuspid valvulotomy and ligation of the inferior vena cava below the renal veins—for the relief of the "cardiac lung" in those cases of left ventricular failure and mitral stenosis which can no longer be managed successfully by medical treatment. They performed tricuspid valvulotomy under local anæsthesia on four patients. The first was a man suffering from syphilitic aortitis and severe heart-failure, and his postoperative progress was entirely satisfactory: his urgent symptoms were rapidly relieved and a material decrease of pulmonary congestion was confirmed by radioscopy. Progress was well maintained, and six months later, apart from slight breathlessness with fast walking, he was relatively symptom-free. Of the three other patients, two were definitely improved. One survived 5 months; the other died from a pulmonary infarct $2^1/_2$ months after the operation. The third patient died in collapse within 8 hours of the operation, during which a paroxysm of tachycardia precipitated the development of acute pulmonary œdema; the tricuspid valve was extensively sectioned, the intraventricular pressure fell to 32 mm. Hg, and dyspnœa and tracheal stridor disappeared rapidly, but tachycardia persisted and terminated fatally.

Ligation of the inferior vena cava was performed in an unspecified number of cases with one operative death and good results in the remainder. Pulmonary engorgement was rapidly relieved in the successful cases and breathlessness disappeared or decreased to the extent that the patients were comfortable in the recumbent position.

In Cossio's opinion, tricuspid valvulotomy and ligation of the inferior vena cava are relatively simple and well-tolerated operations, both procedures reducing the right ventricular output, decreasing the pulmonary congestion, and improving the efficiency of the left ventricle.

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Harken and his colleagues prefer the creation of an atrial shunt for those patients whose cardiac output is within normal limits, and, if the condition is complicated by uncontrolled tachycardia or anginal pain, they recommend cardiac denervation.

Swan (1949) suggested the creation of a pulmonocaval venous shunt by the anastomosis of a proximal segment of the azygos with the right inferior pulmonary vein. Bland and Sweet (1949) performed this operation in five cases of advanced mitral stenosis in which pulmonary venous hypertension caused recurring attacks of pulmonary œdema and hæmoptysis. In three of the cases it was very successful; in another (operated on recently) the early progress was satisfactory. In no case was there any clinical evidence that reduction in the left auricular pressure impaired the peripheral circulation. Bland and Sweet regarded the operation as a compromise, not as a cure, suitable patients being those with small strong hearts and a tendency to circulatory complications in the lungs.

Cossio and Perianes (1949) advocate two surgical remedies—tricuspid valvulotomy and ligation of the inferior vena cava below the renal veins—for the relief of the "cardiac lung" in those cases of left ventricular failure and mitral stenosis which can no longer be managed successfully by medical treatment. They performed tricuspid valvulotomy under local anæsthesia on four patients. The first was a man suffering from syphilitic aortitis and severe heart-failure, and his postoperative progress was entirely satisfactory; his urgent symptoms were rapidly relieved and a material decrease of pulmonary congestion was confirmed by radioscopy. Progress was well maintained, and six months later, apart from slight breathlessness with fast walking, he was relatively symptom-free. Of the three other patients, two were definitely improved. One survived 5 months; the other died from a pulmonary infarct $2^1/_2$ months after the operation. The third patient died in collapse within 8 hours of the operation, during which a paroxysm of tachycardia precipitated the development of acute pulmonary œdema; the tricuspid valve was extensively sectioned, the intraventricular pressure fell to 32 mm. Hg, and dyspnœa and tracheal stridor disappeared rapidly, but tachycardia persisted and terminated fatally.

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to the bases of the tubules. The remainder of the epithelium lining the tubules stained faintly with mucicarmine. The epithelium of the surface and the gastric pits stained deeply with mucicarmine.

Clinical Findings

Subject X was aged 25 and weighed 11 st. He had not had dyspepsia. His past history included three mild bouts of benign tertian malaria following three years' Army service, and an attack of tonsillitis with subsequent tonsillectomy at the age of 5 years. His diet had always been good except for two months' poor diet while on Army service in New Guinea. The family history showed that his maternal grandmother had died of pernicious anæmia at the age of about 70. His mother, at the age of 44, had had several months' illness in which weakness and dyspepsia had been the main symptoms. A gruel meal had then showed that she had a low secretion of free acid (less than 20 units), and the amount of mucus had been described as abnormal.

Clinical examination revealed no abnormality. Radiography after a barium meal showed normal gastric emptying time and no abnormality in stomach or duodenum. The findings on the third test-meal were achlorhydria, secretion of 105 ml. in two hours (normal range 81–272 ml., average 134 ml., in 11 controls), secretion of mucus in two hours 107 mg. of reducing substance (Weiden 1949) (normal range in controls 86–440 mg., average 169 mg.), and peptic activity 20 units (accepted normal in this laboratory over 70 units).

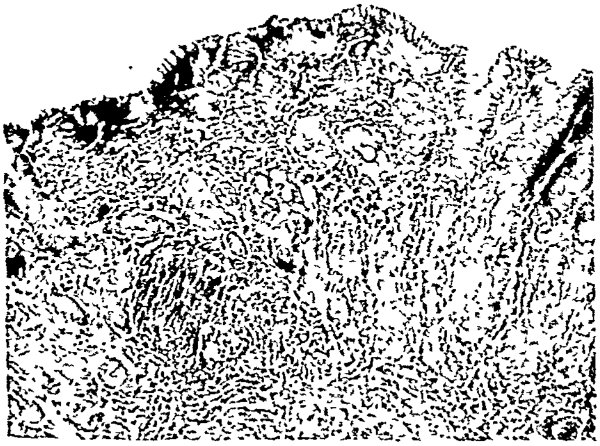

Fig. 2—Biopsy specimen (piece A) from mucosa of body of stomach in a student with persistent histamine-fast achlorhydria and low pepsin index. There is some thinning of mucosa and atrophy of chief and parietal cells. Epithelium of residual tubules now shows mucus secretion with specific mucin stain. There is development of a lymph follicle. (Pepsinogen stain and methyl green.) (×105.)

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Gastroscopy was not done.

DISCUSSION

This investigation confirms current opinion on the low incidence of achlorhydria in young adults. It also suggests that achlorhydria has a definite histological abnormality as its cause in healthy people as well as in patients with dyspepsia or related conditions, as we have previously demonstrated (Wood et al. 1949b). This continuing agreement between the histological picture and the biochemical findings, and the similarity of structure when more than one biopsy specimen is obtained from the same patient, make us feel that even one sample is representative of the histological lesion throughout the body of the stomach in gastritis. Though this relation between structure and function has been suggested by other workers, no histological evidence has been brought forward in the case of an apparently normal person. On the contrary, on looking at the mucosa many gastroscopists can see little change, as cited by Palmer (Cecil 1943).

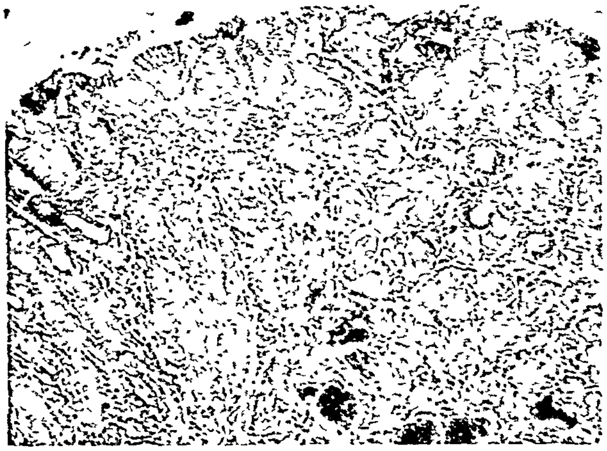

Fig. 3—Biopsy specimen (piece B) from mucosa of body of same stomach as in fig. 2. The portion on the left shows complete atrophy of chief and parietal cells, also seen in piece A (fig. 2). The portion on the right shows a few pepsinogen-containing chief cells at base of tubules. (Pepsinogen stain and methyl green.) (×105.)

Clinically the only ætiological factor to be considered in subject X is a brief period of dietary deficiency three years ago, but our experience with malnutrition does not lead us to believe that this is the cause of the mucosal change in this student. Apart from cases of pernicious anæmia, patients with achlorhydria whom we have studied have always shown a superficial or catarrhal inflammation with polymorph infiltration and surface exudate, and atrophy has depended on the depth of inflammation. In subject X the histological picture was one of gross atrophy of the specific glandular elements of the mucosa of the body of the stomach and macrophage and lymphocyte aggregation about the atrophied areas. An extreme degree of this change—i.e., from almost complete to complete atrophy of chief and parietal cells with minimal catarrhal inflammation—is particularly the case in pernicious anæmia.

SUMMARY

In 134 medical students only one example of persistent histamine-fast achlorhydria was discovered.

Gastric biopsy in 4 students who gave normal results with test-meals showed relatively normal gastric mucosa.

Gastric biopsy in the student with achlorhydria showed an unusual type of atrophy of the specific glandular elements of the gastric glands and an absence of superficial inflammation. In this student no ætiological factor for gastritis was found. There was a family history of pernicious anæmia and of hypochlorhydria on the maternal side. Clinical examination, a barium meal, and examination of the blood all gave normal results. The volume of gastric juice secreted was normal, but free acid was absent and pepsin and mucus were much reduced.

It is felt that persisting achlorhydria, when histamine is used as the stimulus, will always be associated with a diffuse histological change in the mucosa of the body of the stomach, independent of the presence or absence of any symptoms relating to the gastro-intestinal tract or elsewhere.

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ACHLORHYDRIA IN YOUNG ADULTS

A STUDY OF THE GASTRIC MUCOSA OBTAINED BY BIOPSY FROM A VOLUNTEER*

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There has been much speculation concerning the cause of histamine-fast achlorhydria in healthy young adults; but, so far as we know, no previous histological examination of the gastric mucosa in such persons has been made.

There is agreement about the incidence of achlorhydria in healthy young adults. Originally Bennett and Ryle (1921), using the gruel test-meal, found 4 cases of achlorhydria in 100 healthy medical students; in 1934, Lander and Maclagan, using histamine as a more powerful stimulus, found an incidence of 1% in a comparable series. In the present study we found 1 case of histamine-fast achlorhydria in 134 students. Out of eight commonly used textbooks (Wiggers 1944, Best and Taylor 1945, Harrison 1937, Maxwell 1947, Price 1941, Dible and Davie 1945, Boyd 1944, Cecil 1943), only the first four mention the low incidence of histamine-fast achlorhydria in healthy persons.

As regards the cause, both Hurst (Price 1941) and Boyd (1944) suggest that chronic gastritis would always be the basis of persistent achlorhydria irrespective of symptoms, but they provide no histological evidence in "normal" people. Schindler et al. (1940) have demonstrated mucosal abnormalities gastroscopically in 96 of 101 cases of persistent achlorhydria associated with various diseases; but Palmer (Cecil 1943) points out that "in many cases of histamine-proved anacidity in apparently normal individuals the mucosa as seen gastroscopically is essentially normal or shows evidence of relatively slight or patchy inflammation."

The present investigation was carried out to discover young adults with histamine-fast achlorhydria and submit them to gastric biopsy. In the one such person so discovered gastric biopsy revealed extensive changes in the mucosa of the body of the stomach.

MATERIAL

The 134 volunteers were students in the clinical school of the Royal Melbourne Hospital. There were 112 men and 22 women, aged 19–35, the average age being 24. Before volunteering the students were informed that if achlorhydria was detected they would be asked to submit to gastric biopsy. We are most grateful to those students who volunteered for the test-meal and in particular to the student with achlorhydria and the four controls on whom gastric biopsy was done.

TECHNIQUE

A gruel test-meal was given, and specimens were withdrawn at intervals until a secretion of over 10 units of free acid was obtained. If no success was obtained in an hour, the stomach was emptied, and 0·3 mg. of histamine was given, and the procedure repeated; 32 students did not secrete 10 units of free acid with this technique and were retested in the same manner but under improved conditions. In 11 cases the test-meal was done in more detail, and the results were used as a basis for control in this and other studies.

Gastric biopsy was done with a flexible gastric biopsy tube, and the sections were prepared as described by Wood et al. (1949a). There were no untoward reactions, and satisfactory samples were obtained.

INCIDENCE OF ACHLORHYDRIA

All 134 volunteers except one man, "subject X," showed a secretion of 10 units or more of free acid on one or more occasions. Subject X secreted no free acid on either occasion. Three months after the first test-meal a third test-meal was given to this volunteer, with 0·5 mg of histamine as the stimulus. The stomach was completely emptied at 15-minute intervals for two hours. Again achlorhydria was found. The incidence of histamine-fast achlorhydria in young adults, when taken with the results of Lander and Maclagan (1934) in 234 subjects, is 0·85%.

Four students with normal values for free acid were submitted to biopsy and showed body mucosæ within normal limits. A typical example of one of these is shown in fig. 1.

FINDINGS IN SUBJECT WITH ACHLORHYDRIA

Biopsy Findings

At biopsy in subject X two pieces were obtained. In piece A (fig. 2) there was some thinning of the mucosa, and the gastric glands showed gross atrophy of the specific chief and parietal cells. Chief-cell remnants with poorly staining pepsinogen granules were seen at the base of the mucosa. The scanty tubules present were lined with an irregular epithelium which stained faintly with mucicarmine. The lamina propria, especially in the region of the atrophied glands, showed a dense collection of wandering cells of macrophage and lymphocyte types. The lymphocytes were occasionally aggregated into nodules. There was proliferation of young fibroblasts round obvious centres of epithelial necrosis. The muscularis mucosæ was split up, and strands of muscle penetrated between the bases of surviving glands to an abnormal extent. The superficial portion of the lamina propria showed a few plasma cells only, but there was much intercellular hyaline material. The appearance suggested œdema fluid. The overlying mucosa was flat in parts but was chiefly normal and was deeply stained with mucicarmine.

In piece B (fig. 3) the mucosa was a little thicker, but advanced atrophy like that present throughout the first piece was found in only half the section. The remaining half showed normal architecture, but the parietal cells were scanty and poorly staining, and the chief cells with pepsinogen granules were limited

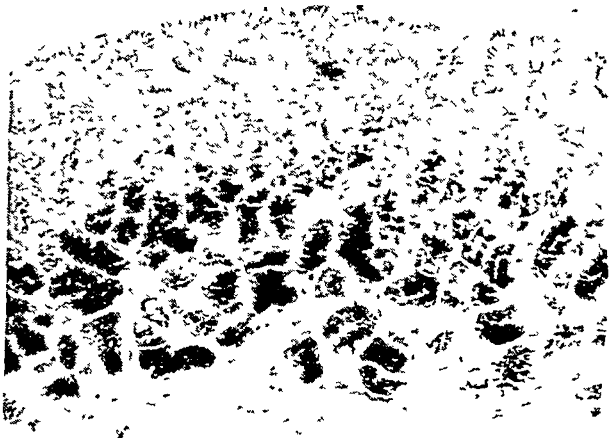

Fig. 1—Biopsy specimen from mucosa of body of stomach in a male student who gave a normal reaction to a histamine test-meal. Section shows normal mucosa. Normal lightly staining parietal cells lie between the chief cells, which are readily identified by their abundant darkly staining pepsinogen granules. (Pepsinogen stain and methyl green.) (×105.)

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* Aided by a grant from the National Health and Medical Research Council of Australia.

to the bases of the tubules. The remainder of the epithelium lining the tubules stained faintly with mucicarmine. The epithelium of the surface and the gastric pits stained deeply with mucicarmine.

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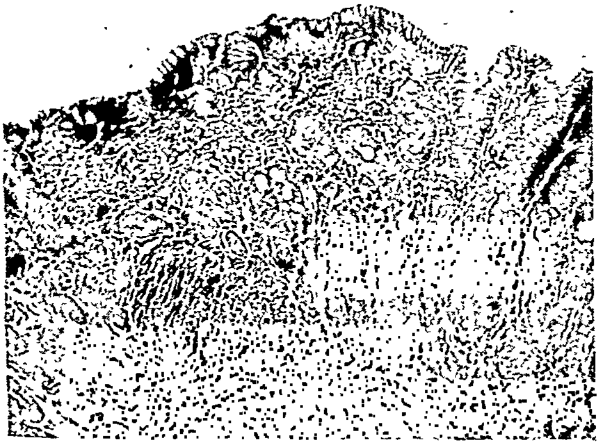

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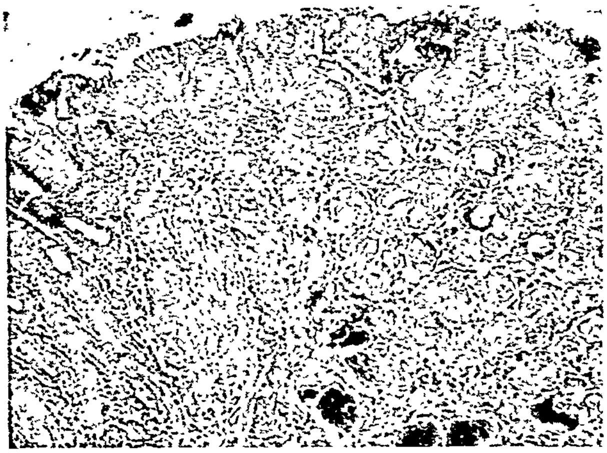

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AUREOMYCIN IN LYMPHOGRANULOMA INGUINALE

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THE demonstration by Wong and Cox (1948) that 'Aureomycin' was effective against experimental lymphogranuloma inguinale in mice was followed by studies on man.

Early accounts were enthusiastic. Thus, Wright et al. (1948a), who reported on 25 cases of lymphogranuloma inguinale (including 8 with inguinal buboes) treated with aureomycin in a daily dose of 10–20 mg. intramuscularly, found that all showed a reduction in the size of the glands after four days' treatment—"a result which has never been observed to occur spontaneously within so short a time." They clai[illegible]ed equally good results in lymphogranulomatous proctitis, with or without ulceration, and in benign rectal strictu[illegible]. A later account by the same authors (1948b) conta[illegible]ed a similarly favourable conclusion. Benhamou et al. [illegible]1949) have described a single case in which aureomyc[illegible] was administered orally—750 mg. every eight hours. [illegible] was rapid and spectacular, the inguinocrural masses disappearing within six days.

More recently, Robinson et al. (1950) have assessed more critically the value of aureomycin in lymphogranuloma inguinale. They treated 9 patients; 4 received intramuscular injections totalling 0·56–3·6 g. in four to fifteen days, while the remaining 5 received 3·6–38·0 g. orally in five to fifteen days. They concluded that after aureomycin therapy clinical improvement, as measured by healing of genital lesions and reduction in size or complete resolution of buboes, was not impressive. In the patients tested the intradermal test remained positive after treatment; they regarded the complement-fixation test as an unsatisfactory index of therapeutic effect.

CASE-RECORDS

The present series consists of 6 cases. All the patients were adult males suffering from inguinal and/or femoral buboes. Ages ranged from 22 to 44 years. The nationalities of the patients were Chinese (3), Indian (1), Norwegian (1), and British (1). In each case the infection had been acquired abroad—in Hong-Kong in 2 cases, in Batavia in 2 cases, and in Singapore in 1 case. In 1 case linguistic difficulties made it impossible to ascertain the locality in which the infection was acquired.

The lymph-gland enlargement was unilateral in 4 cases, and bilateral in 2. In 2 cases there was accompanying enlargement of the iliac glands on one or other side. In every case the diagnosis was confirmed by a positive Frei test and by a positive complement-fixation t in a titre of 1/40 or higher. Symptoms had been prese for two to eight weeks before the patients came un observation. Only 1 patient had received any previ treatment; he said that on board ship he had receiv a fifteen-day course of tablets (presumably sulphonami without apparent benefit. We gave this patient a thr day course of chloramphenicol 3 g. daily. No improvem could be detected after ten days.

Aureomycin was administered by mouth. A stand dosage was used for the first 5 cases—250 mg. ev six hours to a total of 7 g. The 6th case, described detail below, received two courses of aureomycin, t total of 29 g.

In 4 cases, clinical improvement was gratifying. instance, when the patient who had failed to resp to sulphonamide and chloramphenicol was examined the seventh and last day of treatment there was no p and no visible swelling; the inguinal glands were palpably enlarged, but were firm, discrete, and no lon tender. In the 3 other patients the results were equ good. Pain and tenderness vanished; periadenitis appeared; and within a week of completing treatm all that remained were a few discrete, mobile, pain glands only a little larger than normal.

In the 5th case the clinical result was less satisfact[illegible] month after completion of treatment enlarged gla the[illegible]till readily palpable, and they had not retu were [illegible] size a fortnight later. They were, howe to norma[illegible]e. The iliac glands, originally enlarged, c discrete; and t[illegible]phie[illegible] no longer be felt. [illegible] of [illegible]receiving a much higher do

The 6th case, although [illegible] were [illegible]least satisfactory c than the preceding 5, had t[illegible] [illegible]roliferatio[illegible] response. [illegible]thelial seen on Nov [illegible]ago.

This patient, Chinese, aged 44, was first [illegible] seen on Nov 1949. Treated for primary syphilis four years ago. L to infection at Singapore two or three months [illegible]ons in in groin for eight weeks. A few tiny herpetic les the r coronal sulcus; matted mass of enlarged glands in fem inguinal region; discrete enlargement of the right f glands; large mass of glands palpable in the right iliac no clinical signs of syphilis. Frei test positive; Wasse reaction positive; lymphogranuloma inguinale complem fixation test positive 1/320.

Treatment.—Aureomycin 500 mg. 6-hourly—double dosage used in previous cases—was begun immediately, had to be discontinued after two days owing to a tempo shortage of the drug. A fresh supply was secured, and tr ment was continued to a total of 14 g. Two days a completion of treatment, the inguinal glands were a li smaller but were still matted together. The iliac glands formed a palpable mass in the iliac fossa.

No further aureomycin was administered for a mon During this time, 'Bisoxyl' 1·2 g. and crystalline penicilli 5 mega-units were administered, because of the latent syphi without any apparent effect on the lymphogranuloma inguina

On Jan. 11, it was decided to administer a further cou of aureomycin, and 250 mg. were given 6-hourly for fifte days. There followed a further slow decrease in the size the inguinal and iliac gland masses.

On Feb. 9, the iliac glands were still readily palpable, a there was still a thickened ridge along the fold of th right groin, persisting periadenitis making it impossible distinguish individual glands.

When treatment was completed, all patients were kep under observation for a period of six to fourteen week in an attempt to discover the behaviour of the Frei an lymphogranuloma inguinale complement-fixation test after treatment with aureomycin; during this perio both tests were performed at short intervals.

An initial difficulty with the Frei test was that patients repeated testing appeared to become sensitised to e constituent of egg embryo, developing large o reactions in the control arm. Subsequently, antigen was prepared according to Frei's original -patient became Frei-negative; 2 patients

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eventually gave doubtful reactions, 1 some three months, and the other one month, after completion of treatment. The other 4 all remained Frei-positive six to twelve weeks later. These comprised 3 cases regarded as clinically cured, and the 6th case reported above.

The behaviour of the lymphogranuloma inguinale complement-fixation test after treatment was equally disconcerting. In one case the titre, initially 1/80, dropped to 1/10 three days after treatment was completed, fluctuated between 1/10 and 1/5 for a further two months, and became negative at 1/5—the lowest dilution tested—by the end of three months. In another case, where the clinical result was equally satisfactory, the titre was initially 1/120, and it remained at this level for several weeks; but two months after completion of treatment the titre had risen to 1/320. Although there seemed to be no correspondence between clinical and serological results, the 2 cases with doubtful Frei tests after treatment both showed the most significant drop in the titre of the complement-fixation test—from positive 1/80 to negative 1/5, and from positive 1/160 to positive 1/40. No other case showed a drop to less than half the original titre—i.e., a change of more than one tube.

SUMMARY

Six cases of lymphogranuloma inguinale have been treated with aureomycin, and four showed a good clinical response.

These cases were kept under observation for 6–14 weeks after treatment, and the results of serial Frei and lymphogranuloma inguinale complement-fixation tests are recorded. No case became Frei-negative.

I am indebted to Dr. L. A. Little, of the department of bacteriology, University of Liverpool, for the results of the lymphogranuloma inguinale complement-fixation tests. I wish to thank Dr. A. O. F. Ross for allowing me to treat some of his cases and for valuable advice. Thanks are also due to Mr. R. J. Ousby without whose assistance it would not have been possible to follow up some of the cases.

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EOXYCORTONE AND ASCORBIC ACID IN THE TREATMENT OF RHEUMATOID ARTHRITIS

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rom the Special Unit for Study and Care of Juvenile heumatism, Canadian Red Cross Memorial Hospital, Taplow, ucks, and the Department of Medicine, Postgraduate Medical School of London

IN view of our failure to observe any obvious bedside provement in patients with rheumatoid arthritis ter the injection of ascorbic acid and deoxycortone etate, following the technique recommended by Lewin d Wassén (1949), and in view of the numerous claims at such improvement does result (Le Vay and Loxton 949, Loxton and Le Vay 1949, Spanopoulos 1950, ox 1949, Landsberg 1950, Robertson 1950, Nashat 50, Fox 1950, Douthwaite 1949, Le Vay and Loxton)), we have followed ten patients more closely, with [illegible] analysis of some of the responses.

METHOD

riteria for selection of patients included an erythro e-sedimentation rate above 25 mm. in 1 hour (Westergren), and radiological signs of bone and cartilage destruction. The disease had been present for 1 to 10 years.

Assessment included, besides an inquiry into symptoms, and a daily diary kept by 4 of the patients: (*a*) measurement of strength of grip in mm. Hg (in patients with wrist involvement): (*b*) measurement of the angles of flexion and extension of the knees or other involved joints; (*c*) assessment of pain on pressure over a joint (graded 0–3); and (*d*) functional tests, such as the measurement of time to put on or take off a certain garment, walk a certain distance, or write a test sentence, or of the number of stitches knitted in 2 minutes. The angles of knee movement were measured in duplicate. Two strips of wood, hinged together at one end, were aligned with bony points (marked in indelible ink) on the outer malleolus, outer condyle of tibia, and greater trochanter. The angle was then drawn on paper and was measured later. This ensured a "blind" measurement. Direct eosinophil-counts were done 3 hours after the injection.

TABLE I—IMMEDIATE EFFECTS OF DEOXYCORTONE ACETATE AND ASCORBIC ACID INJECTION, COMPARED WITH PROCAINE AND SALINE

Injection	Walking-time (sec.)		t*
	Before	After	
Saline	50·0 ±6·3	48·5 ±7·6	0·3
Deoxycortone acetate and ascorbic acid	57·0 ±4·3	52·0 ±4·8	1·9
Procaine	47·3 ±5·5	44·5 ±4·6	1·3

* 2 45 for p = 0·05.

Similar findings with left-handed and right-handed strength, knitting-time, and eosinophil-count.

EXPERIMENTS

The plan of the first experiment was as follows:

After preliminary familiarisation of the three patients with the methods of measurement, and a week or so under hospital conditions, an injection (of a substance unknown to the patient) was made at 10.55–11 A.M. each day, preceded by a battery of measurements at 10.15 A.M. and 10.45 A.M. and followed by the same measurements at 11.15 A.M. and again at 11.45 A.M. The substances used were saline intravenously (2 ml.): procaine intravenously (4 mg. per kg. body-weight in 200 ml. of saline in 20 min.); and deoxycortone acetate 5 mg. intramuscularly (or 5 mg. of the glucoside intravenously) and ascorbic acid 1 g. intravenously.

The results showed no significant change after either saline, procaine, or deoxycortone acetate and ascorbic acid. Representative readings, given in table I and in fig. 1, show three replications of each type of treatment in one of the three patients. Evaluation was by the ratio of the difference between the means of each measurement before and after each type of drug to the standard

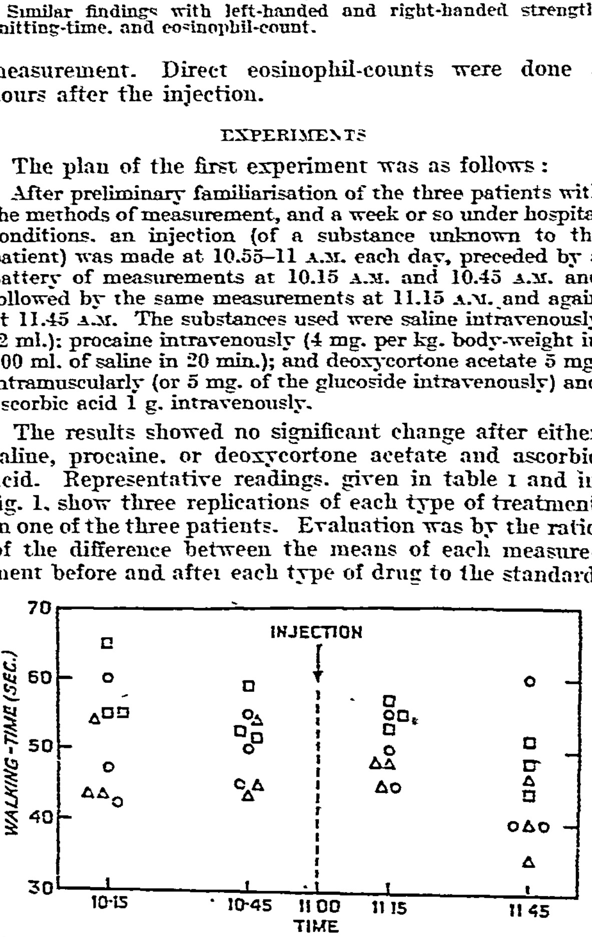

Fig. 1—Immediate effects of deoxycortone acetate and ascorbic acid injection, compared with procaine and saline, expressed diagrammatically. Circles = saline; squares = deoxycortone acetate and ascorbic acid; triangles = procaine.

TABLE II—ANALYSIS OF VARIANCE IN 3 PATIENTS RECEIVING SALINE, DEOXYCORTONE ACETATE AND ASCORBIC ACID, OR PROCAINE

Variance	Sum of squares of deviation from mean	Degrees of freedom	Mean square
etween patients ..	35·39	2	17·6
tween days	8·18	2	4·1
ween treatments ..	5·93	2	3·0
r	383·89	29	13·2
otal	433·39	35	..

Ratio of mean squares "between-treatments/error" should be 3 or more to be significant. On the second complete replication, ratio of mean squares was 0 3. compared with 0·2 for the iment detailed above.

of that difference. Values of *t* were obtained for e, deoxycortone acetate and ascorbic acid, and caine well below the minimum required for p = 0·05. o significant change in eosinophils was seen.

Because there was some day-to-day variation in base-line readings, which might have masked small but significant differences, a second experiment was made, of a Latin-square design, where three patients with hand and wrist involvement had three different treatments (saline, deoxycortone acetate and ascorbic acid, and procaine) on each of three different days. Readings of hand-grip were made in duplicate before and one hour after each injection. Changes in left and right grips after injection showed no significant difference and hence were treated as two further replications. An analysis of variance (with 35 degrees of freedom) showed that neither the variance between persons, days, or treatments reached significance (table II). This whole trial has been repeated once again with the same patients, the same treatments (except that the dose of procaine was doubled), and the same results.

Independent analyses by two observers of the diary kept by the most reliable of the patients treated and the most "objective" self-observer, showed remarkable agreement. There was little difference between the effects of procaine, saline, and deoxycortone acetate and ascorbic acid. Thus of the 18 days of the trial, moderate improvement was noted on 3 days (2 of which followed procaine and 1 deoxycortone acetate plus ascorbic acid); on 6 days slight improvement was noted (4 following deoxycortone acetate and ascorbic acid and 2 following saline). No change occurred on 8 days (following procaine on 3 days, saline on 4 days, and deoxycortone acetate and ascorbic acid on 1 day). She became worse on 1 day only (following procaine). Although there was some relationship between objective and subjective improvement, this was not constant. The highest grade of subjective improvement coincided on only 1 day with the highest grade of objective improvement, and that followed a procaine injection. The patient left hospital after 7 weeks greatly improved—as she had done also after her previous admission in 1948.

Three cases of established rheumatoid arthritis in children were studied in respect of numerous functions before and after injections of saline, and of deoxycortone acetate and ascorbic acid. No significant objective change occurred in either the clinical observations or the measured functions. One of these patients had previously shown a good response to adrenocorticotropic hormone (A.C.T.H.) (which had also, of course, been substituted after an 8-day control period of saline injections).

FURTHER TRIAL

A longer trial of deoxycortone acetate and ascorbic acid in three patients with rheumatoid arthritis was made at the Postgraduate Medical School of London. Fig. 2 illustrates observations on a patient who had had rheumatoid arthritis for 4 years. It will be seen that all criteria improved on the first few days of saline injection, and that no further improvement occurred when deoxycortone acetate and ascorbic acid was substituted (given three times daily for 3 days). Two other patients, studied in the same way, showed exactly the same results.

Finally, we have administered deoxycortone acetate and ascorbic acid on 3 days, and saline on 3 days, to a patient with severe rheumatoid arthritis who had previously undergone an immediate and dramatic remission with A.C.T.H. and who had relapsed after cessation. The patient had a very good idea what subjective improvement he might expect, but neither subjective nor objective improvement was noted in either degree or rapidity of joint movement.

CONCLUSION

We are well aware that statistically negative results like this do not prove that the treatment is without effect: the wrong criteria may have been selected. In our trials of A.C.T.H., a number of criteria have shown no significant change; other criteria have shown significant improvement. We think that in the present cases, however, any real improvement, even if unnoticed by the patient or by the observer, would have been revealed by the several tests that we chose.

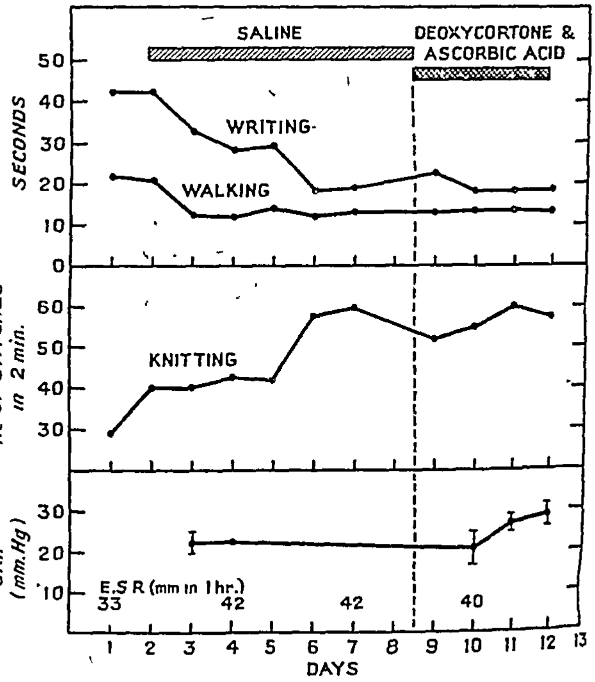

Fig. 2—Effects of deoxycortone acetate and ascorbic acid injections thrice daily.

We conclude, therefore, from this limited but intensive experience—and in common with Kellgren (1949), Spies et al. (1949), Hart and Starer (1949), Fletcher et al. (1950), Hartfall and Harris (1949), Kersley et al. (1950), and Currie and Will (1950)—that deoxycortone and ascorbic acid has no immediate measurable or appreciable effect on rheumatoid arthritis beyond that which follows any non-specific injection or treatment, and that it is not in any way comparable to A.C.T.H. While it is a thankless and even dangerous task to try to account for other investigators' results, we might perhaps suggest that the substitution of the drug to be tested in place of preliminary saline injections, unknown to the patient, and if possible also to the nurses, is an essential requirement of a careful study. The path of therapeutic advance is strewn with the bones and the bottles of those who have neglected such precautions.

Dr. L. G. C. Pugh, Dr. M. Keech, and Dr. E. Dresner assisted in some of these observations; Dr. D. Mitchison gave valuable help with statistical analysis.

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FLAXEDIL AS AN ADJUVANT IN GENERAL ANÆSTHESIA

PARTICULARLY WITH NITROUS OXIDE AND INTRAVENOUS PETHIDINE

J. SHEGOG RUDDELL
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AFTER having a considerable experience with *d*-tubocurarine as a muscle relaxant and fully appreciating its value in general anæsthesia, my attention was drawn to 'Flaxedil'—tri-(β-diethylaminoethoxy)-benzene triethodide—by the preliminary report of Mushin et al. (1949). Flaxedil has the advantage of being miscible with thiopentone, but if it is to take the place of *d*-tubocurarine it must also be equally effective and free from qualities which might be undesirable. In an attempt to assess its relative value careful records have been kept in the 440 successive cases in which it has been administered.

OPERATIONS AND GENERAL ANÆSTHETICS GIVEN

Operation	*Cyclo-propane*	*Pethidine and N_2O*	*Trichlor-ethylene*	*Thio-pentone*	*Total*
Appendicectomy	23	3	4	5	35
Dissection of tonsils	14	8	5	1	28
Cystoscopy	10	10	0	1	21
Hæmorrhoidectomy	33	27	13	4	77
Dissection of glands of neck	4	2	1	1	8
Eye operations	2	11	1	2	16
Operations on joints	15	6	4	0	25
Amputations	12	7	2	1	22
Open reduction of fractures	17	7	4	3	31
Herniorrhaphy	14	5	3	0	22
Thoracoplasty	2	3	1	0	6
Operations on penis, urethra, &c.	1	2	2	0	5
Skin grafts, &c.	15	9	4	3	31
Bone grafts	1	3	1	0	5
Operations on testicles	9	5	4	0	18
Cystostomy	4	0	0	0	4
Dilatation and curettage; ligation of ovarian tubes	3	7	0	0	10
Total hysterectomy	2	1	0	0	3
Partial thyroidectomy	0	3	0	0	3
Partial gastrectomy, cholecystectomy, gastro-enterostomy, repair of perforated viscus	8	2	1	0	11
Trendelenburg's operation	4	2	1	0	7
Lobectomy	0	1	0	0	1
Nephrectomy and nephrotomy	2	1	0	0	3
Hemicolectomy	0	1	0	0	1
Removal of mesenteric cyst	0	1	0	0	1
Excision of lower end of ureter	0	1	0	0	1
Exploratory laparotomy	3	1	0	0	4
Bronchoscopy	0	0	0	41	41
Total	198	129	51	62	440

INDUCTION AND PREMEDICATION

Of these cases, 386 were induced with, and intubated by direct vision under, thiopentone and flaxedil mixed in the same syringe. Intubation has invariably been easy, and in no case has there been any spasm of the glottis or bronchospasm.

The technique is as follows: 15–20 ml. of a 5% solution of thiopentone, the amount depending on the patient's physical condition, is drawn into a syringe, followed by 2 ml. of a 4% solution of flaxedil. This mixture is administered over $2^1/_2$–3 minutes, and a pause of 1 minute is made to allow the flaxedil to exert a sufficient effect for intubation to be performed through either the mouth or the nose.

In 4% of the cases—females—2 g. of thiopentone dissolved in 2 oz. of water was run into the rectum an hour before operation. When the patient became drowsy gr. $^1/_{100}$ of atropine was given intramuscularly. All these patients arrived in the anæsthetic room either asleep or very drowsy; there they received either 5 or 10 ml. of a 5% solution of thiopentone mixed with 2 ml. of a 4% solution of flaxedil and were intubated.

The premedication in all other cases was morphine gr. $^1/_6$ and atropine gr. $^1/_{100}$ given intramuscularly three-quarters of an hour before operation.

In no case induced by either of these methods was there any respiratory depression requiring more than assisted respiration, and this became unnecessary once surgical stimulation had started.

MAINTENANCE

The effect of 80 mg. of flaxedil lasted on an average 20 minutes, and a further 40 or 80 mg. was given when required. In 60% of the cases in which flaxedil was repeated assisted respiration was necessary for an average of 5 minutes; in the remaining 40% it was not needed. The effect of the second dose was apparent in 20 seconds and lasted up to half an hour, but spontaneous respiration was always adequate after 10 minutes.

In abdominal cases it has been found advantageous to give 40 mg. of flaxedil when the peritoneum is being closed. This does not interfere with respiration but provides relaxed recti abdominis muscles and is greatly appreciated by the surgeon.

Continuous Thiopentone

Early in the present series 15 cases were operated on under continuous thiopentone with flaxedil, but this technique was discontinued because the only safe method of watching the respirations seemed to be to administer oxygen through a rebreathing bag. The addition of an anæsthetic gas has removed the need for continuous thiopentone.

Cyclopropane; Trichlorethylene

There is nothing to note regarding the use of flaxedil with cyclopropane or with trichlorethylene except its general advantage over *d*-tubocurarine in being miscible with thiopentone, quick in action, more transient, not cumulative, and showing no histamine effects and no increased bleeding.

Thiopentone and Intravenous Pethidine

The 129 cases which had nitrous oxide, flaxedil, and intravenous pethidine came at the end of the series, and it is felt that this method approaches the ideal. By the judicious use of these three drugs narcosis is pin-pointed with nitrous oxide, relaxation is achieved with flaxedil, and the analgesic effect of nitrous oxide is supplemented with pethidine.

The technique adopted is essentially that outlined by Mushin and Rendell-Baker (1949), except that the initial dose of pethidine given is 50 mg. The patient is induced with and intubated under thiopentone and flaxedil and put on a mixture of nitrous oxide and oxygen, the proportion of nitrous oxide varying from 75% to 80%. The initial dose of pethidine 50 mg. is given as the patient is being draped.

The very close watch that has to be kept on the patient's pulse-rate, respirations, and blood-pressure may be more exacting for the anæsthetist but is more than compensated for by the absence of postoperative complications. There was no postoperative vomiting in this series, only two patients had a slight moist cough, and none had atelectasis. Postoperative restlessness, which is associated with rapid recovery of consciousness, was noted in only one patient, an Arab who had had numerous plastic operations and thoroughly enjoyed making a noise to show how quickly he recovered. The absence of postoperative chest complications may not be so significant as it appears, because they are comparatively rare here, possibly owing to the climate. There has been no venous thrombosis due to intravenous therapy.

Major operations such as hemicolectomy, hysterectomy, resection of dilated ureter, nephrectomy, lobectomy, *thoracoplasty, partial gastrectomy, and partial thyroid*ectomy have all been done under this form of anæsthesia successfully and with no postoperative complications. The pethidine does not abolish respirations, but it produces a quiet and regular respiratory exchange owing to deepening of anæsthesia.

BRONCHOSCOPY

The 50 bronchoscopies done under anæsthesia induced with thiopentone mixed with flaxedil were all very simple in execution. The patient was given flaxedil 80 mg. mixed with thiopentone 1 g. over $2^1/_2$–3 minutes, and a pause of 2 minutes was allowed before the operation began. The bronchoscope was passed with the patient lying on his back with his head raised on a pillow, and the bronchoscope was passed with the aid of a laryngoscope. If a sufficient pause is not made after the administration of the thiopentone and flaxedil, the patient will "buck." On one occasion a second dose of flaxedil 80 mg. had to be given before the bronchoscope could be passed.

SUMMARY AND CONCLUSIONS

Flaxedil has been used as a muscle relaxant in 440 cases of general anæsthesia.

Flaxedil has the advantages over *d*-tubocurarine of being miscible with thiopentone and more rapid and more transient in action. It is not cumulative, and it does not *seem to increase bleeding.*

Nitrous oxide as a narcotic, with intravenous pethidine to supplement its analgesic properties and flaxedil as a muscle relaxant, gives a general anæsthesia approaching the ideal.

Attention is also drawn to the use of flaxedil with thiopentone for intubation and bronchoscopy.

I wish to thank Mr. M. G. Allen-Mersh, the surgeon for whom these anæsthetics were given, for his cooperation.

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"... In December, 1948, the Council adopted standards for approval of residencies in general practice. ... These residencies provide for supervised training in the major clinical divisions of internal medicine, surgery, obstetrics-gynecology and pediatrics and in the special services of anesthesiology, radiology and pathology. ... On completing residencies of this nature, the young doctor can begin his practice with the assurance that he has had advanced training comparable to that of his colleagues who finish residencies in the specialties."—*J. Amer. med. Ass.* April 15, p. 1219.

THE HYPOPHYSIS IN RHEUMATOID ARTHRITIS

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IT is usually considered that in rheumatoid arthritis there is no primary endocrine dysfunction. This belief rests mainly on the normal responses of persons with rheumatoid arthritis to various hormones and hormone fractions, and on the essentially normal figures obtained in those hormone assays which have been attempted. The therapeutic action of adrenocorticotropic hormone (A.C.T.H.) and 'Cortisone' is apparently considered to be a non-specific action on collagen. Lichtwitz (1942), however, stated that in "endogenous arthritis" many of his patients had well-marked signs of pituitary disorder, some being acromegalic while others showed features belonging to Simmonds's disease.

In view of the work now being done on rheumatoid *arthritis, the finding of a specific hypophyseal abnor*mality is of interest. Ten pituitary glands from cases indexed in the departmental post-mortem register as rheumatoid arthritis, and three from cases of lupus erythematosus disseminatus have been examined by the older staining techniques of Mallory and Gram together with the newer method described by Pearse (1949, 1950) and other cytochemical methods.

DEFINITIONS

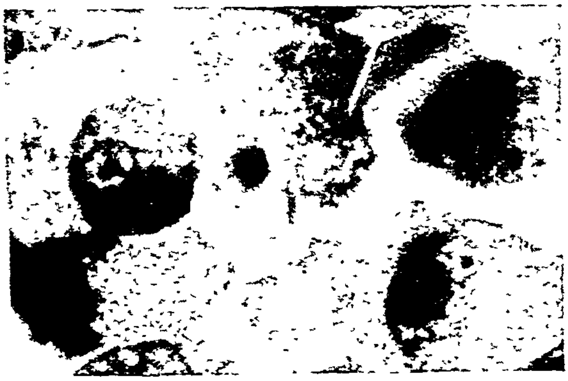
It has become necessary to make some new definitions in pituitary cytological terminology.

(1) The mucoprotein granules which were identified with the beta granules (Pearse 1949) must be divided into beta and gamma granules. The beta granules are stained by the periodic-acid-Schiff method (Hotchkiss 1948); they are also gram-positive and stain positively by the coupled tetrazonium reaction of Mitchell (1942) and Danielli (Danielli and Brown 1947) after as much as sixteen hours' benzoylation. This last reaction is considered to indicate that the beta granules are composed of polymerised mucoprotein, probably associated with ribonucleic acid. The gamma granules are periodic-acid-Schiff-positive only and are considered to be composed of depolymerised mucoprotein alone.

(2) Cells containing beta or gamma granules are referred to collectively as mucoid cells. It will be realised that the basiphils of the older nomenclature are mucoid cells containing beta granules, while a variable proportion of chromophobes (old terminology) contain gamma granules and *therefore belong to the mucoid series.*

In nine of the ten cases of rheumatoid arthritis identical abnormalities of the mucoid cells were present. In the tenth case (spondylitis ankylopoietica) and in two of the three cases of lupus erythematosus they were absent. Eight of the nine cases were shown clinically or at necropsy to be in an active stage of the disease. There is no record of the joint condition in one case of long-standing arthritis in a man of 43, but he was still receiving physiotherapy at the time of his death. No "burnt out" cases—that is, cases in which the disease could be presumed on clinical and pathological grounds to be inactive—have yet been examined. There were no cases of rheumatoid arthritis in which the changes were *not found in* some degree; *it is probable* that they would be absent from the hypophyses of completely inactive cases. The changes, which in all cases occurred diffusely throughout the gland, in three cases were also present in small adenomata, with a diameter of 0·2–1·0 mm., composed entirely of abnormal cells. They consist of partial and eventually *complete* degranulation of the mucoid cells as regards mucoprotein granules, leaving the remainder of the cell partly or completely filled with granules composed of a simple protein with stronger basic properties than those of the protein of normal chromophobe granules.

The diffusely occurring cells, which are partly filled with gamma granules and partly with simple protein granules, have been identified with a type of "abnormal transitional basiphil" described by Crooke and Russell (1935) and found in large numbers in the hypophysis in Addison's disease. They must not be confused with the hyaline basiphils of Crooke (1935), characteristic of Cushing's syndrome and allied disorders. In the adenomata, however, and to some extent outside them, a more striking cellular change was found which has been called polar bigranulation. Such polar bigranulate cells are illustrated in the accompanying photomicrograph. The polarity of the change is dissimilar in adjacent cells and cannot be due to fixation artefact. One half of the cell, top or bottom, left or right, is filled with beta granules, and the other half with simple protein granules identical in character with those found in Crooke-Russell cells. Differential counts of the types of mucoid cell present in four of the glands showed that 18–25% were either Crooke-Russell or polar bigranulate.



Section (5μ) of human hypophysis from a case of active rheumatoid arthritis. Four polar bigranulate mucoid cells can be seen. The contrast between the dark-staining mucoprotein beta granules and the lighter-staining simple protein granules shows well with this stain. (Mallory's trichrome ; × 1050.)

Over 200 control glands were examined, and apart from cases of Addison's disease, where even larger numbers of Crooke-Russell cells and polar bigranulate cells containing gamma instead of beta granules were seen, the former cells were present only in a few cases in the older age-groups. Single polar bigranulate cells were only exceptionally observed in control glands.

Since the number of mucoid cells in active production is considerably lowered in the majority of cases of rheumatoid arthritis, it may be expected that the amount of follicle-stimulating hormone in the hypophysis, and possibly the urinary excretion of that hormone in these cases, will be below the normal levels, perhaps rising to the normal figure in periods of remission if these are reflected in the function of the hypophysis.

SUMMARY

It is considered that a specific change affects the mucoid cells (basiphils, cyanophils) in rheumatoid arthritis which is closely related to the changes seen in Addison's disease. The abnormal appearances of the mucoid cells in both conditions are considered to be secondary to suprarenal dysfunction, whether they are induced directly or indirectly. They indicate, so far as the hypophysis is concerned, that rheumatoid arthritis has some affinity to conditions of suprarenal underaction but none to those of suprarenal overaction (Cushing's syndrome, virilism).

References at foot of next column

Medical Societies

BRITISH ORTHOPÆDIC ASSOCIATION

THE association's spring meeting was held in Cardiff on April 21 and 22, under the presidency of Mr. S. L. HIGGS.

End-results of fracture of the patella.—Mr. J. V. TODD (Newcastle upon Tyne) reviewed the results of 46 cases of fracture of the patella—16 treated by suture with catgut, and 30 by excision of the patella. Good or excellent results (judged by function, movement, and capacity for work) were gained in 68% of the cases treated by suture and in 80% of those treated by excision. In general, movement was slightly better after excision, but power was better after suture. Mr. K. H. PRIDIE (Bristol) advocated repair of transverse fractures by a single vertical screw. This afforded better apposition and fixation than suture with catgut and allowed movement to be begun immediately. Mr. F. G. BADGER (Birmingham) thought that extension lag was liable to develop if the plaster was removed early after excision; he advised immobilisation for six weeks. Suture was undertaken only in the younger patients. Excision of the smaller fragment, leaving the larger, was capable of giving results equal to the best results of suture and had a place in the treatment of selected cases. Mr. E. N. WARDLE (Liverpool) believed that extension lag after excision could be prevented by care in the postoperative treatment. Flexion movements should not be begun until the power of active straight-leg raising had been regained.

Manubriosternal joint in ankylosing spondylitis.—Mr. D. L. SAVILL (Edinburgh) had studied the condition of the manubriosternal synchondrosis in 61 cases of ankylosing spondylitis, and had found evidence of pathological changes in 72%. Radiographically the joint was shown best by a lateral projection. Normally, the bony margins of the joint were smooth, slightly convex, and separated by a clear cartilage-space. When the joint was affected in ankylosing spondylitis, there was progressive narrowing of the cartilage and erosion of the bone ends. The process was limited by a narrow zone of sclerosis, and the joint line was increased in depth anteroposteriorly. In the later stages the joint was obliterated completely by bony ankylosis. These changes were essentially similar to those occurring in the sacro-iliac joints. Of 22 patients with rheumatoid arthritis, the manubriosternal joint was normal radiographically in 13, slightly narrowed in 4, and partly or completely fused in 5; erosion of the bone ends was not observed. Histological examination of the joint surfaces in ankylosing spondylitis showed, in the areas of erosion, replacement of bone by collagenous fibrous-tissue, without inflammatory reaction. These changes were absent in rheumatoid arthritis.

Hip in fibrous dysplasia.—Mr. A. C. BINGOLD (Leeds) showed radiographs of 5 cases in which the bones in the region of the hip-joint were affected by fibrous dysplasia of the monostotic or polyostotic type.

Pseudarthrosis of the tibia.—Mr. BRYAN MCFARLAND (Liverpool) discussed the results in 9 cases of pseudarthrosis of the tibia treated by the "by-pass" bone-grafting operation described by him in 1940.[1] The operation had been successful in securing bony union in 7 patients, and unsuccessful in 2. The 2 failures were probably due to technical errors: in 1 case the lower end of the graft was notched into the tibia too

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[1] McFarland, B. *Brit. J. Surg.* 1940, 27, 706.

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and put on a mixture of nitrous oxide and oxygen, the proportion of nitrous oxide varying from 75% to 80%. The initial dose of pethidine 50 mg. is given as the patient is being draped.

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"... In December, 1948, the Council adopted standards for approval of residencies in general practice. ... These residencies provide for supervised training in the major clinical divisions of internal medicine, surgery, obstetrics-gynecology and pediatrics and in the special services of anesthesiology, radiology and pathology. ... On completing residencies of this nature, the young doctor can begin his practice with the assurance that he has had advanced training comparable to that of his colleagues who finish residencies in the specialties."—*J. Amer. med. Ass.* April 15, p. 1219.

THE HYPOPHYSIS IN RHEUMATOID ARTHRITIS

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IT is usually considered that in rheumatoid arthritis there is no primary endocrine dysfunction. This belief rests mainly on the normal responses of persons with rheumatoid arthritis to various hormones and hormone fractions, and on the essentially normal figures obtained in those hormone assays which have been attempted. The therapeutic action of adrenocorticotropic hormone (A.C.T.H.) and 'Cortisone' is apparently considered to be a non-specific action on collagen. Lichtwitz (1942), however, stated that in "endogenous arthritis" many of his patients had well-marked signs of pituitary disorder, some being acromegalic while others showed features belonging to Simmonds's disease.

In view of the work now being done on rheumatoid arthritis, the finding of a specific hypophyseal abnormality is of interest. Ten pituitary glands from cases indexed in the departmental post-mortem register as rheumatoid arthritis, and three from cases of lupus erythematosus disseminatus have been examined by the older staining techniques of Mallory and Gram together with the newer method described by Pearse (1949, 1950) and other cytochemical methods.

DEFINITIONS

It has become necessary to make some new definitions in pituitary cytological terminology.

(1) The mucoprotein granules which were identified with the beta granules (Pearse 1949) must be divided into beta and gamma granules. The beta granules are stained by the periodic-acid-Schiff method (Hotchkiss 1948); they are also gram-positive and stain positively by the coupled tetrazonium reaction of Mitchell (1942) and Danielli (Danielli and Brown 1947) after as much as sixteen hours' benzoylation. This *last reaction is considered to indicate that the beta granules* are composed of polymerised mucoprotein, probably associated with ribonucleic acid. The gamma granules are periodic-acid-Schiff-positive only and are considered to be composed of depolymerised mucoprotein alone.

(2) Cells containing beta or gamma granules are referred to collectively as mucoid cells. It will be realised that the basiphils of the older nomenclature are mucoid cells containing beta granules, while a variable proportion of chromophobes (old terminology) contain gamma granules and therefore belong to the mucoid series.

In nine of the ten cases of rheumatoid arthritis identical abnormalities of the mucoid cells were present. In the tenth case (spondylitis ankylopoietica) and in two of the three cases of lupus erythematosus they were absent. Eight of the nine cases were shown clinically or at necropsy to be in an active stage of the disease. There is no record of the joint condition in one case of long-standing arthritis in a man of 43, but he was still receiving physiotherapy at the time of his death. No "burnt out" cases—that is, cases in which the disease could be presumed on clinical and pathological grounds to be inactive—have yet been examined. There were no cases of rheumatoid arthritis in which the changes were not found in some degree; it is probable that they would be absent from the hypophyses of completely inactive cases. The changes, which in all cases occurred diffusely throughout the gland, in three cases were also present in small adenomata, with a diameter of 0·2–1·0 mm., composed entirely of abnormal cells. They consist of partial and eventually complete degranulation of the mucoid cells as regards mucoprotein granules, leaving the remainder of the cell partly or completely filled with granules in plaster and 50 by simple strapping. The average period of incapacity was eleven and a half weeks for patients treated in plaster, and only six weeks for patients treated by strapping. The slower rate of recovery with the plaster method was probably due to loss of the normal pump action of the muscles (and consequent œdema) while in plaster, and to interruption of the normal walking habit. The patient had to recover from the immobilisation as well as from the fracture. Fractures of this type should be treated by strapping. Mr. H. Osmond-Clarke said that if treatment was to be by strapping, it was necessary to be quite sure that the fracture was stable. Mr. V. H. Ellis doubted whether working time was saved by avoiding plaster; many patients were able to return to work in plaster who otherwise would be unwilling to do so because of pain. Mr. P. H. Wiles and Mr. W. D. Coltart favoured plaster immobilisation.

DEVON AND EXETER MEDICO-CHIRURGICAL SOCIETY

Obesity

Addressing the society on April 20, Dr. P. M. F. Bishop remarked that the conventional view that obesity was due to overfeeding was correct in many cases. Of 300 cases of obesity selected at random at Guy's Hospital, at least 50% were eating too heartily for the amount of work they were doing. As a rule, therefore, curtailment of diet was the essential of treatment; less commonly obesity was an endocrine problem.

On a diet of 1000 calories a day it was possible to do an average day's work, but it might be necessary to reduce the diet to 750 calories a day. Patients were required to weigh themselves weekly and to report at the end of two months. If there had been little or no reduction in weight it was necessary to admit the patient to hospital and starve him, limiting the fluid intake to $1^{1}/_{2}$ pints daily; after twenty-four hours of this régime appetite diminished greatly. Experience had shown that this apparently drastic method of treatment was in fact kinder than giving a niggling diet. With loss of appetite, associated unhappiness and discomfort was dispelled; it was then comparatively easy for patients to accept a 750-calorie diet, on which they would lose weight steadily. Weight-charts generally showed a rapid fall during the first ten days, after which the curve flattened out; 1–3 stone might be lost in the first fortnight. The treatment could not be carried out at home because individual care was necessary. Ketone bodies might appear in the urine, but they disappeared if a little sugar was given.

Diuresis was a valuable adjunct to treatment. Thyroid was useful, especially in myxœdematous subjects. If *d*-amphetamine sulphate was used, it should be given in 10 mg. doses before breakfast and lunch. Where there was fluid retention, ammonium chloride in 10 mg. capsules once or twice daily, a heaped teaspoonful of urea flavoured with lemon three times a day, a combination of calcium lactate and sodium citrate, or an injection of 2 ml. of mersalyl might be tried. Neither anterior nor posterior pituitary extracts were of value. Chorionic gonadotropin might help in cases associated with delayed puberty; œstrogens tended to increase rather than diminish weight. Exercise was of limited value, and so-called secret remedies depended for any success on concomitant dieting.

Attention was drawn to pregnancy and postpartum "obesity," and recent observations on overactivity of growth hormone leading to large babies and maternal "obesity," due to depletion of fat stores in order to provide the energy for laying down protein. This was one example of obesity not due to over-eating.

Reviews of Books

Among the Doctors

Alfred Cox, M.D., formerly secretary of the British Medical Association. London: Christopher Johnson. 1950. Pp. 224. 12*s.* 6*d.*

In this book Dr. Cox, from old age, looks back upon a long life largely devoted to the service of the British Medical Association. The most interesting reminiscences of those who have played a prominent part in public affairs are often concerned not with the days of their prominence but with their beginnings and origins in obscurity. Certainly Dr. Cox's account of his work as an unqualified assistant to a succession of practitioners, some respectable, some sad rascals, has as much of interest in it as have his later experiences of contacts with the heads of the profession at B.M.A. House or on his many journeys. Thus his portrait studies of seven medical peers as he knew them are conventional respectful portraits with little of the character and flavour of his earlier studies of the colliery doctors of the 1890s.

Dr. Cox writes simply and modestly of his own achievements and upon matters of which few but himself can now have had personal experience. His comparison between the reconstructions of the profession in 1911 and in 1948, and between Mr. Lloyd George and Mr. Aneurin Bevan as negotiators, is the most important part of a book which will be read with interest by many.

Coagulation, Thrombosis, and Dicumarol

Shepard Shapiro, M.D., assistant professor of clinical medicine, New York University College of Medicine; Murray Weiner, M.S., M.D., fellow in medicine at the college. New York: Brooklyn Medical Press. 1949. Pp. 131. $5.50.

This book is a short and well-balanced account of current views on the physiology and pathology of blood-coagulation and of clotting in blood-vessels, followed by a thorough discussion of the use of anticoagulant therapy with heparin and dicoumarol. It is not a "one-school" book: the authors present all sides fairly and give proper references. But having done this, they clearly state their own views and take a definite stand on techniques and on methods of treatment. This gives the book real practical value, and those who adopt the methods recommended are likely to have as much success as is possible in the application and control of anticoagulant treatment. We are glad to see that the "one-stage" method of prothrombin estimation is advised and that techniques using snake-venom are decisively rejected. Dr. Shapiro and Dr. Weiner describe an original method of estimating clotting-time by using a rotating tube. The technical section is full of interest, and with each method there is a section of "useful hints" which reveal the authors' experience. Every worker in this field will probably find points at which he disagrees, but this is as reasonable an introduction to the subject as we have seen.

Pollen Slide Studies

Grafton Tyler Brown, M.D., F.A.C.P., consultant on allergy, United States Public Health Service. Springfield, Ill.: C. C. Thomas. Oxford: Blackwell Scientific Publications. 1949. Pp. 122. 43*s.*

The aim of this book is to "enable any allergist or technician to identify and count the important pollen grains and larger fungus spores that are present in the air in sufficient numbers to be breathed in with normal respiration." Dr. Brown traps pollen from the air in the usual way—by exposing an adhesive-covered and horizontally placed microslide. The circular shelter which he shows in position over the slide would be insufficient to keep off British rain. His statement that the pollen is deposited on the slide by gravity (though this is now known to be true only in part) is unfortunately typical of his rather uncritical account of the principles underlying the estimation of airborne pollen populations. He quotes his own analyses of pollen caught on daily slides exposed, as he says, "in the District of Columbia"—an area of some 61 square miles. He does not state close to the fracture; in the other the operation was undertaken too soon. The strong tendency for pseudarthrosis to persist despite the usual forms of conservative and operative treatment was due entirely to mechanical factors; immobilisation was not sufficiently complete to overcome the bending stresses that were so inimical to the formation of lamellar bone. Pseudarthrosis of the tibia was neither a birth fracture nor a non-fusion of two separate centres of ossification: it was a stress fracture in a tibia that was congenitally abnormal. The abnormality was in the mesenchyme, and it might give rise to a cyst or to an area of slender bone of inadequate strength. Pseudarthrosis had been produced experimentally in chickens by injecting insulin into the embryo at the appropriate period of development.

V-arthrodesis of the hip.—Mr. R. C. HOWARD (Norwich) described a method of arthrodesis of the hip, developed in association with Mr. H. A. BRITTAIN, in which fixation of the joint by a nail was combined with ischiofemoral grafting. The bed for the graft was prepared by passing a wide-diameter drill through the upper part of the femoral shaft into the ischium. The nail and the graft formed a V, which made for mechanical rigidity. Prolonged immobilisation in plaster was unnecessary, and walking with crutches was permissible within a few weeks of the operation. The main indication for the operation was unilateral osteo-arthritis of the hip. Sound bony fusion had been secured in 14 of 17 patients.

Oblique osteotomy for osteo-arthritis of the hip.—Mr. G. V. OSBORNE (Liverpool) had reviewed 75 cases in which oblique displacement osteotomy of the femur had been performed for osteo-arthritis of the hip. He emphasised the importance of careful selection of cases for this operation. The most suitable patients were those with gross osteo-arthritis and fixed adduction deformity. The operation should be avoided when a free range of abduction remained, and when marked flexion deformity could not be corrected by preliminary manipulation; in such cases loss of contact between the osteotomy surfaces might lead to non-union. The mechanical disadvantage of the hip—due to leverage factors—was such that the thrust through the joint was equal to at least twice the weight of the body, and much more when adduction deformity was present. Displacement osteotomy overcame this mechanical disadvantage. It reduced leverage by bringing the line of body-weight near to the axis of the femoral shaft, and by affording a bony block to prevent adduction. The operation had been successful in relieving pain and restoring adequate function in 61 cases, and unsuccessful in 14. Many of the failures were attributable to errors of technique.

Pseudarthrosis of the hip-joint.—Mr. R. G. TAYLOR (Oxford) had studied the late results in 93 patients treated for osteo-arthritis of the hip, ankylosing spondylitis, and other conditions by excision of the head and neck of the femur. The result was good in 83 cases and poor in 7; 3 patients died as a result of the operation. In successful cases the benefit was permanent. Pseudarthrosis was the most satisfactory and the most reliable operation in ankylosing spondylitis, and in patients over 60 years of age with disabling osteo-arthritis. Cup arthroplasty might prove to be superior in younger patients with osteo-arthritis.

Treatment of Volkmann's contracture.—Mr. A. R. PARKES (Glasgow) had treated 2 patients with established Volkmann's contracture by tendon transplantation designed to restore independent action to the flexor digitorum profundus tendons without interfering with active movement at the wrist. The operation consisted in division of the contracted finger flexors (sublimis and profundus), division of contracted wrist flexors, and transfer of extensor carpi radialis longus to the distal stumps of the profundus tendons above the transverse carpal ligament. The results had been promising. Mr. D. L. GRIFFITHS (Manchester) recalled that the extensor muscles were often affected in Volkmann's ischæmia. Before undertaking this operation, it was necessary to be quite certain that there was adequate voluntary power in the wrist dorsiflexors. Mr. H. J. SEDDON hoped that the operation might reduce the indications for prolonged stretching of the contracted tissues, and for such operations as shortening of the forearm bones. The muscles affected most seriously by ischæmia were the flexor digitorum profundus and flexor pollicis longus. Involvement of the superficial flexors was often relatively slight, and their action could be adequately reinforced by transplants. Arthrodesis of the wrist made available sufficient extensor tendons for transfer to flexor pollicis longus as well as to the finger flexors.

Tendon growth in the rabbit.—Dr. G. N. C. CRAWFORD (Oxford) had placed multiple indian-ink marks along the length of suitable tendons of growing rabbits, and had measured the intervals between the marks. The same intervals were measured again after killing the rabbits three to four months later. Tendon grew interstitially throughout its length; and the most rapid growth was near the muscle-tendon junction.

Amputations of lower limb for vascular disease.—Mr. HARMAN SMITH had examined 138 amputation stumps in 95 patients with primary vascular disease of the lower limbs. The object had been to assess the criteria that could be relied upon to determine whether below-knee amputation was likely to be adequate. Of 81 below-knee stumps, 27 had proved satisfactory and 54 unsatisfactory. The most significant factors were age, the state of the popliteal pulse, and the amount of bleeding at operation. The most valuable criterion was the amount of bleeding at operation and the appearance of the muscles. When bleeding was sluggish and the muscles grey, amputation at a higher level was indicated; but when free bleeding occurred from healthy muscles a satisfactory stump could be expected. Used in conjunction with other tests of circulatory function (skin-temperature tests, tourniquet tests, and oscillometry) these criteria were reasonably reliable in indicating the lowest practicable level for amputation.

Histology of bony union.—Mr. JOHN CHARNLEY (Manchester) showed histological sections taken from the line of arthrodesis at various intervals after "compression" arthrodesis of the knee. He demonstrated convincingly that the line of fusion was bridged by trabeculæ of woven bone as early as four weeks after operation. At eight weeks, healing by fully established woven bone was almost mature. It was still uncertain whether this rapid bony union was determined by pressure or simply by close apposition of the fragments.

Monteggia fracture.—Mr. J. H. PENROSE (Bristol) reported 7 cases of Monteggia fracture with posterior dislocation of the radial head. He suggested that the mechanism of the injury was similar to that which caused posterior dislocation of the elbow—a fall on to the hand, the elbow being slightly flexed and the forearm in moderate pronation. In every case there was a marginal fracture of the head of the radius. Treatment was by intramedullary fixation of the ulna and excision of the radial head or of the detached fragment. All patients regained good function, but some limitation of elbow movements was usual. Mr. E. MERVYN EVANS (Birmingham) thought that closed manipulation —by full extension and supination—should be tried before open operation was resorted to.

Movements of the tarsus.—Mr. EDMUND SHEPHARD had observed the movements of the tarsal joints in living and dead feet. Only two movements were possible: supination (combined inversion and adduction) and pronation (combined eversion and abduction). These movements might take place at the peritalar joint or at the midtarsal joint. The peritalar joint comprised the talonavicular joint and the subtaloid joint; its mechanism was comparable to that of the radio-ulnar joints. The peritalar joint allowed a wide range of supination and pronation about an axis directed obliquely downwards and backwards through the body of the talus. The midtarsal joint allowed a small range of supination and pronation about a similar axis.

Fracture of the lateral malleolus.—Mr. DAVID THOMAS (Scunthorpe) presented an analysis of 109 stable fractures of the lateral malleolus—59 treated by immobilisation

THE LANCET

LONDON: SATURDAY, MAY 20, 1950

Anomalies of Salary

If we had chosen to have a State medical service on the military model, the remuneration of doctors would have been simple and straightforward. Everyone in the service would have been employed directly by the Minister of Health, who would have paid him the salary belonging to his rank. But a hierarchical system of this kind was unacceptable, and instead we have devised one in which the large majority of doctors are neither officials nor Civil Servants but private persons working by contract with one or other of the more or less autonomous bodies which have been created to administer the service. So we have a state of affairs in which, though nearly all the money ultimately comes from the Treasury, some doctors are paid directly by the Government, some by local authorities, some by regional hospital boards, some by the boards of governors of teaching hospitals, some by universities, some by hospital management committees, and some by local executive councils. This ingenious system goes far to meet professional susceptibilities and preserve valuable traditions of work; but unfortunately, at its present stage of development, it also embodies some anomalies which are intolerable in a service which was made national in order that it could be rational. These anomalies arise chiefly from the fact that, while the new administrative bodies (the regional boards, the executive councils, and so on) pay their doctors at new rates, based on the recommendations of the two Spens Committees, the administrative bodies that existed before the Act was passed (the Government departments and local authorities) have so far failed to make the changes needed to bring their remuneration into line.

Big differences in rates of pay are least defensible where doctors in different branches of national service are doing the same work under similar conditions. The classical example is provided by the Ministry of Pensions, which seems to think it proper that the senior physicians and surgeons clinically responsible for the work of its hospitals should still, in 1950, be paid at rates round about £1000 a year, or only a couple of hundred pounds more than their senior residents. If the Ministry of Pensions hospitals were small antiquated buildings which attempted only a primitive form of medical care, for a small group of chronic disabilities, this might be more excusable. But in fact some of them are large hospitals undertaking advanced work. The operation list of a senior surgeon at a Ministry of Pensions hospital is often just like the operation list of his colleague in the National Health Service hospital across the road, whose salary is probably some £1500 a year higher: and the situation is becoming more absurd now that Ministry of Pensions hospitals admit and treat considerable numbers of N.H.S. patients. Clearly the Ministry cannot be allowed indefinitely to pursue a policy which must end in its having an incompetent staff. Its record must lead many to ask again whether there is any sufficient reason why its hospitals should not be transferred to the National Health Service.

Many of these arguments apply, equally or with modifications, to the situation of other clinicians working in Government medical services—e.g., in the Post Office or the prisons. The time has surely come when the departments concerned should realise that if they want specialists or other doctors with first-rate qualifications to accept clinical appointments they will have to pay the rate for the job, as laid down by the N.H.S. Application of this rule, however, would still not solve the problem of the doctor who has entered the service of local or central government as an official—the medical officer of health and his assistants, and the medical officers of the Ministry of Health or the Factory Department. Salary scales for the M.O.H. are now, after long delay, being considered by the public-health committee of the medical Whitley Council; so they cannot usefully be discussed for the moment. But the attempt to gain better remuneration for medical Civil Servants has been brought into the foreground of controversy by the exchange of letters with the Chancellor of the Exchequer, and by the British Medical Association's subsequent decision to discontinue advertisement of Civil Service medical appointments in the columns of the *British Medical Journal*. In this dispute the arguments are briefly these. The Treasury holds that a doctor who enters the Civil Service accepts the known conditions thereof, one of which is that his salary will be slightly lower than that of an administrator of corresponding grade. In relation to other walks of life, the Civil Service has always been poorly paid, but it offers certain countervailing advantages. When the Chorley Committee's scales are applied (as, but for the devaluation crisis, they would have been last October) medical officers with salaries of £1500 or over will benefit with their lay colleagues, and some day there will no doubt be a corresponding improvement in the pay of junior medical officers: but so long as the Government are urging organised labour to accept a wage-freeze, any rise at all would be most inopportune. To these Treasury arguments the reply is that the advantages of belonging to the Civil Service are no longer what they used to be, and that if it is to handle large new technical undertakings such as the National Health Service it must have technicians of high quality in its departments and must create the new conditions which will attract and keep them. In its dealings with atomic scientists, the Treasury has recognised the existence of the law of supply and demand, and has gone outside the previous range of remuneration. At the Ministry of Health, on the other hand, it has preferred to keep to Civil Service precedent, even though this has meant losing expert staff. Instead of having freedom to pick the best medical talent for key positions on the Ministry's side of the new service, the chief medical officer has had to watch many of his younger men slip away one by one—often to posts in the N.H.S. which were less important but better paid. The danger of this Treasury policy is not that the Minister of Health will one day wake up to find that he has no medical officers at all: it is that, failing an adequate supply of really capable men with pensions or other private means, some of the posts will be filled by people who are not up to standard. Of this danger the Minister and the

the exact location, or describe the vegetation surrounding his pollen station, though pollen incidence may vary widely between any two stations only a mile or two apart. In a brief discussion on the effect of weather on "pollination" (a term which has another sense here, but which he uses for pollen liberation) he makes statements which have been shown not to be generally true.

The greater part of the book is an atlas of airborne pollens and spores; and a good atlas of this kind has long been wanted. Some 32 types of pollen are included, among them 16 of the 30 or so chief types to be met with in Great Britain. Each type is briefly characterised in simple language and figured three times—by means of a simplified diagram, an enlarged drawing, and a photomicrograph. Dr. Brown pins his faith to the "dry pollen technique"; that is, he mounts and examines his pollens in soft paraffin, claiming that "many of the common hayfever pollens are more easily recognised [thus] than in any other condition." Several examples could, however, be quoted to show that essential diagnostic features, which are easily demonstrable by other techniques, are not mentioned by Dr. Brown, and do not appear in his illustrations. He even admits that the single pore which distinguishes grass pollens "does not show when the pollen is in the dry state."

Pollen iconography is a difficult art, and Dr. Brown has not overcome the difficulties. His photographs serve only to indicate the size and general shape of the grains, and his drawings only partly make up the deficiency. He illustrates only a few types of fungus spores and some of these present an unfamiliar appearance. The book is beautifully produced but it cannot be recommended without reservation.

Bermondsey Story

The Life of Alfred Salter. FENNER BROCKWAY. London: Allen & Unwin. 1949. Pp. 246. 15*s.*

Mr. Fenner Brockway's brushwork never sparkles, but he paints a convincing portrait of a remarkable medical man. Alfred Salter had the capacity and opportunity to become a consulting physician or pathologist, but he chose general practice in Bermondsey. Such a choice may not be quite so rare or even so self-sacrificing as the author suggests; but Salter chose, further, to live, with wife and daughter, where he practised, to send this much-loved child to the local council school until a third attack of scarlet fever ended her life, to give up practice for political social service, and to spend himself without stint or reserve in promoting what he esteemed to be justice, truth, and beauty, and in fighting what he deemed to be their opponents.

The motive force in all this was a belief in the Christian ethic, acquired directly from his parents and actually lifelong, for a brief period of agnosticism in youth was ethically Christian, and in its essence religious. But the quality of the man, as here depicted, was as much Roman as Christian. *Integer vitæ, scelerisque purus, Justum et tenacem propositi virum*—the Horatian phrases fit him like a glove. One who, struck suddenly with complete aphasia in a snack-bar near King's Cross, could think out his route to Bermondsey by train and bus and make it good with no word spoken, knew well how to "keep the equal mind," *rebus in arduis.*

Salter is presented as a tireless advocate of "Socialism," but this elusive concept is nowhere defined; and it is clear that he, like so many Socialist heroes, was in fact an extreme individualist. His sole allegiance was to his conscience. He resisted alike decisions of Parliament and of local authorities, defied popular opinion with the utmost courage, and broke in turn with the Liberal Party, the I.L.P., the Labour Party, and ultimately even the Peace Pledge Union on grounds of principle consistently held. Not of such citizens, surely, could a working Socialist State be formed.

The book gives a notable account of British social history in the last fifty years, as seen from the Left and from Bermondsey. For municipal Socialism in a downtrodden area it makes an unanswerable case, but it avoids the wider issue of individual liberty versus dictated order. Salter's ideal State can only be guessed at, but it seems clear that though its citizens could be certain of justice none would be free either to drink with his friends or to take arms in any cause, however sacred; and it might well prove to be a State without music. A book provoking much thought.

Fifty Years in Midwifery

The Story of Annie McCall, M.D. Written and arranged by PATRICIA BARRASS. London: Health for All Publishing Co. 1950. Pp. 122. 6*s.*

Dr. Annie McCall spent her life in the service of childbearing women and it was the dearest wish of her closing days to leave the story on record as a challenge to our times. Her photograph, at the age of 86, on the title-page of Mrs. Barrass's labour of love reveals the forceful genius which possessed her. The achievement of the Clapham Maternity and the overspill of her restless spirit into tuberculosis, child health, and rehabilitation are widely recognised. But in posting her biographer her memory was brightest for those early formative years in Göttingen and Vienna and Berne, and the early chapters will be new to many.

The Road to Love

GWILYM O. ROBERTS, PH.D. London: Allen & Unwin. 1950. Pp. 230. 9*s.* 6*d.*

THIS book, directed to a popular audience, contains excellent material, is written by a pupil of Terman with a long research experience, and is presented with a foreword by Prof. William Brown and another by Mr. David Mace, PH.D. The merits of the material are, however, almost wholly defeated by the style of the writing. One probably loses more than one gains by describing the "young man devoid of understanding" (*Proverbs*, vii, 4–23) as "the halfbaked laddie whose sexual brakes failed to function," or by counselling the adolescent girl: "when the sex jack-in-the-box crisis begins to loom, sidetrack him charmingly." These quotations are typical. The manner is peculiarly unfortunate, because vulgarity and facetiousness are possibly even greater handicaps in work of this type than excessive moral earnestness, especially in dealing with an intelligent adolescent audience. The author summarises his advice on the regulation of sexual conduct "in the R.A.F. motto, *per ardua ad astra*"; but the adequacy of the exhortatory method, even when it is veiled in these terms, remains open to question. The emphasis on maturity and reasonableness is excellent, but readers will regret that the promise of the factual part of the book is not fulfilled.

Skin Grafting

(2nd ed.) JAMES BARRETT BROWN, M.D., professor of clinical surgery, Washington University; FRANK MCDOWELL, M.D., assistant professor of clinical surgery in the university. London and Philadelphia: J. B. Lippincott. 1949. Pp. 339. 60*s.*

THE first edition of this book was called *Skin Grafting in Burns.* In this second edition the authors have extended the scope to include skin grafting for defects caused by traumatic injuries, the removal of tumours, and the excision of areas which have been irradiated excessively. Thus it offers an adequate description of plastic surgical problems that may arise in any general hospital; but it does not include the treatment of congenital deformities, or the more complex problems that may be seen in a special hospital.

The pathology of burns is stated clearly and succinctly, and the methods recommended correspond closely to those in use in this country. Immediate treatment consists in careful cleansing and the application of massive dressings and compression bandages. Penicillin and blood are used as supportives. Split-skin grafts, applied reasonably early, are required for total skin losses; homografts are useful as a temporary cover. For final repair in bigger defects other varieties of graft may be required—full-thickness grafts, flaps, or tube pedicles. Their employment is discussed and illustrated by photographs of good quality, and the methods again conform in the main to those used here. The book will be useful to anyone concerned with soft-tissue repair.

ON April 29 we published an advertisement for Prof. Harry Gold's new book, *Quinidine in Disorders of the Heart*, published by Messrs. Cassell & Co. The price of this work is 16*s.*—not 6*s.* as might be supposed from looking at some of the copies we issued.

isolated in various laboratory animals, and gives highly specific agglutination or complement-fixation reactions with convalescent sera from Q fever patients. Antibodies persist on the average for two years, and occasionally for as long as seven years after infection, so a serological survey of a "normal" population will yield information covering several years of its past experience. It is not surprising, therefore, that these ideal qualities, combined with the intensive investigations of the last five years, have produced almost an embarrassment of epidemiological riches. The presence of *R. burneti* has been detected in so many situations—animal, arthropod, and inanimate—in the environment of cases of the disease that it is pertinent to ask where its presence is significant as a source of human infection and where it is merely an incidental finding.

The Australian studies [9] from 1935 to 1942 detected 129 cases of Q fever in Brisbane and 47 in the surrounding countryside; 123 of the urban patients worked in meat-packing plants and 39 of the rural ones were dairy workers or exposed to farm stock. The results may have been influenced by selective case-finding, for 116 of the urban cases came from one plant; nevertheless, occupational exposure to cattle seemed to be the important factor in contracting the disease. Serological evidence of infection was found in cattle, but direct contact with cattle organs by handling them during slaughtering and processing was probably not the cause of human infection, because cases were distributed throughout the meat-packing plants and not confined to those actually touching the carcasses. A wider search for *R. burneti* revealed that the bandicoot, a small bush animal, and its tick, *Hæmaphysalis humerosa*, were infected, and since some of the cattle ticks (*Boophilus annulatus microplus* and *Hæmaphysalis bispinosa*) could be experimentally infected, **Derrick** [9] postulated that the infection was probably maintained in nature by a tick-bandicoot cycle with a secondary spread to cattle via their ticks. Man was presumed to be infected by the inhalation of dust containing dried tick excreta from the hides of cattle. Infection by tick bite was thought to be an uncommon means of infection. Epidemiological investigations [5] of the outbreaks of Q fever among American troops in Italy showed that person-to-person spread was unlikely, and that dust contaminated by animals was a possible mode of infection. In one particularly striking episode 20–30% of an infantry battalion contracted the disease, probably having been infected during the showing of combat-training films in a hay barn.

Valuable additions to our knowledge of the epidemiology of Q fever have been made by the special team studying the disease in the endemic area of southern California. A preliminary field study of 300 cases in and about Los Angeles indicated that residence near dairies (in California this means a place where cattle are stalled, fed, and milked), occupational exposure to cows, sheep, goats, or their fresh products, and the consumption of raw milk containing *R. burneti* were probably the means of infection. The discovery [10] that raw milk from many of the dairy herds was infected with *R. burneti* was an early and entirely new finding. Observations on naturally infected cows show that they may have a chronic and practically symptomless infection of the udder and may shed rickettsia in their milk over long periods. It is not clear from experiments whether the disease of the udder represents the final localisation of a systemic infection or whether the udder is infected in some more direct way.

The epidemiological findings in the initial study regarding occupation, residence, and the use of raw milk were highly suggestive, but their significance could not be established until the incidences of the disease in populations with and without these three attributes had been compared. **Bell** and his colleagues [11] have now obtained such controlled data from an excellently planned inquiry. They found that the incidence of positive complement-fixation tests with *R. burneti* among the employees was 1·2% in two aircraft plants, compared with 5·9% in meat-packing plants, 15·6% in hide and pelt plants, and 20·6% in dairies. The significance of drinking raw milk was demonstrated by showing that the incidence of positive complement-fixation tests in households using raw milk was 10·7%, compared with 0·9% in neighbouring households which did not use it. The importance of residence near dairy herds known to be infected was shown by their finding that the frequency of serological positives declined as the distance from the dairy increased. The effect of the interaction of these attributes was also analysed. It may be supposed that human infection in Los Angeles occurs in two ways. One is by the respiratory route, through inhalation of dust or other airborne particles derived from animal discharges, excreta, or other products, a finding which is in accord with the Australian and Mediterranean experience. It is interesting in this connection that **De Lay** et al.[12] have recently isolated *R. burneti* from the dust of sheep pens in northern California. The other possible mode of infection is consumption of raw milk or milk products containing *R. burneti*. Attempts to test these portals of entry by experimental infection in man have given rather confusing results. **Blanc** et al.[13] infected two patients and four observers who inhaled a heavily infected aerosol, but **Fonseca** et al.[14] failed to convey the infection by either the respiratory or alimentary routes. So many factors affect such experiments that it would be unwise to draw definite conclusions from the negative findings.

If the means of transfer of the disease from animals to man is now a little clearer, much remains to be discovered about the spread among animals. One of the striking facts about Q fever is the frequency with which the rickettsia has been isolated from various ixodid and argasid ticks. In many of these *R. burneti* has been shown to survive from one instar to the next and to be transmissible to the host animal at each stage. Further, trans-ovarian passage of

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9. Derrick, E. H. *J. Hyg., Camb.* 1943, **43**, 357.
10. Huebner, R. J., Jellison, W. L., Beck, M. D., Parker, R. R., Shepard, C. C. *Publ. Hlth Rep., Wash.* 1948, **63**, 214.
11. Bell, J. A., Beck, M. D., Huebner, R. J. *J. Amer. med. Ass.* 1950, **142**, 868.
12. De Lay, P. D., Lennette, E. H., De Ormo, K. *Amer. J. trop. Med.* 1949, **29**, 527.
13. Blanc, G., Bruneau, J., Poitrot, R., Delage, B. *Bull. Acad. nat. Med.* 1948, **132**, 243.
14. Fonseca, F., Pinto, M. R., Oliveira, J., Da Gama, M. M., Lacerda, M. T. *Clin. contemp.* 1949, iii, 1567.

Chancellor are no doubt as well aware as anyone else, and the Chancellor in fact proposes to appoint a committee to go into the question of "the remuneration and the general salary structure of Civil Service doctors," and advise the Government on what changes can be made "when economic conditions allow improvements to be made in remuneration generally." This committee, however, is to consist of four administrators and only two doctors (one formerly of the Ministry and one formerly of the London County Council); and the B.M.A. therefore regards it as quite unsuited to the only kind of inquiry which would be worth having. If the Chancellor, instead of proposing what looks a little like a mechanism for repeating his own opinions after a decent interval, were to appoint a really representative committee to make a serious study of what is after all a serious problem, the B.M.A. would, we believe, regard the proposal as fair and would remove its embargo on the advertisement of Civil Service posts.

If we do not at present impose a corresponding embargo on advertisements in THE LANCET, it is not because we are satisfied, any more than the B.M.A., with the remuneration of doctors working in or for Government departments. We have every sympathy with the response of the B.M.A. council to the appeal from a small but important section of its members to protect their interests. Our own position, however, as an independent journal, is rather different. At first sight an embargo on the advertisements of a particular service may seem no more than a dignified form of protest; but in the last analysis it is a form of pressure applied with the deliberate object of making a service unworkable until those in charge of it give way. Pressure of this kind is permissible, in our view, when an individual employer does not apply some national scale; thus, like other medical journals, we have long been in the habit of refusing advertisements which are inconsistent with the Askwith agreement. Pressure seems permissible, again, where employers violate an established custom of the profession; and we regularly refuse advertisements which say that remuneration will be lower if the successful applicant is a woman doctor rather than a man. Thirdly, pressure can probably be justified when it is brought to bear on an employer who refuses to negotiate through the channels laid down for the purpose; and last year we joined in refusing advertisements for public-health appointments until the local authorities agreed to take part in the Whitley Council and use its machinery for arriving at new terms of service. But to employ direct action to force the Government to reverse a national policy is a rather different matter. In this case the policy is that defined two years ago in the white-paper on the stabilisation of personal incomes, by which the Government are trying to hold off a general and dangerous rise in the cost of living and therefore of the cost of exports. In rejecting the claim for improved remuneration of medical Civil Servants, the Chancellor said that he fully recognises the need to maintain the efficiency of medical establishments but thinks it even more important to maintain the policy of wages stabilisation. Expert opinion is increasingly doubtful whether this line can be held much longer at all points: the freezing of wages and salaries cannot be borne indefinitely when there is so much unfairness in their present allotment. But, as citizens, most of us would be sorry to see changes in the policy forced by direct action on the part of aggrieved sections of the community. Various groups indirectly employed by the Government, such as the lower-paid railwaymen and the teachers, have reasons no less strong than those of the medical Civil Servants for desiring revision of their pay, and our colleagues' powerful case could actually be weakened by presenting it too forcefully and out of context. What is needed is its unprejudiced consideration; and the proper atmosphere for this would be created by the appointment of the kind of committee for which the B.M.A. asks.

Epidemiology of Q Fever

Q FEVER must now be considered among the possible diagnoses in obscure cases of acute febrile illness in England, especially southern England, and more particularly if the signs are suggestive of atypical pneumonia. Only thirteen years have elapsed since DERRICK [1] found the ætiological agent in Queensland stock workers, and the infection has since been recognised almost all over the world. Shortly after DERRICK had isolated the organism in guineapigs, BURNET and FREEMAN [2] [3] adapted it to the mouse and recognised that it had the morphological characters of a rickettsia; DERRICK then gave it the specific name of *Rickettsia burneti*. In the first five years after its discovery a great deal of epidemiological and other work on Q fever was done in Australia, but elsewhere it was looked on as a medical curiosity of strictly localised distribution, in spite of the recovery of a similar rickettsia from ticks collected in Montana, U.S.A.[4] Several laboratory outbreaks of Q fever occurred in the U.S.A. in this period and two-thirds of the cases, including some of the mildest, had an atypical pneumonia as part of the systemic disease.

The first outbreaks of the naturally occurring disease outside Australia were dramatic enough. The arrival of large numbers of susceptible Allied and enemy troops in the Mediterranean area was followed in 1944 and 1945 by large-scale outbreaks of an illness variously labelled as "atypical pneumonia," "Balkan Grippe," "pyrexia of undetermined origin," and the like. Many of these were subsequently identified by laboratory studies [5] [6] as Q fever, and it was evident that Italy, Greece, and Corsica were endemic areas. In 1946, two outbreaks of the disease were recognised in stockyard employees at Amarillo (Texas)[7] and in Chicago,[8] and in 1947–48 an endemic area was found in California. Q fever has also been reported from France, Germany, Palestine, Switzerland, Spain, Turkey, South America, and Great Britain—in fact, in most places where it has been looked for. It is in many ways an ideal disease for combined bacteriological and epidemiological studies. The rickettsia is a hardy organism easily

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1. Derrick, E. H. *Med. J. Aust.* 1937, ii, 281.
2. Burnet, F. M., Freeman, M. *Ibid*, p. 299.
3. Burnet, F. M., Freeman, M. *Ibid*, 1938, i, 296.
4. Davis, G. E., Cox, H. R. *Publ. Hlth Rep., Wash.* 1938, 53, 2259.
5. Robbins, F. C., Gauld, R. L., Warner, F. B. *Amer. J. Hyg.* 1946, 44, 23.
6. Caughey, J. E., Dudgeon, J. A. *Brit. med. J.* 1947, ii, 684.
7. Topping, N. H., Shepard, C. C., Irons, J. V. *J. Amer. med. Ass.* 1947, 133, 813.
8. Shepard, C. C. *Amer. J. Hyg.* 1947, 46, 185

and checking expenditure against the budget used to be considered the special province of the hospital administrator who knew his job. It is encouraging to see them coming once again to the fore; the Department of Health would find some other well-tried recipes, such as the use of quantity statistics and scrutiny of bed occupancy, in the now almost forgotten files of the 1920s and 30s. But Leviathan is bestirring himself, and if he maintains his energy will soon rediscover most of what can usefully be done by improving the system of hospital accounts.

So far so good; but it is no good overlooking the fact that there is still a serious flaw in the financial set-up which has nothing to do with the system of accountancy or techniques of financial control of the kind mentioned above. Why should any hospital unit bother about these refinements if savings are forfeit to the Exchequer? It would not do, we are told, to make outright allocations to the regional boards and thence to the hospital management committees; it would be inconsistent with the present system of governmental finance. That, no doubt, is true; but then the administrative framework of the hospital system is quite a new thing, and if we are going to give units at the periphery real administrative responsibility, and if we are going to ask them to sort out, in conjunction with their medical advisory committees, how the money had best be spent, we cannot at the same time say that they are not free to sort it out. We cannot tell them to go shopping and get the best value for money, and add as an afterthought that they must let us know in advance how they are going to spend it; or add that if they change their minds when they see the prices in the shops they will incur our displeasure and possibly a fine too—unless they have been pretty careless to begin with. Of course nobody at the Treasury or in the health departments sees the matter in this light; but that is because of the traditional divorce in public affairs between administration and finance, and the habit of thinking of them in separate compartments. As things stand today, the administrative framework of the hospital part of the Act, and the financial machinery being used to implement it, do not fit together; and one or the other will ultimately have to give way. So far the crucial nature of the struggle has been obscured by the flow of public money; and now that this is at an end it is imperative that the financial implications of the new model hospital system should be looked squarely in the face.

One last word. In typically British fashion we have indeed admitted a curious non-logical compromise; for it seems that regional boards have been allowed a power of approving the transfer of a "saving" from a head under-expended to one over-expended. Though this helps—and in some instances "helps" is too mild a word—to stave off the breakdown of the system, the device is open to serious criticism; for there is, of course, no true connection between overspending and saving, and the door is left wide open to the unscrupulous: what is easier than to overestimate this and that in the hope of pulling off a switch to something else? This half-permission to switch from one head to another is surely a snare, which serves only to obscure the need for clear thinking on the main issue.

Annotations

THE SPRINGS OF DELINQUENCY

EVEN among psychiatrists actually working on adolescent delinquency, the data and conceptions embodied in Sir Cyril Burt's *Young Delinquent* still hold the field, with little accession from more recent work; and it is no reflection on the merit of this pioneer study to wish for fuller confirmatory studies, based on wider data and other personal attitudes. The report on *Delinquency and Human Nature*,[1] compiled by Mr. D. H. Stott, M.A., is thus a particularly useful document. He presents clinical material of first-rate importance in a form which is generally comprehensible.

The basis is a detailed survey of 102 youths, between 15 and 18 years of age, in English approved schools. It was impossible to study persistent absconders, but otherwise there was no significant selection. Stott points out that the 15–18 age-group is of particular criminological interest: it is here that the greatest apparent numerical increase of offences has occurred in recent years; it provides the recruiting-ground for the persistent adult offender; and the cases in it have reached a stage, both in character-structure and in conflict with society, at which proper investigation is possible with a view to classifying the factors at work. The interview, the technique of which is described, was often supplemented by fairly extensive social contact and observation. To most readers, perhaps, the investigator's most notable comments are those on the factors which did *not* operate to produce delinquency. He points out that in none of the 102 cases studied did simple "wanting and taking" play any identifiable part. The cinema—where its influence was detectable—uniformly determined the type of crime, not its occurrence. Concerning "low moral standards" he aptly comments that since in almost all the boys delinquency constituted an outlet from an intolerable inner or outer environment, precisely because it was a disapproved and exceptional activity, low moral standards cannot be considered a primary factor: the child whose father is a burglar does not choose burglary as his own form of protest. "Lack of home discipline," which Stott investigated in some detail, he finds inseparable from a general inadequacy in the personality of the parent, and to this extent spoiling and harshness are opposite sides of the same coin.

He extracts five main motives behind delinquent action: avoidance-excitement (the excitement being a symptom of the unconscious avoidance—sometimes to the extent of complete amnesia or blackout—of a painful or distressing thought or memory), inferiority-compensation, delinquent-attention-seeking, resentment against parents, and desire for removal from home. Of these the first was by far the most conspicuous (53 cases) and desire for removal from home the most prevalent (58 cases). The cases are further cross-divided into categories of parental background. In all these groups, Stott repeatedly stresses the explosive nature of crime, its function in relieving tensions in the criminal which are entirely unrelated to obvious motive and purposive wickedness, and the clear-cut distinction between the "once-er" who may benefit by reproof, and the persistent offender for whom reproof, punishment, and the reaction of society are part and parcel of the pattern which he deliberately courts when he adopts delinquency as an escape mechanism from inner forces. This is fully in line with widely diverse psychiatric experience, and is true of all persistent offences, from sadistic assault to pilfering. The offence is a breakdown, or more correctly a breaking out. In a few cases physical factors such as fright or illness

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[1] Carnegie United Kingdom Trust, Comely Park House, Dunfermline. 1950. Pp. 460.

R. burneti has been demonstrated[15] with *Dermacentor andersoni*. It is tempting to argue that the tick is a primary and continuing reservoir of the infection in nature and that the disease can spread from it to various wild and domestic animals. The ticks and animals involved seem to differ according to the locality. Cows, sheep, and goats have been found to be infected in nature, and other domestic animals such as the horse, mule, and dog are experimentally susceptible. The disease may be spread among the domestic animals by the appropriate tick, but in California, at least, this does not seem to be so. Other blood-sucking insects might repay investigation, but it seems likely that *R. burneti* has sometimes become independent of arthropods and that its successful colonisation of the mammary gland and possibly the genital tract[16] will at any rate partly explain its spread among these animals. Infected dust and milk may be the intermediate links in the chain, as they are in the spread of infection from animal to man.

Epidemiological investigations of Q fever in Great Britain are at an early stage. The identification of cases by Stoker[17] and the description of an outbreak by Harman[18] and MacCallum et al.[19] last year has been followed by the discovery of other sporadic cases. Most of these have been found in south-east and south-west England, though a few have been recognised elsewhere. Serological evidence of infection of cattle has been established, and *R. burneti* has been isolated from milk in the areas where cases have occurred. The present aims of the investigators are to define the endemic areas by serological surveys of the human and bovine populations, and to study the incidence of the disease in man, animals, and arthropods in two small endemic areas.

Towards Control of Hospital Expenditure?

To scouts reconnoitring towards an objective, the slow progress of the main army is often exasperating. The general waits first for this, then for that, and at last takes what seems a reluctant and inadequate step forward. So in the hospital world those who understand something of the history of hospital accounts and comparative statistics watch with something approaching resignation the slow motion of our new Leviathan in its efforts to establish controls. Besides issuing a "standstill" circular,[20] the Minister, as briefly noted last week, has announced three new steps. First, he is going to make mandatory a rather more detailed analysis of expenditure than that at present in use, in accordance with a scheme drawn up by the regional treasurers. We have not seen this form, but it seems from the context that it is on the old subjective lines, which, as we have urged before, ought scarcely to be described as "costing." Still the move is overdue, and we hope it will soon be followed by permission to publish the figures for the different hospitals. Secondly, the Minister is going to send out teams to fix establishments. This is surely a much more dubious proposition, for so much depends on who are chosen to compose the teams. If the task is passed to two or three of the best administrators in each region and they consult the right people, it may be done well enough and may serve a useful purpose; but if it is to be entrusted to men who lack first-class practical experience of running hospitals it may easily do more harm than good. Thirdly, the Minister has accepted a recommendation of the Central Health Services Council that King Edward's Hospital Fund for London and the Nuffield Provincial Hospitals Trust should be invited to undertake a costing investigation into a limited number of hospitals. That is to say, a definite attempt is to be made to try a true departmental system of hospital accountancy, whereby at long last valid comparisons between one hospital and another will become possible. This we have advocated more than once. The system to be adopted will no doubt be on the lines advocated by Captain J. E. Stone of the King's Fund in a series of articles we published last year; a somewhat similar system is understood to be in operation at the Radcliffe Infirmary under the auspices of the Nuffield Trust. This step will be widely welcomed, and most wholeheartedly by those who realise the bankruptcy of the present system of accounts. The King's Fund has long been a pioneer in hospital accountancy. It first established a measure of uniformity among the London voluntary hospitals many years ago, and its tables of comparative statistics have served well in their day. A departmental system thoroughly worked out and proved fit for general adoption may well mark a new era in hospital affairs.

The Secretary of State for Scotland has taken his own line, in a circular to hospital authorities and has suggested ways of ensuring economy. This circular is also in its way a step forward; unlike its English counterpart it attempts to educate its boards of management (= the hospital management committees of England and Wales) in the way they should set about control of expenditure. Thus the hospital authorities are urged to "compare ascertained costs as between hospitals and groups of hospitals, in total and under particular heads, and to arrange for the examination of all items which appear to be relatively high or to be increasing unduly. "Most Boards of Management," it is suggested, "can do much in this respect within their own groups"; and, it is indicated, "all will be able readily to obtain from the Regional Board comparative figures for hospitals more or less similar in type to their own." Moreover, "each Board of Management should also arrange to examine systematically, in turn, the main items in its expenditure—the numbers of junior medical, nursing, auxiliary and domestic staff, the cost of food for patients and staff, the consumption of fuel, power and light, laundry expenditure, and so on to satisfy itself as to the efficiency and economy of the existing practice." The fact that such advice should be thought necessary shows how far we have strayed (on both sides of the Border) from the older conception of hospital administration as the enlightened pursuit of economy. These techniques of comparing costs

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[15] Parker, R. R., Davis, G. E. *Publ. Hlth Rep., Wash.* 1938, 53, 2267.
[16] Kilchsperger von G., Weismann, E. *Schweiz. Arch. Tierheilk.* 1949, 91, 553.
[17] Stoker, M. G. P. *Lancet*, 1949, i, 178.
[18] Harman, J. B. *Ibid*, ii, 1028.
[19] MacCallum, F. O., Marmion, B. P., Stoker, M. G. P. *Ibid*, p. 1026.
[20] R.H.B. (50) 41.

Doubts on the mathematics of Rhine's experiments were expressed by one speaker: was it not possible, he asked, that some of the test results were due to a coincidence of a bias of the experimental subject with a bias of the material. Another speaker inquired where parapsychology ends and mysticism starts. Professor Rhine is confident that he is guided only by the logic of scientific procedure; and he is fully aware that he is working on dangerous ground. "This is a jungle. . . . We are frightened of the danger of making a false step."

YOUNG PEOPLE WORKING IN HOSPITALS

HOSPITAL cadet schemes and other unofficial pre-nursing courses designed to bridge the gap between school-leaving and admission of student nurses to training, are multiplying, with the result that more young girls between the ages of 15 and 18 are finding their way into the hospitals. In one way this is a good thing: an early wish to become a nurse is often lost in those intervening years, not because the enthusiasm is insincere or romantic but because it is never nourished. If the girl begins other work she often finds it inconvenient to change later; whereas if she can do work that has some links with nursing the training is progressive and the change-over natural.

Nevertheless, there are serious drawbacks to cadet schemes, as the Minister of Health fully recognises in a recent circular (R.H.B. [50] 37). He is anxious that the work assigned to young people should not be of a type for which they are unsuited by reason of their age, and that the conditions should be in keeping with the requirements of the Factories Acts and the Young Persons (Employment) Act. He has therefore drawn up some conditions of service appropriate to young people, and has set out types of work which are suitable and unsuitable for young people to undertake. These conditions are not laid down as regulations, anyhow for the present, but the Minister expects that hospital authorities will adopt them and put them into force as soon as possible.

He thinks that young people under 18 should not be allowed, in any hospital, to carry out any treatment or to have the care of drugs or to nurse sick people. They should not be employed in any capacity in operating-theatres or mortuaries, or in any way that would bring them into contact with the sick in homes for the dying, cancer hospitals, or venereal-disease hospitals or departments; or in the wards or attached to the wards of mental hospitals or mental-deficiency institutions. Nor should they be employed in the radiological, physical-medicine, or outpatient departments of mental hospitals, isolation hospitals, tuberculosis sanatoria, or in mental-deficiency institutions in any work which would bring them into contact with low-grade or difficult patients. For young people under the age of 17 he proposes some further restrictions: they should not be employed in the X-ray, physical-medicine, or outpatient departments of maternity hospitals, or in hospital reception rooms, or attached to wards in any type of hospital. This last provision is particularly sound, taking account as it does of the tuberculosis risk in general wards. The risks of acquiring infection from the known or suspected case hardly matter: they can be guarded against. The danger comes from the early unrecognised case of pulmonary tuberculosis with bacilli in the sputum. There are always some of these about, as mass radiography has shown, and adolescents should not deliberately be brought into contact with them. True, they will meet such unrecognised cases in buses and trains, but they do not as a rule undertake small personal services for their fellow travellers, or handle objects they have handled, or spend an hour or two within range of their coughing. At least one first-aid organisation outside the hospitals likes to send its cadets into the wards for a few hours each week: but much as the young people enjoy and appreciate the experience, they should not be granted it. The fact that most of them keep well should not weigh against the chance that here and there one may be infected with a serious disease.

The Minister's list of suitable duties for those between 15 and 18 includes work in diet kitchens, where the young people can help to prepare and serve diets and clean equipment; in X-ray departments, where they can help with filing, guide walking patients to other departments, look after linen, help in the dark-room, and play with waiting children; in the physical-medicine department, where they can look after the telephone, help to marshal waiting children, dust, clean equipment, and mend linen; in the outpatients, the almoner's department, the nurses home, and the linen room, where they can do comparable duties; in the records office, and the catering and steward's office, where they can help with clerical work. They can also act as messengers. Those between 17 and 18 can take on more responsible jobs, helping in the reception room by taking inquiries and messages, and learning the use of the switchboard; and on the wards, where they can share in the general care of the ward kitchens, bathroom, sluice room, sterilising-room and clinical room, clean equipment and cupboards other than the drug cupboard, help to cut up dressings and pack drums, help to serve meals, lay trays, arrange flowers, and do similar light tasks, all of which are specified in the memorandum.

The Minister further suggests that the maximum working hours (exclusive of meal and rest breaks) should be 44 hours a week for people under 16, and 48 for those of 16 and over, with a maximum of 9 hours in a day. An additional hour daily may be worked by those of 16 and over, provided that only 50 such hours are worked in a year, and that not more than 6 are worked in any week. The maximum span of work, he suggests, should be 11 hours, beginning not earlier than 7 A.M. and ending not later than 8 P.M. (6 P.M. for people under 16). The periods suggested for meal-breaks are 45 minutes for midday dinner and 30 minutes for tea. These hours, and particularly the span of work, seem to us too long. Night work is to be prohibited, and there must be a half-holiday and a full day off weekly. Public holidays, too, are to be allowed.

Hospital authorities should arrange for any young people who work for them to attend part-time courses for further education for the equivalent of one full day a week; and this must not be taken out of the time off duty. For those who intend to become nurses the further education course should be of a kind to fit them for their profession. The Ministry of Education will shortly be asking local education authorities to consider providing a new type of pre-nursing course, occupying one day a week for two years, designed to meet the needs of young people working in hospitals. The Minister asks hospital authorities to let the education authorities know what kind of courses they want, and to help the authorities in organising such courses by offering them accommodation and equipment and the services of lecturers on technical subjects.

ON May 8 the King visited Sir MORTON SMART in hospital and invested him with the insignia of the G.C.V.O.

THE next session of the General Medical Council will open on Tuesday, May 23, at 2 P.M., when Dr. DAVID CAMPBELL, the president, will deliver an address.

Prof. B. P. BABKIN, M.D., of McGill University, Montreal, who was elected F.R.S. earlier this year, died on May 3, at the age of 73.

determined the timing of a breakdown. With regard to war, Stott predicts from his data a fairly rapid decline in cases attributable to the actual events and conditions of war-time, though this forecast could not be taken to include cases due to the social and emotional factors on which war was engrafted, and which have in part persisted in the "cold" war. The average Raven test score for the group was 40, corresponding to the 36th percentile. Frank psychosis was not widespread, though some of the recorded cases show a curious pseudoschizophrenic reaction which is more familiar in older delinquents.

The most urgent problem in modern criminology is that of identifying the offender whose delinquency is compulsive *at his first offence*—that is, to pick out the recurring decimal. The anger of judges and moralists when the term "neurotic" is used in connection with delinquency cannot withstand the enormous body of evidence, both in this report and in general experience, which shows that while some crimes result from impulse or greed, the entire body of repeated and persistent crime arises as an inappropriate form of behaviour which gratifies an unconscious and irrational need in the criminal. This observation fits exactly into Horney's definition of a neurosis; over the wider issue, Stott remarks that "the moralist and the psychologist can eat grass together. In our present society we cannot afford the luxury of endlessly tolerating neurotic ways of life, delinquent or otherwise. . . . [But] the undiscriminating philosophy of a self determination has outgrown its usefulness when it insists on the ability of the psychopath to adjust himself unaided to life, and inflicts on him term after term of imprisonment in the vain hope that this will prove a deterrent."

At the present time a remarkable amount of ill-informed and ignorant comment on juvenile crime is being made by prominent people. It is important, therefore, that studies such as this—presented with humour and insight, from a wide general culture, and wholly free from emotional bias—should reach the general public. The Carnegie Foundation would do well to issue this report far outside its present envisaged circulation to libraries and interested individuals. It is a cheering document, and its title is well chosen, for it strengthens the humanist conviction that conduct is comprehensible even when it is not understood, and that we are within sight of an extension to human misconduct of the same epistemological and systematic method which has enabled us to control infectious disease. Mr. Stott is fully aware of these implications, and treats them at a level which will satisfy the philosopher as well as the psychiatrist. He deserves the support of all those, inside and outside psychiatry, who share his awareness.

PSI PHENOMENA AND PSYCHIATRY

Prof. J. B. Rhine, of Duke University, South Carolina, had a crowded audience of psychiatrists and psychologists when he lectured on parapsychology in the Royal Society of Medicine. Parapsychology, according to Rhine,[1] is the science of those mental manifestations that appear to transcend recognised principles. "It attempts to deal scientifically with the problem of man's place in nature and the relationship of the personality to the physical world." Professor Rhine credits Mesmer with having encountered and described both thought transference and clairvoyance. He referred to famous psychiatrists (Ribot, Janet, Freud, and others) who had reported examples of extrasensory perception. Interest in these phenomena has been growing among psychiatrists and psychologists of late, partly no doubt as the result of the work carried out in Professor Rhine's laboratory over the last twenty years. A recent inquiry among American psychiatrists revealed that, of 725 who replied, a quarter believed themselves to have encountered such phenomena, while 68% thought them worthy of investigation. The term "psi phenomena" was suggested by Thouless and Wiesner,[2] of Cambridge University. It is applied to both extrasensory perception, or E.S.P., (the extrasensory influence of mind on mind), and psychokinesis, or P.K. (the influence of mind on matter). Professor Rhine and others regard both as experimentally established beyond doubt, E.S.P. with the help of card tests, P.K. with dice tests. The technique of these methods and the application of the laws of chance in the interpretations of test results are described in Professor Rhine's books.

Their methods established, the investigators began to study the types of subjects and states of consciousness likely to produce demonstrable psi phenomena. Contrary to popular belief, they found no basic connection between mental abnormality, in the psychiatric sense, and psi phenomena; nor was there any indication that emotional maladjustment favoured their occurrence. They rather gained the impression that a high degree of emotional adjustment made for success in their tests, though a few of their media had been of an "excitable temperament." Hypnosis has been found to affect both P.K. and E.S.P., but controlled experiments have so far been inconclusive as to the kind of changes which these phenomena undergo in the hypnotic state. Psi phenomena are functions of the unconscious mind, and failure in experiments may be due to unconscious "negativism," resulting in large deviations which cannot be explained mathematically as chance effects. Rhine and his co-workers confirmed the observations made by Soal and Goldney[3] of the "displacement effect"—the extrasensory perception of objects near the target. The relation of psi phenomena to the functions of the nervous system is still unexplored, though a promising start has been made with tests in states following concussion. Urban,[4] of Innsbruck, using E.S.P. card tests before and after electroconvulsant treatment and narco-analysis, found a rise of the scores during a certain phase of clouding of consciousness; but his report is based on 100 tests only, and his experiments still require confirmation. Urban suggested that the emergence of psi phenomena was due to the removal of inhibiting mechanisms. Professor Rhine posed the question whether "there may not have been something in the mind that has been smothered in the history of evolution." He is inclined to regard the homing phenomena in animals as based on E.S.P., and referred to experiments which to him made this assumption almost inescapable. The "vestigial theory" of the psi phenomena has many adherents among parapyschologists. Professor Rhine regards these phenomena as a challenge to our psychological and philosophical concepts: do they not force us back from our unitary concept of the mind-body relationship, he asks, to a dualistic conception of man? We must choose between a mind-centred (psychocentric) and a brain-centred (cerebrocentric) conception. Although he owned to being cautious and open to correction, he left no doubt where his sympathies lay, and he was supported by Mr. Thouless who also felt that parapyschology seemed to be pointing to the old idea that soul ruled the body. According to present-day psychological theory, psi phenomena should not take place; but they do. Psychological theories, Mr. Thouless said, must take account of parapsychological facts.[5] Other speakers reported on psi phenomena from their own experience.

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[1] Rhine, J. B. The Reach of the Mind. London, 1948.

[2] Thouless, R. H., Wiesner, B. P. *Proc. Soc. psych. Res.* 1947, 58.

[3] Soal, S. G., Goldney, K. M. *Ibid*, 1913, 47.

[4] Urban, H. Festschrift für Potzl. Innsbruck, 1949.

[5] Thouless, R. H. *Brit. J. Psychol.* 1919, 39, 97.

Doubts on the mathematics of Rhine's experiments were expressed by one speaker: was it not possible, he asked, that some of the test results were due to a coincidence of a bias of the experimental subject with a bias of the material. Another speaker inquired where parapsychology ends and mysticism starts. Professor Rhine is confident that he is guided only by the logic of scientific procedure; and he is fully aware that he is working on dangerous ground. "This is a jungle. . . . We are frightened of the danger of making a false step."

YOUNG PEOPLE WORKING IN HOSPITALS

HOSPITAL cadet schemes and other unofficial pre-nursing courses designed to bridge the gap between school-leaving and admission of student nurses to training, are multiplying, with the result that more young girls between the ages of 15 and 18 are finding their way into the hospitals. In one way this is a good thing: an early wish to become a nurse is often lost in those intervening years, not because the enthusiasm is insincere or romantic but because it is never nourished. If the girl begins other work she often finds it inconvenient to change later; whereas if she can do work that has some links with nursing the training is progressive and the change-over natural.

Nevertheless, there are serious drawbacks to cadet schemes, as the Minister of Health fully recognises in a recent circular (R.H.B. [50] 37). He is anxious that the work assigned to young people should not be of a type for which they are unsuited by reason of their age, and that the conditions should be in keeping with the requirements of the Factories Acts and the Young Persons (Employment) Act. He has therefore drawn up some conditions of service appropriate to young people, and has set out types of work which are suitable and unsuitable for young people to undertake. These conditions are not laid down as regulations, anyhow for the present, but the Minister expects that hospital authorities will adopt them and put them into force as soon as possible.

He thinks that young people under 18 should not be allowed, in any hospital, to carry out any treatment or to have the care of drugs or to nurse sick people. They should not be employed in any capacity in operating-theatres or mortuaries, or in any way that would bring them into contact with the sick in homes for the dying, cancer hospitals, or venereal-disease hospitals or departments; or in the wards or attached to the wards of mental hospitals or mental-deficiency institutions. Nor should they be employed in the radiological, physical-medicine, or outpatient departments of mental hospitals, isolation hospitals, tuberculosis sanatoria, or in mental-deficiency institutions in any work which would bring them into contact with low-grade or difficult patients. For young people under the age of 17 he proposes some further restrictions: they should not be employed in the X-ray, physical-medicine, or outpatient departments of maternity hospitals, or in hospital reception rooms, or attached to wards in any type of hospital. This last provision is particularly sound, taking account as it does of the tuberculosis risk in general wards. The risks of acquiring infection from the known or suspected case hardly matter: they can be guarded against. The danger comes from the early unrecognised case of pulmonary tuberculosis with bacilli in the sputum. There are always some of these about, as mass radiography has shown, and adolescents should not deliberately be brought into contact with them. True, they will meet such unrecognised cases in buses and trains, but they do not as a rule undertake small personal services for their fellow travellers, or handle objects they have handled, or spend an hour or two within range of their coughing. At least one first-aid organisation outside the hospitals likes to send its cadets into the wards for a few hours each week: but much as the young people enjoy and appreciate the experience, they should not be granted it. The fact that most of them keep well should not weigh against the chance that here and there one may be infected with a serious disease.

The Minister's list of suitable duties for those between 15 and 18 includes work in diet kitchens, where the young people can help to prepare and serve diets and clean equipment; in X-ray departments, where they can help with filing, guide walking patients to other departments, look after linen, help in the dark-room, and play with waiting children; in the physical-medicine department, where they can look after the telephone, help to marshal waiting children, dust, clean equipment, and mend linen; in the outpatients, the almoner's department, the nurses home, and the linen room, where they can do comparable duties; in the records office, and the catering and steward's office, where they can help with clerical work. They can also act as messengers. Those between 17 and 18 can take on more responsible jobs, helping in the reception room by taking inquiries and messages, and learning the use of the switchboard; and on the wards, where they can share in the general care of the ward kitchens, bathroom, sluice room, sterilising-room and clinical room, clean equipment and cupboards other than the drug cupboard, help to cut up dressings and pack drums, help to serve meals, lay trays, arrange flowers, and do similar light tasks, all of which are specified in the memorandum.

The Minister further suggests that the maximum working hours (exclusive of meal and rest breaks) should be 44 hours a week for people under 16, and 48 for those of 16 and over, with a maximum of 9 hours in a day. An additional hour daily may be worked by those of 16 and over, provided that only 50 such hours are worked in a year, and that not more than 6 are worked in any week. The maximum span of work, he suggests, should be 11 hours, beginning not earlier than 7 A.M. and ending not later than 8 P.M. (6 P.M. for people under 16). The periods suggested for meal-breaks are 45 minutes for midday dinner and 30 minutes for tea. These hours, and particularly the span of work, seem to us too long. Night work is to be prohibited, and there must be a half-holiday and a full day off weekly. Public holidays, too, are to be allowed.

Hospital authorities should arrange for any young people who work for them to attend part-time courses for further education for the equivalent of one full day a week; and this must not be taken out of the time off duty. For those who intend to become nurses the further education course should be of a kind to fit them for their profession. The Ministry of Education will shortly be asking local education authorities to consider providing a new type of pre-nursing course, occupying one day a week for two years, designed to meet the needs of young people working in hospitals. The Minister asks hospital authorities to let the education authorities know what kind of courses they want, and to help the authorities in organising such courses by offering them accommodation and equipment and the services of lecturers on technical subjects.

ON May 8 the King visited Sir MORTON SMART in hospital and invested him with the insignia of the G.C.V.O.

THE next session of the General Medical Council will open on Tuesday, May 23, at 2 P.M., when Dr. DAVID CAMPBELL, the president, will deliver an address.

Prof. B. P. BABKIN, M.D., of McGill University, Montreal, who was elected F.R.S. earlier this year, died on May 3, at the age of 73.

Special Articles

THE REGISTRAR SYSTEM IN NON-TEACHING HOSPITALS

D. Vellacott
M.B. Camb., F.R.C.S.
A SENIOR REGISTRAR

For most provincial non-teaching hospitals the registrar system is a comparatively recent innovation. Senior registrars or their equivalents—first assistants—have for many years been a feature of teaching hospitals, where their position and duties have been fairly clearly defined, with minor variations between different schools. Their duties usually consist of emergency and routine surgery at the discretion of the " chief," certain duties in outpatient clinics, the teaching of students, and responsibility for the documentation and recording of cases. Research is usually voluntary, although sometimes suggested and directed by the chief. Teaching hospitals are to some extent the " shop-window " of medicine and surgery, and as training centres they are justifiably regarded with great respect, credit accruing to the registrars fortunate enough to hold appointments there.

In the career of the would-be consultant a registrarship is a crucial stage, for it offers him an opportunity to form, in the light of practical experience, fundamental principles for the future ; to benefit from the experience, direction, and criticism of senior staff engaged in the same problems that he has to face ; and to make good himself.

CRITERIA

What are the particular facilities in teaching hospitals which help the would-be consultant ? Briefly, they seem to be these : (1) Working with, and learning from, men eminent in the profession ; (2) practical experience ; (3) the teaching of students, which forces the registrar to clarify his own ideas ; (4) practical work, during a formative period, in a school ; (5) opportunities for attending lectures and meetings in, or near, the teaching centre, and readily available libraries and museums ; (6) opportunities for research and controlled investigations, with first-class ancillary services ; (7) facilities and accommodation for learning and practising the proper recording of cases ; and (8) contact with the basic medical sciences of anatomy, physiology, and pathology.

If these criteria are accepted, how does the position of a registrar in a non-teaching hospital compare with that of his colleague in a teaching hospital ? As regards the men under whom he works, he may not be at a disadvantage, except that his chief may not be interested in, or accustomed to, teaching ; and for practical experience and clinical material, the non-teaching may surpass the teaching hospital. In the remaining six points, however, the registrar at a non-teaching hospital is often at a disadvantage. Furthermore, he is liable to become so involved in practical work, and problems arising from shortage of beds, as to lose sight of the ideal management of a case. He may receive a fine training in life-saving, but his work is necessarily directed to keeping patients out of hospital rather than to selecting patients for admission, and surgery that is economically important is in danger of being neglected. Moreover, outpatient clinics may be so large that history-taking and clinical examination are curtailed, and investigation by ancillary services substituted.

Speaking of surgery, one cannot fail to notice that super-specialised units often appear to gain certain advantages over general units. The former seem to catch the sympathetic eye of the public, of committees, and lay members of staffs, obtaining better ancillary services (including their own physiotherapists) and full clerical assistance. The stomach is removed by either a thoracic or a general surgeon ; but the team-work supporting the former is not always as good for the latter. It seems that undue importance may come to be attached to registrar service on a specialised unit, so that a succession of appointments to such units may become necessary to obtain a recognised general surgical training. General surgery deserves clearer recognition as a basic training for would-be consultants ; and support for general units should equal that for special units. It may, of course, be pointed out that general surgeons often have a particular interest in one branch ; and certainly a system of rotation of registrars does much to ensure a balanced training.

House-appointments should provide a general training for the recently qualified doctor. In this respect the non-teaching hospitals have in the past rivalled the teaching hospitals, residents obtaining practical experience from large and varied clinical material, together with greater responsibility than is usually allowed in teaching hospitals. Does not the adoption of the registrar system endanger the value of these appointments ?

After holding a house-appointment, the decision has to be made whether to go into general practice or to try to become a consultant. If the latter course is chosen, a registrarship should be a definite rung on the ladder, with prospects of advancement, and encouragement to study. The non-teaching hospitals could, and should, provide training and prospects rivalling those in teaching hospitals ; otherwise registrars working in non-teaching hospitals will find themselves at a disadvantage in the competition for consultant posts.

PROPOSALS

The following measures would, it is suggested, improve the value of registrar posts in the non-teaching hospitals, and benefit the hospitals themselves :

House-appointments.—The house-surgeon (or house-physician) should be primarily responsible to the consultant for the management of cases in the wards, taking the chief round and answering questions about the cases, dealing with most of the details of investigation and treatment, and recording history, examination, investigations, operations, and progress of each case. Naturally the registrar should, if required, answer for cases which he has himself dealt with.

The registrar should be concerned more with the management of the ward itself, seeing that the consultant's particular wishes and methods of management are carried out, that records are properly kept, and that new housemen are helped over the initial period of six weeks or so until they understand the routine of the wards and have mastered such procedures as putting up a transfusion and passing catheters.

Facilities for the registrar.—It should be part of the duties of a registrar to summarise and analyse case-notes, not only for purposes of recording, but for his own instruction and training ; in this he should be able to work in conjunction with the records department and render considerable assistance. He may be required, by some consultants, to write letters to the patients' doctors. If this work is to be done efficiently, there must be a separate room for registrars, where they will be free from constant interruptions. Clerical assistance is likewise essential. Provision of these two essentials would instantly raise the standard of notes and outpatient records ; ensure a speedier and more efficient contact with general practitioners ; and diminish the number of " forgotten " patients. But, for the registrars, a separate room and clerical assistance would do much more : it would provide a stimulus to reading and study, and analysis of cases. I have no doubt that registrars themselves would provide medical journals ; and in this local medical societies are already of great assistance.

Emergency and routine surgery.—Emergency surgery is good training—for emergency surgery. It would be a pity if registrars were employed only in this type of work; and registrars—or at least senior registrars—might be allotted one operating session a week.

Meetings and lectures.—In each hospital one registrar should be selected each month to attend a meeting on a subject of his choice, at one of the Royal Colleges, the Royal Society of Medicine, or a teaching hospital, with the obligation to report the proceedings, either verbally or in writing, to his consultants on his return; and a pool of money should be provided by regional boards to cover expenses where long distances are involved. The granting of opportunities to go on courses, after a certain period of service, might be considered. The recognition of some such system as a privilege of a post in a non-teaching hospital would do much to allay the fears of registrars who consider applying for posts remote from teaching centres.

Research.—It is in research that the registrar in the non-teaching hospital finds himself most frustrated. Often masses of clinical material pass before his eyes and stimulate his interest, but the difficulties already enumerated, and the involvement of himself and the ancillary departments in practical work, prevent him from pursuing lines of investigation with proper support. Registrars (if necessary, only the higher grades) should be allowed investigations not vitally essential, and in these the pathological registrar should assist as a part of his duties. Access to post-mortem examinations, opportunities to try operations on the cadaver, and, in interesting cases, the provision of microscopic slides, should be assured.

ASSESSING STANDARDS

Finally it is suggested that the Royal Colleges, or the regional boards, should take some part in ensuring that registrar appointments conform to certain training standards. A system of hospital standardisation, as employed by the American College of Surgeons, has much to commend it. If I may quote[1]:

> "Medical records departments play an essential part—as indeed they must do if the hospital concerned is to gain the approval of the American College of Surgeons—a standard of merit which all hospitals in the U.S.A. covet and endeavour to obtain. It is termed Hospital Standardization, and it is possible to score 1000 marks. The scoring sheet is divided into eight essential divisions, total score 655 marks, and ten adjunct and service divisions, total score 345. It is significant that the medical record department is allocated to the essential divisions, with the second highest possible score of 150 points, 250 out of the 655 points being allocated to the medical staff organisation. Clinical laboratory comes third in that division with 95 points."

Some such system would also give candidates for registrar posts some idea of the value of appointments before they actually took them up, and would stimulate competition and rivalry between hospitals.

I would ask senior consultants to compare the prospects which consultant practice offers today with those they faced some years ago—prospects, not conditions. It is doubtful whether prospect of financial gain will ever again be the same spur to greater effort. In medicine and surgery we have a profession where opportunities for healthy unselfish enterprise abound. It seems obvious that gratification and fulfilment will have to be derived from the very nature of the work. If standards in medicine and surgery are not to fall, senior members of hospital staffs will have to do all in their power to arouse enthusiasm and encourage capacity for criticism.

Obviously, the views expressed here have been formed as a result of experience in a particular hospital; but they may have a wider application. They are frankly expressed because the almost universal adoption of the registrar system calls for a recognised standard of training facilities, and presents a challenge which all non-teaching hospitals should recognise.

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[1] Royle, E. *Med. Rec.* 1950, 1, 28.

EMERGENCY BED SERVICE

LAST autumn branch offices of the King Edward's Hospital Fund Emergency Bed Service were opened at Ealing, Leytonstone, Woolwich, and Wimbledon to carry part of the load which had previously been borne entirely by the head office at Old Jewry. The branch offices now deal with 42% of the applications received. The committee's report on last year's working of the service relates how, through this decentralisation, the speed of admission and the proportion of admissions have both been increased though the total number of applications has risen steeply.

Since the introduction of the National Health Service the E.B.S. has been working for the four Metropolitan regional hospital boards for an experimental period of two years. The experiment has proved useful, and a new agreement has been reached whereby the E.B.S. is to carry on for a further two years and thereafter indefinitely, subject to six months' notice by either party. The King's Fund will continue to pay the first £6500, which was the cost of the E.B.S. in 1947, and the four boards share any expenses in excess of that sum.

THE YEAR'S WORKING IN LONDON

The total number of applications received during the year ended March 31, 1950, was as follows:

General acute cases	42,732
Infectious cases	14,506
Chronic sick cases	3411
Total number of cases ..	60,649

Of the 42,732 general cases offered, 34,575 were admitted, and 2488 withdrawn by the applicant. For the remaining 5669 no beds could be found, and they were referred back to the applicant. In 1070 of these cases the applicant was a hospital, and the patient was in the casualty department, but could not be admitted to the wards owing to their lack of beds.

Comparison of the winter results for 1948–49 and 1949–50 shows that the number of cases admitted, shown as a percentage of cases offered, was 73·5% and 78·5% respectively. The worst months in each winter were 75% in January and February, 1950, and 60% in February, 1949.

During last winter there was once again difficulty in admitting patients over 60 years of age, although the situation has improved since the first winter of the N.H.S. Nearly all age-groups show improvement over last year, the greatest being in the age-group 51–60 where the percentage admitted increased by 8·1. The exception is in the age-group 0–21 which shows a reduction of 0·4%, largely owing to the number of cases of bronchopneumonia in children which it proved impossible to admit during January.

In the winter of 1948–49 the average time taken to admit a case was 56 minutes. Last winter it was reduced to 42 minutes; to find a bed an average of 3·36 hospitals was approached in each case compared with 3·64 in the winter of 1948–49. During that winter, when the E.B.S. failed to find a bed for a patient, 5·15 hospitals were tried. This year an average of 7·05 hospitals were approached before failure was admitted.

The system of dealing with applications for inclusion on chronic sick waiting-lists was revised in November, 1949, when the records of these cases were transferred to the four branch offices which became responsible for the allocation of cases to the waiting-list of the appropriate hospital management committee. This work is done under the direct supervision of the regional medical admissions officers, who check that the case is suitable for a waiting-list, and take steps to obtain a report on the social circumstances where necessary. The new machinery is working satisfactorily, but it is obvious that the hospital management committees will continue to experience great difficulties in regard to these cases so long as the facilities for dealing with the chronic sick remain so inadequate. Until the situation improves it is difficult to see how waiting-lists can be materially reduced.

Since the winter of 1948–49 all patients for whom the E.B.S. is unable to find a bed are referred to the regional medical admissions officers. Formerly these officers referred the case back to the general practitioner, or themselves telephoned a regional board hospital and required it to accept the case. In January, 1949, hospital management committees in the four regions were asked by the regional boards to appoint a senior hospital officer in their group to whom the R.M.A.O. could refer an urgent case, and who would be responsible for finding a bed in the group, or for making certain that no bed was available. Since their appointment 1005 cases have been referred to the group medical referees. In many cases the medical referee has discussed the case with the general practitioner and been able to arrange either for admission within the next day or two, or for a domiciliary visit by a consultant.

IN THE PROVINCES

There are also branches of the service at Chelmsford, Watford, Brighton, and Tunbridge Wells, which are managed by the service, and the cost is a direct charge to the boards concerned.

The *Chelmsford office*, which serves the whole of the county of Essex outside the Metropolitan police district, dealt with 3129 applications for admission last year. It also arranges maternity bookings for the Chelmsford group H.M.C., and helps with the admission of patients to convalescent homes.

The *Watford office*, which covers the area served by the West Herts, Mid Herts, Barnet, and Harefield and Northwood hospital management committees, dealt with 2254 applications for admission. It also maintains waiting-lists of chronic sick cases on behalf of the management committees.

The *Brighton office* covers the area of the Brighton and Lewes group hospital management committee. It dealt with 3043 applications for admission.

The *Tunbridge Wells office* dealt with 1241 applications for admission. It also deals with maternity bookings, and it is often used by doctors as an information bureau. The group chronic sick waiting-list is kept in the office. All cases received from general practitioners are referred to the group geriatrician, who visits the patients and informs the Tunbridge Wells office of his findings.

LONDON TEACHING HOSPITALS

BOARDS OF GOVERNORS

THE Minister of Health has made the following appointments, mainly to fill vacancies caused by the retirement of a third of the members, to the boards of governors of the 26 London teaching hospitals. Of 207 appointments, 169 are reappointments of retiring members. There are 5 appointments outstanding. The names of the medical profession are shown in bold type.

ROYAL HOSPITAL OF ST. BARTHOLOMEW

Reappointed : Sir Herbert Cohen, O.B.E. ; Sir **Henry Dale**, O.M., G.B.E., F.R.C.P., F.R.S. ; Prof. H. G. Jackson ; E. T. Neathercoat, C.B.E., J.P. ; A. McL. Niven, J.P. ; R. R. J. Turner, O.B.E. ; J. S. Weatherley.

New members : **E. R. Cullinan**, F.R.C.P. ; **O. S. Tubbs**, F.R.C.S.

LONDON HOSPITAL

Reappointed : Horace Denton ; Prof. B. Ifor Evans ; Miss Elizabeth Farrelly ; **D. W. C. Northfield**, F.R.C.S. ; V. C. Ponsonby, M.C. ; W. M. Pryor, D.S.O.

New members : Mrs. R. C. Littlejohn ; C. S. B. Wentworth-Stanley ; **Hermon Taylor**, F.R.C.S.

ROYAL FREE HOSPITAL

Reappointed . Alderman Mrs. Martin Smith, M.B.E. ; **Clifford Morson**, O.B.E., F.R.C.S. ; Prof. **Mary F. Lucas Keene**, M.B. ; Prof. T. S. Moore ; **J. D. McLaggan**, F.R.C.S. ; Prof. Winifred Cullis, C.B.E. ; W. E. Ford.

New member : A. H. Telling.

UNIVERSITY COLLEGE HOSPITAL

Reappointed : Prof. **S. J. Cowell**, F.R.C.P. ; D. R. Pye, C.B.E. ; **M. L. Formby**, F.R.C.S. ; A. Shefford, O.B.E. ; **E. A. Gregg**, L.R.C.P.I., J.P.

New members : Mrs. Margaret Harvey, J.P. ; Mrs. I. M. Bolton ; Sir Cosmo Parkinson, G.C.M.G., K.C.B., O.B.E.

MIDDLESEX HOSPITAL

Reappointed : Fred Messer, C.B.E., M.P., J.P. ; Simon Whitbread ; W. B. Morrison ; **M. H. Whiting**, O.B.E., F.R.C.S. ; Prof. **B. W. Windeyer**, F.F.R. ; Sir Eric Gore-Browne, D.S.O ; L. F. Heald, K.C., M.P. ; C. G. Izard, O.B.E.

New member : Reginald Pestell, D.ECON., J.P.

CHARING CROSS HOSPITAL

Reappointed : H. E. Comben, A.M.I.C.E. ; Sir John Stewart-Wallace, C.B. ; **W. D. Southern**, M.R.C.S., L.D.S. ; David Trevor ; Mrs. Elsie O. Lindgren ; H. P. Marshall ; Hon. Mr. Justice Morris ; G. A. Pargiter, M.P.

New member : Mrs. Ann Blofield.

ST. GEORGE'S HOSPITAL

Reappointed : J. B. Bennie, J.P. ; Hon. Mrs. Reginald Coke ; E. O. Durlacher ; Mrs. Helga Feiling ; W. D. Little ; Sir Hugh Lucas-Tooth, M.P. ; **M. F. Nicholls**, F.R.C.S. ; **C. P. Pinckney**, F.R.C.P. ; R. H. Pott.

New members : Hon. **G. J. U. Bridgman**, F.R.C.S. ; I. F Salmon (until March 31, 1951).

WESTMINSTER HOSPITAL

Reappointed : A. N. H. Baines ; Sir Frederick Bovenschen, K.C.B., K.B.E. ; **C. J. Gavey**, F.R.C.P. ; Mrs. R. Margeurite High ; **T. J. Millin**, F.R.C.S. ; **P. H. Mitchiner**, C.B., C.B.E., F.R.C.S., Sir Harry Vanderpant.

New members : Hon. Christopher Addison : H. Solomon ; Alderman Miss E. McCullough.

ST. MARY'S HOSPITAL

Reappointed : Sir **Alexander Fleming**, F.R.C.P., F.R.S. ; Miss **Esther Rickards**, F.R.C.S. ; Lord McGowan, K.B.E. ; Prof. **Wilfred D. Newcomb**, F.R.C.P. ; **Richard Doll**, M.D., F.R.C.P. ; I. M. Gluckstein ; A. H. Lee ; Lady Plummer, H. L. Smedley.

New member : **W. D. W. Brooks**, F.R.C.P.

GUY'S HOSPITAL

Reappointed : S. B. Askew ; Alderman R. H. Burslem, J.P. ; E. V. Evans, O.B.E. ; *Prof.* **T. B. Johnston**, C.B.E., M.D. ; K. I. Julian ; Henry Levitt ; Prof. **W. R. Spurrell**, F.R.C.S., **F. S. Warner**, M.R.C.S., F.D.S.

New members : W. J. Driscoll ; Miss Mabel Crout.

KING'S COLLEGE HOSPITAL

Reappointed : Ralph Cocker ; **Terence East**, F.R.C.P., G. Hart ; H. L. Kendell ; Hon. Mrs. Charles Tufton, O.B.E.

New members : W. Trott ; **Sidney Thompson**, F.R.C.P. ; T. S. Stigger ; **Louis Minski**, F.R.C.P.

ST. THOMAS'S HOSPITAL

Reappointed : **G. H. Bateman**, F.R.C.S. ; **J. Bishop Harman**, F.R.C.P. ; R. J. Sainsbury ; Mrs. Doris A. *Thomas* ; **N. E. Waterfield**, F.R.C.S. ; S. W. Whiffen ; **J. M. Wyatt**, F.R.C.O.G. ; C. R. N. Winn, C.B., O.B.E., LL.M.

New members : Sir Herbert Thompson, C.I.E. ; Mrs. G. L. Rogers.

HAMMERSMITH, WEST LONDON AND ST. MARK'S HOSPITALS

Reappointed : E. G. Anthony, B.E.M. ; *Prof.* **Ian Aird**, F.R.C.S. ; Dame Katherine Jones ; **Horace Joules**, F.R.C.P. ; Prof. E. J. King, D.SC. ; **O. V. Lloyd-Davies**, F.R.C.S. ; Miss Amy Sayle, M.B.E. ; Mrs. M. Griffiths.

New member : J. B. Bennie, J.P.

HOSPITAL FOR SICK CHILDREN

Reappointed : **W. C. V. Brothwood**, M.D. ; Mrs. B. A. Beaumont, J.P. ; Miss E. V. Eckhard ; **G. H. Macnab**, F.R.C.S. ; Hon. Margaret Bigge ; Lady Thomas ; Theodore Magnus Wechsler, M.B.E. ; **I. A. B. Cathie**, M.D.

NATIONAL HOSPITAL FOR NERVOUS DISEASES

Reappointed : **J. B. Hunter,** C.B.E., M.C., F.R.C.S. ; Hon. Mrs. Richard Lyttleton ; **MacDonald Critchley,** F.R.C.P. ; Countess of Rothes ; W. H. Taylor.

New members : Mrs. B. Drake ; Sir Norman Strathie, K.C.I.E.

ROYAL NATIONAL THROAT, NOSE AND EAR HOSPITAL

Reappointed : Mrs. Doris E. Clark ; Lewis-Davis Lewis ; Prof. **F. C. Ormerod,** F.R.C.S. ; A. G. Farr ; J. R. Rosselli ; Mrs. Arthur Rye.

New member : Mrs. Frances Timpson (until March, 31, 1952).

MOORFIELDS, WESTMINSTER AND CENTRAL EYE HOSPITAL

Reappointed : N. E. Behrens ; **J. D. M. Cardell,** F.R.C.S. ; **N. McDiarmid,** M.B. ; **F. W. Law,** F.R.C.S. ; Bryan Roberts ; Miss Spencer-Wilkinson ; Sir John Stainton, K.B.E., K.C.

New member : A. P. V. Smyth.

BETHLEM AND MAUDSLEY HOSPITALS

Reappointed : W. J. Bourne ; Alderman Sir Frederick Wells ; Alderman E. V. M. Stockdale ; Prof. **A. J. Lewis,** F.R.C.P. ; **T. A. Munro,** M.D.

New members : Prof. **Alfred Meyer,** M.D. ; Colonel R. M. Rendel ; Anthony Greenwood, M.P.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN

Reappointed : **G. M. Frizelle,** M.D. ; Sir **Archibald Gray,** C.B.E., F.R.C.P. ; **F. Ray Bettley,** F.R.C.P. ; Hal Gutteridge ; Humphrey Whitbread.

HOSPITALS FOR DISEASES OF THE CHEST

Reappointed : Mrs. M. G. Burton ; J. H. Cooke ; **A. Hope Gosse,** F.R.C.P. ; Sir **Bennett Hance,** K.C.I.E., O.B.E., M.D. ; A. J. Newman ; Mrs. M. Omerod ; Sir Hugh Turnbull, K.C.V.O., K.B.E. ; **F. H. Young,** O.B.E., F.R.C.P.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL

Reappointed : A. E. Renenson Coucher, F.R.I.C.S., J.P. ; **A. T. Fripp,** F.R.C.S. ; **H. J. Seddon,** F.R.C.S. ; Sir Howard Kerr, K.C.V.O., C.M.G., O.B.E. ; William Nicholls, J.P. ; Miss Grace Rattenbury.

NATIONAL HEART HOSPITAL

Reappointed : **R. C. Brock,** F.R.C.S. ; **J. M. H. Campbell,** O.B.E., F.R.C.P. ; J. Simons ; L. H. Watts.

New member : Mrs. E. V. Whiter.

ST. PETER'S AND ST. PAUL'S HOSPITALS

Reappointed : H. Lythgoe ; **A. W. Badenoch,** F.R.C.S. ; **R. Ogier Ward,** D.S.O., O.B.E., M.C., F.R.C.S. ; **J. E. Semple,** F.R.C.S. ; Colonel A. R. Martin ; Sir Hewitt Skinner ; H. M. Tobin.

ROYAL CANCER HOSPITAL

Reappointed : **A. Lawrence Abel,** F.R.C.S. ; D. Jackman, M.B.E. ; D. E. W. Gibb ; W. G. Wilsher ; F. Griffiths Woollard, J.P.

New member : Councillor Douglas Clark.

QUEEN CHARLOTTE'S AND CHELSEA HOSPITALS

Reappointed : **Frank Cook,** F.R.C.S. ; Hon. Mrs. Eliot Hodgkin ; **J. Montagu Wyatt,** F.R.C.O.G. ; Prof. **James Young,** D.S.O., F.R.C.O.G.

New members : Mrs. P. Burton ; L. F. Ramseyer, D.S.O. ; Mrs. T. Keep.

EASTMAN DENTAL HOSPITAL

Reappointed : Sir Percy Everett ; Prof. **W. E. Herbert,** M.R.C.S. ; **C. F. Ballard,** M.R.C.S., L.D.S. ; Miss E. N. Morton.

Public Health

PUBLIC-HEALTH ENGINEERING

THIS country has a long and fine tradition of environmental sanitation, which was the foundation of its public-health service. One of the pioneers in training sanitary officers for their duties was the Royal Sanitary Institute, founded in 1876 ; the following year the institute entered the educational field and set up its first board of examiners. The examinations were designed for local surveyors and inspectors of nuisances and the candidates were expected to reach a standard of competence in "preventive medicine, chemistry, engineering and sanitary jurisprudence." The first examination was held on Oct. 29, 1877, and a distinguished group of examiners, including medical scientists, engineers, and architects, passed five students out of eight entrants. The sanitary inspector of today receives a comprehensive training on lines laid down by the Royal Sanitary Institute and is recognised by law and custom as a guardian of the public health.

There was a time when a sanitary inspector could undertake almost all the environmental work of the health department, even in a large and densely populated area. From the beginning of the present century, however, enormous technical advances have been taking place especially in sanitary engineering, housing, and town planning ; the sphere of the sanitary inspector, like that of the medical officer of health, has become narrowed by specialism within the group, but without sacrificing its fundamental importance to the protection of the community. During the past generation it has been demonstrated in the United States and elsewhere, that there is a special need for public-health engineering in the modern community. For many years this has been recognised as a fact in modern communities and many of our more populous areas have large progressive engineering departments controlling most of the essential services such as water-supply, sewerage, sewage disposal, public cleansing, and works of many kinds that the modern city requires. In the United States this change has been recognised by the establishment of special postgraduate courses for engineers, designed to give them a fuller understanding of the principles of public health in relation to their profession. Experience there has shown that the postgraduate study of public-health engineering is best organised as a joint venture between the university schools of engineering and their postgraduate departments of public health. In this way the engineer receives instruction side by side with those with whom he has to work in the field—health officers and public-health nurses. The day-to-day contact established between these officers, and the give and take of their discussion in seminars and practical district work, is of great value in enabling them to understand one another's point of view. It is, of course, important to realise that the doctor and the nurse gain quite as much as the engineer from the joint instruction.

A NEW ENTERPRISE

Postgraduate courses in public-health engineering are now well established in the United States and are closely linked with public-health teaching. The Rockefeller Foundation is giving its encouragement and support to a scheme of this kind in Great Britain. The Imperial College of Science and Technology and the London School of Hygiene and Tropical Medicine have been chosen for this experiment, and the joint enterprise which they are beginning in the autumn of this year is supported by eminent engineers and medical men. A Public Health Engineering Advisory Committee has been established by the governing body of Imperial College to assist in policy and organisation. On this advisory committee are represented the senate of the University of London, the London School of Hygiene and Tropical Medicine, the Institution of Sanitary Engineers, the Royal Sanitary Institute, and the Society of Medical Officers of Health.

The course in public-health engineering, to be carried out principally at Imperial College, is intended for graduate engineers and covers one academic year. The plan of the proposed course has now been worked out in detail. The studies fall naturally into three groups. First come the basic sciences of mathematics, physics, management committees will continue to experience great difficulties in regard to these cases so long as the facilities for dealing with the chronic sick remain so inadequate. Until the situation improves it is difficult to see how waiting-lists can be materially reduced.

Since the winter of 1948–49 all patients for whom the E.B.S. is unable to find a bed are referred to the regional medical admissions officers. Formerly these officers referred the case back to the general practitioner, or themselves telephoned a regional board hospital and required it to accept the case. In January, 1949, hospital management committees in the four regions were asked by the regional boards to appoint a senior hospital officer in their group to whom the R.M.A.O. could refer an urgent case, and who would be responsible for finding a bed in the group, or for making certain that no bed was available. Since their appointment 1005 cases have been referred to the group medical referees. In many cases the medical referee has discussed the case with the general practitioner and been able to arrange either for admission within the next day or two, or for a domiciliary visit by a consultant.

IN THE PROVINCES

There are also branches of the service at Chelmsford, Watford, Brighton, and Tunbridge Wells, which are managed by the service, and the cost is a direct charge to the boards concerned.

The *Chelmsford office*, which serves the whole of the county of Essex outside the Metropolitan police district, dealt with 3129 applications for admission last year. It also arranges maternity bookings for the Chelmsford group H.M.C., and helps with the admission of patients to convalescent homes.

The *Watford office*, which covers the area served by the West Herts, Mid Herts, Barnet, and Harefield and Northwood hospital management committees, dealt with 2254 applications for admission. It also maintains waiting-lists of chronic sick cases on behalf of the management committees.

The *Brighton office* covers the area of the Brighton and Lewes group hospital management committee. It dealt with 3043 applications for admission.

The *Tunbridge Wells office* dealt with 1241 applications for admission. It also deals with maternity bookings, and it is often used by doctors as an information bureau. The group chronic sick waiting-list is kept in the office. All cases received from general practitioners are referred to the group geriatrician, who visits the patients and informs the Tunbridge Wells office of his findings.

LONDON TEACHING HOSPITALS

BOARDS OF GOVERNORS

THE Minister of Health has made the following appointments, mainly to fill vacancies caused by the retirement of a third of the members, to the boards of governors of the 26 London teaching hospitals. Of 207 appointments, 169 are reappointments of retiring members. There are 5 appointments outstanding. The names of the medical profession are shown in bold type.

ROYAL HOSPITAL OF ST. BARTHOLOMEW

Reappointed : Sir Herbert Cohen, O.B.E. ; Sir **Henry Dale,** O.M., G.B.E., F.R.C.P., F.R.S. ; Prof. H. G. Jackson ; E. T. Neathercoat, C.B.E., J.P. ; A. McL. Niven, J.P. ; R. R. J. Turner, O.B.E. ; J. S. Weatherley.

New members : **E. R. Cullinan,** F.R.C.P. ; **O. S. Tubbs,** F.R.C.S.

LONDON HOSPITAL

Reappointed : Horace Denton ; Prof. B. Ifor Evans ; Miss Elizabeth Farrelly ; **D. W. C. Northfield,** F.R.C.S. ; V. C. Ponsonby, M.C. ; W. M. Pryor, D.S.O.

New members : Mrs. R. C. Littlejohn ; C. S. B. Wentworth-Stanley ; **Hermon Taylor,** F.R.C.S.

ROYAL FREE HOSPITAL

Reappointed : Alderman Mrs. Martin Smith, M.B.E. ; **Clifford Morson,** O.B.E., F.R.C.S. ; Prof. **Mary F. Lucas Keene,** M.B. ; Prof. T. S. Moore ; **J. D. McLaggan,** F.R.C.S. ; Prof. Winifred Cullis, C.B.E. ; W. E. Ford.

New member : A. H. Telling.

UNIVERSITY COLLEGE HOSPITAL

Reappointed : Prof. **S. J. Cowell,** F.R.C.P. ; D. R. Pye, C.B.E. ; **M. L. Formby,** F.R.C.S. ; A. Shefford, O.B.E. ; **E. A. Gregg,** L.R.C.P.I., J.P.

New members : Mrs. Margaret Harvey, J.P. ; Mrs. I. M. Bolton ; Sir Cosmo Parkinson, G.C.M.G., K.C.B., O.B.E.

MIDDLESEX HOSPITAL

Reappointed : Fred Messer, C.B.E., M.P., J.P. ; Simon Whitbread ; W. B. Morrison ; **M. H. Whiting,** O.B.E., F.R.C.S. ; Prof. **B. W. Windeyer,** F.F.R. ; Sir Eric Gore-Browne, D.S.O. ; L. F. Heald, K.C., M.P. ; C. G. Izard, O.B.E.

New member : Reginald Pestell, D.ECON., J.P.

CHARING CROSS HOSPITAL

Reappointed : H. E. Comben, A.M.I.C.E. ; Sir John Stewart-Wallace, C.B. ; **W. D. Southern,** M.R.C.S., L.D.S. ; David Trevor ; Mrs. Elsie O. Lindgren ; H. P. Marshall ; Hon. Mr. Justice Morris ; G. A. Pargiter, M.P.

New member : Mrs. Ann Blofield.

ST. GEORGE'S HOSPITAL

Reappointed : J. B. Bennie, J.P. ; Hon. Mrs. Reginald Coke ; E. O. Durlacher ; Mrs. Helga Feiling ; W. D. Little ; Sir Hugh Lucas-Tooth, M.P. ; **M. F. Nicholls,** F.R.C.S. ; **C. P. Pinckney,** F.R.C.P. ; R. H. Pott.

New members : Hon. **G. J. U. Bridgman,** F.R.C.S. ; I. F. Salmon (until March 31, 1951).

WESTMINSTER HOSPITAL

Reappointed : A. N. H. Baines ; Sir Frederick Bovenschen, K.C.B., K.B.E. ; **C. J. Gavey,** F.R.C.P. ; Mrs. R. Margeurite High ; **T. J. Millin,** F.R.C.S. ; **P. H. Mitchiner,** C.B., C.B.E., F.R.C.S. ; Sir Harry Vanderpant.

New members : Hon. Christopher Addison : H. Solomon ; Alderman Miss E. McCullough.

ST. MARY'S HOSPITAL

Reappointed : Sir **Alexander Fleming,** F.R.C.P., F.R.S., Miss **Esther Rickards,** F.R.C.S. ; Lord McGowan, K.B.E., Prof. **Wilfred D. Newcomb,** F.R.C.P. ; **Richard Doll,** M.D., F.R.C.P. ; I. M. Gluckstein ; A. H. Lee ; Lady Plummer ; H. L. Smedley.

New member : **W. D. W. Brooks,** F.R.C.P.

GUY'S HOSPITAL

Reappointed : S. B. Askew ; Alderman R. H. Burslem, J.P. ; E. V. Evans, O.B.E. ; Prof. **T. B. Johnston,** C.B.E., M.D. ; K. I. Julian ; Henry Levitt ; Prof. **W. R. Spurrell,** F.R.C.S. ; **F. S. Warner,** M.R.C.S., F.D.S.

New members : W. J. Driscoll ; Miss Mabel Crout.

KING'S COLLEGE HOSPITAL

Reappointed : Ralph Cocker ; **Terence East,** F.R.C.P., G. Hart ; H. L. Kendell ; Hon. Mrs. Charles Tufton, O.B.E.

New members : W. Trott ; **Sidney Thompson,** F.R.C.P. ; T. S. Stigger ; **Louis Minski,** F.R.C.P.

ST. THOMAS'S HOSPITAL

Reappointed : **G. H. Bateman,** F.R.C.S. ; **J. Bishop Harman,** F.R.C.P. ; R. J. Sainsbury ; Mrs. Doris A. Thomas ; **N. E. Waterfield,** F.R.C.S. ; S. W. Whiffen ; **J. M. Wyatt,** F.R.C.O.G. ; C. R. N. Winn, C.B., O.B.E., LL.M.

New members : Sir Herbert Thompson, C.I.E. ; Mrs. G. L. Rogers.

HAMMERSMITH, WEST LONDON AND ST. MARK'S HOSPITALS

Reappointed : E. G. Anthony, B.E.M. ; Prof. **Ian Aird,** F.R.C.S. ; Dame Katherine Jones ; **Horace Joules,** F.R.C.P. ; Prof. E. J. King, D.SC. ; **O. V. Lloyd-Davies,** F.R.C.S. ; Miss Amy Sayle, M.B.E. ; Mrs. M. Griffiths.

New member : J. B. Bennie, J.P.

HOSPITAL FOR SICK CHILDREN

Reappointed : **W. C. V. Brothwood,** M.D. ; Mrs. B. A. Beaumont, J.P. ; Miss E. V. Eckhard ; **G. H. Macnab,** F.R.C.S. ; Hon. Margaret Bigge ; Lady Thomas ; Theodore Magnus Wechsler, M.B.E. ; **I. A. B. Cathie,** M.D.

Parliament

School Dental Service

On the motion for the adjournment in the House of Commons on May 8, Squadron-Leader A. E. Cooper deplored that the school dental service should be one of the real casualties of the National Health Service. Dental officers were leaving the service to go into private practice, where they were able to earn four or five times the salaries they received from local authorities. The service was never adequate, but in 1948, 921 dentists were in the service. By January, 1950, the number had fallen to 738, and now it was lower still. The problem seemed to him to be twofold. First, there was the long-term problem of training sufficient dentists to cover both private requirements and the school dental service. Secondly, there was the immediate problem of maintaining the school dental service during the interim. Was it likely that the Whitley Council would award a scale of salaries which would give the school dental officers anything like the amount of money they could earn in private practice? If they did, the whole of our local government administration would be thrown out of balance, and the school dental officer would earn a higher salary than the town clerk. The only way in which this problem could be solved, he held, was for the Government to negotiate with the British Dental Association for a part-time service on a sessional basis with a somewhat higher fee than is paid today.

Mr. James Baird emphasised that the fixing of the school dentist's salary lay chiefly with the local authorities. There had been considerable improvements since 1945 and, under pressure from the Government, local authorities had gone a considerable way to meet school dental officers on the matter of salary. But authorities were often reluctant to give them the tools with which to do the job. Some school clinics were a disgrace and the equipment was in no way comparable with what a dentist would have in private practice. Also there was too much form filling. Every tiny authority had a senior dental officer who had to do so much book work each week. Why could not the Ministry of Health take the service over and organise it on a regional basis in collaboration with the Ministry of Education? He agreed that the only ultimate solution was more dentists. Till then he believed we might follow New Zealand's example and have dental hygienists—young girls who do two years' training under a dental surgeon and then are allowed to fill and extract children's teeth. He agreed that it was always doubtful to dilute a profession but if this dilution was limited to the treatment of school-children, under supervision all the time by qualified dental surgeons, he did not believe it would do much harm.

Dr. Charles Hill said the plain fact was that there were too few dentists today to provide a dental service for the community as a whole. Paradoxically the result of applying a dental service to the community as a whole had been most of all to deny it to the section of the community that needed it most. There was no doubt that among all the forms of dental care there was none to compare in terms of the health of the people with the dental care of school-children; yet at present a proportion of the children of the country were receiving no dental care whatever. Even though the position might be rectified in the next few months, it still remained true that those children had suffered dentally because of that lack of care. Some people might assert —Dr. Hill said he was not among them—that the terms in dental practice outside the school clinic had been over-attractive. Others would say, with much greater justice, that the remuneration of the school dental service had remained far too unattractive in relation to current conditions. The way to grapple with the situation was to give priority to the school population, whatever that might mean in the provision of dental care for the rest of the community, and secondly to produce new scales of remuneration for school dentists which would retain those still in the service and attract others to it. So urgent was the problem that intervention by the Minister was needed to secure the speediest possible adjustment of the situation.

Dr. Barnet Stross pointed out that dentists working in schools did not put in as many hours as a man working in private practice so that even if appropriate remuneration was given to the school dentists it would still not equal what could be earned outside it, and he believed young men of energy and vigour would still be attracted away from school medical service.

Mr. D. R. Hardman, parliamentary secretary to the Ministry of Education, replying to the debate, said he was anxious not to exacerbate the situation, because reports of one kind or another were awaited and negotiations were afoot for the setting up of Whitley machinery. He was convinced that the long-term solution of the problem was a great addition to the number of trained dentists. He hoped that as a result of recent developments Whitley machinery would be set up to deal with dentists in the employment of local authorities. The mission which had visited New Zealand to study the system of school dental nurses had returned to this country and their report was awaited with interest. If Whitley machinery were set up the question of salaries could at once be considered. No purpose could be served by concealing the fact that the school dental service was now in a very serious position.

Midwives Bill

In the House of Commons on May 8 Mr. Arthur Blenkinsop, parliamentary secretary to the Ministry of Health, moved the second reading of the Midwives (Amendment) Bill which has already passed through the House of Lords. He said it was a modest and non-controversial but useful measure. The Midwives Working Party had rejected the suggestion made in the report of the Working Party on Nurses that the Central Midwives Board might well combine with the General Nursing Council, and Mr. Blenkinsop agreed that it would be a mistake to mix the problem of ordinary health nursing with the work of the midwife. If a general body were set up there would be a danger that the midwives' side would be overweighted by the general nursing side.

The Working Party on Midwives had suggested that refresher courses should be made obligatory for all practising midwives, and the Royal College of Midwives had already increased the number of places for voluntary courses. It might be some time before provision was sufficient to allow the courses to be made compulsory. At the new college for midwives at Kingston full-time courses of six months' duration were beginning this month.

On the recommendation of the Working Party the Medical Research Council had set up a committee to find a more effective method of administration of analgesia by midwives, and it was hoped that their report would be received fairly shortly. The Ministry of Health were most anxious that other methods—for example 'Trilene'—might possibly be brought into more general use than at present, and by a recent amendment operating from April 1 this year, pethidine could now be procured and administered by midwives.

The clause in the Bill dealing with uniforms, he continued, had rather surprisingly caused discussion in the House of Lords where an amendment was carried which ensured that midwives should be entitled to wear the national uniform even if the local employing authority required the local uniform to be worn.

Mr. Somerville Hastings hoped that the Bill would be regarded by midwives as a gesture of appreciation by the nation for the work they had done. The death-rate of mothers in childbirth was a quarter of what it was 20 years ago; and the death-rate of infants had gone down, although not quite in the same proportion. For this they had to thank the midwives, at any rate in part. All doctors must also be grateful to the midwives, because, although not all of them would be ready to admit it, they all, he thought, without exception learned how to deal with a normal case of childbirth from a midwife. He feared that midwives were labouring today under a sense of grievance. They were not quite sure of their status and they were not too certain that they were able chemistry, mechanics, hydraulics, bacteriology, entomology, and parasitology. As the students will all be graduates, a sufficient knowledge of the physical sciences may be assumed, and attention will be devoted to their special applications to sanitation and to the biological sciences, which will be new material to most of the students. Secondly, there are the various fields of application such as water-supply, sewage disposal, housing and town planning, industrial hygiene, and pest control. Thirdly, there is the general background of public health against which the engineering studies may be seen in a right perspective. This involves instruction and practical experience in the organisation of the public-health services and in field epidemiology. This section, which will be carried out at the London School of Hygiene and Tropical Medicine, will bring the engineers into contact with medical men studying for the diploma in public health and with senior nurses, administrators, and other workers in the public services.

The Imperial College is well equipped for teaching the physical and biological sciences and the many engineering aspects of public health. The Royal College of Science possesses fully organised laboratories for teaching bacteriology, entomology, and parasitology, and these will be supplemented by field studies at its station at Silwood Park, near Ascot, which affords excellent opportunities for the practical application of various methods of mosquito control and for demonstrations of methods of rural sanitation, water-supply, and sewage disposal. In the City and Guilds College a laboratory is being set up for the physical and chemical analysis of water and sewage. Special apparatus will be used to determine the effects of different methods of treatment. Rooms will also be available for research. The laboratory work is to be supplemented by field tests on a pilot sewage-treatment plan at Oxford. In most cases the departments concerned are arranging courses specially adapted to the needs of civil engineers, and the Imperial College, which undertakes the greater part of the teaching, is offering all its library facilities to the students. With the generous assistance of the Rockefeller Foundation a special lecturer in public-health engineering has been appointed.

At the London School of Hygiene and Tropical Medicine the engineers will attend the same classes as the medical, nursing, and administrative postgraduate students. Indeed, as has already been mentioned, one of the main reasons for bringing the engineers to the school is to enable them to make contacts with other students in the same field. There are, however, certain subjects in which the engineers require special tuition as a group. For this purpose a medical lecturer has been appointed whose function it will be to supervise the training of the engineers and to see that their work is properly coördinated.

ADMISSION

The course is primarily intended for students holding a first degree in civil engineering, or an equivalent qualification, but students of equal status in other scientific subjects may also be accepted. Applications for admission to the course should be made as early as possible on the college entry form, which can be obtained from the Deputy Registrar, City and Guilds College, Exhibition Road, London, S.W.7. Students in India or Pakistan should send their applications through the office of the High Commissioner. Egyptian students should apply through the Egyptian Education Office.

Smallpox

Although several cases of suspected smallpox had been removed to hospitals in various parts of the country, on May 13 there was no known case of smallpox in England and Wales.

Estimates of Births

In his return for the week ended May 6, the Registrar-General gives the following estimates of live births to be expected in England and Wales during this and the next quarter: final estimate for the quarter ended June 30, 184,000; provisional estimate for the quarter ended Sept. 30, 176,000.

BEFORE THE WAR AND AFTER

REVIEW BY C.M.O.

On May 11 Sir Wilson Jameson, the retiring chief medical officer of the Ministry of Health, introduced to representatives of the press Sir John Charles, his successor; and he went on to survey the field of health today against the pre-war background.

Certain medical advantages had, he suggested, been won from the late war. The first of these was rapid progress in chemotherapy; and he cited mepacrine in particular. Before mepacrine was devised to replace the German atebrine, the annual malaria-rate among Australian Forces in New Guinea was 740 per 1000; with mepacrine the rate fell to 26 per 1000. The war had led, also, to improvement and extension of blood-transfusion. Last year donors had given 456,000 bottles of blood to the National Transfusion Service. This was a record, but hospitals were now using fifty times as much blood as before the war, and a further 200,000 donors were needed. The donors were at present mostly older people; and Sir Wilson hoped that younger volunteers would come forward. Among further medical benefits from the war were the Public Health Laboratory Service; the development of mass miniature radiography (Britain had the best 35 mm. mobile outfit in the world); extension of the welfare-foods and school milk and meals schemes (every day 9 out of 10 school-children were having milk at school, and half the children were having a meal there); publicity for health matters (notably in initiating and sustaining the diphtheria immunisation campaign and in bringing into the open the question of venereal disease); the development of reablement schemes; the initiation of special hospital centres for such specialties as neurosurgery, plastic surgery, thoracic surgery, and the treatment of the neuroses; and finally, arising from the war-time determination to build a new world, the National Health Service itself and the United Nations with its specialised agencies of which W.H.O. was one.

Turning to vital statistics, Sir Wilson compared figures for 1938 with figures (some provisional) for 1949 which had been supplied by the Registrar-General. The stillbirth-rate, which had been 38 per 1000 total births in 1938, was 23 per 1000 in 1949; and the infant-mortality rate had fallen from 53 per 1000 related live births in 1938 to 32 per 1000 in 1949. Maternal mortality—3·24 per 1000 total births in 1938—was 0·98 per 1000 in 1949.

In 1949 diphtheria deaths numbered 85 and notifications 1897, compared with 2861 deaths and 65,008 notifications in 1938. If the immunisation campaign was to be assured of success, 75% of children under 1 year of age must be inoculated; and in 1949 the percentage was within 5 of this goal. With regard to smallpox, only some 16% of infants were vaccinated in 1949—about half the proportion vaccinated before the repeal of the Vaccination Acts. From recent evidence it looked as if preventive inoculation at the height of a poliomyelitis epidemic might precipitate paralytic poliomyelitis; but there was no cause for undue concern, and the diphtheria immunisation campaign would continue.

Last year some 6300 cases of food-poisoning were notified. Sir Wilson attributed the increase in recent years partly to the more prevalent habit of eating in canteens; and he urged that those preparing food should have clean hands, and that cooked food which was not to be used until the next day should be rapidly cooled and placed in a refrigerator. As to pulmonary tuberculosis, he hoped that quite a number of cases would be treated in special wards of general hospitals.

elderly people requiring care and attention.—Mr. HECTOR McNEIL: I have no precise information on this subject but I certainly share my hon. Friend's anxiety that proper care and accommodation should be available for old people. Within the material and financial limits imposed by the present economic situation, hospitals and local authorities are doing all they can to meet this need. Mrs. MANN: Is the Minister aware that the medical profession are gravely perturbed at the number of old people who are merely senile and yet have to be certified as lunatics? Would he consider introducing some such certification as "aged and infirm"? Mr. McNEIL: While I think that rather odd things are happening, I have no precise information, and I have been offered none which would warrant the assumption made by my hon. Friend. However, on the second point, I certainly think there is a good case for considering some other description than that of certification, and I am looking closely at the point.

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Letters to the Editor

THE REGISTRAR'S FUTURE

SIR,—The Colonial Service is not as obvious a solution of the problem of the senior registrar in the thirties as Mr. Mitchiner suggests in his letter of May 6.

Firstly, there is a great deal to be learned about the country, the people, and the diseases of any tropical colony before a man becomes a useful medical officer or is fit to be any kind of specialist therein, as the R.A.M.C. found to its cost during the wars. At least two or three years of general duties is necessary for this. Secondly, the retiring age is relatively early, and he will have to start life again in the late forties or early fifties, with only a very small pension and no hope at all of finding a post in the U.K. where he can practise his specialty.

Even if he decides that he might tolerate general practice, this has in effect been closed to him by the advent of the N.H.S. The B.M.A. has admitted that its bureau has great difficulty in placing men over 40. Some time ago, as a matter of interest, I wrote to an executive council that advertised a vacancy, asking if it was likely that an application from a retired colonial medical officer would be considered. The reply was No; it was experience in general practice that was taken into account when recommending appointments.

Certainly the actual work in most branches of the Colonial Service is as interesting and colourful as anything could be, though a great strain; that it has failed to attract is directly due to Colonial Office mismanagement. But I should advise anyone who does join to get in as young as he can, and not more than three years after qualification.

Bristol. G. L. ALEXANDER.

SIR,—Mr. Mitchiner's letter of May 6 makes depressing reading, but not entirely in the sense that he intended. It is distressing to find one who has risen to the top of the tree in his profession, presumably not without struggle, counselling caution and the easier path to his juniors. Of course the prospect for professional advancement in this country in the immediate future is not rosy—no-one knows that better than we registrars ourselves. I doubt, however, if it has ever been particularly certain. In the natural sequence of events some of us will attain our ambitions in a specialty and the majority will turn to some other sphere, but that is no reason for raising the bogy of "competition" in an attempt to discourage at this late stage those who decided years ago on the course they would pursue. The creation of a vast number of registrar posts—some feel in order to obtain cheap quasi-consultant labour—has only aggravated the perennial state of competition, not created a new problem. There are still those who hold that competition brings out the best: surely what we need in this country now.

What are Mr. Mitchiner's alternatives? The Services? Six and a half years' service during the late war showed me enough of Service medicine from the inside to convince me that nothing short of another war would ever persuade me to expose myself to such a stultifying experience again. The "serious shortage of specialists of many sorts in the medical services of the Fighting Forces," which Mr. Mitchiner holds out as an inducement to join, is merely an indication that many others share this opinion. The Colonial Medical Service? A few minutes' conversation with one of its members, and a perusal of correspondence on the subject in the medical press during the last year or so, will be enough to dissuade anyone whose ambition it is to practise his profession to the best of his ability. Overseas university and university college posts? Delightful, but how many are there? The numbers advertised during the last year amount to a handful. In addition there are the problems—also present in the two foregoing examples—of separation from one's family and adequate schooling for one's children abroad.

No—the race is not always to the swift, nor the battle to the strong, and I hope that such of my fellow registrars (and competitors) who believe they have it in them to succeed will stick it out and disregard both well-meant advice and subtle attempts to evade the results of faulty planning in the past. Presumably all hope for our profession in this country has not come to a full stop in 1950.

Beaconsfield, Bucks. M. C. T. REILLY.

CHRONIC SKIN ULCERATION

SIR,—I am sure that Mr. Troensegaard-Hansen will forgive me if I criticise the form of treatment he describes in your issue of May 6.

First of all, he states that amniotic membrane possesses some specific healing power and that it is used to close dural defects. It is indeed used for this purpose, but not because of its healing power, but purely (so I gather from neurosurgeons) to prevent adhesions of the brain to the overlying bone. Then he goes on to say: "This stimulation of fibrous-tissue growth, combined with my own observations on epithelial repair, convinced me that amnion was an ideal covering for chronic skin ulcers." Surely there is far too much fibrous tissue in and around leg ulcers which already prevents epithelisation and healing. The amniotic membrane is boiled for seven minutes before use. Surely the boiling will kill any epithelising properties that the amniotic graft may have had?

I notice that Mr. Troensegaard-Hansen says the patient is admitted to hospital, and the ulcer is scraped with a Volkmann's spoon under a general anæsthetic. We all know that many of these ulcer cases can be cured by putting the patient (and the ulcer) to bed. But how many of these patients can we admit to hospital these days when beds are scarce? And again, how many of the patients who are working housewives are willing, or even able, to take time off to come into hospital or even to rest at home for ten weeks, as Mr. Troensegaard-Hansen advises?

Most surgeons agree that in many of these cases, even when a skin graft is applied to the ulcer, ulceration quite often recurs; and this is not surprising since the underlying causes of the ulceration are still present. It follows, therefore, that these cases must be re-examined regularly.

For many years I have treated the more intractable cases by what I call the "darn" graft. This treatment, which requires no hospitalisation, consists in darning whole-thickness skin in and out through the granulations of the ulcer.

The ulcer area is sterilised one week before by the application of streptomycin compresses.

The strips of skin for grafting are taken from the patient's thigh, which has been infiltrated with procaine and adrenaline. The strips of skin, which are roughly 5 mm. wide, are cut to the length required with a sharp scalpel; as many grafts as are required are cut. These grafts are raised from the underlying fat by means of short sharp-pointed scissors, such as are used in plastic surgery. After the grafts are cut, the defect in the thigh is made good by stitching the skin edges together. Each piece of skin is now tied at one end to a piece of fine thread, the other end of which is threaded through a small curved needle.

The grafts are now darned in and out through the ulcer bed from one side of the ulcer to the other. In this way the area becomes covered with skin-strips, some part of the strips lying on the granulation surface and some being buried beneath the surface. The area is dusted over lightly with penicillin powder: tulle gras, or, as I prefer, 'Uro-sulphonet' (Dalmas), is applied, then gauze, and finally elastic adhesive bandage.

In the tiny kitchen which adjoined the dining-room a plump and overheated chef was tumbling dismembered cockerels into a huge casserole of wine. Vats of aromatic bouillon simmered nearby. At the solitary table littered with a mélange of vegetables, cheeses, cutlets of meat, fruit, flagons of wine and oil, and bowls of fresh creamy butter, besides a wealth of garnitures, two assistants were seated leisurely enjoying "saucisson en croûte"; another was slicing mushrooms. Outside in the garden and in the glare of the sun we searched for that which was not to be found, and climbing the short outside staircase washed in turn at a small wall fountain. Cheerful and neatly dressed maids hurried past us with bowls of "salade mimosa" for a party of tourists relegated to the barn. As we filed once more through the kitchen the grinning chef was decanting "double-crême" into a cauldron of tiny young peas, while Madame was filling carafes and even teapots with water for her dehydrated guests.

Communications at the congress may have been limited to three minutes each, but these worthy folk do not hurry over their meals. There is some advantage in this, for it does allow one to keep up to date. We began our apéritif at 13.53, reached the "filet de bœuf Pêrigueux aux sarments" (first helping, and the signal for the opening of the "Domaine de la grand-cour") at 15.18 and the "chabichon" at 16.25. Then during one of many intervals in which the most good-natured of overworked women washed stacks of dishes, we listened to speeches, drank to the ladies of France, and sang the Belgian, British, and French national anthems. The "bombe maison," which melted quickly in the heat of the crowded room, arrived at 17.12, while "les corbeilles de fruit" and café were finally dispatched at 17.44.

On the way back, faithful to our calling, we visited the Musée Ramet at Moulin à Vent, and displayed lively interest in the parasitology of grapes. It was with some relief that we learnt on sampling the wine, served appropriately on upturned barrels in the courtyard at the personal invitation of "le propriétaire du crû," that disease had been effectively eradicated.

To make doubly sure, we called at the Château Pizay, by which time it was already twilight. As we drove up the avenue of lopped "platanes" we admired the noble proportions of the castle with its steep blue-grey tiled roof and the stately chapel of marble which flanked the forecourt. Here, behind a massive iron gateway, sat a fearsome Alsatian proudly teaching her pup to guard the entrance to "les caves." Lights shone from a few of the principal rooms, but one by one the shutters were being drawn. In the walled garden a nightingale sang as we admired the skill of the topiarist and the beauty of a tamarisk tree. In this delightful setting we were to learn the importance of temperature control and of skilled handling for the maturation of wine. Still thirsting for scientific knowledge, we tested the red Morgon, the white, and also the château-bottled.

Your reporter's last impression of this memorable and varied congress is of devoted colleagues standing under a solitary cobwebbed light in the coolth of an endless vault with its vista of casks arranged on the sandy floor. With glasses at the ready, their eyes were fixed on a vintner who, with the aid of a ladder, was silhouetted surmounting a particularly large barrel. In his hand he held an ingenious pipette with which he removed, at the instigation of "M. le régisseur du château," generous samples for the favour of our opinion. Seldom had our scientific training stood us in such good stead.

* * *

I had never attended the Nurses' Prizegiving and I accepted Matron's kind invitation rather doubtfully. However, the whole affair proved most enjoyable. Stiffness and starchiness were only apparent in the nurses' uniforms, and my word!—what stiffness and what starchiness! I thought my shirt was white (*pace* Messrs. Persil) but it looked grey against that dazzling sea of starch.

The proceedings were held in the pathology museum, and most of the specimens were tactfully hidden from view, though one elderly woman hardly suppressed a scream when she saw a hairy teratoma gnashing its single tooth at her. A paraphrase, well sung by the nurses but not quite so well by the audience, set the ball rolling. We were not provided with the words, and I suspect that at least one member of the platform party sang the agenda. Nevertheless, most of us put up a fair show and were not led astray by our hearty E.N.T. colleague booming out verse 4 during verse 3 and then proclaiming a loud amen with one verse still to come....

The Chairman briefly introduced the lady who was to present the awards, and soon a miscellany of bright nurses were receiving medals, books, and certificates. It was a pleasure to see a really bonny lass receive the gold medal. At school one so often saw grim creatures with bloodshot eyes and pale bulbous foreheads creep on to the platform to receive their prize, before tottering off to a sanatorium or being led gently away to a psychiatrist. When the gracious lady had presented the last uplifting tome she was given a beautiful bouquet, and after sundry votes of thanks the meeting closed with a photograph of Matron sitting proudly amid the successful nurses and the platform party. The company then adjourned for tea, which was enjoyed by all, except perhaps the woman who had seen the teratoma.

* * *

It's only a matter of weeks now before George, my psychologist friend, completes his paper on *Personality Traits as Revealed by Urine;* but what a long one it could have been if he'd spent a few more months as a G.P.! First there's the kind of bottle in which the specimen arrives—orange-juice containers from the antenatals, milk bottles from the housewife, and beer bottles from her husband, but with innumerable and no doubt revealing minor variations. My housekeeper has now accustomed herself to finding two or three pint bottles of urine on the doorstep in the morning and she no longer accuses the milkman of foul play. Then there are the additions, mostly accidental but some purposive; one purist added a few drops of 'Dettol,' "So that it wouldn't go bad, Doctor." And lastly the labels: my bank manager's, for instance, is marked "Private and Confidential"; and in that busy Christmas week how comforting it was to receive a specimen gaily decorated in festive paper and stamped "Do not open before December 25th."

A problem arose when my kindly publican patient slipped a paper-wrapped bottle into my hand on parting; my well-trained fingers immediately diagnosed it as a whisky bottle; but should I assume the best and thank him warmly, or the worst and say I'd let him know the result later? The only major disaster that has been caused by this sort of confusion in my experience was when I tested and marked n.a.d. the last few drops of my senior partner's priceless "Old Smuggler 1900" he had carelessly left on the hall table. He is now actively lobbying the Minister to supply special bottles for urine collection.

* * *

Hardly had poor Mr. Rank sunk back into his fauteuil with a sigh of relief after being found Not Guilty of causing juvenile crime (minority dissenting) than *Picture Post* bashed him for causing childhood neurosis. Still reeling under this he will have to face my forthcoming thesis. Our rapidly peripatetic coroner's pathologist (was the phrase "the quick and the dead" first used in this context?) tells me that he has had a lot of suicides by precipitation recently and asks the cause. That's obvious. It's all because of the Pictures. Without thought or research I quoted *The Red Shoes*, *The Astonished Heart*, and *Mine Own Executioner*, all of which suggest this way of ending one's troubles. If only the revival of *Mayerling* had lasted longer we would have had a change in suicidal fashion. When I elaborate this preliminary communication *The Lancet* shall have my article.

* * *

One of our patients on 'Antabus' treatment had a persistently uneventful reaction with the weekly test dose of brandy. With characteristic ingenuity he suggested that he should have the brandy every day and the tablets only on test days.

iberculosis, early diagnosis of meningitis is essential, nd that can only be achieved by routine weekly examination of the cerebrospinal fluid for the characteristic hanges, including the appearance of tubercle bacilli.

Department of Child Health,
University of Sheffield.

R. S. ILLINGWORTH
J. LORBER.

VITAMIN B_{12} DIURESIS

SIR,—In their letter last year[1] Dr. Barnard and Dr. Veitzner stated that single injections of 45–75 µg. of itamin B_{12} produced definite diuresis in 12 out of 16 ubjects. This was attributed to the cobalt contained n the vitamin.

We have failed to detect any diuresis after single njections of 40–60 µg. given to 4 patients. The first 2 patients were suffering from cirrhosis of the liver with noderate ascites; there was no evidence of renal disease ind they used to respond well to 'Mercuphylline' njections. The 3rd patient was also suffering from cirrhosis with ascites and macrocytic anæmia: the Wassermann reaction was positive, ++. He used to respond well to mercuphylline injections. The 4th was a boy, aged 14 years, who had chronic malaria and anæmia which responded to iron and antimalarial therapy. He had no evidence of renal disease. The results were as follows:

	Case 1	*Case 2*	*Case 3*	*Case 4*
Dose of vitamin B_{12} (µg)	40	40	60	40
Vol. of urine:				
In 24 hr. before B_{12} injections	550	1300	900	1250
In 24 hr. immediately after B_{12} injections ..	500	1620	550	1300
In 24 hr. on other days	500–550	1000–1800	700–1000	870

The urine of these patients was collected before and after the days of the test, and no appreciable change was found.

Royal Faculty of Medicine,
Bagdad.

M. A. JALILI.

ORIGIN OF PLACENTAL TROPHOBLAST

SIR,—This letter is designed as a critique of last year's article by Dr. Gordon.[2]

Dr. Gordon's article is to the uninitiated a carefully worked out and apparently scholarly argument in support of his theory that the trophoblast is derived from "the follicle cells that surround the ovum when it leaves the ovary." It is this very care with which his case has been made that makes the article dangerously deceptive. So few people have had first-hand experience with this special field of embryonic development that it seems to me rather likely that many may be led to give undue credence to Dr. Gordon's opinion, not realising that he gives absolutely no direct evidence in support of this biologically bizarre concept, and that he totally ignores very ample direct evidence that the trophoblast is a product of the embryo.

Dr. Gordon cites an impressive list of 103 references from which he gleans his "evidence." It is worth noticing that his name is not among these. Many of these articles have a bearing on the subject much less direct than Darwin's concatenation related in the old story of the failure of the clover-seed crop in a certain county due to the death of two old maids who kept numerous cats. In that case the chain of dependent influences leading from their cats, through the mice, the bumble bees, and finally to the pollination of the clover, is at least logical in theory. Yet among the articles he cites are dozens containing direct anatomical evidence for the origin of the trophoblast from the outer layer of the blastodermic vesicle. It is not necessary for me to cite individual papers or particular figures in support of this accepted developmental fact. It is enough to point out that early in the study of the phenomena of this period of development there was indeed some confusion, there being those (notably Hubrecht) who at that time held that the trophoblast was of maternal origin. As more information, both anatomical and experimental, accumulated, syncytia of maternal origin have been distinguished from the trophoblastic syncytium, and the whole matter has been cleared up. My own observations on a rather large amount of comparative material have in every case supported the embryonic origin of the trophoblast, and at this point I feel impelled to ask (as must many others of my scientific colleagues) by what system of thinking—it cannot be called logic—Gordon can justify pulling out of my publications, and of those of others, such as Heuser and Streeter, inconsequential and irrelevant details to be inflated by him beyond all reason, while at the same time he ignores the great mass of important and pertinent direct evidence for embryonic origin of the trophoblast.

Dr. Gordon's introductory paragraph states: "The purpose of this paper is to present for discussion and experiment an entirely unorthodox view of the origin of the main portion of the placental trophoblast—namely, that it is formed from the follicle cells that surround the ovum when it leaves the ovary." Gordon defines trophoblast as "the invasive element of many mammalian placentæ, including the cytotrophoblast of Langhans and the syncytium." He lists twelve lines of evidence which he himself characterises as "indirect," but nowhere presents the direct evidence for fœtal origin of the invasive trophoblast—evidence which is to be found abundantly in practically every description of implantation and placenta formation in any mammal which has an endotheliochorial or hemochorial form of placentation.

It is certainly not a productive scientific endeavour to spend time analysing Gordon's indirect "lines of evidence," but it may be necessary lest I be accused of ignoring Gordon's evidence in the same way that I have accused him of ignoring the evidence of "orthodox" embryologists. I shall proceed briefly to analyse his twelve points.

1. "The production by follicle and trophoblast of similar hormones." Œstrogens and gonadotrophins are obtainable from a wide variety of biologic sources completely unrelated to one another.

2. "The hydatidiform mole and the independence of the trophoblast." There is no conceivable reason why the trophoblast should not grow independently of the embryo, since it is the absorptive layer of the fœtal membranes.

3. "Chorionepithelioma and its independence of a fertilised ovum." There is just as much reason to believe that chorionepitheliomas arise "independent" of follicular epithelium as of an ovum. Their origin in most cases is a mystery. They occur also in the male.

4. "The ovarian reaction in hydatidiform mole and chorionepithelioma." Gordon seems to think that the high incidence of multiple ovarian lutein cysts indicates that the same stimulus is causing both lutein-cyst formation and the abnormal trophoblastic growth, and argues that this similarity of response indicates the common origin of cysts and trophoblastic tumour from follicular epithelium. This entirely unjustified assumption is characteristic of all of Gordon's arguments. A more probable relationship between the tumour and the ovarian cysts is that the latter are evidence of the secretion of gonadotrophins by the tumour. Gonadotrophins cannot be extracted from tumours, but can be recovered from cultures of trophoblast.

5. "The inherent property of granulosa cells to proliferate as tumorous tissue." Granulosa cells are essentially embryonic and proliferative in character and no more prone to hyperplasia than many other tissues. One might as well argue that trophoblast is derived from endometrial stroma because the latter proliferates.

6. "The phylogeny of the graafian follicle." Ericulus, an insectivorous mammal of the family Centetidæ, has been shown by Strauss to have a highly developed "invasive" trophoblast forming a discoid hemochorial placenta, yet its ovarian follicles have no cavities; in fact the sperm penetrate the

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1. Barnard, R. D., Weitzner, H. A. *Lancet*, 1949, ii, 717.
2. Gordon, I. *Ibid*, i, 807.

By this method the ulcer can be skin-grafted in such a way that the graft cannot slip or move about while the patient is ambulatory. This technique is quite simple, does not require a general anæsthetic and hospitalisation, and—most important—allows the patient to carry on with her household duties. However, as I have already suggested, this technique should not be applied in all cases. The vast majority of ulcers will heal with conservative and medical treatment when attention is paid to the underlying causes.

Varicose Vein Clinic, Prince of Wales's Hospital, London, N.15. MAURICE LEE.

ALBUMIN-ACTIVE ANTISERA IN RHESUS TYPING

SIR,—I feel that Dr. Stirk's article last week calls for some comment. The burden of his contribution would seem to be that he regards it as unnecessary to define the nature of the antibody present in his grouping serum, or to absorb out the anti-A or anti-B agglutinins. In support of these contentions he cites reasonable agreement of his distribution of positive and negative reactors in a "population" of 206 with the known incidence of D and d.

The use of incomplete anti-Rh sera for routine grouping is now accepted as standard practice in most laboratories which perform this work on a large scale. Dr. Stirk's methods, rather than economising in serum, would appear to do the reverse in so far as the quantity of blood he removes from his donors is very small and the use of two sera for each test doubles the quantity used.

The shortage of anti-Rh serum of any type is severe enough to make essential the most efficient use of all the available material. This can only be done by removing a generous quantity from the donor, replacing it if necessary by a transfusion of homologous blood; by accurately identifying the antibody; and by careful absorption of anti-A or anti-B with the appropriate cells.

As an example of what may be done in this direction, this laboratory, in addition to being self-sufficient for all grouping serum, has in the past year supplied the Regional Blood Transfusion Service with several hundred ml. of each anti-C, anti-E, and anti-c. Our consumption of serum is heavy, involving the performance of an average of over six thousand tests per year and the supplying of serum to three subsidiary laboratories. The area which we serve has approximately the same population as the Wolverhampton group—i.e., 500,000.

Portsmouth and Isle of Wight Area Pathological Service, Portsmouth. A. RICHARDSON-JONES.

CONGENITAL ŒSOPHAGEAL ATRESIA

SIR,—Dr. Donnelly, in his article of April 8, paints an unnecessarily gloomy picture of the prognosis in congenital atresia of the œsophagus with tracheo-œsophageal fistula.

I have recently reported on 8 cases, with 2 completely successful results [1]; and since my article went to press Mr. David Adler, the thoracic surgeon, has seen 4 more cases in Johannesburg. Of these further 4, 1 was not thought suitable for operation owing to other congenital abnormalities. Another had been given barium by a radiologist and, having severe bronchopneumonia, was a very bad risk; operation was performed but the child survived for only eight hours. The remaining 2 were successfully operated on, and left hospital feeding normally.

These results are very encouraging, and a review of the American literature is even more so. Dr. Donnelly, I think, gives a false impression of the best American views on the subject. He states that Ladd and Swenson [2] favoured the multiple-stage operation. Yet Swenson [3] reports that of 20 cases, 15 were treated by primary œsophageal anastomosis with 14 successes; the remaining 5, in which the patent portions of the œsophagus were too far apart to allow the ideal of direct anastomosis to be achieved, were as a second-best measure treated by multiple-stage operations, only 2 surviving.

Dr. Donnelly does not mention the type of anæsthesia in his series. I am convinced—and so apparently is Swenson—that general anæsthesia with cyclopropane gives the best operating conditions and the best chances of successful operation, and therefore of survival.

Both Dr. Donnelly and I plead in our articles for early diagnosis, but I feel that such a plea is only likely to receive the attention it deserves if the general practitioners and midwives who must make this early diagnosis, are convinced, as I am, that the prognosis is far from exceedingly bad.

Johannesburg, South Africa. F. W. ROBERTS

STREPTOMYCIN IN ACUTE MILIARY TUBERCULOSIS

SIR,—Two points raised in the Medical Research Council's report, published in your issue of May 6, are in notable contrast to our findings in Sheffield. They concern the significance and incidence of choroidal tubercles and the prognosis in children under two years of age.

The report states: "there is no record of choroidal tubercles having been seen in any of these cases on admission." They were found subsequently in 5 out of 25 cases (20%). Choroidal tubercles were found in 13 of our 22 cases (59%), and they were seen on admission in all those who subsequently developed meningitis.

On the basis of findings in 5 cases, the report regards the finding of choroidal tubercles as a danger signal that meningitis is likely to develop. In our series of 22 cases, choroidal tubercles were found on admission in 7 out of 11 of those who later developed meningitis and in 6 of the 11 who did not subsequently develop it.

We would add that in our series of 175 cases with miliary and/or meningeal tuberculosis in no case have we found choroidal tubercles in meningitis without miliary tuberculosis, when proper search was made for miliary spread by histological examination.[1] Bernard et al.[2] made the same observation. The finding of choroidal tubercles in a case of meningitis is, therefore, taken by us to denote miliary spread whether or not the radiograph of the chest shows it. In the one case of uncomplicated meningitis previously described by us[3] in which choroidal tubercles were found, it was subsequently shown by further histological examination that miliary tuberculosis was in fact present.

In no case have we been able to observe the disappearance of choroidal tubercles. One of the case-reports (case 23) in the M.R.C. series implies that this may occur, by saying that "choroidal tubercles were still present."

The second point in which our findings differ from those of this series is the prognosis in children under two years of age. All 3 of the Medical Research Council's cases died. Of our cases, 12 fell into this age-group. 6 developed meningitis, and 4 of these are alive after 30, 28, 24, and 11 months of observation. 6 did not develop meningitis, and 5 of these are alive after 30, 26, 23, 21, and 5 months of observation. We think that this is important, because there are still many who believe that the prognosis in the younger age-group is almost hopeless.

We feel strongly that if good results are to be obtained in meningitis developing during the course of miliary

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1. Roberts, F. W. *S. Afr. med. J.* 1950, 24, 167.
2. Ladd, W. E., Swenson, O. *Ann. Surg.* 1947, 125, 23.
3. Swenson, O. *Surgery*, 1947, 22, 324.

1. Emery, J. L., Lorber, J. (in the press).
2. Bernard, E., Kreis, B., Lotte, A., Paley, P. Y., Mantoux, G. *Sem. Hôp. Paris*, 1949, 25, 2087.
3. Illingworth, R. S., Wright, T. *Brit. med. J.* 1948, ii, 365.

BLOOD DESTRUCTION AND CEREBRAL DAMAGE IN HÆMOLYTIC DISEASE OF THE NEWBORN

SIR,—Discussing exchange transfusion in hæmolytic disease of the newborn, Mollison and Cutbush[1] wrote:

> "Thus at first sight it seems likely that the only way in which the value of exchange transfusion could be proved decisively would be by applying it to alternate cases in competition with, for example, simple transfusion. . . . It may not be necessary to attempt statistical proof if further evidence can be collected to show that the tissue damage in hæmolytic disease is in some way related to blood destruction . . ."

We believe we have succeeded in getting this proof, at least as regards cerebral damage.

It was postulated that in kernicterus the yellow discoloration of the ganglion cells is a secondary effect, because bilirubin is said to enter ganglion cells only if they are already damaged. However, Goldmann[2] showed that ganglion cells are not impenetrable by dyes but are protected against such penetration by the retention of dyes in the endothelial cells of the cerebral vessels, which are the only blood-vessels possessing this power. Trypan-blue, even in high concentration, does not penetrate from the blood-stream into the nerve tissue. The intrathecal injection of the same stain, however, causes symptoms of serious irritation and discoloration of the nerve-cells near the surface of the brain. These investigations have been repeated and confirmed by Spatz,[3] who is convinced that bilirubin acts in exactly the same way.

In hæmolytic disease of the newborn there is capillary damage, which is extreme in fœtal hydrops, and in most cases of icterus gravis slight œdema can also be found. Cerebral œdema is always present in kernicterus.[4] Therefore the endothelial cells of the cerebral capillaries cannot fulfil their protective function completely. In this way bilirubin can penetrate from the blood-stream into the nerve tissue in icterus gravis. In congenital atresia of the bile-ducts the endothelial cells are intact and bilirubin cannot leave the blood-stream and penetrate into the brain. The question arises whether bilirubin is harmful to nerve tissue or not.

We brought bilirubin into contact with living nerve tissue and noted the results. The injection of a highly concentrated solution of bilirubin into the carotid arteries of rabbits did not cause a yellow discoloration of the brain; this confirmed the results of Goldmann[2] and Spatz.[3] However, a cerebral icterus can be caused by an infusion into the carotid artery lasting about 30 minutes, as follows:

Rabbit no.	*Infusion* *	*Fate of rabbit*	*Cerebral icterus*
1	5% glucose	Survived	–
2	Bilirubin (40 mg. per 100 ml.)	,,	–
3	,, (60 ,, ,, ,,)	,,	–
4	,, (75 ,, ,, ,,) and histamine	,,	–
5	Bilirubin (75 mg. per 100 ml.) and histamine	Died in 4 hr.	++
6	Bilirubin (100 mg. per 100 ml.)	Survived	–
7	,, (100 ,, ,, ,,)	,,	Trace
8	,, (100 ,, ,, ,,)	Died in 3 hr.	++
9	,, (125 ,, ,, ,,)	Died shortly after infusion	+++
10	,, (150 ,, ,, ,,)	Died at end of infusion	+++
11	,, (150 ,, ,, ,,)	Died at end of infusion	+++
12	,, (150 ,, ,, ,,)	Died at end of infusion	++++

* The amount of the infusion was 60 ml. per kg. of body-weight in rabbit no. 5. In all the other rabbits the amount was 40 ml. per kg. Bilirubin was given in 5% glucose.

It will be seen that a very high concentration of bilirubin was needed to produce cerebral icterus in these experiments, but in naturally occurring icterus gravis there may be as much as 40 mg. of bilirubin per 100 ml. passing through the brain for days (not for only 30 minutes as in our experiments). In addition to this is the capillary lesion, the cause of which is not exactly known. Our experiments suggest that the penetration of bilirubin into the nerve tissue must have disastrous consequences in the human body also; thus the bad prognosis of kernicterus is completely explained. Direct cerebral damage by the antigen, or the effects of liver toxins on the brain, however, are not ruled out by our results; but there is no need to invoke them in order to explain the cerebral damage in kernicterus.

The conclusion to be drawn as regards therapy is that early exchange transfusion should be given in all severe cases of icterus gravis, without testing its efficacy by giving it only in alternate cases, since it is unnecessary to prove its effect in this way. Only by exchange transfusion can hæmolysis be stopped to any great extent, and the accumulation of end-products of hæmolysis be prevented. Mollison and Cutbush[5] have published a method of assessing the severity of a case of hæmolytic disease of the newborn and so determining whether an exchange transfusion is necessary or not.

Pædiatric Hospital,
Medical Academy of Düsseldorf.
F. KÜSTER
H. KRINGS.

THE VOLE

SIR,—The lower orders do not often have the opportunity of reading THE LANCET. Our conditions of life are all against easy access to the medical journals. I am in an exceptional position owing to the courtesy of a man friend of mine who is himself smarting under the insult of having his photograph taken by a foreign journalist who was so misguided as to think his initials were H. G.

There appears on p. 797 of your issue of April 29 a libellous photograph of me. The libel attaches not to the compromising attitude in which the photograph was taken, but to the fact that it is an excellent likeness of *Sorex araneus*—the shrew. Now Sorex is a low fellow, no relation of mine and wholly undeserving of any mention in the medical press, whereas my social and academic distinction is well known to many of your readers—and I hoped to your good self. I should be obliged if you will make a public apology as soon as possible.

MICROTUS AGRESTIS.

P.A.S.

SIR,—I have read the letter of May 6 by Dr. Carstensen and Dr. Andersen with great interest, not only because the observations reported are important to the use of *p*-aminosalicylic acid (P.A.S.) in tuberculosis, but also because they confirm observations on a small number of cases reported to the Tuberculosis Society of Scotland in January, 1949.[6]

At that time only 9 patients had been observed who had completed three months' treatment with P.A.S. I stated that in my comparatively limited experience, maximum benefit was usually obtained after about four weeks, and that 4 of the patients began to show evidence of deterioration after ten weeks' treatment. At the suggestion of Prof. Charles Cameron, the number of bacilli in direct smears and the rate of growth of sputum cultures on Loewenstein-Jensen medium was recorded. 5 cases became negative, even on cultural examination, at some stage during treatment. In 1 instance —a case of chronic disseminating tuberculosis—the sputum remained negative for sixteen weeks, after which I lost trace of the patient. In the other 4 cases the sputum became negative on culture—at the fifth week in 3 cases, and at the tenth week in the other—but became positive again at ten,

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1. Mollison, P. L., Cutbush, M. *Lancet*, 1948, ii, 522.
2. Goldmann, E. *Abh. preuss. Akad. Wiss.* 1913, 1, 1.
3. Spatz, H. *Arch. Psychiat.* 1933, 101, 267.
4. Zollinger, H. U. *Helv. med. Acta*, suppl. no. 2, p. 805.
5. Mollison, P. L., Cutbush, M. *Brit. med. J.* 1949, i, 123.
6. Horne, N. W. *Edinb. med. J.* 1949, 56, 239.

ovarian tissues and the eggs are fertilised within the follicles. The pronuclear stage of the eggs is shed into the oviduct by gradual dispersion of the overlying follicle cells, and there is no remaining corona radiata to furnish the germ of the trophoblast according to Gordon's theory.

7. "The analogy of the functions of the follicle cells and the trophoblast." Gordon's contention here is that since the follicular epithelium functions as the nutritive membrane for the ovarian ovum, why should it not have been utilised as the nutritive membrane for the uterine embryo? By the same reasoning it would make just as much sense to argue that the mammary epithelium is derived from trophoblast.

8. "Ontogeny and phylogeny." Probably Gordon's confusion here results from separating in his mind the entity of trophoblast from that of chorionic ectoderm. Hubrecht was confused on this point. All available evidence (and there is much more than Hubrecht had forty years ago, or than Gordon seems aware of at present) shows that the trophoblast is the outer layer of the blastocyst and chorionic vesicle. Calling the outer layer of the blastocyst and the chorionic vesicle before invasive properties appear in it "chorionic ectoderm," and after invasiveness occurs "trophoblast," is quite all right if one feels anything in the way of understanding is gained by so doing. However, this should never be promoted to the point that beginning students or other inexperienced people forget that the invasive chorionic ectoderm or trophoblast is derived from the non-invasive type, and that in most cases the two are directly continuous with each other at the placental margins, where indeed all transitional stages between the two conditions can be seen by anyone who cares to look.

9. "The histological dissimilarity of the cytotrophoblast and the chorionic epithelium in man." There is considerable difference between the cells of the various layers of the epidermis, yet this is not thought of as evidence that they have different origins.

10. "The similarity of granulosa cells and cytotrophoblast in culture." This argument of similarity of granulosa and trophoblast cells is too flimsy to warrant more than pointing out that there is much more similarity in appearance between syncytial trophoblast and syncytia formed from the uterine epithelium than there is between granulosa and trophoblast cells.

11. "The unusual placenta of the hyracoidea." Perhaps if Gordon had read Wislocki's 1940 paper on the placenta of Hyrax he would have been less impressed by the tendency of the mesoderm to separate from the trophoblast.

12. "The transplantation of tissues and the evidence of blood-groups." Gordon believes that if the trophoblast were of fœtal origin instead of maternal it should set up an immune body reaction with the mother or host tissues. To this one can ask, what difference would it make whether the fœtal-maternal contact takes place at the trophoblast-decidua level or at the mesoderm-trophoblast level if the trophoblast really were maternal tissue? We just do not know enough about these antigen-antibody reactions in the complex situations arising in placental development to use them as evidence in such a matter.

In a section entitled "The Mechanism" Gordon purports "*to consider the observed facts* of the fate of cumulus cells and ovum in tube and uterus." These "facts" seem to add up to the following: cumulus cells are observed to fall away from the egg in the tube, but the descriptions of this falling away have in his opinion been "much exaggerated." The rest of this section is both irrelevant and conjectural. In fact even the one statement of relevant fact above, is presumptive also.

The inadequacy of the evidence for Gordon's hypothesis is emphasised by the nature of the items which he has attempted to marshal in support of it, such as Heuser and Streeter's "slipped nuclei" and my own admittedly highly theoretical suppositions regarding the evolution of the ungulate type of epitheliochorial placenta. In another section entitled "Deductions, Placental Gonadotrophin" Gordon builds up what might be called a pseudo-rationale of treatment of reproductive dysfunctions, &c., based on his assumption of follicular origin of trophoblast and endometrial origin of placental gonadotrophin. Also he postulates infertility due to failure of egg and follicle cells to reunite. It is certainly a waste of many things to carry such flights of imagination into print without even a sound major premise.

Some of the experiments suggested to test this hypothesis would be perhaps interesting and valuable, but certainly would not disprove the often observed fact of the fœtal origin of the trophoblast. There is no dearth of problems for research on the biology both of the trophoblast and of the follicular epithelium. One might point out the value of one established fact, such as the fœtal origin of the trophoblast, in contrast with an armchair "research" such as the article just reviewed, which has wasted much of both your time and mine.

Department of Anatomy,
University of Wisconsin.

H. W. MOSSMAN
Associate Professor of Anatomy.

TUBERCULOSIS

SIR,—I take it that Dr. Reade, in his letter last week, is suggesting segregation of the open case of tuberculosis. Does he propose to use for this purpose our already inadequate quota of beds, or does he advocate the provision of special institutions? These unfortunate cases certainly present a most serious problem, but instead of demanding compulsory segregation we should rather devote our efforts to earlier diagnosis and to the eradication of sanatorium waiting-lists: these measures will ultimately do away with the problem of the open case.

B. G. RIGDEN
Chest Physician.

Chest Clinic,
Lewes, Sussex.

HYPOTHERMIA WITH CHLORAMPHENICOL

SIR,—Squadron-Leader Briggs, in your issue of Jan. 21, described a case of typhoid fever in which, on the 5th day of treatment with chloramphenicol, the temperature fell to 95°F; the patient complained of feeling cold, and a coarse tremor of the hands and legs appeared. This observation prompts me to record my own experience of this curious phenomenon.

I was called in to see a Hindu man, aged 24, who had recently arrived from India and who gave a history of severe headache and pain in the back with continuous fever for the past week. He had been inoculated with T.A.B. vaccine about a year before.

The patient looked toxic; his temperature was 103°F. He had a dicrotic pulse with a rate of 100 per min. Blood-pressure 120/70 mm. Hg. His tongue was coated. The spleen was just palpable. Rose spots were clearly discernible on his abdomen and chest. Occasional rhonchi were heard on both sides of the chest.

Typhoid fever was diagnosed clinically. Blood was taken for a Widal reaction; and this proved positive against *Salmonella typhi* (*O* 1/500 and *H* 1/50).

Treatment was commenced with chloramphenicol. An initial dose of 1 g. was followed by 0·25 g. 2-hourly. For 72 hours the temperature remained above 103°F; it then started to fall gradually, and 80 hours after the start of treatment it was 100·5°F. The patient's general condition improved considerably during this period, and the toxæmia was much less.

Then, 90 hours after the start of treatment, the temperature suddenly dropped to 94·5°F; the patient became very restless and complained of a chilly sensation. The patient looked anxious; he was not sweating, and his pulse was of good volume (the rate being 80 per min.); blood-pressure 115/70 mm. Hg. No tremor was detected.

Chloramphenicol was stopped immediately. The patient's condition gradually improved, and within the next few hours the temperature gradually rose to 98°F, and the symptoms slowly disappeared. No more chloramphenicol was administered. From then on, the temperature remained within normal limits and the patient made an uneventful and complete recovery.

Further observations will be required to ascertain whether hypothermia of this sort is a toxic effect of the drug, and, if so, what effect it has on the general course of the disease.

Nairobi, Kenya.

B. P. ARYA.

SOME LIMITATIONS OF PSYCHIATRY

SIR,—This correspondence has been interesting. In his letter last week Dr. Watts says: "Dr. Haldane is biased by the type of material he is seeing, and he is obviously not acquainted with psychiatry at general-practice level," where cases are seen in their early stages.

It seems to me that there is much truth in this judgment, which requires the establishment of "an intelligent relationship between the general and psychological physician." The truth is that the psychological physicians do not make any such relationship easy. Some of them hide behind an obscurantist screen: "if you haven't had three years' analysis you can't understand this patient." Others put their trust in machines: "Ah! we will give him E.C.T., and if this does not cure him he is incurable." No wonder that G.P.s are wont to say that they know nothing about psychiatry. It discourages the early approach that the ideal G.P. would make to the patient. That is to say, he would take matters in hand when the patient's anorexia begins to show itself; he would take an interest in the only son who is being spoiled by his mother; he would interest himself in the girl with a bad heredity who was distressing her parents by unsuitable friendships; he would concern himself with the youth who refused to take a job offered him; and he would realise that a lad of 18 with a constant nasal discharge is liable to be a life-long neurasthenic or even schizophrenic.

In conclusion, my submission is that as long as psychiatrists show so little practical interest in early and synergic ætiology, so long will the G.P.s feel justified in ignoring these early factors in a full-blown psychosis.

Harrow-on-the-Hill. H. CRICHTON-MILLER.

SIR,—In my article of April 29 I appear to have misled readers by my use of the word "placebo." Seemingly to a physician the term connotes a medicine of no therapeutic value, whereas I, as a psychiatrist, regard a properly used placebo as of real, though strictly limited, usefulness. I characterised as a "psychiatric placebo" the procedure of simply assuring a patient that he has nothing physically amiss and that his bodily health is excellent, without attempting to seek out and deal with any underlying tensions.

In my summing up, I used the word "placebo" to indicate treatment that does not attempt some readjustment of character drives. This usage was injudicious and confusing, because what may be a mere placebo in one situation may be adequate treatment in another. An aspirin tablet may be a placebo of sorts in an attack of migraine, yet quite effective for an ordinary headache.

The boundaries of neurosis are ill-defined. Some of us are more, and some of us are less, neurotic. With most of us, under reasonably favourable environmental conditions our neurosis neither expresses itself in serious symptoms, nor leads to behaviour disastrous to ourselves or quite intolerable to those who have to live with us, nor seriously reduces our working capacity, nor completely robs us of the joy of life. A temporary worsening of conditions, may lead to the appearance or intensification of one or more of these effects of neurosis. It is chiefly when the effect takes the form of symptoms that a doctor is likely to be consulted. Then simple suppression of the symptoms is likely to be accompanied by intensification of some of these other effects. The whole may well return to its usual state as and when environmental conditions improve again. A minor degree of neurotic suffering from time to time is the life-long lot of many in our present culture.

The exacerbations of a not too severe neurosis may often be relieved by methods which produce no enduring change in the neurotic personality. Reassurance and persuasion, for example, accompanied by redirection of the patient's efforts and attention towards some of the immediate sources of his mental stress, may succeed, especially if he is able actively to improve his environmental situation. Treatment of this order should be within the scope of the general physician, and indeed I do not doubt that he may often do the job better than the psychiatric specialist. Nothing could be more at variance with my outlook than to regard such relief of suffering as "not worth while." This would indeed be an odd standpoint for any doctor. At the same time there are some cases where one feels it best to leave some symptoms undisturbed.

My main argument was that the radical treatment of a serious neurosis—i.e., treatment that must be provided by a highly trained specialist—is of a different nature, cannot be accomplished by a few talks, and requires much time, effort, and persistence as well as special skill and intricate understanding; that this is due to the nature of such disorders; and furthermore that there are many such sufferers at present to whom such treatment is not applicable, or who would require more than is now available, and for whom other methods at our disposal are not adequate.

As for my supposed pessimism, of the three cases quoted the first two were accepted for treatment. The over-optimistic attempt to draw the third into therapy failed. Direct removal of his symptom, had this been possible, might in this case quite possibly have precipitated a paranoid psychosis. I cannot regard as pessimism the recognition of the conditions necessary for the attainment of aims.

West Middlesex Hospital,
Isleworth.
F. P. HALDANE.

THE OPEN WOUND IN TRAUMA

SIR,—I would be grateful for some space to comment on Mr. Essex-Lopresti's assertion (April 22) that early closure of accidental wounds, including war wounds, is the main factor on which the success of treatment depends. He affirms that "conditions in the early years of the first world war . . . were such that primary closure was not attempted, and the dire consequences of grave infection were again evident. . . ." This is not exact. Primary suture had been attempted, and until it was abandoned results did not improve. The change in the surgeon's attitude was due to the recognition that it was wound excision and not primary suture which conditioned the future of the patient. Mr. Essex-Lopresti's belief is reasserted in stating that the publication in 1939 of my work on this subject encouraged the abandonment of the technique which had proved successful in the last two years of the first world war. In support of his views he mentions the American surgeon, Dr. Cleveland, who, in 1946, wrote that "the closed plaster technique of treatment of compound fractures . . . invites infection of bone and soft tissue and healing ensues slowly by second intention, with massive granulations which developed into scar tissue." Evidently both Dr. Cleveland and Mr. Essex-Lopresti refer to the Winnett Orr technique of wide drainage "to prevent the pus from accumulating" and to encourage granulation "from the bottom." Further, Mr. Essex-Lopresti attributes to my method the 10 cases of his series which became infected after being left open and also the 4 which developed septic complications after primary suture and were subsequently treated in the Winnett Orr way. All these cases—all failures—he graciously attributes to my technique.

His paper contains much that is good. I may mention at random, its emphasis on the importance of wound excision which, I am glad to know, does not now need detailed recapitulation "as it is so well known." *Also* twelve, fourteen, and fifteen weeks respectively, the patients still being under treatment. In 3 of the 4 cases where the sputum remained positive throughout, the number of tubercle bacilli per high-power field decreased progressively up to the eighth week and began to increase greatly at the tenth week. In all 4 cases the rate of growth of culture on Loewenstein-Jensen medium became steadily slower up to the eighth or tenth week, but by the fourteenth week had returned practically to the rate observed before treatment was started. Before treatment, growth was observed at 14, 18, 18, and 24 days in these cases, but at the eighth or tenth week no growth was observed until 61, 45, 112, and 70 days, respectively. I concluded that these observations suggested that P.A.S.-resistant organisms might be produced, or that the organisms had been trained into withstanding previously lethal doses of the drug.

The dosage (15 g. daily) was similar to that used by Dr. Carstensen and Dr. Andersen. In one case not previously reported, before treatment, growth was obtained 24 days after sowing the culture. At the eighth week of treatment the number of bacilli had fallen from 30 to 4 per high-power field, and no growth was obtained until 117 days after sowing the culture. Only three colonies were obtained, but the culture, when inoculated into a guineapig, produced gross disseminated tuberculosis. At the fifteenth week of treatment a luxuriant growth was obtained after 26 days.

Dr. Carstensen and Dr. Andersen add that the clinical course of the disease agrees in most instances with the sensitivity of the bacilli to P.A.S. If my observations on the change in the rate of growth of tubercle bacilli in patients treated with P.A.S., indicate the development of P.A.S.-resistance, my experience was similar. I look forward to a detailed report on this important aspect of treatment with P.A.S.

Department of Tuberculosis,
University of Edinburgh.
N. W. HORNE.

GENERAL PRACTICE

SIR,—All cures prescribed for the present ills of general practice (including that of Dr. Collings) urge that more partnerships and group practices, and the use of health centres, must be an early part of the treatment.

There are many general practitioners, however, who have deliberately chosen to work alone, not only by geographical circumstance but in towns and cities as well. These lone practitioners ranked high even in Dr. Collings's short survey of good and bad practices. There are always dangers in isolation, and perhaps in undue possessiveness of patients; but there are advantages too on both sides.

Patients have selected single practitioners just because of the near certainty of seeing the same doctor every time. This certainty can mean a great deal after the number of personalities and the variants of opinion and instruction experienced at hospitals.

The doctor may have the cumulative experience of three generations of many families seen in all their emergencies over a stretch of years; to many this outweighs the uncertainty of ever being really free from calls on their time.

Is a reasonably well-equipped consulting-room and waiting-room so inferior to accommodation in a glittering health centre of the future? Such practitioners often have strong attachments to their own premises, but surely the equipment needed is not so very elaborate and costly, nor so difficult in upkeep.

Single practitioners are rarely at their best in partnership; they often run a trifle uneasily in double harness. Independence and strong identification with patients may be a strength in isolation but a source of friction in partnership.

Is there not a risk that single-doctor practices with surgery accommodation in ordinary dwelling-houses may become slightly downgraded in the eyes of the public in the future? Given sufficient contacts with colleagues and with hospitals, such practitioners have by their very nature contributed much that is best in real family practice and can surely do so in the future too.

London, W.2.
ANNIS GILLIE.

SIR,—Research in general practice is hardly touched on in the Collings report, and it is indeed usually not regarded as a function of the general practitioner.

A little reflection will demonstrate the unwisdom of this view. As a general practitioner, I make about 10,000–12,000 visits and consultations each year, and allowing on the average three visits or consultations per illness I evidently see about 3500 illnesses yearly. In 1949, I referred to hospital for advice or treatment 178 patients—a figure which represents roughly 5% of all the illnesses I see—while the other 95% were dealt with entirely at the "general-practitioner level." The 95% is little spoken of in the medical literature, and comparatively little is known about this largest part of illness, since general practice, alone among the branches of medicine, is apparently absolved from the responsibility of carrying out research and advancing knowledge of the clinical material it deals with. The complaint so often heard, that general practice is just hack-work and the practitioner a glorified sorting officer, is due precisely to this lack of research activity, which is, or should be, part of the job.

The factors inhibiting the general practitioner from research work are many, and so strong that few have made much progress at it. This indeed is little to be wondered at, for it is a difficult discipline, without material incentive as things stand. Merit awards are not for the general practitioner, who, if successful at research, can only hope to increase his income by enlarging his practice at the expense of his limited research time. There is, of course, no reason to suppose that success or failure at research will lead to any substantial change in the size of a man's practice. That is determined by quite other considerations.

Lowestoft.
N. B. EASTWOOD.

SIR,—Dr. Pinsent's article last week focuses attention on one eminently practicable solution to the problem of the overworked general practitioner—i.e., to reinforce practitioners with nurses. If this proposal is to be successfully implemented, however, it is necessary to convince the public (including members of executive councils) of its value.

Arising out of a conference organised by the Royal College of Nursing in January, 1949, my authority put three proposals to the local executive council:

1. That general practitioners be given facilities for running antenatal clinics for their own patients on local-authority premises, and be given the services of a nurse at such clinics.
2. That facilities for minor surgery, with the necessary nursing help, be provided for general practitioners in local-authority clinics.
3. That health visitors be available to help general practitioners in their practice. (This envisaged duties such as Dr. Pinsent outlines in his article.)

The first two recommendations were approved by the executive council, but the third was disapproved, because the example cited was an unfortunate one—a measles epidemic when the practitioners would pay all first visits and the nurse might report progress in selected cases at subsequent visits. The principle of nurses to help overworked practitioners with visiting was therefore not accepted, but:

"We fall to rise—
Are baffled to fight better—
Sleep to wake."

Health Department,
York.
C. B. CRANE
Medical Officer of Health.

SOME LIMITATIONS OF PSYCHIATRY

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It seems to me that there is much truth in this judgment, which requires the establishment of "an intelligent relationship between the general and psychological physician." The truth is that the psychological physicians do not make any such relationship easy. Some of them hide behind an obscurantist screen: "if you haven't had three years' analysis you can't understand this patient." Others put their trust in machines: "Ah! we will give him E.C.T., and if this does not cure him he is incurable." No wonder that G.P.s are wont to say that they know nothing about psychiatry. It discourages the early approach that the ideal G.P. would make to the patient. That is to say, he would take matters in hand when the patient's anorexia begins to show itself; he would take an interest in the only son who is being spoiled by his mother; he would interest himself in the girl with a bad heredity who was distressing her parents by unsuitable friendships; he would concern himself with the youth who refused to take a job offered him; and he would realise that a lad of 18 with a constant nasal discharge is liable to be a life-long neurasthenic or even schizophrenic.

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West Middlesex Hospital,
Isleworth.   F. P. Haldane.

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His paper contains much that is good. I may mention at random, its emphasis on the importance of wound excision which, I am glad to know, does not now need detailed recapitulation "as it is so well known." Also excellent are those remarks referring to the abolition of dead spaces and prevention of post-traumatic œdema by external pressure which, he says, was re-learned during the last war. Mention is made, even if it is inadequate, of the importance of immobilisation with plaster, the shortness of the reference to it perhaps being due to Mr. Essex-Lopresti's conviction that recapitulation is also unnecessary on this point. I must congratulate him on his emphasis on the importance of elevation of the part to prevent œdema. I am pleased to be in his company on this point also.

But in some other respects his article does not seem to me to be so sound. No-one would make me believe that accidental wounds such as those due to street or war injuries are not contaminated on reaching Mr. Essex-Lopresti and become systematically infected when left open in one of the best centres for traumatic surgery in the country. If he is right, we also must admit that the streets of Oxford—where wounds are contaminated on admission to hospital—are dirtier than those of Birmingham, and I do not think this is likely.

Closure of the wound is an ideal towards which any method based on biological principles, as that I propagated before and during the war, must tend. But it can only be achieved when all the factors contributing to success are present. To consider that not to close a wound is to depart from the right road is not only unjustified but dangerous. At the time of my campaign against primary suture in war wounds I personally reduced the size of the wounds I treated by immediately closing that part of the wound which had not suffered muscular damage. I immediately sutured, whenever possible, all the wounds of joints and also lacerations. In respect of skin-grafting I can only say that the first case treated in this country by the "Trueta" method in 1939 had skin-grafts placed on the wound. But I must insist that in muscular wounds, and in compound fractures, immediate suture is bound to cause many disasters when performed by surgeons less experienced than Mr. Essex-Lopresti and in centres less efficient than the Birmingham Accident Hospital. He recognises that no primary suture should be done in any wound in which vitality of the tissues is not clearly assured. In muscular wounds and compound fractures, who can guarantee that every bit of devitalised tissue has been removed at operation? I must humbly confess that after more than twenty years of intensive experience in treating accidental wounds I still have doubts in many cases about the accuracy of my excision. Mr. Essex-Lopresti seems to be faced with the same difficulty, for he says that "from the practical point of view, however, the problem (of wound excision) is not so simple; at the time of operation it is often extremely difficult to decide what tissues are viable." That is the main reason for my fidelity to the "five points technique" which I propagated at the beginning of the war.

Now that we have placed the right emphasis on wound excision and on the method by which it must be done, and now that no-one refers to it as a "decontaminating procedure" or a method to remove "the wound track," and now that no-one performs the "cancer excision" of previous times, suture is becoming less dangerous for a greater number of surgeons. Moreover, penicillin has enhanced the scope and safety of its performance. But to dedicate a paper to proclaim the wonders of primary suture is, I am afraid, the first indication of what will happen if a new conflagration falls upon us. It is this influence of Mr. Essex-Lopresti's writing which I would like to counteract. As to the way in which he refers to my work, I prefer to forget it. Fourteen years of strife have dissipated what I had of personal pride.

Wingfield-Morris Orthopædic Hospital,
Oxford.

J. TRUETA.

Notes and News

WAR AND PEACE

THE opening of the third World Health Assembly in Geneva on May 8 was marked by an incisive address from Mr. Trygve Lie, secretary-general of the United Nations Calling for greater assistance to the underdeveloped areas, he said: "The supreme challenge of the second half of the twentieth century—and especially of the next twenty years —is not expressed in the ideological and power conflict that monopolises the headlines today. The supreme challenge is presented by that great majority of the population of the world—over 1600 million—whose poverty, hunger, and insecurity must be substantially remedied if they are not to result in new and disastrous upheavals. Most of the people live in the so-called underdeveloped areas of the world, mainly in Asia and Africa. They are moving rapidly towards political equality. They will no longer accept the grinding poverty that has been their fate for centuries. We cannot meet this challenge successfully at the snail's pace of today. We cannot meet it by halfway measures. We cannot postpone it until a more convenient time. The challenge is here and now. Bold and creative action on a world-wide scale is required in order to bring about real improvements in the living conditions of these 1600 million people—improvements that will begin to be evident within the next five years and will have as their goal the doubling of living standards within twenty years in many of the poorer areas of the world. There is only one possible way of achieving so great an objective in so short a time. That is to use to their fullest capacity the universal machinery, resources, and experience of the specialised agencies and the United Nations. We are not doing that today. Our expanded programme of technical assistance for economic development and social welfare is a step in the right direction. But the allocation by the member governments of a far greater proportion than at present of their available resources in brain-power and money will be necessary. A United Nations programme to raise living standards can and should be planned and carried out on a non-political basis. It can and should be planned and carried out for the benefit of each one of the member States, without regard for the 'cold war.' If our programme of technical assistance for economic development can be expanded and applied to meet needs wherever they exist, I believe they can also make a substantial contribution toward reducing the tensions of the cold war and enlarging the area of common ground. It should not be forgotten that the technical-assistance programme was adopted unanimously by the General Assembly of the United Nations. This is not a cold-war programme. It is a peace programme."

THE MEDICAL REGISTER

THE Medical Register for 1950 contains 78,140 names of doctors, an increase of 1848 on last year's total and 211 more than the highest number previously recorded (77,929 in 1947). The drop in 1948 was due mainly to the termination of 4467 temporary registrations, mostly foreign. The new registrations in 1949 numbered 3109, which is 859 less than in 1948 (the peak year) but still 56 above the average for the last ten years. The Commonwealth list has increased by 489 to 6570, and the foreign list by 102 to 1905.

The Register is published for the General Medical Council, 44, Hallam Street, London, W.1, by Constable & Co., 10, Orange Street, W.C.1. It is in two volumes and the price is 42*s*.

ACCOMMODATING THE RHEUMATIC

THE British Rheumatic Association is launching a scheme to convert a large block at St. Ann's, Buxton, to accommodate rheumatic patients. The scheme, which is being promoted by B.R.A. Homes Ltd., a housing society with charitable status, calls for the equipment of 60 amenity beds for those who cannot get urgently needed treatment in hospital but who can get it in Buxton as outpatients under the National Health Service Act. In addition, there will be 30 furnished flatlets for elderly disabled rheumatic sufferers needing nursing care. Inclusive charges for beds will range from 2 to 4 guineas and for flats from 4 to 6 guineas. Patients will be received from all parts of the country, but later it is hoped to open similar homes in each of the hospital regions. A total sum of about £50,000 is needed for the present scheme. Donations should be addressed to B.R.A. Homes Ltd., 5, Tite Street, London, S.W.3. Loan stock, bearing interest at 3% per annum, is also to be issued.

DEFINITION OF DRUGS

At the end of 1948 a committee of the Central Health Services Council and the Scottish Health Services Council was set up, under the chairmanship of Sir Henry Cohen, to provide guidance on borderline preparations that might be regarded as either drugs or foods.[1] In its first report[2] the committee lists as foods about 125 preparations, which should therefore not be prescribed free under the National Health Service. These preparations include various baby, milk, invalid, and vitamin foods: glucose preparations: liquid foods, including all alcoholic beverages, wines, tonic wines, and spirits; malt-extract preparations; meat and vegetable extracts and juices; and mineral and spa waters. Certain preparations are regarded by the committee as drugs when used, for example, in the treatment of tuberculosis or vitamin deficiency, but as foods when used as a routine measure for healthy persons such as school-children, factory workers, and athletes. The report, which has no statutory force, is being circulated to practitioners taking part in the service. The committee is to report next on toilet preparations.

University of Oxford

Mr. E. A. Crook has been returned unopposed by the general medical electorate as a member of the board of the Faculty of Medicine.

University of Cambridge

On May 6 the following degrees were conferred:

M.D.—*M. H. Masina, H. H. Wolff, A. B. Bratton.
M.B., B.Chir.—*W. P. Kelly, *I. I. Bornstein.

* By proxy.

On Monday, May 22, at 5 P.M., Dr. A. L. Banks will give his inaugural lecture as professor of human ecology. He is to speak on Man and his Environment.

University of Birmingham

Dr. B. S. B. Wood, senior registrar at the Birmingham Children's Hospital, has been appointed lecturer in pædiatrics and child health.

Mr. D. L. Woodhouse, PH.D., has been appointed lecturer and senior research fellow in chemical pathology, and Dr. A. Lasnitzki senior research fellow in biochemistry. Both these posts are tenable in the cancer research laboratory under Prof. J. W. Orr.

Royal College of Surgeons of England

At a meeting of the council on May 11, with Sir Cecil Wakeley, the president, in the chair, Mr. R. V. Cooke was elected a member of the court of examiners. Dr. David Slome, reader in physiology at the Middlesex Hospital Medical School, was appointed professor of applied physiology in the college. The Cecil Joll prize for 1950 was awarded to Sir Thomas Dunhill for his work on surgery of the thyroid.

Diplomas of membership were granted to the candidates named in the report of the comitia of the Royal College of Physicians which appeared in our issue of May 6 (p. 887).

Dr. Slome, whose appointment to the chair of applied physiology is announced above, will take up his new post on Oct. 1.

Dr. Slome is a graduate of the University of Cape Town. There he took his M.A. in 1926 and his PH.D. in 1929. The following year he graduated M.B. with honours and was awarded the gold medal. Later he gained many scholarships and awards including the Hallett prize. He has been a demonstrator in physiology at St. Bartholomew's Hospital and a lecturer in physiology at the Middlesex Hospital, where he now holds a readership in physiology in the University of London. He has also he[illegible] Mackinnon research scholarships and [illegible] Gale lecture to the college. He is c[illegible] clinic organised by the L.C.C. His published work includes papers on the ætiology of traumatic shock, and on the pituitary and pigmentary effector system.

Order of St. John Investiture

On May 18, at St. Bartholomew's Hospital, Sir Horace Evans received the insignia of commander of the order. Rear-Admiral Lionel Strugnell, Dr. E. W. C. Thomas, Major Phineas Weiner, R.A.M.C., and Dr. T. P. Lalonde received their insignia as officers.

West London Medico-Chirurgical Society

The annual banquet of the society will be held on Friday, June 2, at the Royal College of Surgeons, Lincoln's Inn Fields, W.C.2, at 8 P.M.

Scottish Society of Anæsthetists

This society, whose activities had been suspended since 1939, met at Dunblane on April 29 and 30, under the presidency of Dr. John Gillies. Dr. H. H. Pinkerton was elected vice-president, and Dr. R. N. Sinclair hon. secretary and treasurer.

Society of Public Analysts and other Analytical Chemists

At a meeting of the biological methods group to be held at 2.15 P.M. on Tuesday, May 23, at 11, Chandos Street, London, W.1, there will be a discussion on the assay of vitamin B_{12}. Mr. S. K. Kon, D.SC., will be in the chair.

Claims to Sickness Benefit

In England and Wales new claims to sickness benefit under the National Insurance Act during the weeks ended April 4, 11, 18, and 25 numbered 135,000, 80,700, 127,300, and 121,700. The weekly averages during the twelve months from April, 1949, to March of this year were as follows: 114,400, 97,700, 83,500, 78,600, 88,800, 100,900, 119,100, 136,200, 96,700, 154,900, 178,100, and 181,000.

Irish Medical Schools and Graduates Association

At a dinner held in London on May 3, Mr. J. Johnston Abraham, the president, presented Dr. Ivan Magill with the Arnott medal for his work in anæsthesia. The new president, Sir William MacArthur, was endowed with the chain of office for the coming year. Those wishing to join this association, which was founded in 1878, should write to the secretaries at 149, Harley Street, W.1.

Bone Structure

The recently formed Bone and Tooth Society will hold a symposium on this subject at 5 P.M. on Tuesday, June 6, at the Institute of Orthopædics, 234, Great Portland Street, London, W.1. Prof. W. D. Newcomb will be in the chair, and the other speakers will be Miss Honor Fell, D.SC., Dr. H. A. Sissons, Dr. J. J. Pritchard, Dr. T. F. Dixon, and Dr. H. J. Rogers. Dr. Dixon, who is secretary of the society, may be addressed at the institute.

Health Services in Northern Ireland

In Northern Ireland, which has a population of 1¼ million, the total expenditure during the last financial year on general health services was £3,759,160. The Hospital Authority received £5,400,000. The 716 doctors were paid £1,200,000, the 524 chemists £1,200,000, and 6 million prescriptions were issued, at an average cost during the first six months of 4s. per prescription. The 303 dentists received £1,100,000 and attended 195,000 patients, of whom 76,000 were provided with dentures. The average payment per dentist was £4128, and the highest payment to a single dentist was £8847.

B.M.A.

The British Medical Association is offering next year an occupational health essay prize of £50. This is open to any member of the association who is engaged, either whole-time or part-time, in the practice of occupational health. Candidates may choose their own subjects.

In 1951 the association is also offering prizes to medical students for essays on the Importance of Accurate History-taking in Diagnosis. Further particulars may be had from the secretary of the association, B.M.A. House, Tavistock Square, London, W.C.1.

Chelsea Clinical Society

At this society's annual dinner, on May 9, Dr. Maurice Bewley, the retiring president, replied to the toast of The Society, proposed by Commander Allan Noble, M.P. Commander Noble referred to the value of such societies as this, and went on to suggest that the general practitioner should be afforded more time for real doctoring, for study, and for refreshing himself. The Guests were toasted by Mr. Eric Steeler, and in his reply Sir Charles Harman spoke with humour of his experience of divergent medical opinions in civil actions. Mr. V. B. Green-Armytage uttered a warning that, owing to the National Health Service Act, local medical societies were in danger of extinction. Mr. Geoffrey Parker was inducted as president.

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[1] See *Lancet*, 1948, ii, 1020.

[2] Central Health Services Council and Scottish Health Services Council: the First Report of the Definition of Drugs Joint Sub-Committee of the Standing Medical, Pharmaceutical, and General Practitioner Advisory Committees. H.M. Stationery Office. Pp. 7. 3*d*.

Diary of the Week

MAY 21 TO 27

Monday, 22nd

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Prof. E. C. Dodds, F.R.S.: Recent Advances in Endocrinology in relation to Diagnosis and Treatment. (Second lecture.)

INSTITUTE OF NEUROLOGY, National Hospital, Queen Square, W.C.1
5 P.M. Dr. Arne Torkildsen (Oslo): Value of Angiography in the Diagnosis of Intracranial Neoplasms, with special reference to the Cerebral Gliomas.

NEWSHOLME LECTURE
6.15 P.M. (London School of Hygiene, Keppel Street, W.C.1.) Sir Henry Cohen: The Clinical Contribution to Public Welfare. (First lecture.)

Tuesday, 23rd

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. J. T. Ingram: Treatment of Eczema.

UNIVERSITY OF LONDON
5 P.M. (St. Mary's Hospital, W.2.) Prof. Perrin H. Long: Use of Antibiotics in the Treatment of Infectious Diseases with special reference to the Effect of Aureomycin and Chloramphenicol.

INSTITUTE OF NEUROLOGY
5 P.M. Prof. Olof Sjöqvist (Stockholm): Spinothalamic Tractotomy (Anterolateral Chordotomy) with special reference to Late Results.

INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5 P.M. Dr. L. Forman: Abnormalities of the Hair.

NEWSHOLME LECTURE
6.15 P.M. Sir Henry Cohen: The Clinical Contribution to Public Welfare. (Second lecture.)

EUGENICS SOCIETY
5.30 P.M. (Burlington House, Piccadilly, W.1.) Mr. R. C. K. Ensor: *Quantity and Quality of the Population of Great Britain.*

Wednesday, 24th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
3.45 P.M. Dr. Russell Reynolds: Cineradiographic demonstration of *Orthopædic Subjects.*
5 P.M. Mr. P. H. Mitchiner: Diseased Joints. (Erasmus Wilson demonstration.)

INSTITUTE OF PSYCHIATRY, Maudsley Hospital, S.E.5
4.30 P.M. Dr. K. Cameron: Lecture-demonstration.

INSTITUTE OF NEUROLOGY
5 P.M. Prof. G. Guillain (Paris): Life and Neurological Work of Pierre Marie.

INSTITUTE OF OPHTHALMOLOGY, Judd Street, W.C.1
5.30 P.M. Mr. J. H. Doggart: Diabetes Mellitus and the Eye.

HARVEIAN SOCIETY OF LONDON
8.15 P.M. (26, Portland Place, W.1.) Dr. W. S. C. Copeman, Dr. J. H. Cyriax, Dr. W. S. Tegner, Dr. Francis Bach: Problems of Fibrositis.

NEWSHOLME LECTURE
6.15 P.M. Sir Henry Cohen: The Clinical Contribution to Public Welfare. (Last lecture.)

Thursday, 25th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. A. P. Thomson: *Myelomatosis.*

INSTITUTE OF CHILD HEALTH, Hospital for Sick Children, Great Ormond Street, W.C.1
5 P.M. Dr. Ph. Sandblom (Stockholm): Factors Influencing Growth. (Simpson-Smith lecture.)

INSTITUTE OF NEUROLOGY
5 P.M. Prof. Almeida Lima (Lisbon): Cerebral Angiography—Technique and Generalities.

INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. Mr. E. D. D. Davis: Diseases and Affections of the Nose in relation to the Orbit.

WESTMINSTER SCHOOL OF MEDICINE, Horseferry Road, S.W.1
[illegible] theatre.) Clinicopathological meeting on Fœtalis.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. A. Feiling: Neurology lecture-demonstration.

UNIVERSITY OF BIRMINGHAM
5 P.M. (Medical School.) Dr. Frances Braid: Hypothyroidism in Childhood. (First Ingleby lecture.)

HONYMAN GILLESPIE LECTURE
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Dr. G. D. Matthew: Tubal Factor in Female Sterility.

Friday, 26th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. E. N. Allott: The Rhesus Factor.

INSTITUTE OF NEUROLOGY
5 P.M. Professor Lima: Cerebral Angiography—Diagnosis of Tumours of the Cerebral Hemispheres.

INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. Mr. A. G. Cross: Retrolental Fibroplasia.

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. F. S. Gorrill: *Anatomy of the Bone.* (Arnott demonstration.)

MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. Marion Greaves: *Clinical neurological demonstration.*

Appointments

DYSON, F. L., M.D. Lond., M.R.C.P.: consultant physician, Mi Glamorgan Hospital Management Committee Group.

HESLING, A. G., M.B. Lond., M.R.C.P., D.C.H.: consultant pædi trician to hospitals in Blackpool and Preston Hospital centre

MUMFORD, R. H., M.B. Edin.: appointed factory doctor, Hem worth district, Yorks.

ODDIE, J. A., D.S.C., M.B. Lond.: asst. M.O., East Anglian Region Hospital Board.

OLLERENSHAW, G. J. W., M.A., B.M. Oxfd: *M.O., Gillette Industri Ltd., Isleworth, Middlesex.*

TAYLOR, F. H., O.B.E., M.D. Durh., D.P.H., D.P.M., B.HY.: region psychiatrist, South-West Metropolitan Regional Hospit Board.

Hospital for Sick Children, Great Ormond Street, London:

COX, P. J. N., B.M. Oxfd, M.R.C.P., D.C.H.: house-physicia (junior registrar grade).

COYLE, J. V., M.B., B.SC. Glasg.: house-surgeon (junior registra grade).

D'ARCY, JOAN, M.B. Belf.: asst. medical registrar (registra grade).

JONES, I. C., M.R.C.S.: resident aural registrar (registrar grade).

LAWSON, D. N., M.D. Camb., M.R.C.P.: medical registrar an pathologist (senior registrar grade).

MACAULAY, J. C., M.B. Lond., M.R.C.P., D.C.H.: asst. medica registrar (registrar grade).

South-East Metropolitan Regional Hospital Board:

Consultant Surgeons:

HERIOT, A. J., M.S. Lond., F.R.C.S.: Camberwell group o hospitals.

LILWALL, B. G. A., D.S.O., M.B. Lond., F.R.C.S.: Canterbur and Isle of Thanet group of hospitals.

STANLEY, B. E. C., M.B. Lond., F.R.C.S.: Medway and Grave end group of hospitals.

Consultant Physicians:

EMSLIE, A. G., M.D. Aberd., D.P.H.: Eastbourne group o hospitals.

LIPSCOMB, J. M., M.D. Camb., M.R.C.P.: Canterbury and Isl of Thanet group of hospitals.

PRICE, T. M. L., M.D. Lond., M.R.C.P.: Lewisham and Woolwi group of hospitals.

SOUTHWELL, NEVILLE, M.A., M.D. Camb., M.R.C.P.: Orpingto and Sevenoaks group of hospitals.

Consultant Obstetricians and Gynæcologists:

BURTON-BROWN, JEAN, M.D. Lond., F.R.C.S., M.R.C.O.G.: *Canterbury and Isle of Thanet group of hospitals.*

CHESTER, A. W., M.D. Durh., M.R.C.O.G.: Dartford group o hospitals.

TORRANCE, LYDIA, M.D. Glasg., F.R.C.S., F.R.C.O.G.: Woolwich group of hospitals.

Consultant Orthopædic Surgeons:

BAIRD, R. C., F.R.C.S.E.: South-East Kent and Canterbury group of hospitals.

EPPS, P. G., M.B. Lond., F.R.C.S.: Medway and Gravesend group of hospitals.

Consultant Anæsthetists:

BLAZEBY, R. H., M.R.C.S., D.A.: Canterbury and Isle of Thanet group of hospitals.

FARQUHAR, J. K., M.R.C.S., D.A.: Sidcup and Swanley group of hospitals.

SEARLE, J. B., M.A., B.M. Oxfd, D.A.: South-East Kent group of hospitals.

Births, Marriages, and Deaths

BIRTHS

CAIRNS.—On April 27, at Melbourne, Australia, the wife of Dr. John Cairns—a daughter.

FOX.—On May 6, the wife of Dr. D. L. Fox—a daughter.

LITTLE.—On May 9, at Whitby, the wife of Dr. J. D. Little—a son.

MAITLAND.—On May 11, in Glasgow, the wife of Mr. A. Ian L. Maitland, F.R.C.S.E.—a son.

NEVILLE.—On May 11, in London, to Dr. Alison Neville (née Boodson), wife of Dr. Joseph Neville—a son.

MARRIAGES

MCCORMACK—BRADLEY.—On May 6, at Wisbech, Michael Patrick McCormack, F.R.C.S., to Janet Bradley, S.R.N.

SAVAGE—STUTCHBURY.—On May 9, in London, Paul Thwaites Savage, F.R.C.S., to Anne Stutchbury.

DEATHS

CARTER.—On May 11, at *Enfield*, Ernest Christison Carter, M.D. Edin., M.R.C.P., aged 84.

DAVIDGE.—On May 11, at Sevenoaks, George Sandys Davidge, L.R.C.P.I., surgeon captain, R.N. retd, aged 76.

ELLIOTT.—On May 7, Thomas Robert Elliott, L.R.C.P.I.

FULLERTON.—On May 4, at Pembury, Arthur Hugh Theodore Francis Fullerton, major, R.A.M.C. retd.

HAYWARD.—On May 7, at Walmer, William Davey Hayward, M.B. Manc., aged 81.

HOGG.—On May 7, at Launceston, Tasmania, Gustave Heuzé Hogg, M.D. Edin., aged 81.

MOTHERSOLE.—On May 12, at Bolton, Robert Devereux Mothersole, M.D., M.S. Lond., F.R.C.S., aged 84.

PETERS.—On May 8, at Nailsea, Glos, Benjamin Alfred Peters, B.A., M.D. Camb., D.P.H.

TROTTER.—On May 5, Margaret Jarvey Trotter (née Brown), M.B. Glasg.

USHER.—On May 9, Ruth Dorothy Usher, M.A. Camb., M.R.C.S.

WEATHERHEAD.—On May 8, at Dunbar, Alfred George Norton Weatherhead, M.B. Edin.

WILSON.—On May 9, at Hambleden, Henley-on-Thames, Andrew Steward Wilson, M.B. Aberd., aged 70.

MULTIPLE-LEAD ELECTROCARDIOGRAMS*

IAN G. W. HILL
C.B.E., T.D., M.B. Edin., F.R.C.P.E., F.R.S.E.
LECTURER IN THERAPEUTICS, UNIVERSITY OF EDINBURGH; ASSISTANT PHYSICIAN TO THE ROYAL INFIRMARY, AND PHYSICIAN TO THE DEACONESS HOSPITAL, EDINBURGH

EARLY in my postgraduate days the late Dr. W. T. Ritchie directed my attention to Craib's (1930) studies on the fundamental electrophysiological basis of electrocardiography which cut drastically across the conceptions long taught by physiologists. Soon afterwards I was associated with F. N. Wilson of Ann Arbor, who had independently published similar studies (Wilson et al. 1933a and b) and reached very similar conclusions. These American writers pointed out that the idea that the action current is monophasic derived from records made from muscle strips suspended in air, and they showed that when the currents were led from strips immersed in a conducting medium very different polyphasic curves resulted.

Some knowledge of this electrical background is essential for full understanding of the modern electrocardiogram (E.C.G.). The generally accepted theory of cell polarisation is as follows:

> An inactive or resting cell is electrically polarised, the cell membrane being the boundary or interface between the opposite charges. Activity of the cell—i.e., contraction of a muscle-fibre or excitation of a nerve-fibre—is associated with rapid depolarisation of the cell membrane, the surface of the active tissue becoming electronegative. When the cell passes again to the resting phase, repolarisation takes place in the same order as that in which depolarisation took place.

The original physiological work, done on moist strips of muscle suspended in air, and using bipolar leads, yielded a diphasic type of curve, which was explained as the algebraic summation of two monophasic curves, one derived from each electrode. As proof, the workers crushed or injured part of the strip, thereby preventing its taking part in the excitation process, and led from a point on healthy muscle to a point on the injured zone. A simple monophasic curve resulted.

DOUBLET HYPOTHESIS

Craib however in 1930 showed that, by leading from a single point on a strip immersed in a conducting medium to a distant indifferent point in the medium, a complex polyphasic curve resulted. Similarly, if the partially injured strip in the above experiment was immersed, the curve obtained was no longer simple monophasic. Such curves cannot be explained on the simple negativity hypothesis. It must be remembered that in such experiments we are leading from outside the cells of the tissue strip; the only variable is the amount of fluid bathing the tissue, and this cannot effect the electrical change within the cells, though it modifies profoundly the distribution of potentials in the fluid medium.

By logical argument based on his experimental results Craib showed that the observed phenomena of initial positivity and later negativity of a unipolar electrode on the surface of contacting tissue could be explained on the basis of his "doublet" hypothesis. This implied that the passage of the excitation wave along the fibre was associated with the passage of a series of anodes and cathodes, existing close together and at the same instant at the tissue surface, and arising from a common electromotive force within the tissue. In the transatlantic idiom of Wilson, whose contemporary and independent conclusions were similar, the doublet is replaced by "dipole" and "anode and cathode" by "source and sink." The latter term expresses succinctly the idea that current leaves the fibre at one point (source or anode) and enters at an adjacent sink or cathode.

Direct experimental proof of the existence of such conditions at the surface of a single cell has been furnished in recent years. Using microdissection methods, physiologists in Britain and America (Hodgkin and Huxley 1939, 1945, Cole and Curtis 1939) have introduced fine electrodes into the giant axon of the squid and recorded the potential differences across the cell membrane at rest and during activation. It has been confirmed that the interior of the cell at rest is electronegative, about 40–60 mV below the surface potential. During excitation the action potential swings over to the opposite sign, but proved unexpectedly to be about twice the resting value. Simple depolarisation on the lines of the old membrane theory does not suffice to explain this phenomenon. Hodgkin and Katz (1949) suggest that changes in the relative permeability of the cell membrane to sodium and potassium ions during rest and activity may be responsible for the electrical effect. The height of the action potential in their experiments closely paralleled the concentration of sodium ions in the medium bathing the axon.

I have redrawn Craib's figures with the polarity reversed from the original plates, because the standard physiological technique is to connect the galvanometer so that upward deflection of the string indicates relative negativity of the right arm electrode. This is still clinical practice in recording the standard E.C.G. leads I, II, and III. In leading from the precordium, however, it has become usual to connect the galvanometer so that an upward deflection of the string reflects relative positivity of the electrode on the chest. I fought a losing battle against this method many years ago (Willcox and Lovibond 1937, Hill 1937), and, in accordance with democratic principles, have now conformed to the will of the majority. The curves by this technique certainly resemble ordinary standard-lead E.C.G., but at a cost of complexity of theory that many find perplexing.

Fig. 1 therefore shows Craib's curves redrawn in the new polarity. It will be seen that in the immersed strip the rapid depolarisation, with negativity of the surface electrode is preceded by a definite positive wave, both in leads from simple muscle strips and from the intact frog heart. This positive wave represents the approach of the anode of the doublet, and the swing over

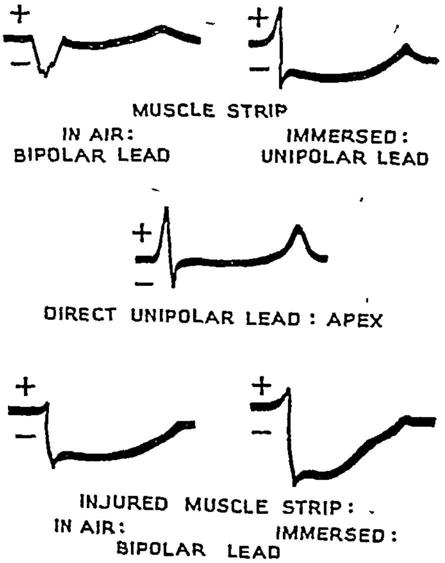

Fig. 1—Bipolar and unipolar leads from muscle strips in air and immersed, and from the intact heart. (After Craib, with polarity reversed.)

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* The George Alexander Gibson Lecture delivered before the Royal College of Physicians of Edinburgh on March 25, 1949.

Diary of the Week

MAY 21 TO 27

Monday, 22nd

Royal College of Physicians, Pall Mall East, S.W.1
5 P.M. Prof. E. C. Dodds, F.R.S.: Recent Advances in Endocrinology in relation to Diagnosis and Treatment. (Second lecture.)

Institute of Neurology, National Hospital, Queen Square, W.C.1
5 P.M. Dr. Arne Torkildsen (Oslo): Value of Angiography in the Diagnosis of Intracranial Neoplasms, with special reference to the Cerebral Gliomas.

Newsholme Lecture
6.15 P.M. (London School of Hygiene, Keppel Street, W.C.1.) Sir Henry Cohen: The Clinical Contribution to Public Welfare. (First lecture.)

Tuesday, 23rd

Royal College of Physicians
5 P.M. Dr. J. T. Ingram: Treatment of Eczema.

University of London
5 P.M. (St. Mary's Hospital, W.2.) Prof. Perrin H. Long: Use of Antibiotics in the Treatment of Infectious Diseases with special reference to the Effect of Aureomycin and Chloramphenicol.

Institute of Neurology
5 P.M. Prof. Olof Sjöqvist (Stockholm): Spinothalamic Tractotomy (Anterolateral Chordotomy) with special reference to Late Results.

Institute of Dermatology, Lisle Street, W.C.2
5 P.M. Dr. L. Forman: Abnormalities of the Hair.

Newsholme Lecture
6.15 P.M. Sir Henry Cohen: The Clinical Contribution to Public Welfare. (Second lecture.)

Eugenics Society
5.30 P.M. (Burlington House, Piccadilly, W.1.) Mr. R. C. K. Ensor: Quantity and Quality of the Population of Great Britain.

Wednesday, 24th

Royal College of Surgeons, Lincoln's Inn Fields, W.C.2
3.45 P.M. Dr. Russell Reynolds: Cineradiographic demonstration of Orthopædic Subjects.
5 P.M. Mr. P. H. Mitchiner: Diseased Joints. (Erasmus Wilson demonstration.)

Institute of Psychiatry, Maudsley Hospital, S.E.5
4.30 P.M. Dr. K. Cameron: Lecture-demonstration.

Institute of Neurology
5 P.M. Prof. G. Guillain (Paris): Life and Neurological Work of Pierre Marie.

Institute of Ophthalmology, Judd Street, W.C.1
5.30 P.M. Mr. J. H. Doggart: Diabetes Mellitus and the Eye.

Harveian Society of London
8.15 P.M. (26, Portland Place, W.1.) Dr. W. S. C. Copeman, Dr. J. H. Cyriax, Dr. W. S. Tegner, Dr. Francis Bach: *Problems of Fibrositis.*

Newsholme Lecture
6.15 P.M. Sir Henry Cohen: The Clinical Contribution to Public Welfare. (Last lecture.)

Thursday, 25th

Royal College of Physicians
5 P.M. Dr. A. P. Thomson: Myelomatosis.

Institute of Child Health, Hospital for Sick Children, Great Ormond Street, W.C.1
5 P.M. Dr. Ph. Sandblom (Stockholm): Factors Influencing Growth. (Simpson-Smith lecture.)

Institute of Neurology
5 P.M. Prof. Almeida Lima (Lisbon): Cerebral Angiography—Technique and Generalities.

Institute of Ophthalmology
5.30 P.M. Mr. E. D. D. Davis: Diseases and Affections of the Nose in relation to the Orbit.

Westminster School of Medicine, Horseferry Road, S.W.1
5.30 P.M. (Meyerstein theatre.) Clinicopathological meeting on Erythroblastosis Fœtalis.

St. George's Hospital Medical School, S.W.1
4.30 P.M. Dr. A. Feiling: Neurology lecture-demonstration.

University of Birmingham
5 P.M. (Medical School.) Dr. Frances Braid: Hypothyroidism in Childhood. (First Ingleby lecture.)

Honyman Gillespie Lecture
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Dr. G. D. Matthew: Tubal Factor in Female Sterility.

Friday, 26th

Royal College of Physicians
5 P.M. Dr. E. N. Allott: The Rhesus Factor.

Institute of Neurology
5 P.M. Professor Lima: Cerebral Angiography—Diagnosis of Tumours of the Cerebral Hemispheres.

Institute of Ophthalmology
5.30 P.M. Mr. A. G. Cross: Retrolental Fibroplasia.

Royal College of Surgeons
5 P.M. Mr. F. S. Gorrill: Anatomy of the Bone. (Arnott demonstration.)

Maida Vale Hospital Medical School, W.9
5 P.M. Dr. Marion Greaves: Clinical neurological demonstration.

Appointments

Dyson, F. L., M.D. Lond., M.R.C.P.: consultant physician, Mid-Glamorgan Hospital Management Committee Group.

Hesling, A. G., M.B. Lond., M.R.C.P., D.C.H.: consultant pædiatrician to hospitals in Blackpool and Preston Hospital centre.

Mumford, R. H., M.B. Edin.: appointed factory doctor, Hemsworth district, Yorks.

Oddie, J. A., D.S.C., M.B. Lond.: asst. M.O., East Anglian Regional Hospital Board.

Ollerenshaw, G. J. W., M.A., B.M. Oxfd: M.O., Gillette Industries Ltd., Isleworth, Middlesex.

Taylor, F. H., O.B.E., M.D. Durh., D.P.H., D.P.M., B.HY.: regional psychiatrist, South-West Metropolitan Regional Hospital Board.

Hospital for Sick Children, Great Ormond Street, London:

Cox, P. J. N., B.M. Oxfd, M.R.C.P., D.C.H.: house-physician (junior registrar grade).

Coyle, J. V., M.B., B.SC. Glasg.: house-surgeon (junior registrar grade).

D'Arcy, Joan, M.B. Belf.: asst. medical registrar (registrar grade).

Jones, I. C., M.R.C.S.: resident aural registrar (registrar grade).

Lawson, D. N., M.D. Camb., M.R.C.P.: medical registrar and pathologist (senior registrar grade).

Macaulay, J. C., M.B. Lond., M.R.C.P., D.C.H.: asst. medical registrar (registrar grade).

South-East Metropolitan Regional Hospital Board:

Consultant Surgeons:

Heriot, A. J., M.S. Lond., F.R.C.S.: Camberwell group of hospitals.

Lilwall, B. G. A., D.S.O., M.B. Lond., F.R.C.S.: Canterbury and Isle of Thanet group of hospitals.

Stanley, B. E. C., M.B. Lond., F.R.C.S.: Medway and Gravesend group of hospitals.

Consultant Physicians:

Emslie, A. G., M.D. Aberd., D.P.H.: Eastbourne group of hospitals.

Lipscomb, J. M., M.D. Camb., M.R.C.P.: Canterbury and Isle of Thanet group of hospitals.

Price, T. M. L., M.D. Lond., M.R.C.P.: Lewisham and Woolwich group of hospitals.

Southwell, Neville, M.A., M.D. Camb., M.R.C.P.: Orpington and Sevenoaks group of hospitals.

Consultant Obstetricians and Gynæcologists:

Burton-Brown, Jean, M.D. Lond., F.R.C.S., M.R.C.O.G.: Canterbury and Isle of Thanet group of hospitals.

Chester, A. W., M.D. Durh., M.R.C.O.G.: Dartford group of hospitals.

Torrance, Lydia, M.D. Glasg., F.R.C.S., F.R.C.O.G.: Woolwich group of hospitals.

Consultant Orthopædic Surgeons:

Baird, R. C., F.R.C.S.E.: South-East Kent and Canterbury group of hospitals.

Epps, P. G., M.B. Lond., F.R.C.S.: Medway and Gravesend group of hospitals.

Consultant Anæsthetists:

Blazeby, R. H., M.R.C.S., D.A.: Canterbury and Isle of Thanet group of hospitals.

Farquhar, J. K., M.R.C.S., D.A.: Sidcup and Swanley group of hospitals.

Searle, J. B., M.A., B.M. Oxfd, D.A.: South-East Kent group of hospitals.

Births, Marriages, and Deaths

BIRTHS

Cairns.—On April 27, at Melbourne, Australia, the wife of Dr. John Cairns—a daughter.

Fox.—On May 6, the wife of Dr. D. L. Fox—a daughter.

Little.—On May 9, at Whitby, the wife of Dr. J. D. Little—a son.

Maitland.—On May 11, in Glasgow, the wife of Mr. A. Ian L. Maitland, F.R.C.S.E.—a son.

Neville.—On May 11, in London, to Dr. Alison Neville (*née* Boodson), wife of Dr. Joseph Neville—a son.

MARRIAGES

McCormack—Bradley.—On May 6, at Wisbech, Michael Patrick McCormack, F.R.C.S., to Janet Bradley, S.R.N.

Savage—Stutchbury.—On May 9, in London, Paul Thwaites Savage, F.R.C.S., to Anne Stutchbury.

DEATHS

Carter.—On May 11, at Enfield, Ernest Christison Carter, M.D. Edin., M.R.C.P., aged 84.

Davidge.—On May 11, at Sevenoaks, George Sandys Davidge, L.R.C.P.I., surgeon captain, R.N. retd, aged 76.

Elliott.—On May 7, Thomas Robert Elliott, L.R.C.P.I.

Fullerton.—On May 4, at Pembury, Arthur Hugh Theodore Francis Fullerton, major, R.A.M.C. retd.

Hayward.—On May 7, at Walmer, William Davey Hayward, M.B. Manc., aged 81.

Hogg.—On May 7, at Launceston, Tasmania, Gustave Heuzé Hogg, M.D. Edin., aged 81.

Mothersole.—On May 12, at Bolton, Robert Devereux Mothersole, M.D., M.S. Lond., F.R.C.S., aged 84.

Peters.—On May 8, at Nailsea, Glos, Benjamin Alfred Peters, B.A., M.D. Camb., D.P.H.

Trotter.—On May 5, Margaret Jarvey Trotter (*née* Brown), M.B. Glasg.

Usher.—On May 9, Ruth Dorothy Usher, M.A. Camb., M.R.C.S.

Weatherhead.—On May 8, at Dunbar, Alfred George Norton Weatherhead, M.B. Edin.

Wilson.—On May 9, at Hambleden, Henley-on-Thames, Andrew Steward Wilson, M.B. Aberd., aged 70.

MULTIPLE-LEAD ELECTROCARDIOGRAMS*

IAN G. W. HILL
C.B.E., T.D., M.B. Edin., F.R.C.P.E., F.R.S.E.
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ASSISTANT PHYSICIAN TO THE ROYAL INFIRMARY, AND
PHYSICIAN TO THE DEACONESS HOSPITAL, EDINBURGH

EARLY in my postgraduate days the late Dr. W. T. Ritchie directed my attention to Craib's (1930) studies on the fundamental electrophysiological basis of electrocardiography which cut drastically across the conceptions long taught by physiologists. Soon afterwards I was associated with F. N. Wilson of Ann Arbor, who had independently published similar studies (Wilson et al. 1933a and b) and reached very similar conclusions. These American writers pointed out that the idea that the action current is monophasic derived from records made from muscle strips suspended in air, and they showed that when the currents were led from strips immersed in a conducting medium very different polyphasic curves resulted.

Some knowledge of this electrical background is essential for full understanding of the modern electrocardiogram (E.C.G.). The generally accepted theory of cell polarisation is as follows:

> An inactive or resting cell is electrically polarised, the cell membrane being the boundary or interface between the opposite charges. Activity of the cell—i.e., contraction of a muscle-fibre or excitation of a nerve-fibre—is associated with rapid depolarisation of the cell membrane, the surface of the active tissue becoming electronegative. When the cell passes again to the resting phase, repolarisation takes place in the same order as that in which depolarisation took place.

The original physiological work, done on moist strips of muscle suspended in air, and using bipolar leads, yielded a diphasic type of curve, which was explained as the algebraic summation of two monophasic curves, one derived from each electrode. As proof, the workers crushed or injured part of the strip, thereby preventing its taking part in the excitation process, and led from a point on healthy muscle to a point on the injured zone. A simple monophasic curve resulted.

DOUBLET HYPOTHESIS

Craib however in 1930 showed that, by leading from a single point on a strip immersed in a conducting medium to a distant indifferent point in the medium, a complex polyphasic curve resulted. Similarly, if the partially injured strip in the above experiment was immersed, the curve obtained was no longer simple monophasic. Such curves cannot be explained on the simple negativity hypothesis. It must be remembered that in such experiments we are leading from outside the cells of the tissue strip; the only variable is the amount of fluid bathing the tissue, and this cannot effect the electrical change within the cells, though it modifies profoundly the distribution of potentials in the fluid medium.

By logical argument based on his experimental results Craib showed that the observed phenomena of initial positivity and later negativity of a unipolar electrode on the surface of contacting tissue could be explained on the basis of his "doublet" hypothesis. This implied that the passage of the excitation wave along the fibre was associated with the passage of a series of anodes and cathodes, existing close together and at the same instant at the tissue surface, and arising from a common electromotive force within the tissue. In the transatlantic idiom of Wilson, whose contemporary and independent conclusions were similar, the doublet is replaced by "dipole" and "anode and cathode" by "source and sink." The latter term expresses succinctly the idea that current leaves the fibre at one point (source or anode) and enters at an adjacent sink or cathode.

Direct experimental proof of the existence of such conditions at the surface of a single cell has been furnished in recent years. Using microdissection methods, physiologists in Britain and America (Hodgkin and Huxley 1939, 1945, Cole and Curtis 1939) have introduced fine electrodes into the giant axon of the squid and recorded the potential differences across the cell membrane at rest and during activation. It has been confirmed that the interior of the cell at rest is electronegative, about 40–60 mV below the surface potential. During excitation the action potential swings over to the opposite sign, but proved unexpectedly to be about twice the resting value. Simple depolarisation on the lines of the old membrane theory does not suffice to explain this phenomenon. Hodgkin and Katz (1949) suggest that changes in the relative permeability of the cell membrane to sodium and potassium ions during rest and activity may be responsible for the electrical effect. The height of the action potential in their experiments closely paralleled the concentration of sodium ions in the medium bathing the axon.

I have redrawn Craib's figures with the polarity reversed from the original plates, because the standard physiological technique is to connect the galvanometer so that upward deflection of the string indicates relative *negativity of the right arm electrode.* This is still clinical practice in recording the standard E.C.G. leads I, II, and III. In leading from the precordium, however, it has become usual to connect the galvanometer so that an upward deflection of the string reflects relative positivity of the electrode on the chest. I fought a losing battle against this method many years ago (Willcox and Lovibond 1937, Hill 1937), and, in accordance with democratic principles, have now conformed to the will of the majority. The curves by this technique certainly resemble ordinary standard-lead E.C.G., but at a cost of complexity of theory that many find perplexing.

Fig. 1 therefore shows Craib's curves redrawn in the new polarity. It will be seen that in the immersed strip the rapid depolarisation, with negativity of the surface electrode is preceded by a definite positive wave, both in leads from simple muscle strips and from the intact frog heart. This positive wave represents the approach of the anode of the doublet, and the swing over

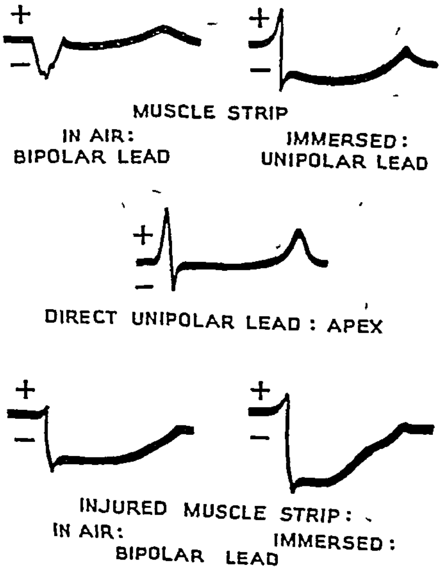

Fig. 1—Bipolar and unipolar leads from muscle strips in air and immersed, and from the intact heart. (After Craib, with polarity reversed.)

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* The George Alexander Gibson Lecture delivered before the Royal College of Physicians of Edinburgh on March 25, 1949.

to negative signals the passing of the electrode by the interface between resting and activated muscle. A similar positive wave precedes the "monophasic" injury curve from partially crushed muscles, and from the conditions of the experiment can only reflect changes at the electrode on the uninjured tissue.

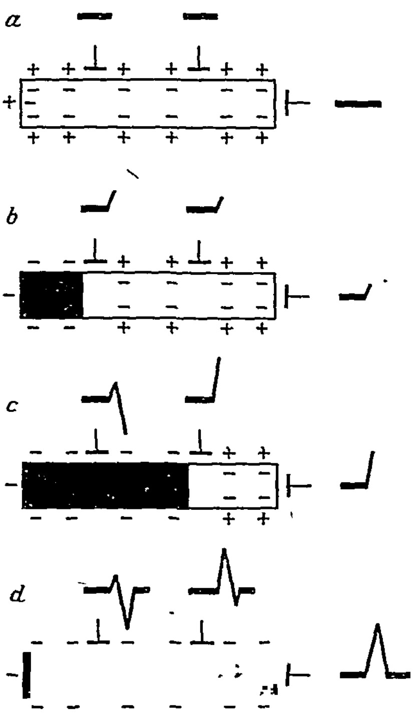

Fig. 2—Schema of genesis of action currents. Unipolar leads from a muscle strip. Black indicates activated muscle.

In fig. 2 the genesis of such curves is illustrated. The excitation wave approaching the electrodes causes relative positivity of each. Its passage beyond the first two electrodes causes a sharp swing over to negativity at each electrode. This very rapid deflection, signalling the arrival of the excitation curve below the electrode, is known as the intrinsic deflection (see below). It will be noted that, at the end of the fibre, excitation causes merely a return of the galvanometer to zero potential, and no deep S wave as at the other electrodes. This is natural, since at the end of the fibre the cathode never passes the electrode, though the anode of the doublet approaches and reaches it. It is indicated in the diagram that the R wave is higher when much muscle is activated before the excitation wave reaches the electrode (see below).

Turning to the ventricular muscle as a whole (fig. 3), we know that excitation normally proceeds centrifugally from the subendocardial Purkinje system toward the epicardium (Lewis 1916). It seems that an electrode on the surface would show similar positive and negative phases, or R and S waves, to those figured from a muscle strip. And Craib's figure (fig. 1) is proof that this is so. It is also apparent that the ventricular cavity is negative from the start, facing the earliest activated part of the muscle. Leads from the cavity of the ventricle in the dog are of the expected type, as was found by many experiments in which I was participant in Wilson's laboratory (Johnston et al. 1935a and b, Wilson et al. 1934a, 1935, 1933).

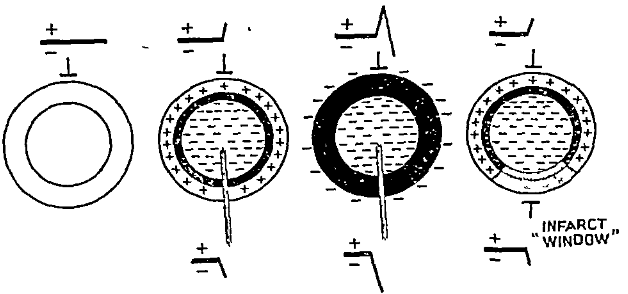

Fig. 3—Schema of surface and cavity leads from ventricle during activation. Black indicates activated muscle. Above, direct lead from surface; below, lead from ventricular cavity.

From these theoretical considerations there emerge three principles, all applicable in the first instance only to the direct leads from the heart wall: (1) the intrinsic deflection in a unipolar lead signals the arrival of the excitation wave below the electrode; (2) the height of R bears some relation to the thickness of the underlying muscle; and (3) leads which show no R and S but are negative from the outset (Q) reflect the potential of the ventricular cavity. Each of these principles has an important bearing on clinical work.

RELATION OF ELECTROGRAMS TO PRECORDIAL E.C.G.

The next point in my argument is to discuss what relation these direct leads (or electrogram) bear to leads from the chest wall overlying the heart (or precordial electrocardiogram). In the work with Wilson cited above we made many experiments on dogs in which curves obtained from the intact chest wall were compared with those obtained directly from the epicardium at corresponding points; a third set of "semi-direct leads" obtained from electrodes separated from the heart by a cotton-wool pad soaked in Ringer's solution or in saline solution were also recorded. The parallelism between the three sets of curves was very close. This was a constant finding. It must not be assumed, however, that a given chest lead in man reflects exactly the changes taking place at an underlying point in the muscle. Nearby areas each add their contributions, less significant as their distance from the focal point increases, distorting the curves to a moderate degree. In general, however, a lead from the chest wall reflects principally the changes in the muscle nearest to it.

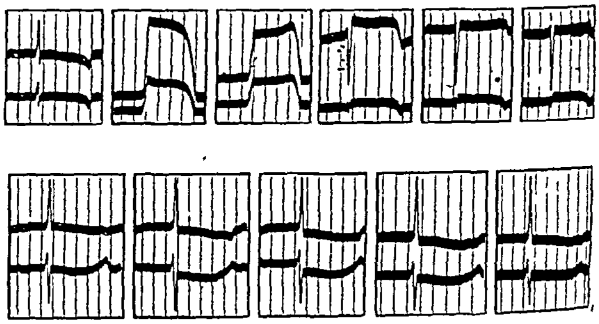

Fig. 4—Electrocardiograms of turtle's heart, showing effects of injury. Above, anterior burn; below, posterior burn. Direct unipolar leads, anterior. Two galvanometers with amplifier in circuit of upper string.

GENESIS OF THE MONOPHASIC CURRENT OF INJURY

Fig. 4 illustrates the changes recorded in direct leads from the front of the turtle heart when areas on the front and the back of the heart are injured by superficial burning. The explanation of the curves may be aided by a diagram (fig. 5*a*), from which it will be seen that, when the resting muscle or cell is injured, the polarisation over the damaged area is lost. This means in effect that the surface in that area becomes electronegative in relation to that of adjacent uninjured muscle. A unipolar lead from such damaged tissue will cause *a constant negative* deflection in the galvanometer, with the result that the string takes up a position below the iso-electric line. By means of the compensator (or equivalent condenser centring device) the string is brought back to zero by introduction of a positive potential in the circuit. When now the uninjured muscle is activated and in turn depolarised, the original potential difference between uninjured and injured muscle is abolished; both are depolarised. The compensating current, now unbalanced, throws the string to a new position above the iso-electric line, which is maintained until the muscle passes again into the resting polarised state. This rectilinear monophasic deflection, lasting throughout systole, is therefore to be expected when leading from over damaged tissue, and is the basis of the so-called monophasic action current of the old school of negativity physiologists. Its importance in practical medicine lies in the fact that its presence betrays the existence of damaged muscle. In experimental work such curves are readily obtained. The period of injury during which such monophasic curves are recorded is short; such is evident in the curves from the turtle heart. In coronary infarction in man they persist longer but are in general transient, lasting only a few hours or days.

This monophasic injury current causing RT or ST shift is the earliest sign of damage to heart muscle in experiment or in clinical practice. The direction of the shift in human myocardial infarction, as in the injured turtle heart, depends on the location of the damaged area; this shift is upwards when the epicardial, and downwards when the endocardial, surface faces the exploring electrode (figs. 5*b* and *c*). The physical basis underlying the observed phenomena had been analysed by Wilson et al. (1934b and c), by Bayley (1942), and Pruitt and Valencia (1948). The occurrence of RT deviation with through-and-through infarction and its persistence in many cases of cardiac aneurysm (Rosenburg and Messinger 1949) present difficult theoretical problems.

The subsidence of ST shifts is closely associated with the development of T-wave changes. In the experimental curves T inversion begins to appear as ST elevation diminishes, and deep inversion of T persists in survival experiments for some days or weeks after the ligation. So in man, the leads showing ST elevation initially show later deep inversion of T, as was described by Parkinson and Bedford (1929). Conversely, in leads with initial ST depression the T waves become high and upright as the ST shift lessens. T waves of very large amplitude are recorded in experiments from the margins of the infarcted area.

QRS CHANGES IN EXPERIMENTAL MYOCARDIAL INFARCTION

We have seen that the ventricular cavity is electronegative from the start of, and throughout, ventricular systole. When an area of muscle is killed, or so damaged temporarily that it does not respond to the excitation wave, the inert damaged muscle contributes nothing to the spreading electrical events except its constant injury current. It conducts passively the potentials of the underlying chamber, and acts, as it were, as a window through which the negative ventricular potential is transmitted to the epicardial surface. A lead from over such an infarcted area therefore shows no R and S waves but simply a Q, similar to that recorded from an insulated copper wire, bare only at its tip, thrust into the ventricular cavity (fig. 3). Records of this type from dog hearts in experimental coronary ligation showed constantly that the potential variations of the cavity and those of the epicardium overlying an infarct were identical (Johnston et al. 1935a and b, Wilson et al. 1934a, 1935, 1933).

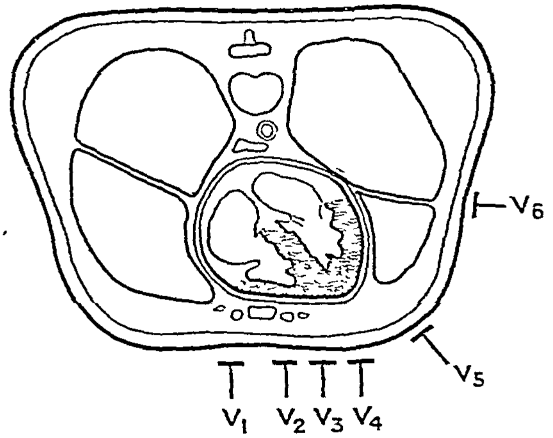

Fig. 6—Transverse section at level of 4th sternocostal junction, to show relation of chest electrodes to heart.

PRECORDIAL LEADS

We have seen how in the dog precordial leads reflect with fair accuracy the potential variations of subjacent points on the epicardial surface. In man precordial leads were introduced by Wilson (Wilson et al. 1926), and much of the early work was done in his laboratory (Wilson et al. 1933c) and by Wood, Wolferth, and their collaborators (Wood, Wolferth et al. 1932, 1933, 1934). These leads came into general use in the last fifteen years, and the interpretation of their results is based on the theoretical considerations just discussed. At first each worker selected a method of leading at his own whim, and within a few years complete confusion had arisen. "Quot homines tot sententiæ"—or, in this case, "so many methods." Individuals chose different points on the chest wall for application of one electrode and placed the other on any one of the four limbs, on the back of the chest, or elsewhere. The old and the new polarity were used indifferently by many, and chaos reigned.

It was at this point, in 1938, that a joint committee of the American Heart Association and the Cardiac Society of Great Britain and Ireland (1938, 1939) sought to standardise the methods of leading: polarity was agreed on, the size and position of the chest electrode defined, and a simple method of labelling leads beyond possibility of confusion devised. On that committee the British members did not agree to adopt the multiple precordial leads which were later standardised by the American members for their own country (American Heart Association 1943). The use of such multiple leads has, however, become

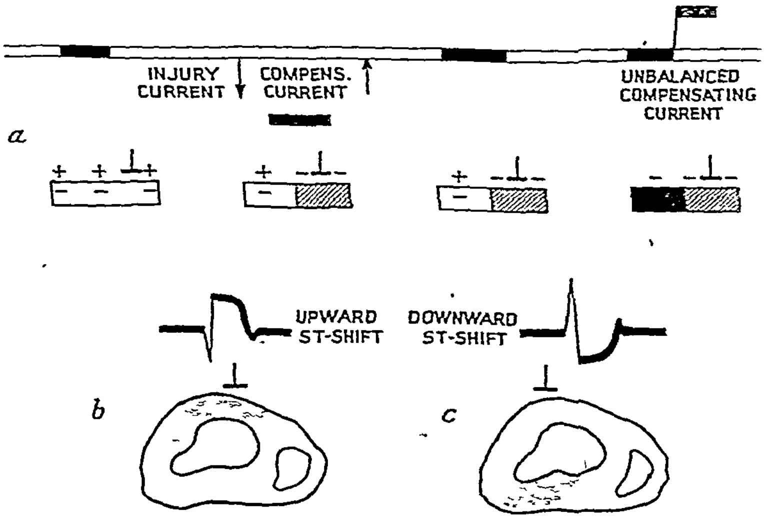

Fig. 5—Genesis of ST shift with injury: *a*, muscle strip, partially injured and activated; *b*, heart, injury of wall underlying electrode; *c*, heart, injury of wall remote from electrode.

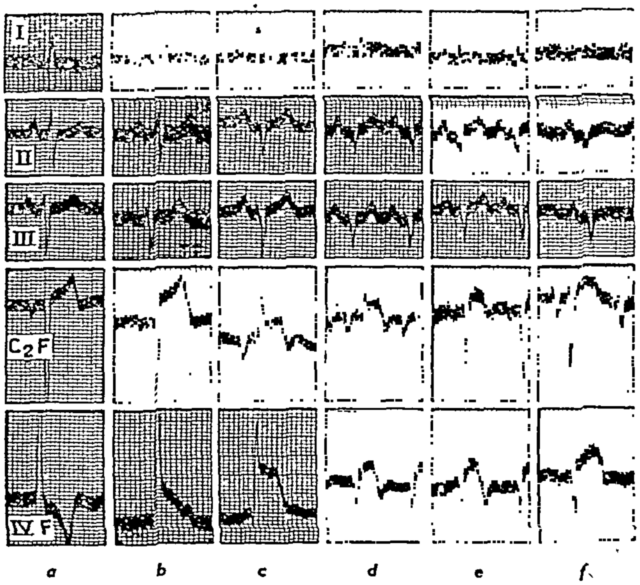

Fig. 7—Serial electrocardiograms in coronary occlusion in a man of 58 (clinical onset 1 p.m., Jan. 29, 1947): *a*, 11.40 a.m. on Jan. 29; *b*, same day, 20 minutes after onset; *c*, same day, 3 hours after *b*; *d*, Jan. 30; *e*, Jan. 31; *f*, Feb. 10.

general in Britain, and a committee of the Cardiac Society of Great Britain and Ireland (1949) has now recommended their official adoption here.

The places selected for applying the chest electrode are numbered serially from right to left of the precordium, and are defined as follows:

1. Right margin of sternum in fourth intercostal space.
2. Left margin of sternum at same level.
3. Midway between 2 and 4.
4. Mid-clavicular line in fifth intercostal space.
5. Left anterior axillary line.
6. Mid-axillary line at same level as 4.

7 and 8. Points at the same level in the posterior axillary line and below the apex of the scapula may be used for additional leads.

The relation of these sites to the heart chambers can be appreciated from fig. 6, which represents a transverse section of the thorax at the level of the fourth costosternal articulations. It will be seen that 1 and 2 are over the right heart, 5 and 6 over the left, and 3 overlies the septal region: 4 may lie over the left ventricle or possibly the septum, according to the size and position of the heart.

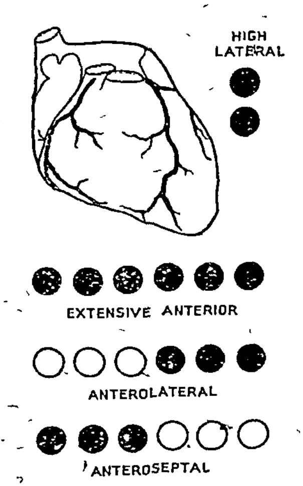

Fig. 8—Varieties of anterior infarcts. Black indicates chest leads showing changes.

So much for the location of the precordial electrode. An electrocardiogram, however, demands two contacts on the body, and the other electrode may be placed theoretically anywhere. Since the body is a volume conductor, the potential variations at the heart are transmitted to all parts of the body, the magnitude of the potentials decreasing as the distance from the heart increases (Wilson 1930, 1943, Wilson et al. 1933a and b). If one electrode is applied over the precordium, and the other to an extremity, the resultant curve is the algebraic sum of the potential variations at the two points of application. These variations are much larger at the precordial electrode than at the peripheral; hence the curves reflect fairly accurately the changes underlying the precordial electrode. The curves may be labelled CF, CR, or CL according as the second electrode is on the left leg, right arm, or left arm.

Wilson et al. (1934e), recognising that the potentials of the extremity, though relatively small, introduced an error into the tracings, considered as precordial curves, introduced the technique of unipolar leads. On theoretical grounds and by experiment he showed that, if

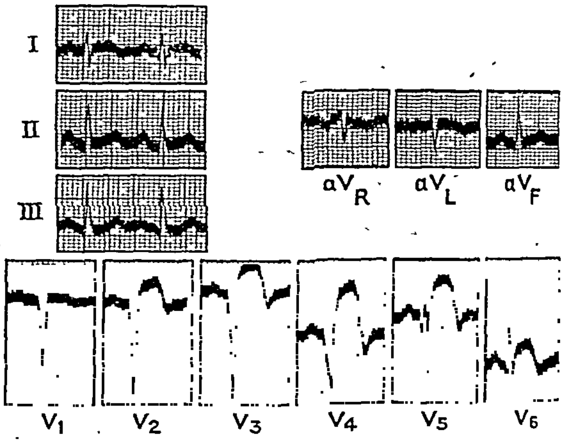

Fig. 9a—Extensive infarct.

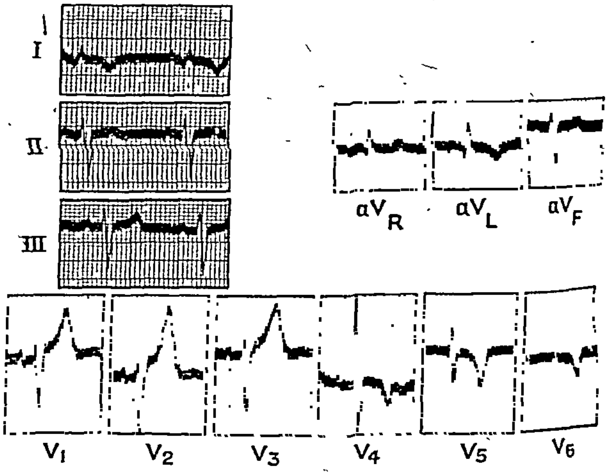

Fig. 9b—Anterolateral infarct.

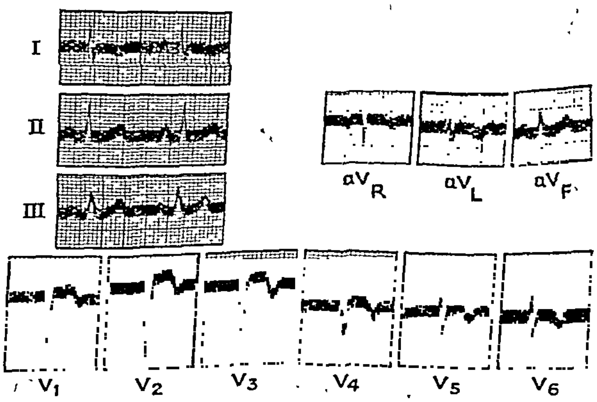

Fig. 9c—Anteroseptal infarct.

Fig. 9—Examples of electrocardiograms from cases of anterior infarction.

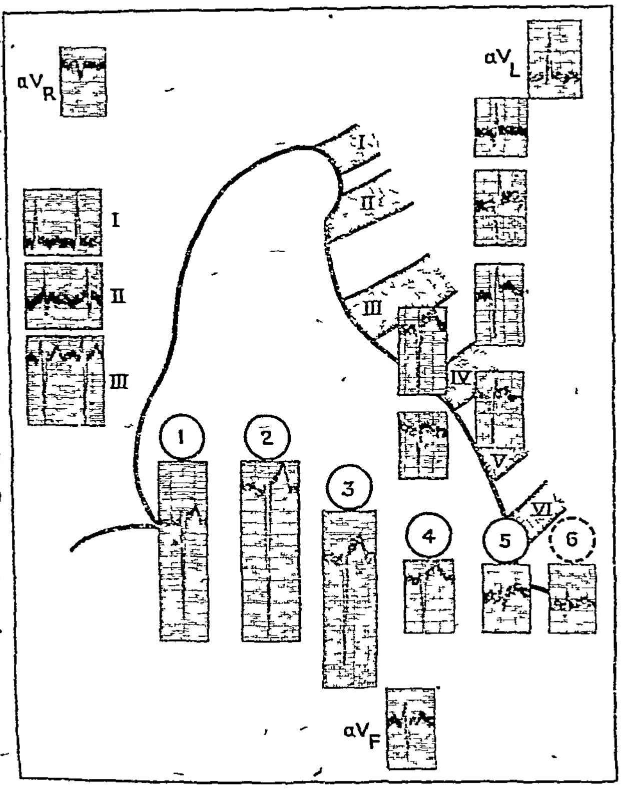

Fig. 10—Electrocardiograms in high lateral infarct. Note the deep Q waves with ST deformities in leads from higher interspaces above points 4 and 5 and the Q and inverted T in lead aVL.

the three limbs (right arm, left arm and left leg) are connected to a central common terminal through resistances of 5000 ohms or more, the central point does not vary appreciably in potential throughout the cardiac cycle. The theory was attacked from many quarters, and experimental evidence was adduced against it. Eventually, however, the theory and practice were abundantly vindicated, and the method of leading from the precordium to such a "null point" is now widely accepted and has been recommended by the Cardiac Society of Great Britain and Ireland (1949). Such leads are "unipolar" since, for practical purposes, they reflect the potential variations of only one electrode, that on the precordium. To distinguish them briefly from other chest leads, they are known as V leads (voltage leads). Such V leads may be recorded from any part of the body —e.g., from the limbs—hence the potential variations of, say, the right arm, left arm, and left leg can be recorded. These leads are known as VR, VL, and VF respectively, while the precordial are labelled V_1, V_2, V_3, &c., in sequence from right to left. It is clear that the standard lead I, from right arm to left arm, with the usual (physiological) polarity, is the algebraic sum of − VR and + VL, since polarity is reversed in the accepted chest-lead technique. So lead II is − VR + VF, and lead III is − VL + VF.

Modifications have been introduced by Goldberger (1942, 1947); the first dispenses with the resistances mentioned above, thus making for technical simplicity in recording; the second causes augmentation of the limb unipolar leads without significant change in their form. Limb leads by this technique are labelled for brevity *a*VR, *a*VL, and *a*VF; these labels are used throughout the clinical section of this paper.

In Britain today various centres follow different systems of leading. In some, precordial leads are taken with the right arm as the "indifferent" electrode, yielding CR leads; for over ten years most of our curves in Edinburgh Royal Infirmary were taken with the left leg as the indifferent point (CF leads). In several hospitals, however, the unipolar (V) leads have been adopted, and these are now current practice in this laboratory. Before discarding the CR and CF systems, however, one should consider their relation to, and possible advantages over, the unipolar leads. A great objection is that curves obtained by such leads are compounded of two independent variables, one admittedly small, but none the less affecting the curve in a way unpredictable unless the potential variations of the distant electrode are known. Unipolar leads are "pure" without distortion from the distant electrode. In favour of the CR leads Evans (1949) states that by this method an inverted T is never found in certain leads in health, whereas by V leads T inversion in V_1 and V_2 may occur in normal people. This seems a specious premise on which to base a preference, and one which has caused no trouble in interpretation. An important argument in favour of V leads is that their adoption facilitates the recording of unipolar limb leads, which in certain conditions yield information of the highest value in the interpretation of E.C.G. (see below). The papers by Bain and Redfern (1948), Letham (1949), Cameron (1949), and Wood (1949) should be consulted for details of the problem.

In summary, an E.C.G. today in most laboratories includes some 12 leads: the 3 standard leads, the 3 unipolar limb leads, and 6 unipolar precordial leads. Fewer precordial leads suffice in some cases; additional leads are required in others.

E.C.G. CHANGES IN MYOCARDIAL INFARCTION

Armed with our knowledge of the changes produced by injury to the heart muscle in direct leads, let us consider the clinical E.C.G. of infarction in man. The case from which these records (fig. 7) were made has already been reported (Branwood 1947). I was implicated solely in the interpretation of the E.C.G.

A man, aged 58, who was subject to effort angina and had had duodenal ulcer, had a routine E.C.G. taken at 11.40 A.M. on Jan. 29, 1947. Twenty minutes later he sustained a clinical

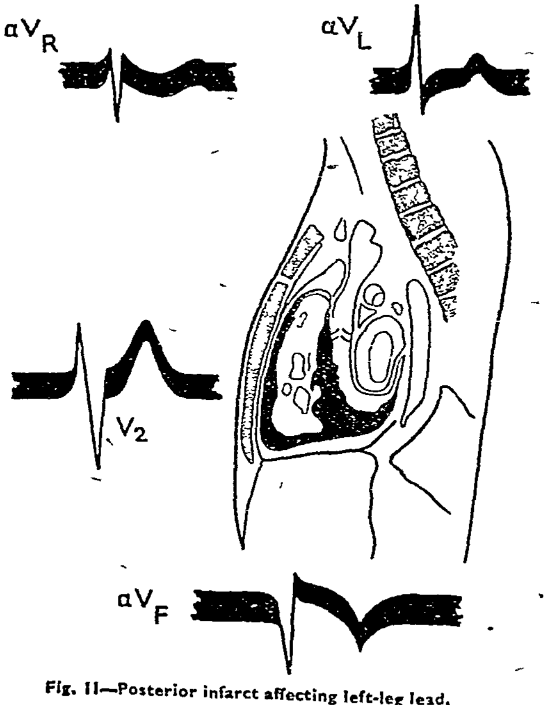

Fig. 11—Posterior infarct affecting left-leg lead.

x 2

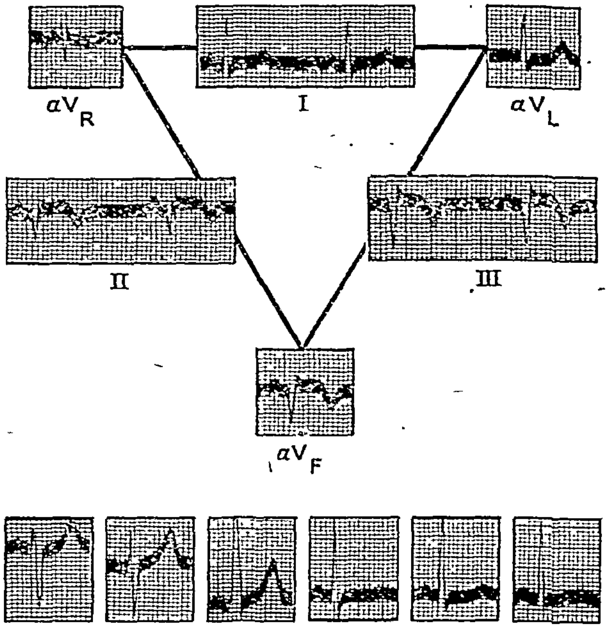

Fig. 12—Electrocardiograms in case of "posterior" infarction.

perforation of a peptic ulcer, and an hour thereafter, at 1 P.M., developed precordial pain suggesting a superadded coronary infarction. A record at 1.20 P.M. already shows ST changes in the two recorded chest leads. The development of ST shifts, Q R S changes, and later T inversions can be followed in fig. 7. From the ST elevation in figure *c* it is apparent that the epicardial surface of injured muscle faces the apical electrode. In *d*, *e*, and *f* the tell-tale Q waves are obvious, indicating that the surface electrode over the apex looks through inactive (dead) muscle into the ventricular cavity; T inversion had begun to appear in the lead showing ST elevation before death supervened. The double diagnosis was confirmed by necropsy, death having taken place on the fourteenth day after the onset of acute symptoms. The sequence of E.C.G. changes is noteworthy.

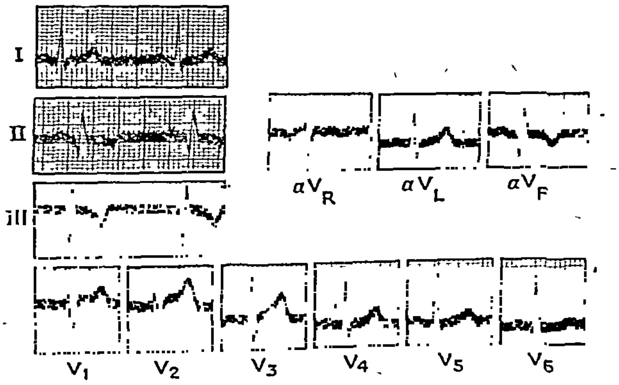

Fig. 13*a*.

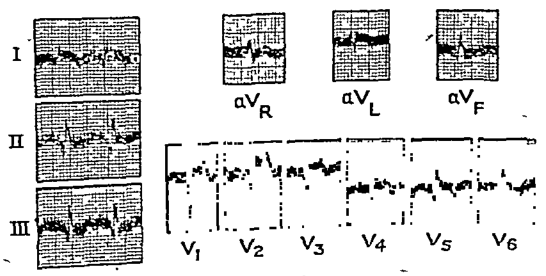

Fig. 13*b*.

We might predict that the E.C.G. changes in precordial leads, so far as Q R S deformity is concerned, would be confined to cases of infarction of the anterior surface, and that the particular leads affected would depend on the exact location of the infarct. Thus, extensive infarction will show changes in all or most of the six leads (fig. 8), whereas anteroseptal and anterolateral infarcts will affect only the leads from points overlying the lesion. The three common types of anterior infarct are illustrated by clinical curves in fig. 9.

Infarcts of the upper part of the left lateral wall (Wilson et al. 1946) may only show changes in special leads from higher interspaces. In such high lateral infarction deep Q waves are visible in leads from over the affected area, and smaller Q waves persist in all higher spaces right up to the left shoulder, with the result that the left-arm unipolar lead may show tell-tale changes when the standard leads are equivocal and the usual chest leads silent (fig. 10).

In a large proportion of infarcts the "posterior" surface of the heart is involved, from occlusion of the circumflex branch of the left, or part of the right, coronary artery. Anatomically this surface is not truly posterior but inferior or diaphragmatic; the posterior aspect of the heart is occupied by the left auricle (fig. 11). In infarction of this surface the precordial leads show no Q R S changes, though downward ST shifts appear in recent cases. But the left-leg unipolar lead, though distant, looks directly at the infarcted surface and might be expected to show Q R S changes similar to those in precordial leads in anterior infarction. The curves in this figure have been redrawn from an actual case of posterior infarction and show the relationship expected.

In lead *a*VF the Q wave of the "infarcted window" is obvious; there is ST elevation, since the lead faces the epicardial aspect of the injured area, and T inversion as usual develops later where ST elevation was found in the early stages. In the full set of leads (fig. 12) from this patient it is apparent that only lead *a*VF and those derived from it (standard leads II and III) show the infarct pattern. It is therefore understandable how so-called posterior infarcts are more readily diagnosed

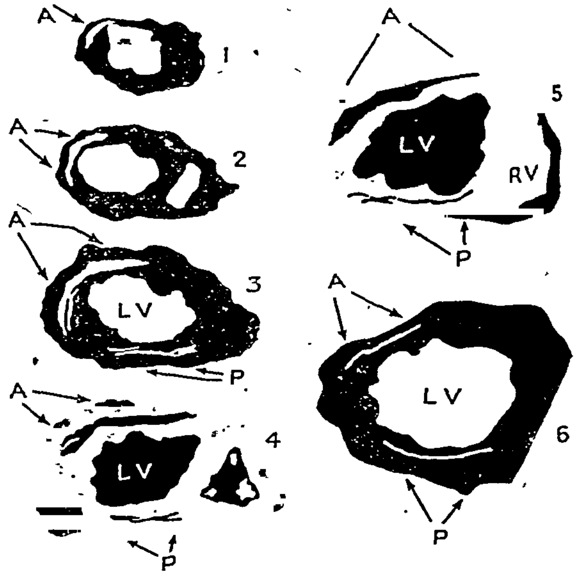

Fig. 13*c*.

Fig. 13—Male, aged 54, first attack of clinical coronary infarction on June 25, 1947; second attack on Dec. 25, 1948; death in congestive failure on Jan. 2, 1949: *a*, electrocardiograms 1 year after first infarction; *b*, electrocardiograms 6 hours after second infarction; *c*, drawings of heart serial sections 1 cm. thick from apex to base, position of old posterior (P) and new anterior (A) infarctions being indicated in white.

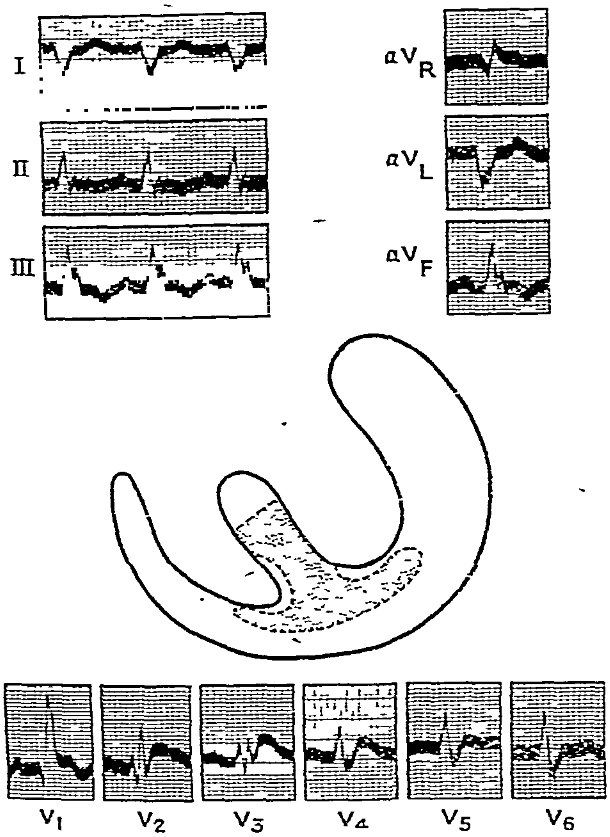

Fig. 14—Electrocardiograms from a case of septal infarction.

from standard lead curves than from precordial leads. In modern practice lead *a*VF is recorded, since a prominent slurred Q in that lead is strongly in favour of infarction, even if changes in the standard leads are minimal. Records made with the exploring electrode in the œsophagus (Brown 1936, Hamilton and Nyboer 1938, Myers and Klein 1948) may yield curves in posterior infarction comparable to those of precordial leads in anterior lesions. They are, however, unsuitable for use in ill patients.

An example, confirmed by necropsy, of the E.C.G. diagnosis of infarction is shown in figs. 13*a*. *b*, and *c*).

A man, aged 54, sustained an attack of clinical coronary thrombosis on June 25, 1947. The E.C.G. 23 days later indicated a posterior lesion, and records a year later were still characteristic and unchanged. On the morning of Dec. 25, 1948, he had a second attack, and the E.C.G. on the same day indicated a fresh anterior infarction. Despite admission to hospital and treatment with heparin, the patient developed auricular fibrillation and congestive heart-failure and died suddenly on the ninth day of illness. At necropsy both infarcts, old posterior and fresh anterior, were found in the predicted locations.

The interventricular septum is involved to a greater or less extent in many infarcts. On occasion gross infarction of the septum occurs which may produce puzzling E.C.G. changes.

For example, the rare type of right bundle branch block was associated with ST deformities and small Q waves (fig. 14) in a patient who had clinically had a very recent infarction preceded by another several days before. At necropsy gross septal infarction, with less extensive infarction of the anterior and posterior walls, was found.

These isolated examples of post-mortem correlation of pathological findings and E.C.G. diagnosis illustrate the close correspondence that is shown in such large series as those of Myers et al. (1948, 1948b, 1949). Space forbids further detailed discussion of the E.C.G. changes produced by infarction, but brief mention must be made of one or two important points. First, the E.C.G. diagnosis rests most surely on progressive changes when such can be demonstrated in serial records, and this is particularly applicable to cases in which the curves do not conform to the classical types. Secondly, E.C.G. changes may be delayed in their appearance, and serious difficulty may arise if diagnosis is attempted from a single early tracing. This should be borne in mind especially perhaps in cases in which the diagnosis lies between a surgical abdominal emergency and a coronary infarction. Thirdly, the QRS changes described above are those of massive transmural infarction. Where the whole thickness of the muscle is not involved, R waves and intrinsic deflections may persist from the outset, or reappear early after initial suppression, and ST and T changes alone are evident.

Lastly, some other conditions may mimic the E.C.G. pattern of myocardial infarction, in particular the state of acute cor pulmonale following massive pulmonary embolism (McGinn and White 1935, Murnaghan et al. 1943). The combination of deep S waves in lead I and of Q and inverted T waves in lead III, together with T inversion in the leads from the right precordium, all relatively fleeting, indicate pulmonary rather than coronary infarction. Right bundle-branch block commonly occurs as an early transient phenomenon (Durant et al. 1939). Characteristic E.C.G. changes occur also in some cases of pericarditis (Bellet and McMillan 1938). These are marked by ST elevation in all three standard leads and in the precordial leads. The ST shifts differ from those of infarction in being "concordant" and not opposite in sign in leads I and III. The changes are not present in all cases. I recently had under my care a case of terminal pericarditis complicating uræmia in which none of the 12 leads recorded showed ST deformity, and at necropsy the whole heart was involved.

(*To be concluded*)

ACHALASIA OF THE PYLORUS IN ADULTS

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PYLORIC stenosis with delay in emptying the stomach is usually due to organic obstruction at the pylorus. When this is caused by congenital hypertrophy of the pyloric sphincter, symptoms usually develop in the early weeks of life, though for many years they may not be particularly obvious. In adults, however, the commoner cause of obstruction is an acquired disease, such as duodenal ulcer.

Some diseases produce a temporary pyloric stenosis or pylorospasm. The lesions may then be in the stomach or the duodenum—e.g., peptic ulceration—or in more distant organs, such as the gall-bladder and the appendix. But cases are seen in which there has been gross retention of gastric contents for many years and yet at operation or at necropsy no lesion can be found in the stomach or the duodenum, and the pylorus appears normal: there is no associated disease which would produce pylorospasm, nor is it reasonable to suppose that such protracted dysfunction of the pyloric sphincter could be merely the result of disease in another organ. This type of lesion was first mentioned by Cruveilhier in 1852 (cited by Lerche 1914). Since this date a few other cases have been noted, and three more are described here.

CASE-RECORDS

Case 1.—A woman, aged 45, had been able to eat anything until seven years before admission to hospital, since when she had had pain and vomited after meals. At first she had vomited small quantities frequently, but in the past year large quantities occasionally, even vomiting food taken a week previously. She had lost 28 lb. in weight.

On examination there was visible peristalsis but no palpable mass in the abdomen. Twenty-four hours after a barium meal radiography showed that practically no barium had left the stomach; the stomach was greatly dilated but no other lesion was seen. A fractional test-meal showed that the acidity was within normal limits, but the curve was of a climbing type.

Operation.—The stomach was grossly enlarged and its wall hypertrophied; the duodenum appeared healthy; and neither organ showed evidence of active or healed ulceration. The pylorus seemed perfectly normal. A partial gastrectomy of the anterior Polya type was performed. To the naked eye no stenosis was visible in the pylorus. The pathologist found gastritis and some hypertrophy of the gastric mucosa but no other abnormality. There was no old or recent ulcer.

Progress.—The patient made a good recovery and has had no trouble in the fifteen months since operation.

Case 2.—A woman, aged 62, had for many years had pain an hour after meals. The pain was relieved by vomiting, and there had been remissions. The patient had become worse in the previous year and lost weight.

On admission she had absolute constipation and visible peristalsis, with waves passing up and down, and her abdomen was much distended, particularly on the left side.

Operation.—Intestinal obstruction due to a carcinoma of the colon was suspected; so after appropriate preoperative treatment a laparotomy was performed. All that was found, however, was great enlargement of the stomach with an apparently normal pylorus. An anterior Polya gastrectomy was done. To the naked eye no ulceration or pyloric stenosis was visible. On section the mucosa was œdematous, but there was apparently no lesion of the submucosa or the muscular layers.

Progress.—In the two years since operation the patient has been free from pain and vomiting, but has had anorexia and lassitude and has not gained weight.

Case 3.—A woman, aged 34, had been assaulted and had her nose broken six years ago. A month later she had begun to vomit, at first only in the evening. A few months before admission vomiting had become more frequent, after most meals, and had been copious at times.

On admission in June, 1947, the patient had epigastric tenderness, achlorhydria, and microcytic anæmia. The plasma-chloride level was 550 mg. per 100 ml. and the blood-urea 150 mg.

Progress.—She improved under medical treatment, and in July radiography of the stomach showed no abnormality. After an inflammation in her lungs the vomiting increased and her condition deteriorated, the plasma-chlorides falling to 445 mg. per 100 ml. Administration of saline again effected an improvement, and at this time visible peristalsis was observed and an organic pyloric stenosis diagnosed.

Operation.—On laparotomy the stomach was proved to be moderately distended, the pylorus and duodenum being normal. A posterior gastro-enterostomy was performed, and gross submucous œdema of the stomach was found. Both kidneys were very large and smooth.

Postoperative Progress.—The patient made good progress for two days but then gradually became worse and died nine days after operation, having had epileptic fits and widespread purpura.

Necropsy Findings.—There was slight puckering of the mucosa at one part of the pylorus, with a superficial scar, but no indication which one would expect from a healed or healing ulcer of the usual type. On microscopy the pyloric musculature appeared normal.

DISCUSSION

Ætiology

A considerable number of cases have been described in which pyloric stenosis in adults has been due to congenital hypertrophy, probably of a mild degree, thereby escaping treatment in infancy but permitting the child to reach adult life. In the present cases the most striking feature was the absence of any pyloric abnormality and of a muscular tumour in particular. There is still disagreement about the cause of congenital hypertrophic pyloric stenosis, but one theory is that there is a congenital achalasia of the pylorus which leads to hypertrophy of the prepyloric muscle, which appears as the tumour. If this condition goes untreated the whole stomach becomes hypertrophied, with the result that a localised prepyloric tumour is not found (Netto 1940). In the type of case under discussion symptoms do not arise until adult life, and so a congenital cause for them is most improbable.

Another explanation of the obstruction is that of Maylard (1904, 1920), who considered that the pylorus was concentrically narrower than normal and therefore the reduplication of mucosa there was greater than usual. This explanation, however, was given only after examination of the pylorus at laparotomy and was not based on its laboratory examination.

Russell (1908) described three of these cases, in two of which he thought the pylorus was fibrosed, probably congenitally, for the symptoms were of long standing. Walton (1923) is sceptical about the presence of pyloric stenosis in the absence of organic obstruction, and does not believe that spasm alone can give rise to enough mechanical obstruction to cause characteristic symptoms. He holds that in cases of this nature the primary lesion is visceroptosis, leading to pyloric obstruction by kinking. If, however, there is hypertrophy of the pylorus, he believes it is an old congenital lesion—a view held by most observers. He also attributes the so-called simple fibrosis of the pylorus to visceroptosis, because it does not improve after gastro-enterostomy; but he has not personally seen such a condition not associated with ulceration.

Hurst (1925) recognised that pylorospasm could be secondary to other lesions, especially peptic ulceration, but he also described a case in which at laparatomy no lesion of the pylorus could be found and no corrective operation done.

Severe obstruction occurs at other levels of the alimentary tract without any apparent change in the sphincter concerned, notably at the cardiac and pelvi-rectal sphincters. It is now generally believed that in these cases the underlying trouble is an imbalance between the components of the autonomic nervous system—either an underaction of the parasympathetic or an overaction of the sympathetic.

It would be surprising if a similar abnormality did not occur at that most important sphincter, the pylorus. The present three cases and some of those previously reported should be regarded as due to achalasia of the pylorus. Considerable weight is afforded to this argument by the fact that in some of the published cases achalasia of the cardiac sphincter was present as well as the pyloric stenosis, suggesting that the two lesions were similar in nature.

The 19 cases described by Maylard (1904, 1908), 2 by Russell (1908), 1 by Hurst (1925), and 3 by Netto (1940) can probably all be included in this category. It is unlikely that the lesion is congenital, since in the great majority of the cases symptoms do not begin until adult life; and few clinicians would now accept visceroptosis as a cause of severe pyloric obstruction. A possibility which must be considered is a prolapse of gastric mucosa, but in the cases described here there was no evidence of this. The symptoms from prolapsed mucosa are extremely variable, but pain is the most prominent, with vomiting relatively rare, and in none of the recorded cases has there been the extreme dilatation of the stomach noted here. The radiological appearances may be mistaken for those of a duodenal ulcer, but some abnormality is generally observed. At operation the prolapse is usually easily palpable, or laxity of the mucosa may be recognised in the specimen (Scott 1946, Manning and Highsmith 1948).

That a muscle tumour or fibrosis of the pylorus was not the underlying cause was excluded by macroscopical and microscopical examination of the specimens. In all, when examined microscopically, there was an entire absence of any fibrous tissue in excess of normal.

It is rather more difficult to decide whether the muscle of the pylorus is within normal limits, because its thickness varies with the age, weight, and height of the individual, and considerable variations may occur as the result of fixation. However, in all three cases neither the surgeon nor the pathologist regarded the pyloric muscle as hypertrophied on naked-eye examination, and the localised tumour which occurs in infants was absent. When the specimens were sectioned and examined microscopically the muscle again appeared to be within normal limits. They have all been examined by Dr. E. R. A. Cooper, who also regards the size of the pylorus as within normal limits.

An almost identical picture may be produced after vagotomy, a fact which lends strong support to the argument that the condition is due to autonomic imbalance, and suggests that it may be due to loss of vagal function from some unknown cause. Whatever may be the reason for the achalasia, it seems to be acquired during adult life and is presumably more closely related to cardiospasm, which usually arises in adult life, than to congenital megacolon.

In case 3 the onset of symptoms was closely related to a shock, which helps to relate the lesion to a nervous cause.

Clinical Features

A striking feature of this type of case has been the great preponderance of females, almost 5 to 1, in most of whom symptoms began in early adult life. This sex-incidence is quite unlike that in hypertrophic pyloric stenosis and should be sufficient to classify the present type of pyloric achalasia as a separate entity.

Diagnosis should not be impossible, for the patients generally have gross gastric retention—e.g., in case 1 scarcely any barium had left the stomach in twenty-four hours. The symptoms last long but usually do not resemble those due to an ulcer, and the onset in adult life will distinguish the condition from congenital lesions. Pain is not so great as in a patient with an ulcer and is generally relieved by vomiting. Radiography of the stomach and duodenum is of great value in excluding obstruction due to ulceration or to neoplasm and prolapse of gastric mucosa.

Treatment

In the published cases treatment has been usually either gastro-enterostomy or partial gastrectomy. Those described by Maylard (1904, 1908) were all treated by gastro-enterostomy, and after an immediately satisfactory response the original symptoms came back. Of the two survivors described here the response to partial gastrectomy in one has not been very satisfactory, though vomiting has been abolished; and, though the other patient has done well for fifteen months, this is too short a period for proper assessment of the treatment. If the cause is an autonomic imbalance, it is not surprising that the operations have not been very successful. This lack of improvement sometimes follows gastro-enterostomy done to relieve the gastric stasis which may develop after vagotomy.

In the present state of our knowledge the treatment seems to be surgical, and some short-circuit of the pylorus should be made, possibly with excision of the pylorus. If this fails to bring about sufficient improvement, one may consider the possibility of an attack on the sympathetic nervous system—e.g., resection of the splanchnic nerves.

SUMMARY

Three cases of pyloric obstruction without any apparent cause are described.

It is considered that the obstruction in these and similar cases is due to achalasia of the pylorus.

The clinical picture and treatment are discussed briefly.

I wish to thank Prof. A. M. Boyd for his advice, Prof. John Morley for his criticism, and Dr. E. R. A. Cooper for examining the microscopical sections.

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UTILISATION OF HIGH-FAT DIET AT LOW TEMPERATURES

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IT is generally accepted that man's tolerance to a high-fat diet is greatly enhanced by living in a cold climate. For the polar traveller such a diet has been accepted as the most efficient, because fat will give more calories per unit of weight than any other food. When, however, the fat content of the diet exceeds a certain limit, fat metabolism cannot be completed and ketone bodies accumulate in the blood and are excreted in the urine. Ketonæmia gives rise to serious, even fatal, symptoms. Shafier (1921) developed a trial method of calculating the ketogenic/antiketogenic (K/AK) ratio of the elements of the diet from gramme-molecular weights of the components in various foodstuffs: if the K/AK ratio does not exceed 1, ketonæmia will not occur. Woodyatt (1921) developed a similar empirical formula for the fatty acid/glucose ratio, which should never exceed 1·5.

Probably, however, the limiting factor to ingestion of a high-fat diet is the lack of palatability. It is well established that fat has a specific inhibitory effect, through the hormone enterogastrone (Ivy et al. 1935), on the secretion of gastric juice and on the movements of the stomach.

Recently attention has been focused on the problems of (1) man's tolerance to a high-fat diet (Consolazio and Forbes 1946) and (2) tolerance to cold as affected by the diet (Mitchell et al. 1946). Consolazio and Forbes investigated the effects of a high-fat diet, composed of pemmican, with a 50% fat composition, in a temperate environment, and found that only one out of eight men could tolerate such a diet, and that this man developed ketonuria. Mitchell *et al.* found that men's tolerance to cold (exposure to −20°F for four hours) was superior on a high-fat diet, composed 55% by weight of fat, than on a high-carbohydrate or high-protein diet of the same caloric value.

Hawley et al. (1933) pointed out that tolerance to a high-fat diet, in the sense of better oxidation of fat, could be acquired. Heinbecker (1928), in studies on Eskimo metabolism, demonstrated the capacity of the Baffin Land and Polar Eskimo to excrete remarkably

I wish to thank Mr. R. J. Rutherford for permission to report this case, and Mr. D. B. Smith, supervisor of the laboratory of the department of surgery, Edinburgh, for the photograph.

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UNSUCCESSFUL TREATMENT OF ASCARIASIS WITH HETRAZAN

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'Hetrazan' (1-diethylcarbamyl-4 methylpiperazine hydrochloride) has been used by Oliver-Gonzalez et al. (1949) in the treatment of six patients infested with *Ascaris lumbricoides*. All worms were apparently removed from three of the patients, and in the other three the egg-count was considerably reduced.

Confirmation of these results was sought in the treatment of patients admitted to hospital at Winneba, Gold Coast.

Material and Method.—The stools of all patients admitted were examined microscopically; concentration methods were not used. The intensity of the infection was estimated by the number of ova of *A. lumbricoides* per coverslip preparation.

Alternate patients with ascariasis were treated with hetrazan, the other patients with ascariasis being treated with oil of chenopodium, the routine treatment at Winneba. Those treated with hetrazan were thirteen females and eleven males, aged 6–65 years, with an average of 50 ova per coverslip preparation. Those treated with oil of chenopodium were eleven females and thirteen males, aged 5–62 years, with an average of 41 ova per coverslip preparation.

Dosage.—The dosage of hetrazan was that recommended by Oliver-Gonzalez et al.: 2 mg. per kg. of body-weight eight-hourly for twenty-four hours. Eight hours later a saline purge was given.

Treatment with oil of chenopodium was as follows. Twenty-four-hours' starvation was followed by a saline purge in the evening. At 6 A.M. next day adults were given oil of chenopodium 1 ml. in a solution of sodium sulphate; two hours later another saline purge was given. The dose of oil of chenopodium was reduced proportionately for children.

Results.—Stools were examined for worms during the next three days; on the morning of the third day after treatment the number of ova per coverslip preparation were counted. The findings were as follows:

	Oil of chenopodium	*Hetrazan*
No. of cases	24	24
Ascaris found in stools after treatment	15	7
Stool findings on 3rd day:		
Stools cleared of ova	19	11
No. of ova per coverslip preparation reduced by more than 50%	5	7
No. of ova per coverslip preparation reduced by less than 50%	—	6

Two patients treated with hetrazan without reduction in the number of ova per coverslip preparation were treated with oil of chenopodium a week later. Both passed worms, and in both cases the number of ova in the stool was reduced. No toxic effects of treatment were observed either with hetrazan or with oil of chenopodium.

Most of the worms passed by both groups of patients were alive.

SUMMARY

Twenty-four patients infested with *Ascaris lumbricoides* were treated with hetrazan, and twenty-four with oil of chenopodium.

In the dosage used hetrazan was less effective than oil of chenopodium in the treatment of ascariasis.

I wish to thank Dr. R. L. Cheverton, director of medical services, Gold Coast, for permission to publish this note.

REFERENCE

Oliver-Gonzalez, J., Santiago-Stevenson, D., Hewitt, R. I. (1949) *Sth. med. J.* 42, 65.

RHEUMATIC AORTIC ANEURYSM IN A BOY OF 19

K. Dorry Loutfy
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Aortic aneurysm is rare in young people. In 184 cases reported by Cowan and Ritchie (1935) the youngest patient was aged 29 and 14 were under the age of 39. It is uncommon to find in the more recent published reports patients under the age of 30, but in the older reports aneurysms were described in young people; possibly their disappearance is due to improved methods of treating syphilis. Le Boutillier (1903) reviewed 80 cases of aneurysm, of which 23 were aortic, in patients under the age of 20. Of these 80 patients 13 were under 12 years old and the youngest was a child of 2 years, congenital syphilis being the cause of these cases in children. Willson and Marcy (1907) reported a large aortic aneurysm in a child aged 4 years.

Though syphilis is the commonest cause, Bernert (1910) collected 14 reported cases in which aneurysms were associated with rheumatism. In rheumatic aortitis Pappenheimer and Von Glahn (1924) reported numerous scars in the media, but the lesions were much smaller than in syphilitic aortitis. A few years ago, in the Kasr-el-Aini Hospital, Cairo, a case of rheumatic aneurysm of the aorta was confirmed at necropsy. Smallpox, influenza, typhoid fever, and pneumonia have occasionally been accused of weakening the adventitia (Boyd 1940).

In view of the rarity of rheumatic aneurysms the following case is reported.

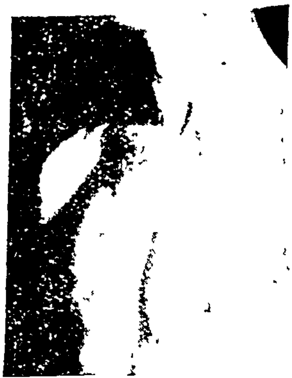

Fig. 1—Anterior surface of chest showing swelling in second right interspace close to sternum.

A boy, aged 19, single, working in an electrician's shop, complained of palpitation, pains in the joints, shortness of breath on exertion, and dry cough for four years. More recently there had been a sense of oppression at night, specially felt behind the sternum. The attacks of rheumatic pain had recurred almost yearly, lasting for three months with fever and swelling of the joints and confining the patient to bed. In the last five years he had had repeated sore throat. Four years ago he had had an attack of severe breathlessness on exertion which lasted three or four hours and was followed by a stitch-like precordial pain with palpitation. The breathlessness had increased, becoming more severe on exertion and worse in the winter. For a month before admission to hospital he had had a dry cough associated with the dyspnœa, and nocturnal dyspnœa had broken his sleep and been accompanied by throbbing headache and retrosternal oppression. Four days before admission he had had fleeting pains in the large joints. There was no history of syphilis in either the patient or his parents. Seven years previously he had had urinary bilharziasis.

On examination he was a normally grown youth of good nutrition. His cheeks were flushed, but his temperature was normal. Capillary pulsation was visible in the skin; in the neck gross pulsations of the carotid arteries were present, together with pulsation in the suprasternal notch. The trachea was central, and a tug could be felt. The pulse was of the water-hammer type, with blood-pressure 140/50 mm. Hg in both arms, and 190/60 in the thigh, where a characteristic Duroziez murmur was audible. There were no signs of peripheral venous congestion. There was a visible pulsating swelling in the second and third right intercostal spaces, just outside the sternum (fig. 1). The apex-beat was in the fifth space 1 in. outside the mid-clavicular line and gave a heaving impulse. In the aortic area there were palpable systolic and diastolic thrills, and thrills with similar timing could also be felt at the mitral area. Systolic and diastolic murmurs were audible in the aortic area, and in the mitral area a harsh systolic murmur was propagated to the axilla, and, following an "opening snap," there was a slightly rumbling mid-diastolic murmur of lower pitch than that heard in the aortic area.

Fig. 2.

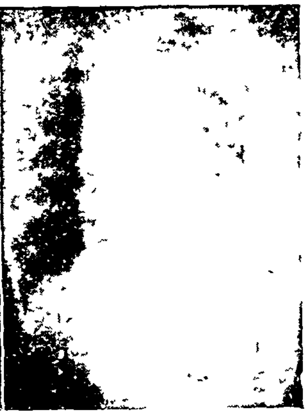

Fig. 3.

Fig. 2—Anterior view of chest, showing enlargement of left side of heart, with diffuse enlargement of whole aortic arch.

Fig. 3—Right anterior oblique view of chest, showing œsophagus indented by enlarged aortic arch.

Investigations.—The Wassermann reaction was negative even after provocative neoarsphenamine. The cerebrospinal fluid was normal, with negative Wassermann. The erythrocyte-sedimentation rate was 8 mm. in 1 hour, and 25 mm. in two hours (Westergren). Blood-culture was negative. Red-cell count 3,680,000 per c.mm.; Hb 70%, white-cell count 9000 per c.mm. (eosinophils 6%). Stools contained ova of ascaris (this condition was treated). Urine contained a trace of albumin; specific gravity 1·030. Radiography of the chest showed diffuse enlargement of the aorta, particularly of the arch (figs. 2 and 3); enlarged left ventricle and auricle; greatest transverse diameter of the heart $17^1/_2$ cm.; transverse diameter of the chest 26 cm. Electrocardiogram showed left ventricular hypertrophy with inverted T wave in all three leads; the P wave was within maximum normal limits.

DISCUSSION

The major features of this case of aortic aneurysm are the youth of the patient and the presence of severe rheumatic heart-disease. There was no clinical or serological evidence of syphilis, and infective endocarditis seems to be ruled out. The rheumatic history was strong, and the murmurs at the mitral area were compatible with a rheumatic lesion of the mitral valve, accompanying rheumatic aortic incompetence. There was no suggestion of dilatation above a coarctation of the aorta, and it is difficult to assign the aneurysm to any cause other than rheumatism.

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PITUITOUS CATARRH

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ENUMERATING the various types of bronchitis, Laennec (1823) described a condition which he called idiopathic pituitous catarrh. He said: "I give this name to that variety of catarrh in which the expectoration is colourless, transparent, ropy, frothy on the surface, and underneath like the white of egg diluted with water." He described two varieties: an acute type which may occur at intervals and a chronic form which is often characterised by considerable regularity of the paroxysms of cough and expectoration.

In view of the paucity of published cases this condition seems to be very rare. Reference to it as a special variety of bronchitis is seldom made in standard textbooks, though Davidson (1941) mentions it.

The clinical picture is striking: the patient is subject to extremely severe bouts of coughing, during which he expectorates a large volume of sputum having the characteristics described by Laennec. As much as three pints in twenty-four hours may be produced. Apart from the distressing chest symptoms of cough, sputum, and dyspnœa, the patient's general condition remains good and does not exhibit any evidence of toxæmia such as may be found in chronic thoracic sepsis. The ætiology of the condition is unknown.

The case reported below has been kept under my own observation for a little over two years and has been the subject of numerous investigations.

CASE-RECORD

A carpenter, aged 36, was admitted to hospital on May 6, 1947, with cough, expectoration, and dyspnœa. He said his symptoms had begun in June, 1942, during a training course in jungle warfare in New Zealand. Previously well, he had become ill with severe cough and dyspnœa; he was thought to have bronchopneumonia, and was in hospital for about six weeks. His symptoms improved but little, and from then until the present admission he had continuous chest symptoms which were so severe that he could not do any sustained physical work.

The outstanding feature of his illness was that each night since its onset (five years ago) he was woken by a paroxysm of coughing lasting about $^1/_2$–$^3/_4$ hour, during which he coughed up 1–$1^1/_2$ pints of sputum. As a rule the coughing bout occurred about seven hours after he had fallen asleep (if he went to sleep at 11 P.M. the attack would occur at about 6 A.M.; if he went to sleep at 9 P.M., it would occur at 4 A.M.). After the attack, which was associated with much dyspnœa, he would feel very exhausted and go to sleep again. During the daytime he had little cough and expectorated practically nothing. He always felt exceedingly short of breath, even when resting. Only occasionally did he note any blood in the sputum, and then it was but a mere streak.

He had no other symptoms; his appetite was good, and he had not lost weight. At different times chronic bronchitis, asthma, and bronchiectasis had been diagnosed. Treatment with adrenaline, ephedrine, postural drainage, &c., had been tried without benefit. The patient had been advised to live in a warmer climate and had tried this without any benefit.

Past and family history were uneventful. There was no history of exposure to irritants of the respiratory tract, or of any disease of the upper respiratory tract, and nothing to suggest allergy.

On examination the patient was a well-nourished man weighing 13 st. 10 lb., a little dyspnœic while resting in bed. He was not cyanosed or feverish. His pulse-rate was 75 per min., pulse regular. His cardiovascular system appeared normal; blood-pressure 115/80 mm. Hg. Examination of the lungs revealed no impairment of the percussion note, voice sounds, or breath sounds, but numerous coarse low-pitched rhonchi were heard scattered over both lung fields; there was no evidence of bronchospasm. There was no clubbing of the fingers, and all other systems appeared normal.

I wish to thank Mr. R. J. Rutherford for permission to report this case, and Mr. D. B. Smith, supervisor of the laboratory of the department of surgery, Edinburgh, for the photograph.

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UNSUCCESSFUL TREATMENT OF ASCARIASIS WITH HETRAZAN

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M.B. Edin.
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'Hetrazan' (1-diethylcarbamyl-4 methylpiperazine hydrochloride) has been used by Oliver-Gonzalez et al. (1949) in the treatment of six patients infested with *Ascaris lumbricoides*. All worms were apparently removed from three of the patients, and in the other three the egg-count was considerably reduced.

Confirmation of these results was sought in the treatment of patients admitted to hospital at Winneba, Gold Coast.

Material and Method.—The stools of all patients admitted were examined microscopically; concentration methods were not used. The intensity of the infection was estimated by the number of ova of *A. lumbricoides* per coverslip preparation.

Alternate patients with ascariasis were treated with hetrazan, the other patients with ascariasis being treated with oil of chenopodium, the routine treatment at Winneba. Those treated with hetrazan were thirteen females and eleven males, aged 6–65 years, with an average of 50 ova per coverslip preparation. Those treated with oil of chenopodium were eleven females and thirteen males, aged 5–62 years, with an average of 41 ova per coverslip preparation.

Dosage.—The dosage of hetrazan was that recommended by Oliver-Gonzalez et al.: 2 mg. per kg. of body-weight eight-hourly for twenty-four hours. Eight hours later a saline purge was given.

Treatment with oil of chenopodium was as follows. Twenty-four hours' starvation was followed by a saline purge in the evening. At 6 A.M. next day adults were given oil of chenopodium 1 ml. in a solution of sodium sulphate; two hours later another saline purge was given. The dose of oil of chenopodium was reduced proportionately for children.

Results.—Stools were examined for worms during the next three days; on the morning of the third day after treatment the number of ova per coverslip preparation were counted. The findings were as follows:

	Oil of chenopodium	*Hetrazan*
No. of cases	24	24
Ascaris found in stools after treatment	15	7
Stool findings on 3rd day:		
Stools cleared of ova	19	11
No. of ova per coverslip preparation reduced by more than 50%	5	7
No. of ova per coverslip preparation reduced by less than 50%	—	6

Two patients treated with hetrazan without reduction in the number of ova per coverslip preparation were treated with oil of chenopodium a week later. Both passed worms, and in both cases the number of ova in the stool was reduced. No toxic effects of treatment were observed either with hetrazan or with oil of chenopodium.

Most of the worms passed by both groups of patients were alive.

SUMMARY

Twenty-four patients infested with *Ascaris lumb* were treated with hetrazan, and twenty-four with oil of chenopodium.

In the dosage used hetrazan was less effective than oil of chenopodium in the treatment of ascariasis.

I wish to thank Dr. R. L. Cheverton, director of medical services, Gold Coast, for permission to publish this note.

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K. Dorry Loutfy
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Aortic aneurysm is rare in young people. In 184 cases reported by Cowan and Ritchie (1935) the youngest patient was aged 29 and 14 were under the age of 39. It is uncommon to find in the more recent published reports patients under the age of 30, but in the older reports aneurysms were described in young people; possibly their disappearance is due to improved methods of treating syphilis. Le Boutillier (1903) reviewed 80 cases of aneurysm, of which 23 were aortic, in patients under the age of 20. Of these 80 patients 13 were under 12 years old and the youngest was a child of 2 years, congenital syphilis being the cause of these cases in children. Willson and Marcy (1907) reported a large aortic aneurysm in a child aged 4 years.

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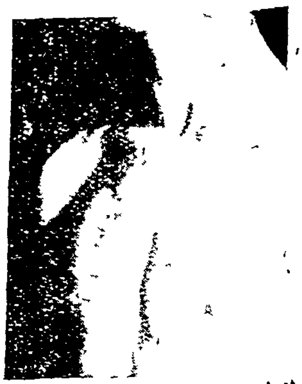

Fig. 1—Anterior surface of chest showing swelling in second right interspace close to sternum.

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COOMBS TESTS

With rabbit anti-human serum before absorption and after absorption with washed human red cells, titrated against (*a*) hæmolytic-anæmia cells, and (*b*) Rh-coated cells.

Dilutions of rabbit serum	Rabbit serum untreated *versus*		Rabbit serum absorbed with hæmolytic-anæmia cells *versus*		Rabbit serum absorbed with Rh-coated cells *versus*	
	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)
2^{-1}	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +
2^{-2}	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +
2^{-3}	+ + + +	+ + + +	+ + + +	+ + + +	+ + +	+ + + +
2^{-4}	+ + + +	+ + + +	+ + + +	+ + + +	Neg.	Neg.
2^{-5}	+ + + +	+ + + +	+ + +	+ + + +	Neg.	Neg.
2^{-6}	+ + + +	+ + + +	Neg.	+ + + +	Neg.	Neg.
2^{-7}	+ + +	+ + +	Neg.	+ +	Neg.	Neg.
2^{-8}	+ +	+ + +	Neg.	Neg.	Neg.	Neg.
2^{-9}	+ +	+ + +	Neg.	Neg.	Neg.	Neg.
2^{-10}	Neg.	+ +	Neg.	Neg.	Neg.	Neg.
2^{-11}	Neg.	+ +	Neg.	Neg.	Neg.	Neg.
2^{-12}	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

in the immune rabbit serum is responsible for the agglutination of cells sensitised with a specific blood-group antibody, the same element is active against the (presumably sensitised) red-cell surface in acquired hæmolytic anæmia.

This work was done at the South-Western Regional Blood Transfusion Centre, Bristol, to the director of which, Dr. G. H. Tovey, I am obliged for permission to publish.

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Reviews of Books

The Biology of Mental Defect

LIONEL S. PENROSE, M.A., M.D. With a preface by Prof. J. B. S. HALDANE, F.R.S. London: Sidgwick & Jackson. 1949. Pp. 285. 21*s*.

IF the reader approaches this book with the idea that it will provide him with simple and authoritative statements on all the problems which arise in the ætiological aspects of mental deficiency, he will be disappointed. This is not the design of the author. Almost as many questions are asked as are answered, and no attempt is made to conceal by dogmatic generalisations the numerous gaps in our knowledge.

Professor Penrose attacks his subject in an entirely fresh way. He begins with a historical introduction in which more attention is paid to evolution in ideas than in institutions. The result is most readable and stimulating. From this he goes on to the incidence of mental deficiency and the measurement of intelligence, and discusses the relation between intelligence and various physical, social, cultural, and economic factors. After chapters on the problems of classification and causation, there is a valuable section on methods of analysis of statistical data, which should prove of great use to all workers in this field for reference purposes. It is only after this comprehensive introduction that the author enters on the special field of genetics. Chapters on the relation of mental defect to mental disorder and on treatment conclude the work. There is a bibliography of about 500 references, as well as a number of appendices and an index.

Professor Penrose's work should prove invaluable for the research-worker, and as it is full of stimulating ideas anyone with an interest in biology would find many of the chapters fascinating. Professor Haldane in his preface says that he believes that the study of mental deficiency is of considerable philosophical importance; and Professor Penrose does not burke the wider implications of this theme. The answer that is given to the eugenic problem is very cautious. There are probably few among the informed who believe that society should use semi-compulsive eugenic measures on any large scale in the attempt to rid itself of morbid conditions dependent on hereditary factors. The social problem of providing support and care for the idiot and the imbecile is not a major one; and from the racial point of view their occurrence is a matter of no importance. Voluntary sterilisation can be humanely desirable in a limited number of picked families, but it is of little significance to society as a whole. Professor Penrose, however, also has strong objections to positive eugenics—i.e., the encouragement of vigorous and successful people to produce rather more than their fair quota of children. His arguments on this point seem far less strong, but one of them should be allowed great weight in its proper field of application. The vigour of a race and its adaptability to changing circumstances lies very largely in its genetical variability. Any processes which, like the stockbreeding of animals, encourage some desirable qualities at the expense of increasing uniformity must be regarded as dangerous.

The Sulphonamides

F. HAWKING, M.D., National Institute for Medical Research, Mill Hill, London; J. STEWART LAURENCE, M.D., M.R.C.P., physician in charge of the Walkden Clinic, Manchester. London: H. K. Lewis. 1950. Pp. 390. 42*s*.

As the authors of this admirable book state in their preface, the time has now come when a reasonably full and detached account can be given of the sulphonamide drugs. Such a review can also be more or less definitive; for, though the sulphonamides have advanced a long way since the first reports of their activity, it is not now probable that many new properties of this group of drugs will come to light. The authors turned a delay in publication to good account by adding recent Continental views; and this has greatly enhanced the value of the book to the English-speaking reader. The account of the toxic effects of the sulphonamides is especially full, but every important aspect of the drugs has been dealt with adequately and the bibliography is comprehensive. The completed work is something with which to be well pleased. Handsomely produced, and well printed and illustrated, its binding will please eye and hand during the years to come when it will be indispensable to many of us.

Ecology of Health

The New York Academy of Medicine Institute on Public Health, 1947. Editor: E. H. L. CORWIN, PH.D. New York: Commonwealth Fund. London: Oxford University Press. 1949. Pp. 196. 20*s*.

THE words "ecology of health" conjure up a picture of ecological studies on the grand scale. This book represents the quintessence of papers and discussions held as part of the centennial celebration of the New York Academy of Medicine, and the introduction claims that it may be regarded as a point of departure for the next century's progress in public health. For the American citizen this promise may be fulfilled, though it is oddly disappointing to the non-American.

The first chapter is devoted to Genetics and the Public Health, and despite an almost overwhelming preoccupation with the genetic effects of atomic energy and the atom bomb it contains much valuable information. The teaching of genetics to medical students in the United States is examined in detail, and this section should be read by all those planning medical curricula for the future. The reader may be startled to find the recommendation that "it should be mandatory for a man to abstain from acts of reproduction for some two months after his testes have been exposed to any considerable dose of radiation." Next follows a chapter on maternal health and nutrition which gives a clear idea of recent research in the United States and Canada but not elsewhere: war-time experience in Great Britain is not mentioned. The discussion on animal and insect vectors of disease is truly ecological and vividly describes the recent advances in control of epidemic diseases, particularly plague and yellow fever. The chapter on Climate, Geography, and Disease is also world-wide in outlook, though the comment that diphtheria was not at all prevalent in England a hundred years ago is open to challenge. The description of Mills's views on the effects of external heat and the date of conception is interesting. He has found inter alia that of the 32 American Presidents

Investigations.—A blood-count showed red cells 5,200,000 per c.mm., Hb 14 g. per 100 ml. (102%), white cells 6500 per c.cm. (differential count normal). The Wassermann reaction was negative. A Mantoux test (1 in 1000) was positive. Electrocardiography showed a normal tracing. The vital capacity was 3·5 litres. Radiography of the chest showed a little general increase of the lung markings only. A bronchogram revealed no abnormality of the bronchi.

Sputum.—The amount expectorated was 15–25 oz. daily, all of which was produced in $^1/_2$–$^3/_4$ hour. The sputum was neither fetid nor purulent. Laennec's original description fitted it perfectly; the surface of the sputum was frothy, but the bulk of it looked like clear mucus, resembling the "white of egg diluted with water." It could be poured very easily from one sputum mug into another, "flopping" in and leaving the sputum mug clear. No "casts" were found. Microscopically it was acellular. Culture on several occasions revealed only a few contaminants and an absence of any [illegible]sms or fungi. Attempts to isolate a virus [illegible] the sputum was non-albuminous but contained mucin.

Bronchoscopy showed that the mucosa of the bronchial tree appeared a little redder and softer than normal; excessive glairy secretion was coming from all bronchial orifices. The configuration of the bronchial tree appeared normal. A biopsy specimen of the bronchial mucosa showed that the epithelium was tall columnar; its cells show great secretory activity; the submucosa was œdematous and infiltrated with chronic inflammatory cells, particularly in the subepithelial layer and to a lesser extent round the mucous glands; and the mucous glands showed considerable secretory activity.

Subsequent Course.—The patient has been carefully followed for the succeeding two years. His clinical condition has remained unchanged. The nocturnal bouts have been recurring daily with clockwork regularity and without any apparent relation to external environment. Bronchial antispasmodics and anti-histamine drugs have had no effect. Chemotherapy with penicillin, &c., has been useless. Large doses of atropine given to the point of intolerance were tried and, though they diminished the total quantity of sputum, it became more viscid and tenacious, and the patient experienced much distress in attempting to expectorate it. Deep X-ray therapy to the chest was also tried without benefit. Repeated bronchoscopy has revealed little or no change in the appearance of the bronchial mucosa. Successive radiograms likewise have shown no alteration. The quantity and quality of the sputum have not altered in any way. Despite the chronicity of his symptoms the patient's general condition remains good.

DISCUSSION

The diagnosis of this case was at first in doubt. The chronicity of the patient's symptoms, together with their peculiar characteristics, did not conform to any well-recognised disease. Thorough investigation of the chest, including bronchography and microscopical section of the mucosa, did not give much positive assistance. The outstanding feature of the case is that for seven years without remission the patient has coughed up a large amount of sputum each night after going to sleep. The sputum contained no pus and showed merely a large amount of clear mucus-like material. The biopsy report suggested that the secretory glands of the bronchi were extremely active in the absence of any obvious inflammation.

The condition has resisted all forms of therapy, including those directed against possible allergy or infection.

The conclusion appears inescapable that this is an example of *catarrhe pituiteux idiopathique* originally described by Laennec. Probably some of the cases reported by Laennec under this heading may have been confused with cases of bronchial asthma, or cardiac asthma with pulmonary œdema. However, Laennec, mentions several examples which conform to the syndrome encountered in the present patient, and cites one such patient who had "expectorated during the last ten or twelve years, in two daily paroxysms, about four pounds of a colourless, ropy, and frothy fluid."

Hartley and Davies (1923) reported the case of a woman, aged 34, who had a series of acute attacks, especially at night; the average daily amount of sputum was 20 oz., and a 6 oz. container would be filled in 15 minutes. They described the sputum as being "thick, ropy, and homogeneous" and consisting of "mucus looking just like unboiled white of egg," and stated that the other characteristic feature of the sputum was "the ease with which it could be emptied from vessel to vessel, the whole flopping out en masse, leaving the sputum pot clean, save for a little froth near the rim." They commented on the rarity of the condition and suggested that it might be due to excessive secretory activity of the mucous glands of the bronchial tract.

In a case cited by Seyfarth (1932) that came to necropsy, tuberculous bronchial lymph-glands were found, among which the vagus nerve was embedded on one side, and the bronchorrhœa was attributed to vagal irritation; it is difficult, however, to explain the generalised bronchial disturbance on the basis of such a unilateral lesion.

The rarity of pituitous catarrh may be more apparent than real. Possibly some cases are masquerading under a clinical diagnosis of bronchiectasis without radiological proof; others have been merely called chronic bronchitis or asthma despite the lack of any associated sepsis or bronchospasm.

The ætiology is obscure. Pituitous catarrh seems to be unrelated to infective, allergic, or psychic factors. The characteristic clinical picture results from intense hypersecretion of the bronchial glands in the absence of any demonstrable cause, and tends to be paroxysmal and come on especially at night.

I wish to thank Dr. A. B. Anderson, medical superintendent of the Repatriation General Hospital, Springbank, South Australia, for permission to publish this case.

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COOMBS TEST IN ACUTE ACQUIRED HÆMOLYTIC ANÆMIA

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M.D. Dubl.
MEDICAL DIRECTOR, NATIONAL BLOOD TRANSFUSION ASSOCIATION, DUBLIN

IN 1946, Boorman et al. reported that the red cells of patients with acute acquired hæmolytic anæmia gave a positive direct Coombs test. This has been confirmed by various workers. On the whole, red cells from these patients are agglutinated rather less avidly in the Coombs test than are red cells sensitised in vitro by specific immune Rh or other antibodies.

In a cross-absorption experiment two samples of the same batch of rabbit anti-human serum (Coombs serum) were respectively absorbed with an equal volume of washed packed cells which were (*a*) from a typical case of severe acquired hæmolytic anæmia and (*b*) normal group-O D-positive sensitised in vitro with an incomplete anti-D antibody. Next, back titrations were done and compared with the titres shown by this particular immune rabbit serum against the cells before absorption (see table).

The untreated rabbit serum was active at a higher titre with the cells sensitised in vitro, and absorption was more complete with these cells; but it can be seen from the back titration that the same component was evidently absorbed from the rabbit serum by both types of sensitised cells. I conclude that, whatever antibody element

THE LANCET

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Training For General Practice

DR. COLLINGS, in his report, said more than once that nobody had ever satisfactorily defined the scope of general practice. We all thought we knew what it was, or should be; we were willing to comment on its present defects, or suggest improvements for its future; but we did this without accurately delineating its proper sphere. He asked that "an attempt should be made to define the future province and function of general practice within the framework of the National Health Service,"[1] and it is good to see that an attempt of this kind is made in the British Medical Association committee's new report on *The Training of the General Practitioner* (see p. 1008). Before considering recommendations on training, the committee, with Sir HENRY COHEN as chairman, set itself to describe the nature of general practice. An early chapter of the report, after giving accounts of days in the lives of practitioners in different types of practice, goes on to analyse the tasks that general practitioners now perform and must continue to perform. This analysis leads to a chapter comparing and contrasting the work of the general practitioner and the specialist, from which the conclusion is drawn that "general practice, as the continuous medical care of the individual, provides the underlying unity of Medicine, and has as its goal the study of 'the whole man.'"

> "Ultimately, it is in the return of its results to general practice that the fragmentation of Medicine into specialties finds its fullest justification."
>
> "The adequate pursuit of many specialties requires no higher ability, industry, zeal and personality than general practice; indeed some require less."
>
> "... the traditional distinction in status and prestige between general practice on the one hand and any and every specialty on the other is wrong."
>
> General practice "is different in kind from other departments of medicine and the general practitioner must have personal qualities rather different from those of specialists."

It is on the basis of these conclusions, and on the premise that general practice is a calling with special skills of its own, worthy of ranking, when these skills have been acquired, on an equality with other more specialised branches of medicine, that the report proceeds Given this premise, it is natural to ascertain what are the special skills required, and what are the disciplines that will best fit the student to become a worthy practitioner.

The committee rightly insists that up to the time of qualification, and in the pre-registration year that will now follow qualification, there should be no distinction between the education of the future general practitioner and that of the potential specialist. Each should be given the same background of scientific training, based (the committee would prefer) on the principles outlined in the earlier B.M.A. report, *The Training of a Doctor*. Only when he has completed this basic training will the young doctor be ready to make his choice of general practice as a career and to take advantage of the opportunities he should be given for further training. The committee believes that this further training will ordinarily take three more years: the first year should be spent as a trainee under the tutelage of an approved established practitioner; in the second, the future practitioner should go back to a hospital to study hospital practice, with the new perspective acquired from his year in practice; and the third year should be occupied in special studies of the doctor's own choice to meet his particular needs for more knowledge of subjects that especially interest or have previously escaped him. Somewhere, too, in these postgraduate years, service in the Armed Forces will have to be fitted in; and for the present it is proposed that 18 months in uniform should count as 12 months' training, though the year spent in actual general practice must not be shortened. Altogether it is a long extra spell of training that is suggested, and obviously the doctor will have to be adequately paid while engaged in it.

In these days of growing concern, when the content of general practice is changing, and its prestige and attractiveness are falling, it is salutary to have such revolutionary recommendations presented; and they deserve the most careful consideration in the universities and in Whitehall. Opinions will differ as to their practicability, partly because of the prolongation of the already long years of medical training but partly also because of the difficulty of finding enough places in hospitals or in practices where the young graduate would receive proper tuition, encouragement, and experience. Already we are committed to finding internships for a year for the whole student population, while all those proceeding to specialist training must spend some five further years in posts of rising seniority as registrars: can we in addition, find room to give further hospital instruction, for a year or more, to our apprentice G.P.s? Where, too, do we find our trainers among the practitioners? The report is against discrimination, and would have us allow any practitioner of over five years' standing to apply to train a newcomer; but this seems to be too liberal a policy. The apprentices ought surely to be taken under the wing of practitioners who are themselves giving a high standard of service, and who are not so overworked as to have no time to give proper instruction, or so harassed that they may be tempted to unload too big a share of their burden on the inexperienced shoulders of the trainee. Certainly some of the practitioners met by COLLINGS will be unsuitable instructors until they have been enabled to change their manner of practice. The aim is not to teach the young to adapt themselves to the hurried methods of industrial practice, but rather to show them such better ways of organising their working lives that if they eventually undertake such work they will rebel against its present conditions and build something better. Some selection of trainers is in any case inevitable because at any one time there will hardly be more than one trainee, in his apprentice year, for every twenty doctors established in practice

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11 were conceived in the first quarter of the year, 10 in the second, 7 in the fourth, and 4 in the third.[1] The Atlas of Diseases projected by the American Geographical Society of New York will be a valuable addition to our medical libraries.

A chapter is devoted to realities in preventive psychiatry, and some of the statistics given are surprising. It has been estimated that approximately 8 million people in the United States have now, or have had in the past, some form of mental disease or personality disorder. Of 15 million men examined for military service during the war a total of 2,480,000 were rejected because of neuropsychiatric disorders. This chapter is full of common sense and nobody will dispute the conclusion that "psychiatry today is in the curious position of having acquired, through a tremendous popularisation, a somewhat magical aura while it is still suffering from a carry-over of the medieval attitudes which placed an everlasting stigma on the psychiatric patient." The chapters on trends in State and Local Health Services, the Hospital Survey and Construction Act, and the preparation of professional workers, are of interest mainly to those concerned with future developments within the United States. Lastly there is a glorious finale by Prof. Franklin Bobbit on the education of laymen in health responsibilities in which he attacks the present-day education of adolescents in the United States. After describing the impressive and inspiring custodial institutions, spacious and dignified with ivy-covered walls and cap-and-gown atmosphere, he concludes that "in reality this is education without purpose, since the programs do not aim at the shaping or improvement of any definite human functions."

Though much of this book is devoted to preventive medicine, it contains information of value to all who are interested in the preservation and improvement of the health of mankind. The European reader must be warned not to allow himself to be prejudiced by the predominantly all-American approach.

The Inner Experience of a Psychoanalyst

THEODOR REIK. London: Allen & Unwin. 1949. Pp. 514. 21*s.*

IT is a recurrent charge against psychiatry that it attracts psychopathic practitioners as well as psychopathic patients; there are still medical men who prefer to see themselves as the competent mechanic with the servicing-schedule, dealing with the breakdown and the psychical accident from behind a level surface of common sense and sanity. Dr. Reik is a pupil of Freud who has been in analytical practice too long to accept such a view. Psychiatry involves the interplay of two minds, not a surgical operation by one mind on another. This is not the only field of medicine where introspection, a sense of experience shared with the patient, and even a personal experience of suffering are assets precious to the physician. Dr. Reik returns to the part which Freud's awareness of his own inner conflicts played in providing the driving force behind his study of mental processes. His book looks resolutely towards the personality of the analyst rather than that of his patient. In so far as Dr. Reik's personality emerges, it is a scholarly, sympathetic, and wise one. It is given, perhaps, to a process of thought which releases an idea and follows it by association, looking for experimental evidence to justify, rather than to guide, the course it takes; but such an approach is probably better suited to the business of tracking the strange and the irrational associations in other minds than rigid objective logic. Much of the wisdom is in the humour of the writing, a quality usually lacking in psycho-analytical literature. The chapter on "Psychoanalese" deserves special recommendation to the inexperienced and the amateur Freudian. As Reik says, this is a book for the young worker. In its way, and subject to the limitations of the strict analytical method, it does for its subject something of what the great humanists of medicine have done for general practice. Some of it will be condemned as whimsical; but whimsicality itself can be a point of contact with the surprising behaviour of the deranged mind. This particular psycho-analyst will, the reader feels, be far less congenial to fanatics of his own system than to its critics. He quotes with relish Freud's own remark "Moi, je ne suis pas Freudiste." The technique he advocates depends almost wholly on the personality of the technician. In Dr. Reik's hands it must inevitably be of value, even where it is vague or mistaken.

Maladies du squelette

LUCIEN LEGER, R. DUCROQUET, HENRY LEGER. Paris: Masson. 1949. Pp. 253. Fr. 1200.

THIS well-illustrated and well-written book gives detailed descriptions of the rarer diseases of bone. The authors have compiled largely from previous authors, but their own cases are surprisingly numerous, and carefully described. Albright's disease, bone xanthoma, eosinophil granulomas, and skeletal associations of neurofibromatosis are all covered, and the authors suggest that some common ætiological factor may prevail, or that they may be diverse manifestations of a common pathological process. The curious distribution of lesions is the chief point they establish for this hypothesis; but even if the suggestion is flimsy, the argument is illustrated by elaborate records. Melorheostosis, strain fractures, and so-called essential osteolysis are fully recorded, and a final chapter on myelomata of bone completes a catalogue of rarities. Obviously the authors have considerable experience of the conditions they describe and their book, though it makes rather difficult reading, is a valuable work of reference.

Differential Diagnosis of Chest Diseases

J. J. SINGER, M.D., F.A.C.P., F.C.C.P., medical director, Rose Lambert Foundation, Beverly Hills. London: Henry Kimpton. 1949. Pp. 344. 52*s.* 6*d.*

THIS book, whose title on the outside cover is simply *Chest Diseases*, is a highly condensed account of the subject in which the emphasis has been placed upon the differential diagnosis. A large field is covered, and affections of the diaphragm and thoracic cage are included. Its main defect rests upon the fact that the author has not confined himself to his "terms of reference" but has been beguiled from diagnosis into the realm of treatment. This is particularly apparent in the chapter devoted to the surgical treatment of pulmonary tuberculosis. It is unfortunate that a potentially good book should thus have fallen between two stools, for it contains a great deal of valuable information about the relation between the clinical study of the patient and the help derived from laboratory and radiological investigations. It is extensively illustrated and the reproductions are excellent.

The Middlesex Hospital (1745-1948)

HILARY ST. GEORGE SAUNDERS. London: Max Parrish. 1949. Pp. 100. 8*s.* 6*d.*

THE Middlesex Hospital has done well to chose Mr. Hilary St. George Saunders to chronicle its two hundred years of growth and achievement, and his practised pen gives to a story, certain to be read with interest by Middlesex men, a very much wider appeal. It is the story of a triumph of the voluntary system. Middlesex Hospital, unlike St. Thomas's or St. Bartholomew's, has no past stretching far back into the history of England; nor had it, like Guy's, a wealthy godfather to speed it on its way with a rich endowment. From its beginning in two little houses (which survive to this day) in Windmill Street off the Tottenham Court Road, it simply grew, not without difficulties and setbacks but with an ever-increasing momentum. That it did so was due, even more than at other hospitals whose resources were greater, to the unremitting labours of a staff that not only wrought in the hospital but wrought the hospital itself. Charles Bell, Bland-Sutton, Webb-Johnson, and a host of others not only gave voluntarily to their hospital a life-time of service in its wards and classrooms; they saw to it that money was always forthcoming for its unending extension. Middlesex Hospital has never lacked benefactors and benefactions on the largest scale. To read its story is to appreciate the boldness of the reforms of today. The staff of tomorrow, salaried and equipped at all points by the State, must keep the pace set by men who were, and knew themselves to be, the architects of its greatness.

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[1] See *Lancet*, 1949, ii, 848.

that preformed stores of esterase are held in the liver and released in response to alterations in plasma-albumin levels,[19] the liver being the site of synthesis.[20] The blending of many of these enzyme-protein-disease relationships is a pleasing feature of WATERLOW'S study.

The metabolic effects of the low esterase levels are unknown. The hydrolysis of acetylcholine or fatty acid esters may be affected. The esterases, along with some other enzymes formerly considered to be concerned only with hydrolysis, have now been allotted rôles in anabolic reactions.[21] In the future, therefore, they are likely to be accorded greater importance in studies of the lean and hungry tissue cells of malnourished people.

Deoxycortone and Pregnenolone in Rheumatism

WHEN LEWIN and WASSÉN[22] announced that deoxycortone and ascorbic acid benefit patients with rheumatoid arthritis, their work was widely repeated. At first the favourable reports were as numerous as the unfavourable, and they included some experimental data. But the presentation of negative findings is always an ungrateful task, and many physicians who had no success with the method did not say so. The view of the large majority is that expressed by twelve medical members of the Empire Rheumatism Council,[23] and several detailed papers we have printed in the last few weeks show that if deoxycortone with ascorbic acid has any pharmacologically valuable effects they are obtained only irregularly and do not produce objective changes that can be readily measured. Though a remarkably large number of clinicians have from time to time noted improvement which they regarded as significant, it has always been difficult, on the theoretical side, to see how the intramuscular injection of a very small quantity of hormone in oily solution, could be responsible for any substantial change in rheumatoid arthritis within a few minutes. Undoubtedly 'Cortisone' and adrenocorticotropic hormone can remove the symptoms, but the improvement seems to take much longer than the 5–15 minutes claimed for deoxycortone. Moreover the quantities of cortisone needed are much greater than the quantities of deoxycortone which have been used; and even if some theoretical mechanism could be devised for the conversion of deoxycortone into cortisone, it is not clear why 5 mg. of the former should have an effect comparable to 100 mg. of the latter. Deoxycortone and ascorbic-acid therapy came in for further condemnation from E. C. KENDALL and PHILIP HENCH at the National Academy of Sciences last month.[24]

When the effects of cortisone and A.C.T.H. were first described, it was pointed out that their importance lay chiefly in the stimulus they would give to research; and this has of course been borne out. Deoxycortone and ascorbic acid is one attempt, and probably an unsuccessful one; the latest seems to be the use of pregnenolone. Two papers have lately been published by DAVISON et al.[25] and by FREEMAN et al.[26] describing improvement with pregnenolone in cases of rheumatism. The claims, though very definite, are less than those made for deoxycortone by some of its supporters. The improvement is much slower and the quantites used are much more of the same order as required for cortisone. Pregnenolone is more easily obtainable than cortisone, and if these claims are substantiated this drug should be another very useful tool. However, KENDALL and HENCH, at the same meeting,[24] denied that pregnenolone has any action on rheumatoid arthritis or any of the other ills which respond to cortisone. They also said that a number of other compounds related to cortisone were without effect.

The position therefore still is that no substances except cortisone and A.C.T.H. can yet be held to have substantiated their position in the endocrine treatment of rheumatism.

Annotations

MEDICINE IN AUSTRALASIA

Prof. G. W. Pickering, who last year held the Sims Commonwealth travelling professorship, brought home more than casual impressions; for his report[27] contains an acute analysis of the university systems in Australia and New Zealand. He detected two fundamental weaknesses. The first was the absence of a body analogous to our own University Grants Committee, which "is sensitive enough to interpret university needs without undue delay, and which provides for financial assistance on a relatively generous scale from the Government, while at the same time insulating the universities from purely political pressure." In New Zealand this defect was being remedied by the establishment of such a committee; but in Australia there was no promise of such a reform, and in some places there was a distinct tendency for the State to interfere in university affairs. This may be partly ascribed to the composition of the Civil Service. Professor Pickering later visited South and East Africa: and he points the contrast between Civil Servants in Colonial territories, who have nearly all been recruited from universities, and those in the Dominions, who have mostly risen by reason of long experience and ability after entering the service on leaving school. In the Dominions "the universities were very poorly supported financially and had to settle many of the smallest details of their programmes with Civil Servants who had no real knowledge of the function or purpose of a university." The second main defect to which Professor Pickering draws attention is the lack of integration, in both New Zealand and Queensland, between the teaching hospital's board of management and the medical school. In New Zealand the members of the board are elected as representatives of local districts, the views of the staff being *voiced* by the medical superintendent. Thus neither expert knowledge nor continuity of policy is assured: and with a change in the board's membership, a senior physician or surgeon may be dropped from the staff, to be reappointed after a year or two to a junior post.

In most of the Australian States the university must accept all students qualifying for admission; and this has led, since the war, to gross overcrowding, notably deemed to have the ability, the willingness, and the facilities for teaching, we could still provide a reasonable choice of trainer and locality of training.

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[19] Brauer, R. W., Root, M. A. *Amer. J. Physiol.* 1947, 149, 611.

[20] Wescoe, W. C., Hunt, C. C., Riker, W. F., Litt, I. C. *Ibid*, p. 549.

[21] Hestrin, S. *J. biol. Chem.* 1949, 180, 879. Hestrin, S. *Biochim. Biophys. Acta*, 1950, 4, 310. Lipmann, F., Tuttle, L. C. *Ibid*, p. 301.

[22] Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.

[23] *Lancet*, April 29, p. 830.

[24] See *New York Times*, April 25.

[25] Davison, R., Koets, P., Snow, W. G., Gabrielson, L. G. *Arch. intern. Med.* 1950, 85, 365.

[26] Freeman, H., Pincus, G., Johnson, G. W., Bachrach, S., McCabe, G. E., MacGilbin, H. *J. Amer. med. Ass.* April 15, p. 1124.

[27] Report to the presidents of the Royal College of Physicians of London, the Royal College of Surgeons of England, the Royal Australasian College of Physicians, and the Royal Australasian College of Surgeons.

The report contains much else to commend, for it covers a large field. "The Committee has formed the view that the attainment and maintenance of a high standard of general practice demands, firstly, a period of systematic postgraduate preparation, and secondly, the opportunity for continuing education throughout the period of active practice." With so wide a range of studies to provide, all is grist that comes to the mill, and each chapter has its quota of thought-provoking ideas. Not all, of course, are new; but even the old ones have often been given a new look and adapted to the new patterns of general and hospital practice. Many of these ideas could be applied in the absence, or in advance, of agreement about the three years' preparation for practice. Prominent among these are the suggestions for developing the office of postgraduate dean, with special emphasis on his value as a director of students (in non-teaching hospitals, and with selected practitioner trainers, as well as in teaching hospitals), to his rôle of adviser to the newly qualified, and to his function of planning postgraduate instruction for established practitioners, whether by lectures, demonstrations or films, or by arranging clinical assistantships or other personal association with medical teaching. Particulars are given, too, of lectures on general practice, which are already being given by a general practitioner to the students in at least one teaching hospital. These lectures could profitably be copied elsewhere.

Enzymes, Proteins, and Malnutrition

ONE of the reasons for the increasing interest in *medical research in our African colonies* has been "the rapid advance in the knowledge of nutrition, and the recognition not only that the colonial territories offer unique opportunities for gaining new information on this subject, but also that defective nutrition is one of the main causes of inefficiency, ill-health, and general backwardness in tropical countries."[1] Since 1946 a Medical Research Council unit have been carrying out an experiment in applied nutrition in the Gambia, British West Africa, as part of the scheme to improve the nutrition of this group of colonial peoples.[2–5] One of the difficulties is that the food-supply, like the rainfall, is markedly seasonal; and just at the time of the year when food-supplies are running out the Gambian has to make special efforts to produce another year's crops. His diet is not likely to be well balanced in the seasons of comparative plenty, but in these half-yearly "hungry-gaps" it is always unbalanced as well as generally insufficient. Moreover, besides those to meet his body's physiological demands, the Gambian requires extra nutrients for the production of antibodies against the many infections and infestations to which he is exposed; this call may be so urgent and insistent that the tissues become impoverished and, though immunological response seems adequate, death may ensue. The need for nutrients is at its highest during growth, particularly in infancy; so it is hardly surprising that about half the children born die before they reach the age of ten years.[3]

The scientific value of the arrangements whereby research-workers from this country can from time to time employ their tools and techniques in tropical countries was illustrated in Dr. JOHN WATERLOW's paper of May 13 (p. 908). In malnourished African infants he showed that the interplay of dietary and zymotic factors may produce clinical manifestations of protein insufficiency, accompanied by early histological signs of liver damage and by subnormal levels of plasma albumin, plasma esterase, and liver esterase. In growing animals the enzyme contents of the tissues are known to depend on age and feeding. The plasma-esterase levels tend to be low at birth and to rise during growth—puppies seem to derive their plasma esterase from the milk or colostrum of the dam—and chronic malnourishment may prevent this normal rise occurring.[6] Thus at birth the rat has no measurable amount of xanthine oxidase in the liver, whereas at weaning it normally has about half the adult amount, and the increase after weaning depends on the diet.[7] More than a dozen liver enzymes are known to be reduced in amount or activity when underfeeding or starvation has lowered the protein content of the liver.[8]

The observation that the tributyrin-esterase activity of serum is lowered in cachectic conditions was first made by BAUER[9] in 1912; and many times since it has been shown that similar conditions interfere with the normal hydrolysis of acetylcholine.[10] It seems that the same enzyme may hydrolyse the esters of fatty acids and acetylcholine, for highly purified preparations of cholinesterase retain their power to *hydrolyse tributyrin*.[11] Plasma albumin levels may be seriously lowered by lack of dietary proteins,[12] and in various pathological states the amount of cholinesterase in the plasma has been shown to vary directly with the amount of albumin[13] (except in some cases of kidney damage when there is albuminuria but the esterase does not pass through the kidney filter[14]). Reduction in the cholinesterase activity of the plasma has been shown to be associated with liver damage in infectious hepatitis and cirrhosis[15]; with underfeeding[16]; and with deficiency of liver proteins.[17] In spite of the close correspondence between the changes in albumin and esterase in the plasma, the esterase is not contained in the albumin fraction but in a fraction composed mainly of α_2 globulin.[18] It is believed

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1. Report of the Medical Research Council for 1945–48. Cmd. 7846. London, 1949; p. 31.
2. *Colonial Research*, 1946–47. Cmd. 7151. London, 1947; p. 59.
3. Colonial Research, 1947–48. Cmd. 7493. *London*, 1948; p. 66.
4. Colonial Research, 1948–49. Cmd. 7739. London, 1949; p. 75.
5. Report on the work of the London School of Hygiene and Tropical Medicine, 1947–48; p. 70. *Ibid*, 1948–49; p. 38.
6. McCance, R. A., Hutchinson, A. O., Dean, R. F. A., Jones, P. E. H. *Biochem. J.* 1949, **45**, 493. Copenhaven, J. H., Stafford, R. O., McShan, W. H. *Arch. Biochem.* 1950, **26**, 260.
7. Westerfield, W. W., Reichert, D. A. *Science*, 1949, **109**, 68. Schmidt, J. A., Petering, H. G. *J. biol. Chem.* 1949, **179**, 489.
8. Potter, V. R., Klug, H. L. *Arch. Biochem.* 1947, **12**, 241. Miller, L. L. *J. biol. Chem.* 1948, **172**, 113. Seifter, S., Harkness, D. M., Rubin, L., Muntwyler, E. *Ibid*, **176**, 1371. Rosenthal, O., Rogers, C. S., Ferguson, C. C. *Fed. Proc.* 1949, **8**, 245.
9. Bauer, J. *Wien. klin. Wschr.* 1912, **25**, 1376.
10. Augustinsson, K.-B. *Acta physiol. scand.* 1948, **15**, suppl. 52.
11. Strelitz, F. *Biochem. J.* 1944, **38**, 86.
12. Peters, J. P. *Nutr. Rev.* 1950, **8**, 33.
13. Faber, M. *Acta med. scand.* 1943, **114**, 59. Levine, M. G., Hoyt, R. E. *Science*, 1950, **111**, 286.
14. Levine, M. G., Hoyt, R. E. *Proc. Soc. exp. Biol., N.Y.* 1949, **70**, 50.
15. Kunkel, H. G., Ward, S. M. *J. exp. Med.* 1947, **86**, 325.
16. McCance, R. A., Widdowson, E. M., Hutchinson, A. O. *Nature, Lond.* 1948, **161**, 56.
17. Milch, L. J. *Proc. Soc. exp. Biol., N.Y.* 1950, **73**, 321.
18. Cohn, E. J., Strong, L. E., Hughes, W. L., Mulford, D. J., Ashworth, J. M., Melin, M., Taylor, H. L. *J. Amer. chem. Soc.*

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MEDICINE IN AUSTRALASIA

Prof. G. W. Pickering, who last year held the Sims Commonwealth travelling professorship, brought home more than casual impressions; for his report[27] contains an acute analysis of the university systems in Australia and New Zealand. He detected two fundamental weaknesses. The first was the absence of a body analogous to our own University Grants Committee, which "is sensitive enough to interpret university needs without undue delay, and which provides for financial assistance on a relatively generous scale from the Government, while at the same time insulating the universities from purely political pressure." In New Zealand this defect was being remedied by the establishment of such a committee; but in Australia there was no promise of such a reform, and in some places there was a distinct tendency for the State to interfere in university affairs. This may be partly ascribed to the composition of the Civil Service. Professor Pickering later visited South and East Africa: and he points the contrast between Civil Servants in Colonial territories, who have nearly all been recruited from universities, and those in the Dominions, who have mostly risen by reason of long experience and ability after entering the service on leaving school. In the Dominions "the universities were very poorly supported financially and had to settle many of the smallest details of their programmes with Civil Servants who had no real knowledge of the function or purpose of a university." The second main defect to which Professor Pickering draws attention is the lack of integration, in both New Zealand and Queensland, between the teaching hospital's board of management and the medical school. In New Zealand the members of the board are elected as representatives of local districts, the views of the staff being voiced by the medical superintendent. Thus neither expert knowledge nor continuity of policy is assured: and with a change in the board's membership, a senior physician or surgeon may be dropped from the staff, to be reappointed after a year or two to a junior post.

In most of the Australian States the university must accept all students qualifying for admission; and this has led, since the war, to gross overcrowding, notably in Sydney. "To me, the overriding consideration is quality . . . for once it is lost, it is not easily regained. There is therefore an upper limit of entry which all universities should be empowered to enforce." In undergraduate teaching methods Professor Pickering found much to applaud. Thus in New Zealand the professor of bacteriology and preventive medicine allocates to each pair of students a problem to be worked out during the long vacation of the fifth year; and at Adelaide the mammalian-physiology class is divided into teams of about six who conduct a series of experiments on wild rabbits, one student acting as anæsthetist, one as surgeon, and another as assistant, while two look after the recording and one keeps the records. In Australia the young graduate may face difficulties unknown in this country; for in some States resident posts are exceptional outside the capital cities. "It will be to the local interest of the hospitals themselves, and vital to the national interests, that resident posts be established in all hospitals with 100 beds and over." For the slightly more senior man at the critical registrar phase the position is even more difficult. Registrar posts are few and the only full-time university units with junior posts are at Sydney and Dunedin. To gain experience, many of the best men come to this country; and some are then lost to the Dominions because there are not enough good jobs to attract them back. Professor Pickering was "rather appalled" by the prevalence of "diplomatosis" among the young graduates of the Dominions; but "I doubt if we on this side can do much to alter this, except by avoiding any increase in the already formidable list of postgraduate diplomas, and if possible eliminating most."

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[19] Brauer, R. W., Root, M. A. *Amer. J. Physiol.* 1947, 149, 611.
[20] Wescoe, W. C., Hunt, C. C., Riker, W. F., Litt, I. C. *Ibid*, p. 549.
[21] Hestrin, S. *J. biol. Chem.* 1949, 180, 879. Hestrin, S. *Biochim. Biophys. Acta*, 1950, 4, 310. Lipmann, F., Tuttle, L. C. *Ibid*, p. 301.
[22] Lewin, E., Wassén, E. *Lancet*, 1949, ii, 993.
[23] *Lancet*, April 29, p. 830.
[24] See *New York Times*, April 25.
[25] Davison, R., Koets, P., Snow, W. G., Gabrielson, L. G. *Arch. intern. Med.* 1950, 85, 365.
[26] Freeman, H., Pincus, G., Johnson, G. W., Bachrach, S., McCabe, G. E., MacGilpin, H. *J. Amer. med. Ass.* April 15, p. 1124.
[27] Report to the presidents of the Royal College of Physicians of London, the Royal College of Surgeons of England, the Royal Australasian College of Physicians, and the Royal Australasian College of Surgeons.

In New Zealand, Professor Pickering was not very deeply impressed with university standards: "the Universities have been regarded too much in the past as teaching institutions and too little as institutions for the pursuit of knowledge by research." Yet the standard of medical practice is high. "In Timaru, a small provincial town, the standard of case presentation and the intelligence of the questions asked after my lecture was as high as one would have obtained in a teaching hospital, and far beyond what one would meet in a provincial town of comparable size at home." The payment by the State of a flat-rate for each consultation tests the doctor's integrity; and "it says a great deal for the New Zealand character that there is still the same urge to excellence, and the same desire to come home for postgraduate work, despite the immediate financial prospects." While in New Zealand, Professor Pickering watched dental nurses doing their work of filling and extraction among school-children. "The parents like them and the children like them. Moreover the dentists like them, for the work they do is monotonous and unremunerative to the dentist, and when he receives the patients as adults, the groundwork has been well laid."

From this urbane report it is clear that the mother country has no less to gain from the example of the Dominions than she can offer in return.

STANDARDS IN ADVERTISING

The Code of Conduct Committee of the advertising profession has now issued a revised edition of its Code of Standards in relation to the Advertising of Medicine and Treatments. This code, originally drawn up in 1948, is recognised on the one side by the Newspaper Proprietors Association, the Newspaper Society, and the Periodical Proprietors Association, and on the other side by the Proprietary Association of Great Britain, the Advertising Association, the Incorporated Society of British Advertisers, and the Institute of Incorporated Practitioners in Advertising; so its provisions apply to almost all the major national and local newspapers and magazines, and to m st of the large firms. In its list of medicines, treatments, products, or appliances which may not be advertised the code goes further than statute law, and the conditions listed in the new edition include asthma (unless the advertisement makes it clear that the product does no more than alleviate an attack, and recommends the sufferer to seek medical advice), amenorrhœa, "artery troubles," arthritis, pernicious anæmia, blood disease, "blood-pressure," cardiac symptoms, dermatitis, chronic or persistent indigestion or rheumatism, varicose veins, "slimming" (this last does not apply to offers of physical-exercise courses or articles used for exercise). Though still not assuring accuracy in advertisements, this new edition is on the whole an advance on the first, issued two years ago.[1] The committee included representatives from the British Medical Association and the Pharmaceutical Society, sitting as members of the Advertising Association.

WAYS WITH OLD PEOPLE

Care of the aged presents a wide field, recently untilled, but now under cultivation by a growing body of enthusiasts inspired by some keen pioneers. The crop is still uneven, certainly; but it is healthy and variegated. Dr. Marjory Warren, speaking at a conference on the better care of the elderly, arranged by the Salford public-health department during May, dwelt on the value of this variety. Everyone agrees, she said, about continuity in the treatment of old people: we must continue to look after them until they require no further treatment; but different units must be allowed to choose their own ways of setting about it. Dr. E. B. Brooke, of St. Helier Hospital, Carshalton, who also spoke at the conference, aims at giving patients all the benefits of hospital care in their own homes. He was supported by Dr. J. M. Greenwood, of Withington Hospital, Manchester, who said that for some four months he had been seeing every patient listed for admission to a chronic sick ward; about a quarter of them, he found, did not need hospital care. Dr. Warren herself at the West Middlesex Hospital, was the first person to start a unit in which old people were classified and treated. The Minister of Health, in a new circular[2] on the treatment of the elderly chronic sick, does not urge any standard pattern on the hospital authorities but is content to draw attention to some underlying principles. Thus early investigation and accurate diagnosis should be ensured and suitable treatment arranged; admission to chronic wards should always be by way of wards or hospitals for acute cases; and reablement for the chronic sick should be better and more general than it is now. Patients who are not fit to be discharged to their own homes or to local-authority residential homes, but who no longer need active treatment, should be placed in a separate part of a large hospital, or in special hospitals, or in long-stay annexes attached to an acute hospital. Every encouragement should be given to the treatment of old people in their own homes by the general practitioner, acting when necessary in conjunction with the domiciliary specialist services or hospital outpatient departments.

This outline offers scope for experiment of the many kinds discussed at the conference. As Dr. [illegible] noted, the hospital ward can offer me… diagnostic facilities and treatment (esp… therapy), nursing care, medicosocial… meals, heating, and a bed with … some of these benefits can be … by means of a ferry service … can be provided from … notably the home-… local authority. … offer quite a w…

276, 1371.
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…d. 114, 59. Levine, M. G.,
286.
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M. J. exp. Med. 1947, 86, 325.
…dowson, E. M., Hutchinson, A. O. Nature,
6.
Soc. exp. Biol., N.Y. 1950, 73, 321.

…trong, L. E., Hughes, W. L., Mulford, D. J.,
M., Melin, M., Taylor, H. L. J. Amer. chem. Soc.

pplemented if necessary by taking the patient daily to e physiotherapy department in transport provided y the hospital. A domiciliary laundry service is being veloped, with the help of the Assistance Board. ort spells in hospital are arranged for those who ed investigations or treatment which cannot be underken in their homes, for those in the terminal phase of n illness distressing to relatives, and for those whose latives are badly in need of a rest.

Dr. Greenwood divides the care of old people into the reventive and curative aspects. The first is a medicoocial problem, and he places suitable housing high on is list of our needs; he also advocates education of the ublic, employment of old people, and the provision f such things as old people's clubs. On the curative ide he is discontented with bedridden old people; we nust get them up, stimulate them mentally and physically —even to the point of bullying them in mild ways. Dr. Warren sees the patient and his disorders and his personal difficulties as a single problem, and sets about solving this quadratic equation with something like gusto. The physician must take a full clinical history, past and present, from the patient and his friends, examine the old person thoroughly, take a history of his social conditions, and plan his treatment in association with the health-visitor and the medicosocial worker or almoner. Her general principles of treatment aim at activity, independence, and some assurance of security for the patient, and a future in an atmosphere of hopefulness and happiness. Specific treatment, of course, is relevant to the disease or diseases, and may call for adaptation of orthodox methods. The happy days of "dumping" are gone, she says—which the more lazy among us, looking forward to a strenuous old age, may be tempted to regret. The reabled old, however, getting up and walking after years in bed, seem to think well of the change.

"COMICS"

THOUGH controversy concentrates on the effects of the cinema on child audiences, some other characteristic twentieth-century influences have not been forgotten. In the United States, where millions of adults as well as children show addiction to the comic strip, the matter and symbolism of the "comic" convention, and the extraordinary response that it seems to evoke in the adult public, are examined in an angry but informative and entertaining little book by Legman.[1] Collecting a series of peculiarities of this form of commercial art, he records that in a girl's periodical, within a few weeks, brides in their wedding dresses were dumped in the mud on no less than seven occasions; and on a basis of one such picture per page, he calculates that by adolescence the American child will have absorbed something like 18,000 sadistic pictures. Attempts to provide better motives and loftier themes have been revealingly unsuccessful, though there have been Biblical and religious comics, one of which was largely devoted to the tortures inflicted on martyrs. As a result of protests, including a particularly strong one from Wertham, whose experience of the psychiatric aspects of
nt crime is among the longest in the United States,
first desc lately been a certain change of front: a recent
lay chiefly in ticle listed some hundred "love story"
and this has of ad replaced "crime" titles (Western
and ascorbic acid is was transmuted into My True Love),
unsuccessful one; the phasise the hardships of crime
ution. How far this change is
an hardly judge; though,
tes are to influence
t love is probably
to the censors
reaking Point have always shown themselves more tolerant to blows than to kisses; they "see thousands of pictures in comic-books of half-naked women being tortured to death, and complain only that they are half-naked. . . . Comic-books do not exist in a vacuum. American parents see nothing wrong with the fictional violence of the comic-books because they are themselves addicted to precisely the same violence in reality. . . . At least sex is normal: is murder?"

The vigour of this polemic is somewhat blunted for readers in a society where addiction to comics is less intense and where some of the native productions maintain a high standard of homely fun. In issuing a new English comic to compete with imported varieties, the Hulton Press seem to have taken no chances of becoming involved in a similar controversy. The editor is a clergyman, and the matter, like that of Dick Barton, is based on a nicely adjusted distinction between violence which is sadistic and violence which releases "healthy aggression." Besides a good deal of information about the inside of locomotives and of germinating seeds, this comic produces heroes who are scrupulous in finding socially acceptable outlets for their two-fistedness. One flies to Venus in a rocket, at the behest of World Government, to find new means of growing food for an overpopulated world. Others organise international espionage to secure the atom bomb against international crooks, being at pains to point out that such an arrangement is to everyone's advantage, on both sides of the Iron Curtain. On the back page we find the voyages of St. Paul. While not meeting Legman's criticisms of violence as a sexual substitute (it could hardly be expected to do so) the Hulton publication balances itself fairly well between edification and blood-and-thunder on the assumption that the second does not necessarily have to be frankly unedifying. It is the streak of psychopathology which is alarming in the American article, and this at least is avoided. The Jeremiahs who denounced Sweeney Todd or the Steam Man as subversive of youth had not the same strong reason as those who now denounce Superman and the Katzenjammer Kids—namely, that our generation has seen similar patterns of fantasy realised elsewhere than on paper, and has found them singularly uncongenial.

GERMAN PSYCHIATRY REVIVED?

THE prominent part played by German-speaking workers in Germany, Austria, and Switzerland in the development of psychiatry during the last fifty years is familiar to us all. The names of Kraepelin, Wernicke, Freud, Wagner-Jauregg, Bleuler, Bonhoeffer, and Kretschmer stand for a high tradition maintained until the Nazis came to power. From that time psychiatry was especially misused for political purposes—to excuse the introduction of compulsory sterilisation, and later the systematic extermination of chronic and incurable patients. Expulsion and suppression of workers for racial and political reasons under Hitler's Reich was followed, twelve years later, by fresh expulsions for opposite political reasons when Hitler's Reich broke down.

How much of the solid structure of this branch of medicine has survived the storms and upheavals of the last fifteen years? And how far has the standard of German published work been preserved? A few publications which have recently reached Great Britain give some idea. Some characteristic schools of thought and methods of approach have survived. Kleist, of Frankfurt University, for instance, who as early as 1919 broached the theory of the heredo-degenerative nature of certain psychoses, has published his latest contribution in one of the reports issued by the U.S. Military Government in Germany.[1] This describes a follow-up of cases,

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19. Brauer, R. W., Root, M. A. Amer
20. Wescoe, W. C., Hunt, C. C., Aiker,
p. 549.
21. Hestrin, S. J. biol. Chem. 1949, 180,
Biochim. Biophys. Acta, 1950, 4, 310.
L. C. Ibid, p. 301.
22. Lewin, E., Wassén, E. Lancet, 1949, ii, 993.
23. Lancet, April 29, p. 830.
24. See New York Times, April 25.

[1] Kleist, K. Fiat Final Report. London, 1949; no. 1257.

and ends by summing up earlier studies by Kleist's pupils. The grouping and subgrouping of mental illness according to symptomatic differences is carried to extremes (ten different types of paranoid schizophrenia are distinguished); and the whole suggests a relapse into the purely symptomatic classifications of the 19th century.

Descriptive clinical psychology, prominent in German psychiatry before Hitler, is well represented in a small monograph by Weitbrecht on convulsive therapy.[2] He analyses sensitively and well the influence of this form of physical treatment on the symptoms and course of psychoses. This influence, he considers, is not merely one of negation and extinction of symptoms: there is a subtle interplay between the original personality and the mechanisms of illness and therapy, leading to replacement and adaptation of symptoms. He observes and describes with as little theoretical interpretation as possible, and throws light on the psychology of the psychosis as well as on the effects of the therapy.

Schultz-Hencke's textbook on dream analysis[3] is an example of the undaunted thoroughness of Teutonic workers. Starting with a philosophy of human instincts, he works through all the explanations he can put forward of the dream as a psychological phenomenon, and arrives at a table of model dreams; and then by applying his psychology of drives to the same dream sample in different settings, he offers many possible interpretations of each model. Though the book is based on Freud's concepts, it is written obscurely, with many digressions; it lacks the clear observation-close-to-life that distinguishes Freud's writings. More practical, but rather superficial, with a flavour of lay and nature medicine, is a small volume on treatment by active relaxation written by Dr. Faust.[4] Like Jacobson, in America, he trains patients with neuroses and psychosomatic disorders to relax deliberately for the relief of muscular and mental tension. His mixture of naïve—and in places rather cranky—theory with sound practical advice is typical of this kind of book wherever it appears. Relaxation as an adjunct to psychotherapy, however, has been adopted by such well-known authorities as J. H. Schultz[5] and Kretschmer.[6]

K. Scheele,[7] a surgeon, discusses in simple language the common fears and concerns of the patient during examination, before and after operation, and in hospital surroundings; and some problems of pain and anæsthesia, convalescence, disfigurement, and compensation. The booklet, meant for the student or young medical man, often refers to the similar, more comprehensive clinical psychology, by Hellpach,[8] which has recently appeared in a second edition.

Finally, Hitler involuntarily enriched psychiatric literature by forcing two outstanding academic teachers to their writing tables by suppressing their other activities: Karl Jaspers,[9] the eminent philosopher, has revised his *General Psychopathology,* first published in 1913—a book which has contributed much to clear thought on psychiatry. An English translation of the new edition, now being prepared in America, will be welcome to British psychiatrists. The second work is *Verstehende Psychologie,* the psychology of empathy, by H. W. Gruhle,[10] who has recently been appointed to the chair of psychiatry at Bonn. It records his life work,—and deals with the problem of psychological understanding between human beings, analysing its criteria and its fallacies. It is crowded with original observations, and draws on the sister sciences of psychology, history, and sociology. It is free from theoretical bias and does not take refuge in psychology without psyche. These two books by old-timers challenge modern German psychiatry to regain and retain its former standard.

TOWARDS SAFETY IN BOXING

IN most games and competitive sports the risk of sprains, fractures, or even visceral damage is accepted as inevitable; indeed, the element of danger is itself an attraction. But boxing is unique in that the chief aim of the contestant is to disable his opponent; and though his intention is to produce only temporary disablement he may easily go further than he intends. The head is the principal target; and, though facial bruises and abrasions can usually be dismissed as trivial, no fewer than 36 reported fatalities from intracranial hæmorrhage, caused either by a blow or a fall, have been collected by Jokl.[1] Other serious injuries include the curious condition known as punch-drunkenness, which seems to be the result of repeated trauma causing multiple hæmorrhages in the deeper portions of the cerebrum, the corpora striata, and the corona radiata, which are later replaced by gliosis leading to a state mimicking parkinsonism. Blows over the precordium may result in direct damage to the heart, and reflex vagal stoppage in diastole has been caused by blows in various situations. The solar-plexus knockout, though very unpleasant, rarely does much harm, but visceral lesions have occasionally been noted. Among more remote consequences may be included the activation of latent tuberculosis and other pre-existing diseases.

Jokl, who is an enthusiast on the subject of exercise and certainly no alarmist, has been sufficiently impressed by these catastrophes to advocate the exclusion of boxing from the physical-training programme of Armed Forces. The customary reply, of course, is that the casualty-list of this sport is small compared with that of certain other sports, especially when one considers that so many men take part in it in so many parts of the world. But clearly some solicitude is justified, and it is interesting to hear that the medical advisory board of the New York State Athletic Commission has lately announced a new set of medical rules and regulations for boxers and wrestlers who participate under its jurisdiction.[2] In future all contestants are to be medically examined just before a bout; and for championship matches a further special examination five days previously will be required. During bouts, an attending physician at the ringside may enter the ring to evaluate apparent or latent injury, and when in his judgment the contestant is in serious danger he shall advise the referee to end the contest.

In principle such recommendations will be approved; but whether they will really be much of a safeguard or can be fully applied in practice, is less certain. Sir Adolphe Abrahams[3] has deprecated the conventional examination of competitors before a marathon race on the ground that the only danger of this event is hyperpyrexia, and that the doctor is unlikely to identify those competitors constitutionally liable to overheating. In the same way clinical examination merely to exclude gross physical signs is generally a farce in the case of pugilists; and what sort of examination could identify the likely candidates for intracranial hæmorrhage? Frequent neuropsychiatric investigations might reveal early warning symptoms of traumatic encephalopathy, but innate personality traits can readily be confused with it. As for the medical attendant at the ringside, it may be easy enough for a referee to use his prerogative to end a contest when the indication is unmistakable—for example, when there is an injury to the eye and consequent blindness—but he would need most convincing testimony from a doctor to persuade him on less obvious grounds. The recovery of a boxer from extreme distress is a commonplace experience, for the reserve called upon in extreme urgency is inestimable. If the referee is to be under an obligation to accept a medical opinion, one can well imagine that a doctor, especially when he knows that much money and other important considerations are at stake, will hesitate to take a course of action which may be reprobated as premature or unjustified.

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[2] Weitbrecht, H. J. Studie zur Psychopathologie Krampfbehandelter Psychosen. Stuttgart, 1949.

[3] Schultz-Hencke, H., Lehrbuch der Traum-analyse. Stuttgart: Thieme. 1949. Pp. 283. D.M. 24.

[4] Faust, J. Aktive Entspannungs Behandlung, Stuttgart: Hippocrates Verlag. 1949. Pp. 128. D.M. 6.80.

[5] Schultz, J. H. Das Autogene Training. Leipzig, 1912.

[6] Kretschmer, E. Psychotherapeutische Studien. Stuttgart: Thieme. 1949. Pp. 215. D.M. 13.50.

[7] Scheele, K. Von der Angst der Kranken. Stuttgart, 1949.

[8] Hellpach, W. Klinische Psychologie. 2nd ed., Stuttgart: Thieme. 1949. Pp. 234. D.M. 16.50.

[9] Jaspers, K. Allgemeine Psychopathologie. Berlin, 1948.

[10] Gruhle, H. W. Verstehende Psychologie. Stuttgart, 1948.

[1] Jokl, E. Medical Aspect of Boxing. Pretoria, 1941.

[2] *J. Amer. med. Ass.* 1950, 142, 1298, 1304.

[3] Abrahams, A. Training for Health and Athletics. London, 1936.

The chairman of the medical advisory board of the New York State Boxing Commission expresses the hope that the new regulations will safeguard the health of the athletes concerned and will reduce accidents before, during, and after bouts. We shall all share this hope, though it remains to be proved whether the precautions now proposed will be more effective in practice than those ordinarily enjoined by common sense.

LOSS OF INFANT LIFE

THE general downward trend in the birth-rate since the beginning of the century has been accompanied and to some extent offset by a decline in the stillbirth and infant-mortality rates; but of course we have by no means reached the limit of achievement in the saving of infant lives. The biological and medical committee of the Royal Commission on Population collected much evidence on reproductive wastage due to abortion, stillbirth, and infant mortality, reproductive capacity and the birth-rate, and involuntary childlessness; and they have now published[1] the reports on this evidence which they made to the commission.

As a cause of loss of infant life, abortion is difficult to assess, because most induced abortions are illegal, and both field surveys and hospital studies are therefore liable to underestimate the proportion of them. The incidence of spontaneous abortion is almost as difficult to estimate, but the committee incline to put it in the region of 7·6% of all pregnancies: and they suggest that therapeutic abortions amount to about 0·7%. It is not easy to find ways of reducing the numbers of illegal abortions, but it is thought that they would undoubtedly decrease if people were more aware of the danger this practice carries to the mother's health (apart from her life) and her future capacity to bear children. "The decision to have an abortion is seldom reached by the mother alone, and it is important that the father also should be aware of these dangers."

The reasons why women seek illegal abortion are social rather than medical or biological, and it therefore stands apart from other causes of loss of infant life. But taking it into account as well as they can the committee put the reproductive wastage as a whole in England and Wales between 15% and 22% of all children conceived. For the other causes of wastage they can give exact figures: stillbirths account for the loss of 2·3% of all children conceived, neonatal death for 2·0%, and deaths between four weeks and one year for 1·4%—a total of 5·7%. When cases are grouped according to the Registrar-General's five social classes, there is a steady increase in the stillbirth-rate with falling social class. The nutrition of the mother during her own childhood and her pregnancy, her living conditions, the care she receives before and after the birth, and the skill with which she is delivered may all have a bearing on this trend. Birth injuries, especially to premature children, could be avoided by more skilful delivery and by the elimination of unnecessary interference during labour. That skilful obstetrics really does save lives is shown by the fact that in 1939 the stillbirth-rate in primiparæ in social classes I and II (the classes where the infants are likely to be strong because the mothers are in the main healthy and well nourished) was 37 per 1000 births, but among 1633 primiparæ belonging to these classes supervised by specialists the rate was only 17. The committee conclude that, in spite of a considerable fall, attributable to better feeding, in the stillbirth-rate in recent years, it could be reduced still further by better obstetrics, including more thorough antenatal care, and better nutrition and living conditions for the poorer mothers. Even the present rate of 23 might be reduced to 18 per 1000 or even less, and this would mean a saving of 4000 babies yearly.

The picture is much the same for neonatal deaths: again there has been a considerable decline in the rate (from 30 per 1000 in 1937 to 20 in 1948), and again the rates rise as the social class descends. Post-mortem studies show that birth-injury, congenital abnormalities, and postnatal infection take the chief toll, especially of premature children—who make up no less than half of those who die in the first four weeks of life. The most promising method of reducing neonatal deaths would therefore be to prevent premature births—by better nutrition of mothers, better antenatal care, good housing, economic security (so that the mother will not have to do heavy work during pregnancy, even in her own home), and family planning so that children are properly spaced. At this age bronchitis and pneumonia are the infections most commonly causing death, while in children between four weeks and a year enteritis and diarrhœa are more commonly responsible, especially in classes III, IV, and V. Chemotherapy has greatly reduced all death-rates from infections since 1941, but they could be brought still lower, the committee think, by better teaching of health conditions to children in schools, more and better health visiting, better child-welfare services, and better training of health visitors, midwives, and medical students in infant and child health, preferably in schools set up for the purpose. By means of all measures taken together, they believe, it would be possible, without any new progress in medical knowledge, to bring the infant-mortality rate down from 34 to perhaps 14 per 1000—which, in 1948, would have meant a saving of 11,000 lives in England and Wales. But whether this saving would have meant a like increment to the population is another matter: some parents decide on the size of their family in advance, and the saving of a child in such a family would probably mean deliberate avoidance of a conception later. Leaving this possibility out of account, the committee suggest that if reproductive wastage was reduced to the extent they think possible, the rate of recruitment to the population would gain by about 1·5%. On the evidence before them, they could not see that there had been any noteworthy decline in the reproductive capacity of the nation, and they concluded that the reduction in the average size of the family since the 1870s has been very largely due to deliberate family limitation.

Involuntary childlessness has only recently begun to be studied. The committee estimate that it occurs in some 5–8% of marriages, the main causes—accounting for half to two-thirds of the cases—being defective spermatogenesis (in about a third of the marriages), blocked fallopian tubes (in 19% of 2291 women examined), and failure to ovulate (in 17% of 1253 women examined). Some miscellaneous causes include inability to achieve coitus, uterine abnormalities, ignorance of the fertile phase, dietetic deficiency, and lack of confidence. More research is clearly needed on every aspect of this problem, but in the meantime people need, and are eager to receive, simple sex instruction at the time of their marriage, and adequate investigation on modern lines when they seek advice about subfertility from their doctors.

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[1] Royal Commission on Population Papers, vol. IV. Reports of the Biological and Medical Committee. H.M. Stationery Office. Pp. 52. 1s. 6d.

Special Articles

TRAINING FOR GENERAL PRACTICE

REPORT BY A B.M.A. COMMITTEE

IN *The Training of a Doctor*[1] a committee of the British Medical Association gave their views on the medical curriculum. Now another B.M.A. committee, sitting under the same chairman, Sir HENRY COHEN, F.R.C.P., have considered the postgraduate training of the general practitioner, and have reported.[2] The members are: Sir LIONEL WHITBY, F.R.C.P., Dr. C. W. C. BAIN, F.R.C.P., Dr. E. A. GREGG, Dr. J. A. BROWN, Mr. A. M. A. MOORE, F.R.C.S., Mr. A. LAWRENCE ABEL, F.R.C.S., Dr. JANET K. AITKEN, F.R.C.P., Dr. J. T. BALDWIN, Dr. G. W. BAMBER, F.R.C.P., Dr. G. O. BARBER, Sir ALEXANDER BIGGAM, F.R.C.P., Mr. NORMAN CAPENER, F.R.C.S., Mr. V. ZACHARY COPE, F.R.C.S., Dr. H. GUY DAIN, F.R.C.S., Dr. HUGH DAVIES, D.M.R.E., Dr. R. G. GORDON, F.R.C.P., Dr. K. H. C. HESTER, F.R.C.S., Dr. R. P. St. L. LISTON, Prof. HILDA N. LLOYD, F.R.C.O.G., Mr. J. D. McLAGGAN, F.R.C.S., Miss IDA MANN, F.R.C.S. (resigned, July, 1949), Dr. J. I. MILNE, Dr. CHARLES NEWMAN, F.R.C.P., Sir PHILIP PANTON, Sir LEONARD PARSONS, F.R.C.P., F.R.S., Dr. I. C. B. PEARCE, Dr. C. M. SEWARD, F.R.C.P., Dr. DONALD STEWART, F.R.C.P., Mr. J. W. TUDOR THOMAS, F.R.C.S., Dr. C. W. WALKER, Prof. B. W. WINDEYER, F.R.C.S., and Prof. G. M. WISHART, F.R.F.P.S.

The committee regard general practice as a special branch of medical practice requiring an adequate period of training under supervision, and continuous education throughout the doctor's life; and they believe that the conditions of his life should be adjusted to give him leisure enough to interest himself in such education.

General Practice

The change chiefly affecting general practitioners in the past century has been the growing bulk of medical knowledge. In the early 19th century doctors could be conversant with almost the whole range of medical knowledge; but in our own century it has become impossible for one man to practise or comprehend in detail the whole field of medicine, or to possess or use all the necessary equipment. A review of a typical day's work in different types of practice confirms the usual belief that minor ailments, and acute and chronic illness, provide most of the general practitioner's work—the conditions most often seen being respiratory, digestive, and circulatory disorders, rheumatic and skin diseases, children's diseases, and minor psychological disturbances. Doctors who attend current postgraduate courses complain that their lecturers do not give sufficient attention to these types of illness.

DUTIES OF THE FAMILY DOCTOR

The degree of responsibility taken by doctors for various types of case differs; thus one reported that he treated most ear, nose, throat, eye, and skin cases, referring only the most difficult to a specialist, while another wrote that he referred nearly all eye cases and skin cases to the clinics. In the estimation of the committee the responsibilities undertaken by the general practitioner include continuous care of patients, health education and preventive medicine, treatment of the patient as an individual, diagnosis, treatment (including emergency treatment, aftercare, and reablement), information to specialists, administrative and legal responsibilities, and other miscellaneous duties. As family doctor he sees the beginnings of disease and the interrelation of illness, environment, and occupation. He is able to give continuous advice on the maintenance of health, and undertakes such active preventive measures as vaccination and diphtheria immunisation. He sees the patient whole, as a person living in a particular setting exposed to strains which he is able to assess. He gives the first-aid treatment in all emergencies, and sends full information with any patient when he refers to a consultant. He has many legal and administrative duties to do with the National Health Service, death certificates, dangerous drugs, and the giving of medical evidence; and these demand from him much clerical work. In addition he may hold one or more part-time appointments—in public health, industrial work, maternity and child-welfare work, or school inspection. And finally he is always being asked for advice on subjects which are often a far cry from straight medicine.

Since, to meet these many calls, the general practitioner must have a wide range of knowledge based on the fundamental principles of medicine, and a synoptic grasp of the scope of the specialties, the committee deprecate the traditional distinction in status between general practice and the specialties. Every doctor should be free to follow the branch of medicine which appeals to him, and should be properly trained after registration for his chosen branch; and all branches should offer reasonable prospects of material reward. Opportunities should be made for general practitioner and specialist to cooperate fully. Doctors in a group practice should each be encouraged to develop some special interest; but this should be within the scope of general practice, and should not include services ordinarily given by a fully trained specialist.

The committee see the general practitioner as humane, easy with all company, ready for work which demands the sacrifice of much of his home life, healthy and robust, with cultural interests that develop the whole man in him.

THE WELL-RUN PRACTICE

In order to do his work and still have time to keep abreast of medical advances, the doctor needs to organise his work well, acquiring some understanding of business method, and the ability to delegate non-medical duties to competent ancillary staff. An account is given of a well-organised firm in a small country town: a full-time secretary and qualified dispenser are employed who "do all possible work that can be done by an unqualified person, i.e., telephones, correspondence, appointments, admission to hospital, all forms, visiting lists, all dispensing, urine testing, &c." The surgery is well designed, with dispensary, large waiting-room, and two consulting-rooms, all communicating by means of small talking-hatches as well as doors.

Yet even a well-organised practice cannot run itself while the doctor is attending a refresher course. The suggestion that a central pool of permanent locums should be provided did not commend itself to the committee, since doctors who are willing to spend their lives in this pursuit are not usually of the highest quality. Locums can best be found, the committee believe, among young doctors returning from abroad or waiting for appointments, or newly discharged from their term of National Service with the Forces. Young doctors training for general practice should be allowed, they consider, to take short locums in their third postgraduate year.

General practice today gives greater opportunities than it did for health education of the family, and carries a greater responsibility for prompt and accurate diagnosis. The doctor must have time to do his work properly—to make thorough examinations, to see his patients, and to consult specialists as often as he deems necessary—as well as time for postgraduate study. He must not be isolated from other medical services, or from his colleagues.

The First Three Years

The committee recommend that before the newly registered doctor begins independent general practice he should spend three years in specially designed training. For the first of these years he should act as trainee and assistant to an established general practitioner. The second year is to be spent in specially designed and preferably residential hospital appointments, and the third should provide supplementary training at the choice of the trainee. The whole course would be organised by a postgraduate committee and dean appointed by a university or medical school. During his three-year period the doctor would receive an adequate salary, and take an amount of responsibility appropriate to his experience. After consulting with the heads of the Forces' medical services, the committee decided to recommend that the 18 months spent in National Service should count as 12 months of the three years' training for general practice.

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[1] [illegible] of a Doctor. London, 1948. See *Lancet*, 1948, i, 839.

[2] [illegible] General Practitioner. London: British [illegible] 1950. Pp. 88. 7*s*. 6*d*.

The general practitioner to whom the assistant trainee is to be attached in his first year must be experienced; but the committee is not in favour of compiling an "approved list" of principals. Every practitioner who has been in independent practice for not less than five years should be allowed, if he can provide the right opportunities, to train entrants for general practice. The committee believe that a few years' experience would show which principals were the best teachers, and trainees would gravitate to them. The teacher's aim would be to show the trainee how the general practitioner lives and works, how he approaches and handles patients and relatives, and how he runs his practice. Information on the administrative side of general practice might, it is suggested, be given in a series of lectures during the intern year, and a syllabus is outlined, covering setting up in practice, common ailments, equipment, record-keeping and paper-work, preventive medicine in general practice, and medical ethics.

The hospital appointments during the second year of training should be resident posts in the larger non-teaching hospitals under the regional hospital boards, and should give the trainee experience of the kind of case met in general practice and enable him to recognise when to seek specialist help. Though arrangements should be flexible, to cater for varying tastes, each trainee should be encouraged to get experience of infectious diseases, obstetrics, pædiatrics, ear, nose, and throat conditions, eye and skin diseases, psychological medicine, and casualties. He should also acquire those techniques in treatment and pathological investigations which he will need in practice. In the third year the trainee could either take further hospital appointments, or simultaneous clinical assistantships in different subjects, and should do a short period of whole-time work in a laboratory. He should also have some further instruction in psychiatry.

Continuous Education

Postgraduate education for those in general practice is seen as a process continuing throughout active life, intended to preserve and increase technical competence and keep the doctor in touch with hospital practice and medical advances. The need for postgraduate education of general practitioners was agreed to be great, both by consultants and the general practitioners themselves. Current courses are said to be "insufficient in extent and inadequate in content."

The postgraduate committee and dean appointed by the university should be responsible, it is suggested, for coördinating arrangements for postgraduate education of general practitioners in the area, and should collaborate with hospitals, specialists, and medical committees and societies for the purpose. Courses of varying lengths should be available, but educational work in the hospitals —clinical and clinicopathological discussions and conferences, and ward rounds—should be just as important as set courses, and should supplement the activities of local medical societies.

THE WELL-PLANNED COURSE

Postgraduate courses will usually require the doctor to leave his practice for a weekend, a week, or a fortnight; and the committee consider the last, held in an appropriate teaching or regional hospital, to be the most useful. They oppose the idea of compulsory attendance, or the offer of special inducements, believing that a well-run course with good and useful teaching and social amenities—including entertainment for the doctors' wives while their husbands are attending lectures—should be its own attraction. Teachers of high standing should be selected for their interest and competence in teaching, and should include suitable general practitioners. Full use should be made of cases in the chronic wards, outpatients, and casualty departments of non-teaching hospitals. The course should refresh the doctor's basic knowledge of procedures, including clinical methods; inform him on new methods of diagnosis and treatment; relate new knowledge to his own approach to medicine and to his patients; and restate the contribution of other sciences to medicine. Methods of teaching should include tutorial classes, conferences, demonstrations, and discussions.

ALL THE YEAR ROUND

Local arrangements should also be made, for continuous postgraduate training. The local medical society, which can do much, should become a medical club, the centre of all professional life. The committee recommend that in each area the profession should develop an active medical society, in the conduct of which general practitioners and specialists should participate. Programmes should include lectures and demonstrations, courses at local hospitals, discussion groups and conferences, and [illegible] and clinicotherapeutic conferences, [illegible] ns trusts, and meetings with members of other professions. It is suggested that edited reports of clinical conferences of interest to general practitioners should often be published in a general medical journal.

The committee believe that the divorce of the general practitioner from the hospital is bad for the efficiency of the whole medical service. Arrangements should be made for doctors to attend outpatient sessions and ward rounds, and to hold clinical assistantships which would enable them to develop their knowledge of a particular aspect of general practice, and to move more easily from general practice to specialties if they wished. Some doctors, it is thought, would prefer a fortnight's resident hospital appointment as an alternative to a refresher course; and this might be arranged. The committee also strongly support, from an educational standpoint, the growing demand among family doctors for hospitals or wards where they can treat those of their own patients who cannot conveniently be nursed at home.

Self-education during practice must depend on contact between the doctor and the hospital medical staff. The doctor should accompany his patient to hospital for consultation, when possible, and should be free to visit him in the wards at any time. The hospital medical staff should keep the family doctor informed of the patient's progress while he is in hospital.

Doctors in general practice should have opportunities to contribute to field researches in medicine and social science planned by university departments. They should also have leisure for "systematic, unhurried and uninterrupted professional reading," and should make full use of medical libraries, including the facilities now offered for purchasing 'Photostat' copies of any given article at a small price.

The committee conclude that the better the general practitioner the more insistent will be his demand for adequate and appropriate postgraduate medical education. He must be given time for it, however, and on a long-term view this should be possible if general practice gains in interest and status, so that more newly qualified men are willing to enter it. The committee believe that if their recommendations are fulfilled, a larger supply of such doctors will be forthcoming.

THE PROBLEM OF CHILDREN'S DENTISTRY

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FOR many years now we have been accustomed to a system of rationing in this country. This ensures, in times of scarcity, an even distribution of materials and commodities among the whole population. We have, moreover, established priorities in foods and vitamins for mothers and children, to safeguard the health of the present and future generations. Our community rightly considers health to be a cornerstone in our social structure. Yet, paradoxically enough, in Britain today the facilities for a very important part of the child health service, namely, children's dentistry, have deteriorated so rapidly as to constitute nothing short of a major tragedy. Dental caries, one of the commonest of children's diseases, is being allowed to become rampant once again. The loss of its control is causing the greatest disquiet among members of the dental profession and this concern is reflected in numerous contributions to the dental journals and in letters from dental surgeons to the lay press. The anxiety of the profession has now spread to the parents, who are becoming increasingly aware that all is not well with the arrangements for the dental treatment of their children. In his recent article in THE LANCET MacGregor (1950) has emphasised the urgency of the problem of children's dentistry and suggested a possible solution.

This seems an appropriate time, therefore, to survey the present state of children's dentistry, to define the problem which faces us, and to indicate in which directions the solution may be found.

CHILDREN'S DENTISTRY TODAY

In Britain today children may receive dental treatment from general practitioners, from the School Dental Service, or at the teaching hospitals. Theoretically, the children are well served. Practically, we know the reverse is true. Many dental practitioners, inundated by the demands of adults, can find little opportunity for the treatment of children, which is often more trying and time-consuming. Furthermore, the disparity in fees for the conservation of deciduous and of permanent teeth in the National Health Service is no incentive to carry out comprehensive treatment for children.

The School Dental Service, after the set-back it suffered during the war years, made rapid strides towards recovery. The strength of the service, which at the beginning of 1946 was the equivalent of only 634 whole-time officers, had increased to the equivalent of 921 by the end of 1947. In England and Wales at that time only six local authorities had failed to appoint a senior dental officer. The post-war difficulties of equipment were being overcome and shortages of premises were being made good. Orthodontic schemes were being developed, and more and more children could enjoy the advantages of general anæsthesia. Greater opportunities were being offered to dental officers for postgraduate instruction. Indeed, we had a vigorous and healthy School Dental Service which was rapidly developing and was contributing most effectively to the battle against dental disease in children.

Then came July 5, 1948, and the decline of the School Dental Service began. By the end of 1948 the number of school dental officers had fallen to the whole-time equivalent of only 868. Since then there have been further depletions, until in Scotland, for instance, six counties have no school dental officer. Thus, if we estimate the practising strength of the dental profession in Britain as 12,000, less than a twelfth of the total remain to deal with children's dentistry. Yet, of the total of 50 million people in the United Kingdom, 10 million are children under the age of 15 years. So less than a twelfth of the profession is responsible for the dental care of over a fifth of the population. Admittedly, children up to the age of 3 years need little if any dental treatment, but there are many adults with full dentures who require just as little attention.

This inequable distribution of dental man-power has only one cause: the gross disparity between the earnings of dental surgeons in private practice and the salaries of the School Dental Service. One can understand the dilemma of the local authorities; if they raise the salaries of their dental officers they may have to make a general increase in the pay of comparable grades of their employees.

Meanwhile the exodus of school dental officers continues, and the collapse of the service has been disastrous. In some areas only an emergency service is now possible, and great credit is due to those who, resisting the financial attractions of private practice, have remained true to the ideals on which the provisions for children's dentistry were based.

Parents are finding difficulty in getting their children's teeth attended to by private practitioners under the N.H.S., and only a small proportion are able (and willing) to pay for their children to be seen as private patients; so the collapse of the School Dental Service has led to an inundation of the teaching hospitals. Not only is there a greater influx of orthodontic cases but more and more children are seeking general routine treatment. As a result, it has become impossible to deal with all who attend, and waiting-lists grow longer every day.

This brief survey of the facilities for the dental treatment of children in Britain today shows at least that there is no cause for complacency. The whole organisation of children's dentistry, which took so long to build, has suffered grave damage in the last few months. To repair it, or if necessary rebuild it, is a task which many of us are anxious to see undertaken. Let us, then, define more exactly the extent of the task.

THE TASK OF REPAIR

The provisions for children's dentistry divide themselves naturally into two parts: (1) general dental attention for all children; and (2) orthodontic treatment for those who need it.

In the past the largest part of the general dental attention of children has been provided by the School Dental Service. This, I believe, must still be an ideal for the future. How many dental officers are required to provide a comprehensive service for all children? The United Kingdom has about 6½ million school-children, and the Minister of Education has said that each dental officer should be responsible for the dental care of about 3000. Presumably it is not anticipated that all of these children will accept treatment and certainly a proportion will not require it. Nevertheless, on the basis of these figures, the strength of the School Dental Service must be increased to the whole-time equivalent of more than 2000 officers.

Turning next to the more intricate problem of providing for orthodontics, it must first be considered what proportion of children need this treatment. In the U.S.A., Brandhorst (1932) found that over half of the children he examined had dental irregularities, and Salzmann (1943) confirmed this. In Britain Pringle and Breakspear (1943) and Sclare (1945) have reached similar conclusions. Assuming then that about half of all the children of school age in Britain require orthodontic treatment the problem is indeed formidable. However, Brandhorst, Salzmann, and Sclare are agreed iat as many as four-fifths of the children who require rthodontic treatment have malocclusions which would spond to simple treatment or could be prevented, and nly the remaining fifth require complicated treatment. herefore it seems reasonable to suppose that, of all the chool-children in Britain, as many as 40% have simple r preventable malocclusions, and some 10% have more evere deformities. The prevention and treatment of imple malocclusions appear to come naturally within he province of the school dental officers, whereas the nore complicated ones should be treated by orthodontists.

How many orthodontists are then required to correct he severer malocclusions present in 10% of the 6½ nillion school-children? It is generally agreed that one rthodontist with a practice of 800 children can treat 200 new patients each year. On this basis the number of orthodontists required is over 3000! This, of course, is impossible, and we must resign ourselves, however reluctantly, to the inevitable conclusion that a large proportion of the malocclusion present in children today must go untreated. What then is the problem for the future? Our 6½ million school-children are between 5 and 14 years of age—in other words, their age-groups extend over ten years. Consequently the problem in the future will be to provide specialist orthodontic treatment, not for 10% of 6½ million, but for 10% of 650,000 children each year. Again assuming that one orthodontist can undertake treatment for 200 new patients each year, it follows that just over 300 orthodontists will be required.

To sum up, the first part of the task of providing for children's dentistry resolves itself into increasing the strength of the School Dental Service to the whole-time equivalent of over 2000 officers, who would be responsible for the general routine treatment of children, including simple orthodontic measures. The second part of the task involves an increase in the number of orthodontists to over 300.

POSSIBLE SOLUTIONS

An equable distribution of the dental profession, on the basis of population, would be to allot a fifth of the total to children's treatment—i.e., 2400 out of the estimated practising strength of 12,000. The School Dental Service would then become fully staffed and the control of dental disease in children would again be possible. All would agree that this is a very desirable aim. How can it be achieved? It is obvious that better surgeries and equipment, more facilities for orthodontic treatment, and greater opportunities for post-graduate instruction are welcome developments which indeed were taking place in the School Dental Service. But above all, and this urgently, there is needed a revision of salaries to compare more favourably with those in private practice. Then, and not until then, will the tide turn and the flow of dentists back into the School Dental Service begin.

Nevertheless, the present recruitment rate to the profession is insufficient to maintain its strength. So any increase in the number of school dental officers will reduce the number of dentists in private practice and will curtail the facilities for the dental care of adults, many of whom, even now, are finding it very difficult to obtain dental treatment.

To overcome these difficulties it is being suggested in some quarters that New Zealand nurses should help our numerically small School Dental Service to take care of the children. In this way the greater part of the profession would be left to treat adults. The disadvantages of such a scheme must be obvious to all. The treatment undertaken by dental nurses would be limited to the simpler types of conservation and straightforward extractions. Would they then provide an effective contribution in the fight against dental disease? Surely the answer to this question must be that any help in the treatment of children would be appreciated at this time. Unfortunately the problem is more involved.

Thus, though it may be possible to train dental nurses under the supervision of dental officers in the school clinics, a more uniform and comprehensive training would be possible in a dental school. But our present schools are working to capacity, so a new school would have to be established. In that case it should be decided whether to train dental nurses or to concentrate on training fully qualified dental surgeons.

If we postulate that a new school is to be established it would be interesting to examine the respective outputs of dental nurses and dental surgeons and then assess their contributions to children's dentistry. The training of a dental nurse takes only two years and the course for a dental surgeon is at least twice as long. Consequently we would expect a new school to train at least twice as many nurses as fully qualified dentists. What then would be their respective contributions to the dental treatment of children? One school dental officer is expected to undertake the care of 3000 children. However, the report of the Chief Medical Officer of the Ministry of Education (1949), shows that only 80% of children require treatment, and Wynne (1948) estimated the crude acceptance-rate as 72%. This means that of 3000 children only 1700 would both require and accept treatment. On the other hand, Owen (1949) states that each New Zealand nurse could deal with 500 children. On the basis of these figures, one British school dental officer could carry out full treatment for more than three times the number of children for whom one New Zealand nurse could perform only simple conservative measures and extractions. Nevertheless the caries rate is thought to be greater in New Zealand than in Britain, and, if the geographical problem there is more complicated, it is possible that a New Zealand nurse, working in Britain, could treat more than 500.

To sum up, to decide whether to train dental nurses or dental surgeons, we must strike a balance between two conclusions. It appears that, with the same facilities, it is possible to train more nurses than surgeons. On the other hand, fully qualified dentists would provide a more effective contribution than dental nurses to the treatment of children. Let us then await the observations of the delegation which is examining the New Zealand scheme, remembering the various factors involved.

We have seen that to provide for orthodontic treatment over 300 orthodontists will be required. Where are these to be trained? In this country there are a variety of orthodontic philosophies and methods of treatment. To preserve this healthy breadth of thought and wide conception it is expedient that orthodontists should be trained in the various teaching hospitals and schools throughout Britain.

Thus the newly-qualified dentist who aspired to be an orthodontic specialist would, as the first step in his career, obtain the post of house-surgeon in one of our teaching hospitals. After holding this post for a year he would carry out the inevitable period of National Service and then return to the teaching hospital as a registrar. During these first years of his professional career he would acquire a deeper knowledge and a wider experience of the various branches of dentistry, and, in addition, would be studying for a higher qualification. At this stage he might well benefit by spending six months or so doing the routine dental treatment of children in the School Dental Service. In this way he would gain experience in the treatment and handling of children. At the same time he would become conversant with the everyday problems the school dental officer has to face and this would make for better coöperation and mutual understanding in the future.

On this broad basis of professional education and experience he would then be in a position to erect his specialty of orthodontics. To achieve this he would obtain the post of senior registrar in the orthodontic department of a teaching hospital. His instruction would be by means of lectures in the dental school and the treatment of patients in the hospital. He should be given opportunities to learn the construction of the various types of appliances he uses and also for research. He might also spend time in the children's department of a nearby general hospital and so gain a wider and more practical knowledge of children's diseases. Lastly, to develop as broad an outlook as possible, he might undertake a full-time postgraduate course in orthodontics for six or twelve months in some other teaching hospital or school. At the end of this period, he would be eligible for a special diploma.

After such a comprehensive and thorough education the orthodontist would be ready to practise his specialty, fully equipped to play his part in the treatment of the dental irregularities of the future generation.

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These then are the directions in which the solution to the problem of children's dentistry may be found. The decisions we must make and the task of carrying them into effect will be by no means easy. But the problem is urgent, not only for the welfare of the profession, but also for the good of the children and the health of the nation in years to come. Let us seek the answer deliberately and conscientiously, remembering that the plans we make for the future will be judged by the children whose treatment is being neglected today.

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Personal Papers

DEATH OF A MIND

A STUDY IN DISINTEGRATION

I FIRST remember my father as a well-built, active man with a wide range of interests. His work required both intellectual and practical ability, and those who could judge his achievement spoke highly of it. I was more impressed at the time by the happy enthusiasm with which he would turn from weightier matters to entertain his small daughter. In 1924, at the age of 49, he retired to the country to devote himself to scientific research of a more academic kind. Possibly the stress of his previous work had begun to tell on him, and this may have influenced his decision, but there was no outward sign that his powers might be failing. Over the next few years he built up a reputation which brought him into contact with fellow workers in many parts of the world. Unlike his earlier work, which required advanced mathematics, what he was doing now came within my own mental range, and I helped him for two years as a prelude to my university studies.

Over the period that we worked together, sometime in the early 1930s, I became gradually aware that the fine edge of his intellect was becoming dulled. He was less clear in discussion and less quick to make the jump from a new piece of evidence to its possible significance. He spent more time over his work and achieved less; and he found it increasingly difficult to get his results ready for publication. He tended also to become portentous and solemn about his subject, as though one small corner of knowledge nearly filled his world, and the wider horizons were narrowing in. The change was so slow as to be barely perceptible, and the signs vanished when I tried to pin them down: they were like those faint stars which are seen more easily when they are not in the direct line of vision. I was left with a feeling of uneasiness which I could not justify.

In 1935, after a period of absence, I looked forward with especial pleasure to my home-coming, but when we met I knew, with immediate certainty that I had lost the companion of my earlier years. The change was as yet mainly a loss of intellectual clarity and he remained himself, but a self that was subtly devitalised. To me it was as though a light had gone out, but no-one else seemed to notice anything amiss. Somewhere between a year and eighteen months later I happened to be at home and we were doing some carpentry about the house. We paused to consider a problem which had thwarted us, and I hit on a solution and outlined the idea. My father could not grasp the principle of it until I gave a demonstration, and even then he lacked sufficient manual dexterity to carry it out. I was profoundly shocked by this, for it was the first clear-cut objective evidence I had of the downhill change which was taking place. It reflected on a practical level precisely the same failure of integration and coördination which I had noticed already on the intellectual plane. His ability was still well within normal limits; but I knew what it had been, and the difference was startling.

By this time he was worried about his general health and attended a doctor from time to time with rather vague symptoms. For several years he had been said to have low blood-pressure, but nothing was found wrong apart from this, and he was reassured. As time went on his physical condition got worse; his walking and his speech were obviously affected, but it was not until the bank failed to recognise his signature on a cheque that I was able to persuade him to ask for specialist advice. In 1937 he was diagnosed as having Parkinson's disease, and the classical physical signs were by then well marked. His mental ability had deteriorated further, though it still passed as normal to anyone who did not know him well. He tried to carry on with his work, but he did not make any headway and became more and more depressed about it. His character remained essentially the same except that he could no longer endure unorthodox views. His own moral standards and religious beliefs were simple and sincere and so firmly grounded that he had found it easy to be patient and tolerant with those who could not accept them. Now, however, if he chanced to overhear one of the eager iconoclastic arguments of youth he became disturbed and petulant and it seemed as though his mental organisation had become less secure even at its deeper levels.

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In the spring of 1938 an attack of pneumonia would have ended the story, but for the recent introduction of sulphonamides. During this illness he was troubled one day by a brief hallucination. The rooks flying across the field appeared as a procession of people or something of the sort; nothing dramatic, but he worried about it afterwards. He was encouraged to dismiss the matter as a chance result of the febrile illness, and he would have done so if he had not found later that the same thing in a milder form began to happen frequently. It appeared to him as a new and alarming symptom, but I think it was the further stage of a process which had been going on for some time. Both sight and hearing were involved, but the effect on hearing was more easily observed by others, while the disturbance of vision—once his attention had been drawn to it—was most noticeable to him.

For the past year or more it had been assumed that was going deaf; but, as far as I could discover, his aring was still acute. The trouble was that he failed to cognise the sounds he heard. You might say something e " the postman hasn't come " and he would hear it as the grocer's cut his thumb." It was superficially like hat might happen with someone who had grown par- ally deaf, but closer attention showed up the difference.

It is easiest to describe the breakdown by comparison th the normal. We may hear a phrase moderately early and yet not get it right at once. I suppose what appens is that the brain first registers a sound pattern nd then compares it with previously remembered atterns so that the gaps can be filled in and the words entified. The result seems to be checked at a higher mental level to see if it " makes sense " before it is fully ccepted as having been heard. When we hear something mprobable we are sometimes conscious of the check and closer scrutiny which take place quite automatically. expect all of us can remember instances when our mind discarded its first attempt to complete a puzzle and held on to the remembered sound until it turned up something else which fitted better. A second choice which makes better sense may match the sound more accurately as well, and we will perhaps conclude with confidence that we " heard " that in the first instance. In a deaf person the disability is presumably at the first stage. The sensory information is scanty or distorted, there are many gaps to be filled, and identification of the words is much more difficult. Allowing for that handicap the next stage—unless there are senile changes also—is carried out in the usual way. In my father's case it was at this second stage that the most gross defect was seen.

The same principle evidently applies to other forms of sense perception, and it was a description of the subjective effects in the visual field that showed me what was happening. If my father glanced at a dark shape which was rather like a black cat he did not instinctively look again to make sure what it was; he *simply saw* a cat. His mind fitted the sensory impression to the first rough approximation which suggested itself, and accepted it without further question, however unlikely it might be in the context. I had not realised until then that the critical sifting process which is only rarely brought to our notice must be going on all the time in normal perception, and that when it fails the result is most confusing to the conscious mind. My father discussed the problem with me in some detail, as he was naturally disturbed to find that he kept on seeing things which were not there. He did not feel it was much use talking to the doctors about it. He was, I think, deterred from taking them further into his confidence after his first suggestion that his mind was affected had been rather lightly dismissed. I could not interfere in that direction, so I did the best I could by the light of nature. When we got down to it together and considered the evidence it seemed clear that he was not hallucinated in the sense of seeing things which were a projection of some idea in his mind. The things he saw always had some basis in actuality, but his brain was constantly sending on messages which had, so to speak, been badly decoded. When he began to understand that this was a mechanical defect he found it much less alarming, and he learnt to allow for it to a considerable extent. The domestic misunderstandings which resulted from it became more comprehensible, and he had sufficient confidence in me to accept my assurance that he was quite sane. No-one else had any suspicion of his difficulties, and I naturally respected his confidence. Since nothing could be done about the condition it would only have caused added distress to others if they had known, and an anxious atmosphere around him always aggravated his condition.

* * *

That was the situation in the autumn of 1938, and the suggestion that he should then go for a trip abroad put me in a difficult position. He felt convinced that it would do him good, and his medical advisers encouraged this belief. I think their view was that it would do him no harm, and that a change of scene would relieve his depression. This was, on the face of it, reasonable enough; but when I considered the international situation and my father's mental state I could not help feeling apprehensive. I had no opportunity of seeing the doctors myself though I was able to ensure that the question of mental fitness was raised. The verdict—as related to me at second hand—was that this disease did not affect the mind and his mind therefore could not be affected. There seemed nothing more that I could do. After all, even if I had insisted on saying what I knew, I had by then no hope that anyone would believe me. My sense of isolation was such that I wondered from time to time whether I was *imagining things* and whether it was in fact my own mind that was giving way. I weighed it up and decided to reserve judgment until events had proved which side was right. I did nothing further to oppose the plan, but I felt I could not take the responsibility of letting my parents go alone. I made arrangements to interrupt my studies, and we left England at the end of the year.

* * *

Our destination was an isolated resort in mountainous country about fifteen miles from the nearest small town. The sea voyage and further train journey passed without incident, and my father was cheered to return to a place which he had known in years gone by and which had happy associations for him. It was soon evident, however, that unfamiliar faces and a foreign language were putting too heavy a strain on his failing faculties. At home among people whom he had known for years and could recognise easily he had been confident that he was among friends, and if he sometimes thought they said *strange or disturbing things* the misunderstandings could generally be put right. Now, listening every day to a background of foreign conversation which, even when fit, he could not easily have followed, he was soon bewildered. His mind accepted the nearest English equivalent to the sounds he heard, and the task of keeping in touch with reality against such odds became impossible. Hearing what he thought was English spoken, he addressed other hotel residents in his own language, to be met by uncomprehending stares. He naturally came to feel that they were hostile to him, and he began gradually to make order out of his mental chaos by systematising, in a delusional way, what he heard and saw. The dining-hall became for him the scene of an interminable lawsuit, and I had often to provide some diversion to prevent him from standing up to give evidence between the courses. At this stage my mother could not have failed to realise what was happening were it not that his speech was so blurred as to be almost unintelligible.

He was still potentially rational. His delusions were not determined by a warped mental outlook, but were a reasonable attempt to make sense out of what was subjectively a hopelessly confusing situation. In days gone by I had learnt to follow his train of thought intuitively, and I could still keep close to him in spite of his difficulty with speech. I found that if I got him away from other people and steered his mind to topics which he had handled with ease in the past he became rational quite quickly. I sometimes led him into long and interesting discussions on subjects which he knew and cared about, and when he got the sense of being on familiar ground, where he could still tread firmly, the black cloud of depression lifted and he became his old self. As soon as he returned to the strain of new and unfamiliar situations he relapsed. It was well on into February has to face and this would make for better coöperation and mutual understanding in the future.

On this broad basis of professional education and experience he would then be in a position to erect his specialty of orthodontics. To achieve this he would obtain the post of senior registrar in the orthodontic department of a teaching hospital. His instruction would be by means of lectures in the dental school and the treatment of patients in the hospital. He should be given opportunities to learn the construction of the various types of appliances he uses and also for research. He might also spend time in the children's department of a nearby general hospital and so gain a wider and more practical knowledge of children's diseases. Lastly, to develop as broad an outlook as possible, he might undertake a full-time postgraduate course in orthodontics for six or twelve months in some other teaching hospital or school. At the end of this period, he would be eligible for a special diploma.

After such a comprehensive and thorough education the orthodontist would be ready to practise his specialty, fully equipped to play his part in the treatment of the dental irregularities of the future generation.

* * *

These then are the directions in which the solution to the problem of children's dentistry may be found. The decisions we must make and the task of carrying them into effect will be by no means easy. But the problem is urgent, not only for the welfare of the profession, but also for the good of the children and the health of the nation in years to come. Let us seek the answer deliberately and conscientiously, remembering that the plans we make for the future will be judged by the children whose treatment is being neglected today.

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Personal Papers

DEATH OF A MIND

A STUDY IN DISINTEGRATION

I FIRST remember my father as a well-built, active man with a wide range of interests. His work required both intellectual and practical ability, and those who could judge his achievement spoke highly of it. I was more impressed at the time by the happy enthusiasm with which he would turn from weightier matters to entertain his small daughter. In 1924, at the age of 49, he retired to the country to devote himself to scientific research of a more academic kind. Possibly the stress of his previous work had begun to tell on him, and this may have influenced his decision, but there was no outward sign that his powers might be failing. Over the next few years he built up a reputation which brought him into contact with fellow workers in many parts of the world. Unlike his earlier work, which required advanced mathematics, what he was doing now came within my own mental range, and I helped him for two years as a prelude to my university studies.

Over the period that we worked together, sometime in the early 1930s, I became gradually aware that the fine edge of his intellect was becoming dulled. He was less clear in discussion and less quick to make the jump from a new piece of evidence to its possible significance. He spent more time over his work and achieved less; and he found it increasingly difficult to get his results ready for publication. He tended also to become portentous and solemn about his subject, as though one small corner of knowledge nearly filled his world, and the wider horizons were narrowing in. The change was so slow as to be barely perceptible, and the signs vanished when I tried to pin them down: they were like those faint stars which are seen more easily when they are not in the direct line of vision. I was left with a feeling of uneasiness which I could not justify.

In 1935, after a period of absence, I looked forward with especial pleasure to my home-coming, but when we met I knew with immediate certainty that I had lost the companion of my earlier years. The change was as yet mainly a loss of intellectual clarity and he remained himself, but a self that was subtly devitalised. To me it was as though a light had gone out, but no-one else seemed to notice anything amiss. Somewhere between a year and eighteen months later I happened to be at home and we were doing some carpentry about the house. We paused to consider a problem which had thwarted us, and I hit on a solution and outlined the idea. My father could not grasp the principle of it until I gave a demonstration, and even then he lacked sufficient manual dexterity to carry it out. I was profoundly shocked by this, for it was the first clear-cut objective evidence I had of the downhill change which was taking place. It reflected on a practical level precisely the same failure of integration and coördination which I had noticed already on the intellectual plane. His ability was still well within normal limits; but I knew what it had been, and the difference was startling.

By this time he was worried about his general health and attended a doctor from time to time with rather vague symptoms. For several years he had been said to have low blood-pressure, but nothing was found wrong apart from this, and he was reassured. As time went on his physical condition got worse; his walking and his speech were obviously affected, but it was not until the bank failed to recognise his signature on a cheque that I was able to persuade him to ask for specialist advice. In 1937 he was diagnosed as having Parkinson's disease, and the classical physical signs were by then well marked. His mental ability had deteriorated further, though it still passed as normal to anyone who did not know him well. He tried to carry on with his work, but he did not make any headway and became more and more depressed about it. His character remained essentially the same except that he could no longer endure unorthodox views. His own moral standards and religious beliefs were simple and sincere and so firmly grounded that he had found it easy to be patient and tolerant with those who could not accept them. Now, however, if he chanced to overhear one of the eager iconoclastic arguments of youth he became disturbed and petulant and it seemed as though his mental organisation had become less secure even at its deeper levels.

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In the spring of 1938 an attack of pneumonia would have ended the story, but for the recent introduction of sulphonamides. During this illness he was troubled one day by a brief hallucination. The rooks flying across the field appeared as a procession of people or something of the sort; nothing dramatic, but he worried about it afterwards. He was encouraged to dismiss the matter as a chance result of the febrile illness, and he would have done so if he had not found later that the same thing in a milder form began to happen frequently. It appeared to him as a new and alarming symptom, but I think it was the further stage of a process which had been going on for some time. Both sight and hearing were involved, but the effect on hearing was more easily observed by others, while the disturbance of vision—once his attention had been drawn to it—was most noticeable to him.

which may be aroused is based on fear of the unknown and a misunderstanding of what happens to people after they have been cut off from reality in this way.

It is clear that a disease process can affect personality, and the instance I have described does no more than illustrate something which is well known. It has been suggested, and indeed it seems at first sight rather obvious, that if damage to certain areas of the brain affects character, character itself must depend upon these structures. This is, I suspect, no more than a half-truth, and because a part of it is demonstrably true it may be all the more misleading. It is reasonable to assume that a man's physical constitution is the machine through which his personality is developed and operated, but the person as a whole is something more than the sum of his parts, and personality in action behaves like a total field of force. If outward behaviour has been a camouflage for inner tension, and if a person's standards have been imposed from without and not accepted as fully worth while in themselves, even slight damage to the machine may have dramatic results; but a balanced and integrated character cannot easily be destroyed.

When my father became violently insane he was certainly not his normal self, but if one makes allowances for the confused view of reality which was relayed to him his actions were consistent and quite in keeping with his character. He had previously become so weighed down by discouragement and weakness that only an intense emotional stimulus could have roused him. The threat to his country and his family struck deeper than any fancied insults or injustice to himself, and he responded with everything he had. By what was in the circumstances an astonishing integrative effort he achieved both mental concentration and physical coordination, and if the results bore no useful relation to the facts that was scarcely to be wondered at. When it seemed to him that his country's interest and his affection for me were in conflict, he put his country first, just as he would undoubtedly have done in real life; but, although his moral judgment condemned me, he made an effort to forgive me personally for the wrongs which he believed that I had done. Although I could not know it at the time, I think his resolution not to attack me, when once made, was final. He might resist, but he would not deliberately harm me.

In acting like this my father was to a large extent following character patterns which had been established many years before; but his self was more than an automaton running along old tracks—it remained vital and capable of new adjustments even in the midst of wreckage. Towards the end of the acute stage of his illness he developed some extremely troublesome delusions about my mother's health. These caused so much distress all round that I spent a long morning trying by every means I knew to win back his confidence. In the end I was successful and for one short space he returned to complete lucidity. In that moment he knew for certain that he was losing his mind, and I think he knew as well as I did that he was losing it for ever. He faced the knowledge without flinching, and he looked beyond it at what was for him the hardest truth of all. The time had come when he must finally commit to others, who might well prove less patient and considerate than he had been, the welfare of the wife he loved. Nothing could have cost more to a man whose chief defect of character had always been a tendency to carry his protective rôle too far. He made the readjustment perfectly, and he was perhaps more truly himself at that moment than he had ever been. It was an act of will which might well command admiration in a man whose mental faculties were unimpaired, and yet it was achieved by one whose brain and nervous system were tottering on the brink of final ruin. It was, I think, a victory which secured release, for he subsided afterwards into a quiet dementia which was like a rambling dream; vivid consciousness and depth of feeling were no longer present, and I never felt another pang on his behalf.

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I do not wish to draw elaborate conclusions from a single incident; I merely set it on record for consideration. Mind and body are inseparable, so far as we can tell, but experience suggests that they are no more than tools, and of much less account than the spirit whose purposes they serve.

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Bronchial Carcinoma

In answer to a question, Mr. ANEURIN BEVAN stated that deaths registered in England and Wales classified to carcinoma of the bronchus numbered 1548 in 1940, 2839 in 1944 and 5198 in 1948.

Iodisation of Salt

Dr. BARNETT STROSS asked the Minister of Food whether he would give an assurance that salt free from iodisation would always be available for purchase by those who feared that a very small iodine content might affect them adversely.—Mr. MAURICE WEBB replied: As the trace of iodine will be very small the Medical Research Council think that adverse effects will be most unlikely; but my Food Standards Committee will bear this point in mind when considering representations about the proposed changes.

before his condition became really grave, and our return passage was booked for March. There was no possibility of getting home earlier, and I hoped that I might be able to stave off disaster meanwhile. I think I might just possibly have been successful if it had not been for the international situation.

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My father had never had a good ear for foreign languages, but he could follow them on paper, and to some extent this faculty remained. When Hitler marched into Czechoslovakia the repercussions spread even to the part of the world where we were staying, and the local papers were blazoned with headlines which implied the imminence of war. This was too much. Faced with a threat which involved his own country and all that was dear to him, my father let go his last faint hold on reason and threw himself into action. The results were spectacular. Until then he had walked unsteadily with shuffling gait, his head drooped forward, his features flaccid, and when he spoke he gave confused and indistinct expression to his rambling thoughts. Now he stood straight with lifted head, strode with firm step, spoke clearly, and set out with rampant anger to find and destroy the enemy in our midst. He spent the day chasing non-existent spies in other people's bedrooms; while I chased after, explaining to the agitated guests and taking what steps I could to deal with the emergency. The hotel manager, the only responsible man about the place, had left that morning for a destination fifty miles away. I managed to telephone a message to the doctor in the nearest town, but it was some hours before he arrived. As was natural in the circumstances, my father's violence became directed against me. I was, after all, the person whom he had relied on most in his difficulties, and now that the situation forced me to restrain him it seemed to him that I, of all people, had gone over to the enemy. In that moment of despair and disillusion the full force of his love for me was turned to bitter hatred. I could understand, but I could not relieve his plight. When the crisis came we were alone in an upstairs gallery, and he turned on me with murder in his eyes. A day earlier the physical advantage would have been on my side, but mania had mobilised his last reserves of strength and he was for the time being a powerful man. My prospects of escape seemed small in any case; so, taking a chance on it, I faced him quietly with an appearance of calmness which assuredly I did not feel. For a moment the issue hung in the balance, but my confidence just turned the scale. I think if I had retreated or resisted he would probably have strangled me, but when my glance met his he could not bring himself to do it. He relaxed at last with a gesture of sad acquiescence and let himself be quietly led away. I was as much astonished by my own intuitive action as I was by the result.

The foreign doctor came and went again, leaving a sedative which was unfortunately a proprietary brand with the contents printed outside the container. My father feared we were intent on drugging him for some nefarious purpose, and he would not touch it. He had, however, recognised the doctor for what he was, and the visit sobered him a little. Even that much relief was something to be thankful for, but it was clear that no further professional help would be forthcoming. The next few days were very difficult. Quite apart from the fact that my father had charge of all our money, I expected that he might become homicidal again at any moment. I found, however, that my influence still counted for something even when he was inaccessible to reason. I was often able by manner and gesture rather than by words to make him feel that I still cared about him and that the dangers around us did not trouble me. This gave him just enough confidence to quieten him for a time, but the task would scarcely be completed before it had to be begun again. It was keeping a constantly skidding car from crashing off road.

I only went on coping because I had to, but it is surprising what an ordinary person can do under the spur of necessity. I didn't even know how frightened I was until the prospect of relief arrived. Towards the end of the week, among a group of passing visitors, I recognised a doctor from another part of the country who had treated me when I was a child. At sight of a familiar and reassuring face I had to sit down suddenly because my knees became unsteady. I explained what was happening, but he only said: "My poor, dear girl, how terribly distressing for you!" and drove away again. Sympathy can be a dangerous drug when it is not backed by practical assistance; I came nearer to losing my grip then than at any other time.

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We got home in the end. All the able-bodied men were being called up by the time we left, and there were rumours that a section of the railway line had been swept away by floods. The prospect was not encouraging, but things seldom turn out as one expects and we had no serious trouble. The wave of violence had exhausted my father's constitution, and his last show of physical strength was paid for in still greater weakness and disintegration. His strength of purpose, briefly reawakened had faded too. He was childish and sometimes deliberately mischievous, but he was never dangerous again.

Once we got back to England he was admitted to a mental hospital without delay. He had long since given up the struggle of trying to relate his ideas to reality, and had retired into a private world of unimpeded action. When last I saw him he had been put in charge of running the war after Dunkirk and was well pleased with the results. He went downhill steadily. Among other physical complications he developed diabetes and he died in coma about eighteen months after admission. The post mortem showed gross physical damage to the brain, and it was apparently regarded as quite spectacular. The medical records were lost during the war, but so far as I know the findings were consistent with a severe post-encephalitic lesion.

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I am not qualified to comment on the medical aspects of this story, and the last thing I wish to do is to disparage the physicians who were concerned in it. I happened to be in a position to see certain aspects more clearly, but I had not the wit to grasp why it was that things which were obvious to me might be invisible to others. In this case neither specialised knowledge of the disease nor intimate knowledge of the patient were by themselves effective. Had they been brought closer together it might have been a help both to those who were reponsible for giving advice and to those who had the task of practical management. How easy it is to be wise after the event.

The point which I would like to make myself is a different one. An illness of this kind affects others besides those who suffer from it, and the idea that a loved person—or oneself for that matter—might be transformed into something alien is disquieting. Pain and incapacity and disfigurement can be faced with fortitude, but the sight of a disease which seems to rot the self is hard to bear. It's not much use countering this with philosophical arguments, because they tend to evaporate in real-life situations, but my practical experience has reassured me about an aspect of the problem which sometimes looks more troubling that it turns out to be. There can be no shame in feeling uneasiness about it, and those who have the task of reassuring others sometimes feel the more because they must not admit to doing so; but I think some of the dread hich may be aroused is based on fear of the unknown nd a misunderstanding of what happens to people fter they have been cut off from reality in this way.

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Bronchial Carcinoma

In answer to a question, Mr. **Aneurin Bevan** stated that deaths registered in England and Wales classified to carcinoma of the bronchus numbered 1548 in 1940, 2839 in 1944 and 5198 in 1948.

Iodisation of Salt

Dr. **Barnett Stross** asked the Minister of Food whether he would give an assurance that salt free from iodisation would always be available for purchase by those who feared that a very small iodine content might affect them adversely.—Mr. **Maurice Webb** *replied*: As the trace of iodine will be very small the Medical Research Council think that adverse effects will be most unlikely; but my Food Standards Committee will bear this point in mind when considering representations about the proposed changes.

before his condition became really grave, and our return passage was booked for March. There was no possibility of getting home earlier, and I hoped that I might be able to stave off disaster meanwhile. I think I might just possibly have been successful if it had not been for the international situation.

* * *

My father had never had a good ear for foreign languages, but he could follow them on paper, and to some extent this faculty remained. When Hitler marched into Czechoslovakia the repercussions spread even to the part of the world where we were staying, and the local papers were blazoned with headlines which implied the imminence of war. This was too much. Faced with a threat which involved his own country and all that was dear to him, my father let go his last faint hold on reason and threw himself into action. The results were spectacular. Until then he had walked unsteadily with shuffling gait, his head drooped forward, his features flaccid, and when he spoke he gave confused and indistinct expression to his rambling thoughts. Now he stood straight with lifted head, strode with firm step, spoke clearly, and set out with rampant anger to find and destroy the enemy in our midst. He spent the day chasing non-existent spies in other people's bedrooms; while I chased after, explaining to the agitated guests and taking what steps I could to deal with the emergency. The hotel manager, the only responsible man about the place, had left that morning for a destination fifty miles away. I managed to telephone a message to the doctor in the nearest town, but it was some hours before he arrived. As was natural in the circumstances, my father's violence became directed against me. I was, after all, the person whom he had relied on most in his difficulties, and now that the situation forced me to restrain him it seemed to him that I, of all people, had gone over to the enemy. In that moment of despair and disillusion the full force of his love for me was turned to bitter hatred. I could understand, but I could not relieve his plight. When the crisis came we were alone in an upstairs gallery, and he turned on me with murder in his eyes. A day earlier the physical advantage would have been on my side, but mania had mobilised his last reserves of strength and he was for the time being a powerful man. My prospects of escape seemed small in any case; so, taking a chance on it, I faced him quietly with an appearance of calmness which assuredly I did not feel. For a moment the issue hung in the balance, but my confidence just turned the scale. I think if I had retreated or resisted he would probably have strangled me, but when my glance met his he could not bring himself to do it. He relaxed at last with a gesture of sad acquiescence and let himself be quietly led away. I was as much astonished by my own intuitive action as I was by the result.

The foreign doctor came and went again, leaving a sedative which was unfortunately a proprietary brand with the contents printed outside the container. My father feared we were intent on drugging him for some nefarious purpose, and he would not touch it. He had, however, recognised the doctor for what he was, and the visit sobered him a little. Even that much relief was something to be thankful for, but it was clear that no further professional help would be forthcoming. The next few days were very difficult. Quite apart from the fact that my father had charge of all our money, I expected that he might become homicidal again at any moment. I found, however, that my influence still counted for something even when he was inaccessible to reason. I was often able by manner and gesture rather than by words to make him feel that I still cared about him and that the dangers around us did not trouble me. This gave him just enough confidence to quieten him for a time, but the task would scarcely be completed before it had to be begun again. It was keeping a constantly skidding car from crashing off road.

I only went on coping because I had to, but it is surprising what an ordinary person can do under the spur of necessity. I didn't even know how frightened I was until the prospect of relief arrived. Towards the end of the week, among a group of passing visitors, I recognised a doctor from another part of the country who had treated me when I was a child. At sight of a familiar and reassuring face I had to sit down suddenly because my knees became unsteady. I explained what was happening, but he only said: "My poor, dear girl, how terribly distressing for you!" and drove away again. Sympathy can be a dangerous drug when it is not backed by practical assistance; I came nearer to losing my grip then than at any other time.

* * *

We got home in the end. All the able-bodied men were being called up by the time we left, and there were rumours that a section of the railway line had been swept away by floods. The prospect was not encouraging but things seldom turn out as one expects and we had no serious trouble. The wave of violence had exhausted my father's constitution, and his last show of physical strength was paid for in still greater weakness and disintegration. His strength of purpose, briefly reawakened had faded too. He was childish and sometimes deliberately mischievous, but he was never dangerous again.

Once we got back to England he was admitted to a mental hospital without delay. He had long since given up the struggle of trying to relate his ideas to reality, and had retired into a private world of unimpeded action. When last I saw him he had been put in charge of running the war after Dunkirk and was well pleased with the results. He went downhill steadily. Among other physical complications he developed diabetes and he died in coma about eighteen months after admission. The post mortem showed gross physical damage to the brain, and it was apparently regarded as quite spectacular. The medical records were lost during the war, but so far as I know the findings were consistent with a severe post-encephalitic lesion.

* * *

I am not qualified to comment on the medical aspects of this story, and the last thing I wish to do is to disparage the physicians who were concerned in it. I happened to be in a position to see certain aspects more clearly, but I had not the wit to grasp why it was that things which were obvious to me might be invisible to others. In this case neither specialised knowledge of the disease nor intimate knowledge of the patient were by themselves effective. Had they been brought closer together it might have been a help both to those who were reponsible for giving advice and to those who had the task of practical management. How easy it is to be wise after the event.

The point which I would like to make myself is a different one. An illness of this kind affects others besides those who suffer from it, and the idea that a loved person—or oneself for that matter—might be transformed into something alien is disquieting. Pain and incapacity and disfigurement can be faced with fortitude, but the sight of a disease which seems to rot the self is hard to bear. It's not much use countering this with philosophical arguments, because they tend to evaporate in real-life situations, but my practical experience has reassured me about an aspect of the problem which sometimes looks more troubling that it turns out to be. There can be no shame in feeling uneasiness about it, and those who have the task of reassuring others sometimes feel the more because they must not admit to doing so; but I think some of the dread hich may be aroused is based on fear of the unknown d a misunderstanding of what happens to people ter they have been cut off from reality in this way.

It is clear that a disease process can affect personality, nd the instance I have described does no more than lustrate something which is well known. It has een suggested, and indeed it seems at first sight rather bvious, that if damage to certain areas of the brain ffects character, character itself must depend upon hese structures. This is, I suspect, no more than a half-truth, and because a part of it is demonstrably true it may be all the more misleading. It is reasonable to assume that a man's physical constitution is the machine through which his personality is developed and operated, but the person as a whole is something more than the sum of his parts, and personality in action behaves like a total field of force. If outward behaviour has been a camouflage for inner tension, and if a person's standards have been imposed from without and not accepted as fully worth while in themselves, even slight damage to the machine may have dramatic results; but a balanced and integrated character cannot easily be destroyed.

When my father became violently insane he was certainly not his normal self, but if one makes allowances for the confused view of reality which was relayed to him his actions were consistent and quite in keeping with his character. He had previously become so weighed down by discouragement and weakness that only an intense emotional stimulus could have roused him. The threat to his country and his family struck deeper than any fancied insults or injustice to himself, and he responded with everything he had. By what was in the circumstances an astonishing integrative effort he achieved both mental concentration and physical coordination, and if the results bore no useful relation to the facts that was scarcely to be wondered at. When it seemed to him that his country's interest and his affection for me were in conflict, he put his country first, just as he would undoubtedly have done in real life; but, although his moral judgment condemned me, he made an effort to forgive me personally for the wrongs which he believed that I had done. Although I could not know it at the time, I think his resolution not to attack me, when once made, was final. He might resist, but he would not deliberately harm me.

In acting like this my father was to a large extent following character patterns which had been established many years before; but his self was more than an automaton running along old tracks—it remained vital and capable of new adjustments even in the midst of wreckage. Towards the end of the acute stage of his illness he developed some extremely troublesome delusions about my mother's health. These caused so much distress all round that I spent a long morning trying by every means I knew to win back his confidence. In the end I was successful and for one short space he returned to complete lucidity. In that moment he knew for certain that he was losing his mind, and I think he knew as well as I did that he was losing it for ever. He faced the knowledge without flinching, and he looked beyond it at what was for him the hardest truth of all. The time had come when he must finally commit to others, who might well prove less patient and considerate than he had been, the welfare of the wife he loved. Nothing could have cost more to a man whose chief defect of character had always been a tendency to carry his protective rôle too far. He made the readjustment perfectly, and he was perhaps more truly himself at that moment than he had ever been. It was an act of will which might well command admiration in a man whose mental faculties were unimpaired, and yet it was achieved by one whose brain and nervous system were tottering on the brink of final ruin. It was, I think, a victory which secured release, for he subsided afterwards into a quiet dementia which was like a rambling dream; vivid consciousness and depth of feeling were no longer present, and I never felt another pang on his behalf.

* * *

I do not wish to draw elaborate conclusions from a single incident; I merely set it on record for consideration. Mind and body are inseparable, so far as we can tell, but experience suggests that they are no more than tools, and of much less account than the spirit whose purposes they serve.

Parliament

The Medical Bill

In the House of Lords on May 16, when this Bill was considered on report, Lord SHEPHERD moved an amendment to clause 14 to provide that at any hearing of a case at least one of the members of the disciplinary committee who were neither registered medical practitioners nor the holders of qualifying diplomas should be eligible to attend. The amendment was agreed to.

On clause 21 he explained that it was proposed that the visitors to London schools and examinations should by agreement be appointed to act both as external inspectors on behalf of the University of London and as visitors for the General Medical Council, so that two separate inspections could be avoided. He then moved an amendment to permit recourse to the Privy Council, if ever the two bodies could not reach agreement, the Privy Council asking that directions might be given as to the procedure to be followed.

The amendment was agreed to.

The report stage of the Bill was concluded.

QUESTION TIME

Mental Disability and Divorce

Dr. CHARLES HILL asked the Minister of Health whether he was aware that no relief was afforded by the Matrimonial Causes Act, 1937, to a person whose wife or husband, having been a certified patient in a mental hospital, after an interval subsequently became a voluntary patient and was incurably of unsound mind; and whether he would introduce amending legislation so as to make available facilities for the release from the matrimonial yoke of a spouse who was incapable of enjoying normal matrimonial life through mental disability of the other spouse.—Sir HARTLEY SHAWCROSS, the Attorney-General, replied: The Matrimonial Causes Act, 1937, enables a petition for divorce to be presented on the ground that the respondent is incurably of unsound mind and has been continuously under care and treatment for at least 5 years immediately preceding the presentation of the petition. For this purpose, a person is deemed to be under care and treatment while he is detained in pursuance of an order made under the Lunacy Acts (or under the corresponding legislation in force in Scotland, Northern Ireland, the Isle of Man, or the Channel Islands) or while he is receiving treatment as a voluntary patient, being treatment which follows without any interval the period of detention already mentioned. If any interval occurs between the ending of the period of detention and the subsequent voluntary treatment it would normally relate to a period during which the patient was not regarded as insane and it would not I think be in the public interest to amend the law so as to permit a period of treatment as a voluntary patient to be taken into account in such circumstances.

Bronchial Carcinoma

In answer to a question, Mr. ANEURIN BEVAN stated that deaths registered in England and Wales classified to carcinoma of the bronchus numbered 1548 in 1940, 2839 in 1944 and 5198 in 1948.

Iodisation of Salt

Dr. BARNETT STROSS asked the Minister of Food whether he would give an assurance that salt free from iodisation would always be available for purchase by those who feared that a very small iodine content might affect them adversely.—Mr. MAURICE WEBB replied: As the trace of iodine will be very small the Medical Research Council think that adverse effects will be most unlikely; but my Food Standards Committee will bear this point in mind when considering representations about the proposed changes.

X-ray Film for Hospitals

Mr. N. N. DODDS asked the President of the Board of Trade whether he was aware of the shortage of X-ray film; and what steps he proposed to take to increase supplies to hospitals.—Mr. HAROLD WILSON replied: I am not aware that there is now any significant shortage of X-ray film. Production continues to increase and home users still have priority. No hospital need now be without supplies.

Accommodation for Aged

Mr. GEORGE THOMAS asked the Minister of Health the number of aged and chronic sick people who were housed in mental institutions in Wales because no other hospital accommodation was available; and what steps he was taking to relieve this problem.—Mr. BEVAN replied: I am not aware that any aged persons not suffering from mental infirmity are being housed in mental institutions in Wales; but I understand that there are, in those institutions, some 663 persons over the age of 65 who are suffering from mental infirmity, but could be appropriately accommodated elsewhere if suitable alternative accommodation were available. I have recently issued to the regional hospital boards some suggestions as to the provision of alternative accommodation for aged persons suffering from mental infirmity.

Medresco Hearing-aids

Replying to a question Mr. BEVAN stated that about 75,000 'Medresco' hearing-aids had now been supplied under the National Health Service.

Dentists in the N.H.S.

In answer to a question Mr. BEVAN stated that on Jan. 1, 1950, there were 9495 dentists on the dental lists in England and Wales, of whom 669 were assistants.

Obituary

BENJAMIN ALFRED PETERS

B.A., M.D. CAMB., D.P.H.

Dr. B. A. Peters, who died on May 8, had retired from the post of medical superintendent of Ham Green Hospital less than two years ago, and with the happy coöperation of his friend and successor Dr. James Macrae he was still pursuing a piece of biochemical research on the body's reaction to disease.

Born at Dundalk in 1882, the son of the late Rev. George Peters, he was educated at Liverpool College and Liverpool University before he went up to Jesus College, Cambridge, in 1901. The next two years he rowed in his college boat. In 1908 he graduated B.CHIR., taking his M.B. and D.P.H. in 1910 and his M.D. in 1913.

After serving on the resident staff of the city hospitals of his native town, Liverpool, he went to Bristol in 1910 as resident medical officer to Ham Green. The history of the growth of that hospital is also the story of his achievements. From 200 beds it grew to become a model fever-hospital-sanatorium of 500 beds with an auxiliary hospital of 108 beds at Charterhouse. The only break in his span of office was his service with the R.A.M.C. during the 1914–18 war as bacteriologist to the 14th General Hospital. In 1930 he was given the status of medical superintendent at Ham Green.

R. H. P. writes: "Dr. Peters has made some notable contributions to our knowledge regarding the treatment and prevention of the infectious diseases—in particular diphtheria and the streptococcal infections. He was a member of the subcommittee on cross-infection in hospital wards of the Preventive Medicine Committee of the Medical Research Council. The University of Bristol recognised his contribution to research by awarding him the Markham Skerritt prize and by making him a reader in infectious diseases. Among his colleagues and his patients he had many friends, and this was made evident when he retired from Ham Green. He came to the rescue of many of his medical colleagues and his clinical advice was much sought after. Although fond of sport, especially tennis at which he excelled, Dr. Peters was shy and retiring by nature and withdrew to his books whenever he had the opportunity, and in his retirement at Nailsea his research work and his garden kept him fully occupied and happy."

Dr. Peters married Sylvia, daughter of Dr. J. C. Heaven, who survives him with a daughter.

In England Now

A Running Commentary by Peripatetic Correspondents

STRANGE things often happen to doctors and I doubt if my story is unique. Being a mere obstetric house-surgeon, I get an off-duty weekend about once a month; but, of course, Friday is always a busy day, and as I'm preparing to make the inevitable dash for the 4.35 there will certainly be a couple of perineums to be stitched. This Friday was no exception. The 4.35 was, however, late, and by the time it arrived my puffing and blowing had subsided and my pulse was again at its normal 72. I leant back in a corner seat and settled down to enjoy the spring colours of the Garden of England and to see what I could of the stringing of the hops. But my enjoyment of Nature was rather spoilt by the hostile atmosphere in the compartment, for a cold and unfriendly stare was evident from the prim and proper middle-aged lady sitting opposite me. I noticed her occasional glance at my feet, and with some embarrassment (that sort of thing had happened before) I too glanced down; but no, both my socks bore the same bright red and yellow check pattern. For the whole of the half-hour journey to the next stop my fellow traveller fixed me with her hostile stare, and then, as the train was about to start again, she jumped up with sudden decision and leapt on to the platform. I settled back with a sigh of relief.

As I passed through the ticket barrier at Victoria, a well-dressed gentleman approached me and asked whether I would mind accompanying him to the station-master's office. Yes, I did mind; but he produced evidence of being a railway policeman, so I thought it wise to go with him. I soon learnt that a lady had telephoned a description of a young man whom she suspected of having recently committed some awful and horrible crime. Would I be good enough to explain? With a little loss of dignity, I had to admit that in the pre-weekend rush I had broken the labour-ward rules and not worn the surgeon's rubber boots for the afternoon's sewings-up. That was why the lower ends of my new flannel trousers were so bespattered with human blood stains.

I must remember to write to the Ethical Committee and ask whether I should sue for defamation of character or offer compensation to the lady for her two hours' wait for the next train.

* * *

This discussion about the capacity of various orifices reminds me of a friend who was called down to Casualty one night to see a deaf mute. His pencilled complaint was that for two days he had had a bottle in his rectum, and was unable to defæcate. My colleague removed a glass bottle, and, there being a rule in force at that time that all surgical specimens were to be sent for biopsy, duly dispatched it to the pathologist. There the story must end, for that morbid gentleman, having no sense of humour, threw the bottle away. It was a pity, for if he had examined it I have no doubt that he would have found a remarkable degree of hyaline change.

* * *

My grandmother had a theory that dogs resemble their owners, either because people tend to choose a dog with characteristics similar to their own or because the dog becomes adapted to his human. The same thing applies to people and their cars: there seem to be definite types that drive various makes of car.

The owner who invests in a Costyn, for example, is mild, donnish, clerical—or a maiden lady. The Pullsley 16 or 25 is driven by the hard, ruthless, self-made man; he thrusts past lesser fry, edging them into the ditch, and cuts in ferociously. The G.M. is driven by sweet young things with Jacqmar scarves, or by long-haired young men in hacking coats and suède shoes. The old round-nosed Boris Fowley is steered along, bang in the middle of the road and at a maximum speed of 20 m.p.h., by a character who wears a pork-pie hat or a bowler rammed fiercely down over his ears, from which hair is sprouting. He sits bolt upright at the wheel, and his little, piggy eyes shoot suspicious glances at anyone trying to overtake. His radiator boils steadily.

The small saloon car, of any brand, confers fertility on owner, to judge by the number of such cars seen at a ekend in which Papa at the wheel, like a rock in stormy sea. emerges dripping, now and then. from a th of small children. The Victory convertible is driven people who have obviously got out of *Vogue* or the *tler*—the wrong side.

However. I realised only the other day, when I got held in a traffic jam. how unscientific these generalisations e. A huge American car purred alongside me, and the onde at the wheel (*left-hand drive*) glanced down at and then remarked, too loudly. to her Stewart angerish escort, " Do look, Sweet—just a too-perfect bstandard Eight type ! "

* * *

The long dreary lists of references that are the postript of a good many medical articles today are of tle interest to the average reader. though they are doubt a godsend to the writers of subsequent articles, pecially M.D. theses. At the present rate of growth will not be long before the man who can find a column two of original remarks to make will be appending me sixteen pages of classified references: so would not relieve the strain and tedium if reference lists were stefully interspersed with photographs and cartoons the authors cited ? I admit these would sometimes hard to find. but they would soon be sent out autoatically with the reprints ; or. like the references emselves, could cheerfully be copied from previous apers. Apart from their amusement value these poraits would often enable one to judge the reliability the authors at a glance. Whether one's judgment ould be fair is another matter.

* * *

The other day I went to the office of the Administrative ssistant to pay my hospital telephone bill. The clerk ook the account and my shilling. checked the reference umber and my name, referred to a ledger. took down nother book and next a book of receipt forms, filled in he five-by-eight page in the latter and then the counteroil, and tearing out the completed receipt, fixed it to he bill with a stapling machine. Including remarks bout the weather the whole process occupied seven inutes, which led me to observe that the payment of the hilling had cost the service about sixpence in paper nd perhaps more in time. " But," said the clerk." you only see one side of the business. When this hilling reaches the finance department they may have man working on it all day." I'm afraid he was pulling ny leg. But the incident made me wonder whether here isn't some low limit below which it doesn't pay he hospital to collect its debts. Two bob is the ninimum on the tote ; what ought to be the low limit n hospital accounting ?

* * *

" . . . and my copy to him of *my answer to you crossed* his etter to me in the post."—*Extract from a colleague's letter.*

rom the Dee in the north the letters fly forth,
rom Auld Reekie to Ayr on the coast,
But my copy to him of my answer to you crossed
[his letter to me in the post.

This fury of writing is strangely exciting.
Our free flow of words is our boast ;
Thus our copy to them of our answer to you crossed
[their letter to us in the post.
The wordy profusion, the total *confusion* ;
Which of these entertains us the most ?
Since your copy to me of your answer to him crossed
[my letter to you in the post ?

There is no need to think so long as the ink
Keeps on flowing. Let this be our toast :
May our copy to us of your answer to you cross
[their letter to them in the post !

So when life is ended, our Colleagues descended
To a Place down below where they'll roast ;
Our copies to them of our views up-to-date
Will pour upon them in continuous spate,
The Gestetners producing at infinite rate.
Distribution : The Heavenly Host.

Letters to the Editor

REGISTER OF COMPLAINTS

SIR,—Your columns contain week by week many trenchant criticisms of the adverse effect that hospital administration is producing on the status and work of members of hospital staffs. Some of the deleterious effects might have been avoided if the administrators had hearkened to, or taken the advice of, knowledgeable and experienced members of the profession.

A grave instance of intervention without consultation with organisations representative of the profession is to be found in a current proposal by a group hospital management committee to establish a register of complaints. In this register it is required that there will be recorded the complaints made by inpatients or outpatients with regard to their care and treatment. An administrative officer will be responsible for maintaining a register at each hospital in his unit, for informing the departmental officers of its existence and purpose, and for stressing the importance of recording the full facts of actual complaints received or instances likely to give rise to complaints. The registers are to be made easily accessible to all departmental officers. It is emphasised in a circular that the regional hospital board, through hospital management committees, is obliged to ensure the admission to hospital of emergency cases. Out of this responsibility, it is urged that criticism will undoubtedly arise from time to time when a patient is refused admission in circumstances that appear to constitute an emergency.

It is also stated that the complaints register, when prepared and set in operation, should be kept in the casualty department or receiving-room of each hospital, so that the medical officer responsible for receiving emergency cases could readily record particulars of every case in the register when complaint is made concerning the action taken by the hospital officials relevant to admission.

More serious still, however, is the obligation cast upon members of the staff to ensure that there is readily available in the register of complaints an answer to criticism that may be raised by questions in Parliament or by letters to Members of Parliament, the Minister of Health, the management committee, or the press. Administrative officers are instructed that extracts of records made in the register during the previous month are to be forwarded to the secretary of the management committee on the third day of each month. The actual registers are now being printed and will be made available as soon as practicable.

The foregoing procedure is fraught with danger for the medical staff of the hospitals concerned, and would doubtless be held in horror by solicitors who have anything to do with the protection of the profession in medicolegal cases. It may be that the management committee is legally competent to give directions for the maintenance of a book of this order. The register will probably work unfairly, since a conscientious medical officer might report every complaint he received from a patient, whilst another less conscientious, and even alive to the dangers of the situation, would report little or nothing.

Some of these entries in the register might be held by the lawyers to be defamatory, and the practitioner concerned might have a right of action if he has suffered thereby. Presumably, qualified privilege will attach to this register, but its availability for examination by interested parties is of great significance. The procedure known to the lawyers as " discovery of documents " could doubtless be employed to gain information on all hospital records pertinent to a case that is proceeding to a hearing in our courts. The medical officer may

X-ray Film for Hospitals

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In England Now

A Running Commentary by Peripatetic Correspondents

STRANGE things often happen to doctors and I doubt if my story is unique. Being a mere obstetric house-surgeon, I get an off-duty weekend about once a month; but, of course, Friday is always a busy day, and as I'm preparing to make the inevitable dash for the 4.35 there will certainly be a couple of perineums to be stitched. This Friday was no exception. The 4.35 was, however, late, and by the time it arrived my puffing and blowing had subsided and my pulse was again at its normal 72. I leant back in a corner seat and settled down to enjoy the spring colours of the Garden of England and to see what I could of the stringing of the hops. But my enjoyment of Nature was rather spoilt by the hostile atmosphere in the compartment, for a cold and unfriendly stare was evident from the prim and proper middle-aged lady sitting opposite me. I noticed her occasional glance at my feet, and with some embarrassment (that sort of thing had happened before) I too glanced down; but no, both my socks bore the same bright red and yellow check pattern. For the whole of the half-hour journey to the next stop my fellow traveller fixed me with her hostile stare, and then, as the train was about to start again, she jumped up with sudden decision and leapt on to the platform. I settled back with a sigh of relief.

As I passed through the ticket barrier at Victoria, a well-dressed gentleman approached me and asked whether I would mind accompanying him to the station-master's office. Yes, I did mind; but he produced evidence of being a railway policeman, so I thought it wise to go with him. I soon learnt that a lady had telephoned a description of a young man whom she suspected of having recently committed some awful and horrible crime. Would I be good enough to explain? With a little loss of dignity, I had to admit that in the pre-weekend rush I had broken the labour-ward rules and not worn the surgeon's rubber boots for the afternoon's sewings-up. That was why the lower ends of my new flannel trousers were so bespattered with human blood stains.

I must remember to write to the Ethical Committee and ask whether I should sue for defamation of character or offer compensation to the lady for her two hours' wait for the next train.

* * *

This discussion about the capacity of various orifices reminds me of a friend who was called down to Casualty one night to see a deaf mute. His pencilled complaint was that for two days he had had a bottle in his rectum, and was unable to defæcate. My colleague removed a glass bottle, and, there being a rule in force at that time that all surgical specimens were to be sent for biopsy, duly dispatched it to the pathologist. There the story must end, for that morbid gentleman, having no sense of humour, threw the bottle away. It was a pity, for if he had examined it I have no doubt that he would have found a remarkable degree of hyaline change.

* * *

My grandmother had a theory that dogs resemble their owners, either because people tend to choose a dog with characteristics similar to their own or because the dog becomes adapted to his human. The same thing applies to people and their cars: there seem to be definite types that drive various makes of car.

The owner who invests in a Costyn, for example, is mild, donnish, clerical—or a maiden lady. The Pullsley 16 or 25 is driven by the hard, ruthless, self-made man; he thrusts past lesser fry, edging them into the ditch, and cuts in ferociously. The G.M. is driven by sweet young things with Jacqmar scarves, or by long-haired young men in hacking coats and suède shoes. The old round-nosed Boris Fowley is steered along, bang in the middle of the road and at a maximum speed of 20 m.p.h., by a character who wears a pork-pie hat or a bowler rammed fiercely down over his ears, from which hair is sprouting. He sits bolt upright at the wheel, and his little, piggy eyes shoot suspicious glances at anyone trying to overtake. His radiator boils steadily.

he small saloon car, of any brand, confers fertility on owner. to judge by the number of such cars seen at a ekend in which Papa at the wheel, like a rock in tormy sea, emerges dripping, now and then, from a th of small children. The Victory convertible is driven people who have obviously got out of *Vogue* or the *ller*—the wrong side.

However, I realised only the other day, when I got held in a traffic jam, how unscientific these generalisations . A huge American car purred alongside me, and the nde at the wheel (left-hand drive) glanced down at and then remarked, too loudly. to her Stewart angerish escort; " Do look, Sweet—just a too-perfect bstandard Eight type ! "

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The long dreary lists of references that are the postipt of a good many medical articles today are of le interest to the average reader, though they are doubt a godsend to the writers of subsequent articles, ecially M.D. theses. At the present rate of growth will not be long before the man who can find a column two of original remarks to make will be appending me sixteen pages of classified references; so would not relieve the strain and tedium if reference lists were stefully interspersed with photographs and cartoons the authors cited ? I admit these would sometimes hard to find. but they would soon be sent out automatically with the reprints; or, like the references emselves, could cheerfully be copied from previous pers. Apart from their amusement value these poraits would often enable one to judge the reliability the authors at a glance. Whether one's judgment ould be fair is another matter.

* * *

The other day I went to the office of the Administrative ssistant to pay my hospital telephone bill. The clerk ok the account and my shilling, checked the reference mber and my name, referred to a ledger. took down nother book and next a book of receipt forms, filled in e five-by-eight page in the latter and then the counteril, and tearing out the completed receipt, fixed it to e bill with a stapling machine. Including remarks bout the weather the whole process occupied seven inutes. which led me to observe that the payment of the illing had cost the service about sixpence in paper d perhaps more in time. " But," said the clerk," you only see one side of the business. When this illing reaches the finance department they may have man working on it all day." I'm afraid he was pulling y leg. But the incident made me wonder whether here isn't some low limit below which it doesn't pay e hospital to collect its debts. Two bob is the inimum on the tote; what ought to be the low limit n hospital accounting ?

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" . . . and my copy to him of my answer to you crossed his tter to me in the post."—*Extract from a colleague's letter.*

rom the Dee in the north the letters fly forth,
rom Auld Reekie to Ayr on the coast,
But my copy to him of my answer to you crossed
[his letter to me in the post.

This fury of writing is strangely exciting,
Our free flow of words is our boast;
Thus our copy to them of our answer to you crossed
[their letter to us in the post.
The wordy profusion, the total confusion;
Which of these entertains us the most ?
Since your copy to me of your answer to him crossed
[my letter to you in the post ?

There is no need to think so long as the ink
Keeps on flowing. Let this be our toast:
May our copy to us of your answer to you cross
[their letter to them in the post !

So when life is ended, our Colleagues descended
To a Place down below where they'll roast;
Our copies to them of our views up-to-date
Will pour upon them in continuous spate,
The Gestetners producing at infinite rate.
Distribution: The Heavenly Host.

Letters to the Editor

REGISTER OF COMPLAINTS

SIR,—Your columns contain week by week many trenchant criticisms of the adverse effect that hospital administration is producing on the status and work of members of hospital staffs. Some of the deleterious effects might have been avoided if the administrators had hearkened to, or taken the advice of, knowledgeable and experienced members of the profession.

A grave instance of intervention without consultation with organisations representative of the profession is to be found in a current proposal by a group hospital management committee to establish a register of complaints. In this register it is required that there will be recorded the complaints made by inpatients or outpatients with regard to their care and treatment. An administrative officer will be responsible for maintaining a register at each hospital in his unit, for informing the departmental officers of its existence and purpose, and for stressing the importance of recording the full facts of actual complaints received or instances likely to give rise to complaints. The registers are to be made easily accessible to all departmental officers. It is emphasised in a circular that the regional hospital board, through hospital management committees, is obliged to ensure the admission to hospital of emergency cases. Out of this responsibility, it is urged that criticism will undoubtedly arise from time to time when a patient is refused admission in circumstances that appear to constitute an emergency.

It is also stated that the complaints register, when prepared and set in operation, should be kept in the casualty department or receiving-room of each hospital, so that the medical officer responsible for receiving emergency cases could readily record particulars of every case in the register when complaint is made concerning the action taken by the hospital officials relevant to admission.

More serious still, however, is the obligation cast upon members of the staff to ensure that there is readily available in the register of complaints an answer to criticism that may be raised by questions in Parliament or by letters to Members of Parliament, the Minister of Health, the management committee, or the press. Administrative officers are instructed that extracts of records made in the register during the previous month are to be forwarded to the secretary of the management committee on the third day of each month. The actual registers are now being printed and will be made available as soon as practicable.

The foregoing procedure is fraught with danger for the medical staff of the hospitals concerned, and would doubtless be held in horror by solicitors who have anything to do with the protection of the profession in medicolegal cases. It may be that the management committee is legally competent to give directions for the maintenance of a book of this order. The register will probably work unfairly, since a conscientious medical officer might report every complaint he received from a patient, whilst another less conscientious, and even alive to the dangers of the situation, would report little or nothing.

Some of these entries in the register might be held by the lawyers to be defamatory, and the practitioner concerned might have a right of action if he has suffered thereby. Presumably, qualified privilege will attach to this register, but its availability for examination by interested parties is of great significance. The procedure known to the lawyers as " discovery of documents " could doubtless be employed to gain information on all hospital records pertinent to a case that is proceeding to a hearing in our courts. The medical officer may thoughtlessly and ill-advisedly record a complaint in such a manner as to place himself in the wrong, whereas on further and fuller investigation it might transpire that he was not in any way blameworthy for what had occurred. This in effect means that medical officers may unintentionally and in good faith provide ample material for a prospective litigant to establish negligence in the discharge of professional obligations.

Steps are being taken to draw the attention of the Consultants and Specialists Committee to this innovation of the administrators in the hope that that committee may regard the matter of sufficient gravity to warrant the presentation of a protest to the Ministry of Health. The council of the Medical Defence Union has adopted a resolution condemning the practice of the establishment of a complaints register in hospitals and it hopes the British Medical Association will be successful in persuading the Ministry of Health to recognise the dangers of the procedure proposed to be followed.

Medical Defence Union,
49, Bedford Square, London, W.C.1.
ROBERT FORBES
Secretary.

ANTI-HISTAMINE DRUGS AND THE TUBERCULIN REACTION

SIR,—As your annotation of Jan. 28 showed, various workers [1] [2] have failed to demonstrate in man a reduction in skin sensitivity to tuberculin after administration of anti-histamine drugs. To provide more conclusive evidence on this point I repeated the experiment using large doses of 'Anthisan.' There were twenty subjects in the series, including five controls, unknown to the observer, and selected at random by the ward sisters. The subjects were inpatients at Preston Hall Sanatorium, and were not receiving streptomycin or *p*-aminosalicylic acid at the time. After the initial Mantoux test (using 0·1 ml. Koch's Old Tuberculin injected intradermally and read at 48 and 72 hours) anthisan was given by mouth (0·3 g. daily for the first day and 0·6 g. daily subsequently, in divided doses). After 4 days the skin tests were repeated and anthisan continued until the results were read. The findings were as follows:

Case		Mantoux		
		1 in 10,000	1 in 1000	1 in 100
Controls ..	1	+		
		+		
	2		+	
			+	
	3		? +	+
			+	
	4, 5			+
				+
Test subjects	6–14	+		
		+		
	15	+		
		? +		
	16–18		+	
			+	
	19		+	
				+
	20			+
			+	

In each case the second reading is recorded on the line below the first.
+ = weal 5 mm. or more in diameter.

It will be seen that the second result was identical with the first in four out of five controls and in twelve out of fifteen test subjects. In one control and one test subject, results were equivocal. Sensitivity appeared to be increased in one test subject and decreased in another.

The Mantoux reaction is a crude instrument for quantitative measurements, as pointed out by Long and Miles,[3] and the method they describe of plotting log dose against lesion diameter may be of more value. The results obtained here support earlier findings that anthisan does not affect the Mantoux reaction.

My thanks are due to Dr. F. Temple Clive for kindly granting facilities for this investigation.

London, W.12. DENIS ABELSON.

HISTORY OF NURSING

SIR,—Your correspondent of May 13, discussing Mrs. L. R. Seymer's book, says that many today see grave ground for anxiety in the fact that the rise in numbers of nurses has not been accompanied by a rise in the quality of nurses or of nursing. This is certainly true, and is largely because it is now taken for granted in this country that the chief part of the nursing staff of the hospital must be drawn from the ranks of the student nurses. This leads to a grave situation in which, in order to keep the wards of the hospital open, candidates for nursing are accepted as "pairs of hands," and little attention is paid to their quality and their suitability for the profession for which they are training. So long as this danger is unrecognised, and so long as inducement from high quarters is given to attract all and sundry into the nursing profession by giving large initial salaries during training, and by other means, so long will this anxiety remain, and so long is there likely to be deterioration in the standard of British nursing.

No doctor or nurse can read the recently published *A Voice Through the Clouds*, by Denton Welch, without a sense of uneasiness. To anyone who knows conditions within our hospitals today it is clear that much of the mental suffering the author underwent in the earlier stages of his long illness was due to the failure of young and frightened so-called student nurses, who were carrying responsibility greater than their age or experience justified and so were unable to deal adequately with the abnormal mental condition and great physical and mental distress of their patient.

The large percentage of failures in the State Examination quoted by your correspondent is due as much to the poor type of candidate, who would inevitably have wasted from the nursing profession, as to the high standard demanded in that examination. Miss Nightingale, when refusing her approval to State registration in 1892, qualified her disapproval by saying—"Twenty or thirty years hence, when so much progress has been made that our present time is looked back upon as the time of bad nursing, this registration might do." I have taught girls in different types of hospitals, from many different types of homes, and from different educational backgrounds, and I have never found anyone who has real purpose and character, and ability to carry the responsibilities of the State-registered nurse, who has failed to do so through failure to pass her examination, though she may not have been successful at her first attempt.

The four great essentials for the nursing of the future are:

1. Greater emphasis on the education of the nurse, and less on the employment of student labour in the hospitals.
2. More careful selection of candidates with regard to intelligence and practical ability.
3. Careful revision of the syllabus of the General Nursing Council, so that all the theoretical background given is closely related to the practical work of the wards and in the public-health field.
4. Retention of professional responsibility and the administration of nurse training schools in the hands of the nursing profession itself.

There is indeed room for a second volume of Mrs. Seymer's *History of Nursing*, in which these and other problems affecting the profession today could be fully and critically discussed.

Nightingale Training School,
St. Thomas's Hospital,
London, S.E.1.
MARION E. GOULD
Sister Tutor.

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1. Friedman, E., Silverman, I. *Amer. Rev. Tuberc.* 1949, 60, 354.
2. Criep, L. H., Levine, M. I., Aaron, T. H. *Ibid*, 59, 701.
3. Long, D. A., Miles, A. A. *Lancet*, 1950, March 18, p. 492.

CONTINUOUS DRIP TREATMENT OF PEPTIC ULCER

SIR,—Dr. Clark (April 29) has shown that although intragastric drips of milk and of alkali are relatively effective in reducing the concentration of hydrogen ions in the gastric contents, the pain of refractory duodenal ulceration is frequently relieved by such treatment. This observation is susceptible to at least two interpretations: (1) that only a minor reduction in the acidity of the gastric contents is necessary to relieve pain, as suggested by Dr. Clark; or (2) that some condition of the stomach associated with its secretory activity—e.g., vascularity—causes the pain, and that this activity is reduced by the fat content of the milk.

We have confirmed Dr. Clark's observations in three patients with duodenal ulcers who were receiving milk drips. In addition we have been able to assess the rate of gastric secretion whilst the drip was being given. For example, in one patient, when the total gastric contents was withdrawn at intervals, the acidity was greater than pH 1·5 in 11 samples out of 25 spread over six days although he had no pain during this period. The mean concentration of chloride in the gastric contents for this period was 127 milli-equivalents per litre (clinical units).

Knowing the maximum concentration of Cl^- in the gastric juice to be 170 milli-equivalents per litre, the concentration of Cl^- in the milk drip to be 30 milli-equivalents, and the volume of the milk drip used in each subject to be 5 pints (2·8 litres) per 18 hours, it was possible to calculate the rate of secretion of gastric juice in each case. In the three subjects the rates of secretion were estimated to be 350 ml., 194 ml., and 183 ml. per hour. If, as seems possible, the concentration of Cl^- in the gastric juice was less than the theoretical maximum of 170 milli-equivalents per litre, then the calculated volume of secretion would be correspondingly greater. Thus as a stimulus of secretion the milk drip was about as effective as the usual dose of histamine given as a test of gastric secretion—which seems to dispose of the idea that milk significantly inhibits the secretory activity of the stomach. This leaves Dr. Clark's suggestion that only small changes in pH are necessary to relieve the pain; or, alternatively, the fat or curd in the milk may mechanically protect the ulcer from the acid.

We hope that this letter will provoke discussion.

Guy's Hospital, London, S.E.1.

A. H. DOUTHWAITE
J. N. HUNT.

PROTECTION OF SURGEONS

SIR,—Having recently been forced to give considerable attention to the protection of young surgeons in this country, it seems to me advisable to publish some points about the present position in general and the question of "cover" in particular.

The first point to be appreciated is that any claim against a hospital will be answered by the Ministry of Health. The Ministry in its turn assumes no responsibility for an act of any member of the medical staff, and will in fact bring him in as a third party in the action. This will have the effect of transferring the action from the Ministry to the doctor; and he will find not only that he is not supported, as he was in the old days, by the hospital and its nursing staff, but also that they are Ministry witnesses and can be used against him. It is therefore vitally essential that he should provide himself with all the assistance he possibly can.

The unenviable position in which the doctor is being placed becomes particularly unfortunate when a visitor from overseas is concerned. Having returned to his own country after a period here during which time he may have performed some operation, at any time up to six years subsequently a claim arising out of that operation can be transferred by the Ministry and laid at his door.

It is therefore good to be able to report that the Medical Defence Union and the Medical Protection Society have recently made special provisions to cover visitors from overseas, and it behoves such visitors to take advantage of these provisions. An overseas doctor who has studied or practised in this country and who desires to maintain protection should make an application for either a retired life membership subscription (Medical Defence Union) or a combined subscription (Medical Protection Society). The full details are available from Dr. Robert Forbes, Medical Defence Union, 49, Bedford Square, London, W.C.1, and from Dr. A. R. French, Medical Protection Society, Victory House, Leicester Square, London, W.C.2.

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B. L. McFARLAND.

TUBERCULOSIS MORTALITY

SIR,—Mr. Daw's interesting and important letter in your issue of April 29, referring to the method of examination of tuberculosis mortality in successive "generations" or "cohorts," developed by Frost,[1] appears to have started a discussion as to who first applied the method to British mortality figures. The answer is: Andvord, of Oslo, the originator of the idea, in 1930.[2]

Whittington Hospital, London, N.19.

A. L. JACOBS.

TEACHING OF PUBLIC HEALTH

SIR,—In your issue of May 13 (p. 934) you record Prof. J. M. Mackintosh's statement on the ultimate dispersal of students from the London School of Hygiene who were awarded the D.P.H.; and the general tone of the commentary is one of regret that of 90 diploma graduates in the past two years only 15 have been recruited to the public-health service in this country.

It seems to me that this somewhat restricted view of the ultimate usefulness of the course for the D.P.H. is unfortunate. Essentially, the value of the course is that it brings into focus the social, environmental, and epidemiological aspects of health and disease. Need there, therefore, be any lament that out of the 22 successful British students last year all but 7 have found their way into work other than that of local government?

Can one imagine a better all-round postgraduate course for general practitioners of medicine than a D.P.H. curriculum containing, as it should, instruction in the epidemiologies of the home, the factory, the school—and even the hospital? Should not the general practitioner have every opportunity of learning the ideas inculcated in the D.P.H. course? I suggest that the head of a department responsible for the diploma course should not be discouraged because his successful students wander into paths other than that of local government, but should be glad to think that some at least of them, as general practitioners, will make good use of his instruction when the present difficulties in general practice subside and the practitioner is able to play his proper part in the public health of the future. I hope that Professor Mackintosh will in fact come to regard the D.P.H. as a very useful extra qualification for the general practitioner; perhaps he might even agree that it is unfortunate that the course is whole-time, since this must prevent many doctors from taking it. If I may slightly amend Professor Mackintosh's wording, the purpose of the course in public health should not be to provide training for consultants in preventive medicine, but to offer opportunities for the making of good general practitioners in domiciliary health.

Department of Child Health,
University of Bristol.

A. V. NEALE.

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1. Frost, W. H. *Amer. J. Hyg.* 1939, 30A, 91.
2. Andvord, K. F. *Norsk. Mag. Lægevidensk.* 1930, 91, 642.

PREGNANCY AND PULMONARY TUBERCULOSIS

SIR,—In his presidential address to the Sheffield Regional Chest Society, published in your issue of April 15, Dr. Midgley Turner summarised his very extensive observations regarding the influence of pregnancy on pulmonary tuberculosis, and advanced the theory that the increased risks in the first four months of pregnancy are due to the excess of gonadotropins, and in the puerperium to the sudden withdrawal of the favourable influence of the œstrogens.

This excellent contribution has, however, completely ignored a further powerful endocrine factor—the well-marked hypertrophy of the adrenal cortex and hypersecretion of its sugar hormones which takes place in pregnancy. Enlargement of the gland has long been known to occur, and it has been shown [1] that the urinary "corticoids," which indicate the amount of the sugar hormones secreted, increase greatly in the first trimester, along with the increase in the gonadotropins, and return to about normal levels by the 100th–120th day, coinciding roughly with the fall in the gonadotropins. Between the 140th and 160th days the corticoid excretion again rises, in company with the œstrogens and pregnanediol, reaching in the later months the very high levels found in Cushing's syndrome or after severe injury; excretion in the last month declines somewhat, and in the puerperium it falls sharply to normal. There is doubt as to whether the fœtal cortex plays any significant part.

There seems good reason for the belief that this most pronounced response of the adrenal cortex to the stress of pregnancy explains its favourable effects on rheumatoid arthritis and partial adrenal insufficiency; the decreased glucose tolerance of the normal subject and the increased insulin requirements of the diabetic; and the occasional ketonuria and glycosuria, the acidosis, the well-being of the later months, and, in all probability, many other normal and possibly abnormal features of pregnancy.

Recent observations that 'Cortisone,' or the sugar hormones secreted in response to the adrenocorticotropic hormone (A.C.T.H.), have an inhibitory effect on wound healing and the formation of granulation tissue,[2] and on growth as a whole,[3] and their effects on lesions of collagen, allied with the weakness of the supporting tissues and striæ found in Cushing's syndrome, suggest most strongly that abdominal enlargement is only partly the cause of the appearance of striæ gravidarum.

The evidence produced by Rich [4] and others in recent years is strongly in favour of hypersensitivity being the main cause of the destruction produced by the tubercle bacillus, so that the damage is out of all proportion to any defensive value of the hypersensitive state; and it has now been shown that cortisone or A.C.T.H. will non-specifically depress both the tuberculin [5] and the anaphylactic [6] types of hypersensitivity.

In the light of these findings it seems probable that pregnancy may have a dual influence on tuberculosis—by decreasing hypersensitivity and increasing the non-specific resistance, while at the same time retarding healing or even breaking down fibrosis. Thus, though the former effect may be beneficial, the latter may cause the breakdown of a quiescent lesion, or the rapid progression of an active one, with wide dissemination of the disease. It is notable that the reactivation of quiescent lesions has already been reported as a result of using A.C.T.H. or cortisone.[7] The available evidence [4] regarding the influence of pregnancy on hypersensitivity is, however, conflicting and unsatisfactory, though a decisive effect has been demonstrated experimentally.[5]

The reasons for the hypertrophy and hypersecretion of the adrenal cortex in pregnancy are not yet clear, though it is well established that œstrogens will cause hypertrophy of the cortex in the experimental animal.[8] This cannot be the sole reason for this feature of pregnancy, and there can be no doubt that the adrenal cortex must share in the reaction of the whole body to the stress of pregnancy and labour—a reaction which involves *the participation of the endocrine system as a whole,* and not of the sexual functions and glands alone. Furthermore, it is well known that the thyroid gland is also hyperfunctioning in pregnancy, and that its hormone will cause cortical hypertrophy and hypersecretion, within certain limits.

The experiments of Lurie et al.[9] are of great interest: but they point out that previous reports regarding the influence of œstrogens and gonadotropins are conflicting, and that as the use of a special inbred strain of rabbit was necessary to obtain a clear-cut result the effects of these hormones on the disease cannot be great. Though they failed to demonstrate unequivocal evidence of increased cortical activity in the rabbit as a result of administering doses of œstrogen stated to be far in excess of physiological levels, close perusal of their papers leaves little doubt that some increase did occur. Also, since the degree of amyloid degeneration, especially in the cortex, was much less in the œstrogen-treated animals, it is reasonable to assume that cortical function was much better in these animals. The adverse effect of gonadotropin remains to be explained, but the small number of animals and the difficulties with anti-hormone formation which were encountered make it difficult to regard the results as conclusive.

The administration of cortical extracts was shown some years ago [10] to exert a very favourable effect on both lesions and survival-time of the guineapig with tuberculosis; but in this experiment, just as in those referred to above, the infection was a primary one. On account of the possible dual nature of the action of the sugar hormones on a *secondary* infection, it would appear that the effects of these hormones on a primary infection in the experimental animal are most unlikely to be applicable to the disease in man.

It is not possible to rule out the sex hormones as playing a part in the influence of pregnancy on tuberculosis, especially in view of the well-recognised increase in the incidence of the disease following the menarche, as compared with the male. Nevertheless, it would seem most probable that in pregnancy the great excess of the sugar hormones exerts much more influence on the course of the disease than do the sex hormones. It may be postulated that the first rise in the secretion of the sugar hormones may, in conjunction with the initial strain of pregnancy, light up a quiescent lesion or cause the regression of an active lesion, so that the peak of incidence in the fourth month found by Dr. Turner may be due, at least partly, to the decrease in cortical secretion at this time. The low incidence during the rest of pregnancy may perhaps be explained by the effect of the great excess of sugar hormones in raising the non-specific resistance, or by a decline in hypersensitivity. Thus it is possible that the disease may be masked, only to become manifest after delivery when hypersecretion ceases, accompanied by a degree of general exhaustion.

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9. Lurie, M. B., Abramson, S., Allison, M. J. *Amer. Rev. Tuberc.* 1949, 59, 168. Lurie, M. B., Harris, T. N., Abramson, S., Allison, M. J. *Ibid,* p. 186. Lurie, M. B., Abramson, S., Heppleston, A. G., Allison, M. J. *Ibid,* p. 198.
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It would be most unwise to be dogmatic regarding these points, as a multiplicity of factors may influence he relationship between pregnancy and the disease.[4] Nevertheless, attention should be directed to the adrenal cortex as a factor which may be more powerful than is realised. It would seem possible that the dual nature of the influence which the hypersecretion of these powerful hormones in pregnancy may exert on the disease may explain why the individual case may either deteriorate or improve, though the figures for the group as a whole show that the prognosis is not significantly altered.

Edinburgh. H. MORROW BROWN.

ANOMALIES OF SALARY

SIR,—I must express the concern of the Institution of Professional Civil Servants at the line taken in your leading article last week. We have no desire at all to comment on your decision about the publication of Government advertisements. That is patently for you and it would be improper for us to offer an opinion. In the course of your decision, however, you do in fact, even though it may not be your intention, enter the lists against the Civil Service medical officer.

The proposal by the Chancellor that the committee should consider both the structure of the Civil Service and the salaries is an issue that we are shortly to discuss with one of his officers. What neither the Chancellor nor you appear to appreciate is that the structure and salaries are two separate and distinct questions and not one.

So far as salaries are concerned, Sir Will Spens in the two reports of his committees set out in clear and unmistakeable language his views about the remuneration of people in the medical profession. He does not in terms deal with the salaried medical officer, but there is unlikely to be any dissent from the view that the salaried medical officer must have a salary which is in scale with the remuneration open to his fellows, calculated on a different basis. As you quite rightly point out, however, there is not a proper relation between the two, because even the standard and standing of the salaried medical profession will go down. In terms of a medical service, this seems to be an absurd state of affairs and one that ought not to be tolerated. It is our view, therefore, that there is no need for a new committee to adjudicate on what ought to be the salary of the medical officer but that Sir Will Spens, who has had all the advantages of previous research, is the best person to express a considered and authoritative view in this matter. The decision of a committee with Sir Will Spens would not, of course, be dissented from, but there seems to be something fundamentally wrong in any proposal that would place on a body totally different from that of the Spens Committees the work of determining the right level for a section of the salariat in the medical profession.

On particular points that you make, may I offer the following comments? You say that pressure is permissible when an individual employer does not apply some national scale. That, surely, is exactly what is happening here. There are only some 500 or 600 medical officers in the Civil Service. The vast bulk of the 40,000–50,000 medical people in the country are remunerated largely, if not wholly, from State funds through the National Health Service—that is to say, on scales which have been agreed by the Government. The claim that is being made for Civil Service medical officers is simply that these officers should be remunerated on the same basis as medical people in the National Health Service.

You also say that pressure can probably be *justified* when it is brought to bear on an employer who refuses to negotiate through the channels laid down for the purpose. That is exactly what has happened in this case. There is a machinery of negotiation between the institution and the Treasury, but we were told quite definitely and flatly by the Treasury spokesmen that they were not in a position to negotiate. They listened quite politely to what we had to say but they were certainly not negotiating; and indeed the Treasury officers were at pains to make it clear that they were not negotiating.

We are seriously concerned at the effect of what is happening in the medical Civil Service. There is already an undermining of efficiency, which must necessarily result where a service is undermanned. May I assure you that officers throughout the medical Civil Service feel themselves to be very wrongly treated? There would be no objection at all to a proposition that Sir Will Spens or the Spens Committees should in fact be asked to act as arbitrators or to be put in a position in which, say, Lord Chorley, was recently put in a consideration of the salary-scale of assistant secretaries—that is, his committee received evidence from the Association of First Division Civil Servants and from the Treasury and then gave its views as to what the salary-scale of assistant secretaries should be. The Government accepted the recommendations of the committee. There is a precisely similar set of circumstances vis-à-vis the Spens Committees, and it is on that basis that we should be very glad to see this issue referred to them for a decision; and there is no reason, if the Government were prepared, that such an arrangement should not be put in hand forthwith.

Institution of Professional Civil Servants,
Queen Anne's Chambers, Broadway,
London, S.W.1
STANLEY MAYNE.

COINS, ORIFICES, &c.

SIR,—Now that Dr. Lloyd (May 13) has gone a long way towards meeting your peripatetic correspondent's request for a table relating the diameters of coins to the bodily orifices, I must point out the desperate need for a new table, drawn up by a panel of experts, correlating (1) degrees of dilatation of the full-term cervix, (2) fingers of the hand, and (3) coins of the realm. Consultants, nursing staff, and practitioners all use different terminologies and mensuration standards as the os dilates. A table like this would make a fine contribution to present-day obstetro-numismatics. And in view of the shrinking world, it might be as well to systematise the cervix in values of francs, marks, dollars, roubles, and others (at current rates of exchange, of course).

Cambridge. A. S. PLAYFAIR.

THE DEAF CHILD

SIR,—Recently I was reading Mrs. and Dr. Ewing's book on *Opportunity and the Deaf Child* (published in 1947) and found them saying that, when a child is deaf, dumb, and wordless, his intelligence is impoverished by the lack of language. In this they seem to me to overlook the imagination of the child. As a congenitally deaf person, I remember that, before I learnt to lip-read and to speak, my mind was filled with imagination. Naturally my thoughts were in pictures, but so are those of all children before they are able to speak. The difference is that we deaf go on like this for a longer period—until we are taught to speak. I do not think that any parent of a deaf-born child need fear that the mind of the child will remain blank until he achieves speech.

May I at the same time comment on a conclusion reached by the Ewings after much experiment—namely, that a pure-tone audiometer is unsuitable for any child under five years of age, so long as he shows no sign of "hearing." A deaf-born child, they say, must be trained to listen—i.e., to learn to hear—before his hearing can be tested. This I believe to be very true. My hearing amounts to practically nothing; yet, with a hearing-aid I am able to assimilate many sorts of sounds, to recognise some, and to locate them, although I am unable to understand human speech. But when I had my hearing tested on the pure-tone audiometer the sounds became meaningless, and it was extremely difficult for me to know whether I was still hearing, or had just finished hearing. How then can one expect a small deaf child, who perhaps has never heard before, to "hear" such meaningless sounds as are given out on the audiometer?

London, N.W.3. A. B. S. SPRIGGE.

MEDICAL TOUR OF INDIA

SIR,—As you are aware, many Indian medical men come to Great Britain for postgraduate studies, and from my own experience I know how much they appreciate the helpful coöperation shown to them by their English colleagues. When they go back to India they feel they are leaving behind some very good friends.

Now I, knowing both countries, have often thought it a pity that English doctors are able so rarely to visit India and so strengthen from this side the existing ties of friendship. In this thought I am not alone since, when I was last in India two years ago, many of the doctors I met said they would be as pleased to welcome English medical practitioners in India as they would themselves be to visit Great Britain. The chief obstacle is the cost—the return air fare is about £250, and to this must be added approximately the same amount for, say, three weeks' expenses.

Through the great kindness of friends in this country and in India, it will be possible for me to take a small party to India at the end of next September, for a 4–5 weeks' tour at a total cost of £185–190 each, including the return air fare. I shall be very pleased to hear from any medical men or women who are interested. All letters should reach me before June 15.

London, W.1. R. U. HINGORANI.

FLAXEDIL IN LARYNGEAL INTUBATION

SIR,—I should like to make a few remarks on Dr. Doughty's excellent article in your issue of May 13. I have used 'Flaxedil' for both abdominal and E.N.T. surgery in a large series of cases, and I find 80 mg. of flaxedil is too large an amount to give a patient in order to facilitate operation without delay.

The two essentials of anæsthesia for E.N.T. surgery are a perfect airway and a bloodless field. The near-perfect airway is secured with a large endotracheal tube, and this can easily be inserted with 40 mg. of flaxedil and 0·25–0·75 g. of thiopentone, depending upon the age and physique of the patient. The bloodless field is secured, not by pushing the nitrous oxide in a patient whose tidal volume is already diminished by the thiopentone and flaxedil, but by using trichlorethylene. This is done by passing the gases—5 litres of nitrous oxide and 2 litres of oxygen—intermittently through a Boyle's bottle with the plunger right up and containing 8 drachms of trichlorethylene. The trichlorethylene helps to prevent oozing from blood-vessels also. To obviate the risk of the patient breathing against resistance, and the build-up of carbon dioxide, I use the following piece of apparatus: a corrugated tube 18 in. long and $^{3}/_{4}$ in. in diameter attached to the endotracheal connection where the fresh gases enter, and open at the other end. The soundless respiration resulting is a sign of the perfect airway.

I object to the use of amethocaine, because of the risk of sensitivity or overdosage,[1] and I prefer to have the tube thinly lubricated with 10% 'Nupercaine' ointment. This is enough to prevent the cough reflex during operation, provided the tube is not moved; but on moving the tube at the end of the operation the cough reflex is present.

Birkenhead. GOUGH HUGHES.

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[1] Jackson, C. A. *Brit. med. J.* 1949, i, 99.

Notes and News

JUBILEE OF LEBANON HOSPITAL FOR MENTAL DISEASES

AT the 51st annual meeting, which was held in London on April 28, Sir Ronald Storrs presided and Prof. Alexander Kennedy, who knows the hospital personally, presented a medical report by Dr. Manugian, deputy medical director. This showed that the work undertaken has increased and the financial position is more satisfactory. During 1949, 440 patients of twelve different nationalities were treated and the total income for the year was £61,000, of which £56,000 came from patients' fees and £1100 as a gift from the Lebanese government. But there is still leeway to be made up from the war years; the present admission rooms are being extended and new quarters for the doctors are being built, while plans for the near future include a residential block for nervous cases. Professor Kennedy said that the work at Asfuriyeh was known throughout the Middle East, and had left on him a lasting impression. The results were those of a modern mental hospital, setting and maintaining high standards. Treatment included electronarcosis and insulin. The ancient attitudes towards mental disease were hard and cruel: this hospital's great influence was through the example of patient work, technical skill, and kindliness. In opening a neuropsychiatric clinic in Beirut (6 miles away) it had developed its teaching of the community in understanding of the mentally afflicted and their problems. Another important function was the training of doctors and nurses for the Middle East—the former in liaison with the American and French universities in Beirut, the latter by means of an Asfuriyeh certificate course (3 years). From this hospital was thus spreading a movement for mental hygiene, prevention of disease, and coördinated mental-health services, and all the signs pointed to a great forward move at this jubilee period of its history, if support was forthcoming. The Lebanese minister-plenipotentiary, Mr. Victor Khouri, described the hospital as one of the most important medical centres of the Middle East. He was glad that in its efforts to survive the difficulties of the war years the hospital had had the help of his government, and he looked forward to further coöperation. Mr. Fadlo Hourani presented a cheque for £152 from the Lebanese community in Manchester. Miss Jane Gibb, matron from 1913 to 1946, recalled the arrival in early days of chained patients, often burned by red-hot pokers or cigarettes in order to "drive out the devil." Dr. R. W. Brigstocke and Dr. David Yellowlees, whose fathers attended the first public meeting in Beirut in 1896 and had been founder members of the Beirut and Glasgow committees respectively, took part, and the Rev. J. V. Wilson, from his experience as chaplain to a mental hospital, spoke of the good results obtained from the joint efforts of doctors and clergy in bringing healing through the subconscious mind.

The new medical director of the hospital, who has lately taken up his duties, is Dr. Ford Robertson.

UNITED SHEFFIELD HOSPITALS

AT the annual meeting of this group of hospitals on May 12, Mr. A. Ballard, chairman of the board of governors, referred to the need for coöperation by the public. "At this meeting itself," he said, "we are hoping to attempt at least to induce citizens not to relegate all the problems of the day to a few people, or to take refuge in the illusion that the State o municipality is a separate institution from themselves, an that they no longer need play a part in raising our healt standards." The board had coördinated rather tha centralised. When the new service started the old administrative staff was retained almost without exception in the uni hospitals, and as far as possible the small staff of the centra office had been recruited from "transferred" staff. In othe words, no new bureaucracy had descended upon the hospita service. To foster coördination between the board o governors, the regional board, and the university, a liaiso committee, composed of representatives from each, had bee set up.

Discussing the position of the hospitals within the Nationa Health Service, Sir Ernest Rock Carling suggested that th problem of long waiting-lists was one to be solved not b boards but by the whole community. All the links in th health services must be welded into one chain—and link could not be thus welded without some disruption of thei atity. Waiting-lists for admission were long partly because discharge of patients already in hospital could not be anged. "In my opinion there is a need for 2000 homes this country, with 30-40 beds in each, where comfort ld be found by the elderly and infirm." The task of ucing the numbers seeking admission lay with the general-ctitioner service, which would be greatly assisted by lth centres.

MIDWIFE TEACHERS' TRAINING COLLEGE

A NATIONAL residential Midwife Teachers' College has been ened at High Coombe, Kingston Hill, Surrey. The first urse started on May 15. The new college will accommodate students for each six-month course. The students will y for their board and lodging and also a fee to cover the sts of tuition; but students employed within the National ealth Service may be seconded to the course on full pay. or many years instruction for the midwife teacher's diploma as been almost entirely on a part-time basis, and this has nposed a great strain on midwives. Two years ago, as an xperiment, two intensive residential courses, of four months ach, confined to theoretical instruction, were conducted by he Royal College of Midwives; the Central Midwives Board oncluded, however, that, to be of value, residential instruction or the diploma must be of somewhat longer duration and elated to practical midwifery and practical teaching. The iew venture is expected to meet this need. A council, made ip of representatives of the Royal College of Midwives, the Central Midwives Board, the Royal College of Obstetricians and Gynæcologists, the South West Metropolitan Regional Hospital Board, the Ministry of Health, and London University has been set up to administer the college.

MEDICAL SICKNESS SOCIETY

THE report for 1949 of the Medical Sickness, Annuity, and Life Assurance Society shows that during the year new sums assured under the life-assurance fund totalled £1,420,734, with an annual premium income of £46,557 and single premiums of £156. Purchase money for annuities amounted to £4300. The premium income amounted to £257,392, and the rate of interest earned on this fund was £2 18*s*. 11*d*. per £100 after deduction of tax. New sickness policies were issued insuring 9721 guineas per week with annual premiums of £21,857. £77,448 was paid in claims. The premium income amounted to £188,812, and the rate of interest earned on this fund was £2 18*s*. 3*d*. per £100 after deduction of tax. The total premium income increased to £446,225, and the expenses of administration amounted to £52,634—equivalent to 11·8% of the premium income. The total funds now amount to £4,371,026, the increase during the year being £329,060. Last year the society formed a subsidiary—the Medical Sickness Finance Corporation Ltd.—whose main object is to provide hire-purchase facilities for motor-cars and medical and dental equipment.

PATIENTS AT ALEXANDRA PALACE

THE television studios at Alexandra Palace last week resembled the meeting of a medical society, when patients were brought up to demonstrate points in a programme on radioactive isotopes in medicine, in the *Matters of Life and Death* series. The programme was introduced by Sir George Thomson, F.R.S., and Prof. W. V. Mayneord, D.SC., of the Royal Cancer Hospital; and others taking part were Prof. D. W. Smithers and Dr. Geoffrey Bourne. A normal person and a patient with hypoactivity and another with hyperactivity of the thyroid demonstrated the diagnostic use of radioactive iodine. The use of radioactive isotopes in determining the position of the placenta was shown on a pregnant woman, and a girl was televised being given an injection and having the rate of blood-flow in her leg measured. Prof. Le Bond supplied specially for the programme an autoradiograph, and the principle of radioactive isotopes was explained with the aid of diagrams. The programme was devised by Dr. Brian Stanford and produced by Andrew Miller Jones.

West London Hospital Medical School

On Wednesday, June 7, at 8.30 P.M., Sir James Learmonth will deliver the third Alex Simpson Smith lecture at the school. He has chosen as his subject the Surgery of the Sympathetic Nervous System.

University of London

Mr. J. B. Kinmonth has been appointed to the readership in surgery at St. Bartholomew's Hospital Medical College from June 1.

Mr. Kinmonth, who is a graduate of the University of London, qualified from St. Thomas's Hospital in 1938. After holding house-appointments there he served during the late war as a surgical specialist in the R.A.F.V.R. with the rank of wing-commander. In 1941 he took the F.R.C.S., and two years later his M.S. degree. With a research fellowship, he spent some time at Harvard University, and he was chief assistant in the surgical unit at Barts before taking up his present post of senior assistant in the surgical unit at St. Thomas's. He has published papers on thromboangiitis obliterans and on traumatic spasm.

In addition to those mentioned in our issue of May 13 (p. 935) Sir Alexander Fleming, F.R.S., and Dr. C. F. Harris have been appointed to the senate.

University of Manchester

On May 17, the honorary degree of D.SC. was conferred on Mr. V. E. Negus and on Lord Boyd-Orr, F.R.S.

University of Leeds

Dr. R. A. Willis has been appointed to the chair of pathology, from Oct. 1.

Dr. Willis, who is a graduate of medicine and science of the University of Melbourne, is at present director of the pathology department of the Royal Cancer Hospital, London. He has held the Collins chair of pathology at the Royal College of Surgeons of England. In 1942 he was elected F.R.C.P.

On May 19, the honorary degree of doctor of science was conferred on Dr. W. N. Pickles.

University of Sheffield

Dr. J. B. Parkin and Dr. B. A. E. Johns have been appointed demonstrators in anatomy, Dr. M. M. Platts research assistant in medicine, and Dr. J. C. Burne honorary part-time demonstrator in bacteriology. Dr. G. Ansell has been elected junior Graves research fellow.

Royal College of Surgeons of England

Prof. F. M. Burnet, F.R.S., will deliver the Moynihan lecture at the college, Lincoln's Inn Fields, London, W.C.2, on Monday, June 19, at 5 P.M. He is to speak on the Natural History of Surgical Infection.

Royal College of Surgeons of Edinburgh

At a meeting of the college held on May 17, with Mr. W. Quarry Wood, the president, in the chair, the following were admitted to the fellowship:

Kazi Shamsul Alam, A D. R. Batchelor, Binay Bhushan Bhattacharyya, A. L. De P. Carnegie, H. V. Corbett, A. S. Davidson, I. B. Faris, Fattouh Mohammed Fattouh, C. F. G. Fourie, E. F. B. Hamilton, A. P. Hayward, Narayan Laxman Kalle, James Lister, R. S. McCrea, A. G. O'Malley, R. G. Parker, I. R. Ross, L. M. Satchwell.

Conference of Surgeons of St. John Ambulance Brigade

A weekend conference was lately held at Harrogate, under the supervision of Mr. F. H. Edwards, the deputy surgeon-in-chief. Dr. Donald Towle spoke on Atomic Explosions and their effects on human beings with suggested lines of treatment. There were also papers on how the principles of child welfare and home nursing can best be taught to lay personnel, by Dr. Muriel Frazer (Belfast) and Dr. M. Maxwell Reekie (Manchester).

British Association of Physical Medicine

The association held its annual general meeting at the Royal College of Surgeons on May 12 with Lord Horder, the president, in the chair. After the meeting Dr. Frank Krusen, of the Mayo Clinic, read a paper on the work of the Bernard Baruch Committee in physical medicine and rehabilitation. Lord Horder also took the chair at the annual dinner, when the principal guests were the president of the Royal College of Physicians and Mrs. Russell Brain, the president of the Royal College of Surgeons and Lady Wakeley, Dr. Krusen, Dr. Svend Clemmesen (Copenhagen), and Dr. Martin Ott (Zürich). It was announced at the dinner that an International Association of Physical Medicine had been formed, of which Dr. Krusen had been elected interim president and Dr. Philippe Bauwens interim secretary.

A course of lectures suitable for candidates preparing for part II of the diploma in physical medicine will be held at 5 P.M., on Tuesdays and Thursdays from June 1 to July 4. Further details can be had from the honorary secretary of the British Association of Physical Medicine, 45, Lincoln's Inn Fields, London, W.C.2.

Nutrition Society

This society is to hold its annual general meeting and open scientific meeting at the London School of Hygiene, Keppel Street, W.C.1, on Saturday, May 27, at 10.30 A.M.

Society for General Microbiology

Prof. J. W. McLeod, M.B., F.R.S., has been elected president of the society for the session 1950–51.

First-aid and Home Nursing Course

A two-week course on first-aid and home nursing will be held under the auspices of the St. John Ambulance Brigade at St. John House, 15, Collingham Gardens, London, S.W.5, beginning on Sept. 2. Further particulars may be had from the warden.

National Council for Civil Liberties

The council is holding a delegate conference on Saturday, June 10, at the Beaver Hall, London, E.C.4, when psychiatrists, lawyers, and social workers will present evidence on the present working of the Mental Deficiency Laws and the need for reform. Further information may be had from the secretary of the council, 46, Westbourne Grove, W.2.

Course for General Practitioners

From July 3 to 8 a postgraduate course for general practitioners is to be held at the National Temperance Hospital, Hampstead Road, London, N.W.1. No subject matter has been included in the course which cannot be applied by the doctor in his own surgery using his normal equipment. Half the lectures are non-technical and aim at showing the doctor how he may best use the medical and social services. Applications for places should be sent to the secretary of the British Postgraduate Medical Federation, 3, Gordon Square, W.C.1.

Oxford Graduates' Medical Club

The summer dinner of the club will take place at Brasenose College, Oxford, on Friday, June 30, at 8 P.M. The chair will be taken by Sir Henry Tidy. All men who are Oxford graduates, studying or practising medicine, are eligible for membership. As accommodation is restricted, it will be impossible to allow guests on this occasion. Application for tickets (30*s.*) should be made as soon as possible, and not later than June 9, to the hon. secretary, Mr. E. G. Tuckwell, 73, Harley Street, W.1.

Horse Shoe Club

At 5 p.m. on Thursday, June 15, at 11, Chandos Street, London, W.1, a meeting will be held to consider the future activities of this club. Dr. Geoffrey Bourne will be in the chair. The club was started in 1932 to promote the exchange of doctors between the U.S.A. and this country and to give American doctors hospitality on their arrival here. It is hoped that former members and others interested in these objects, especially those who have lately visited the U.S.A., will attend.

On May 13, Baron Cornelius Ver Heyden de Lancey, M.D., D.D.S., LL.B., barrister-at-law of the Middle Temple and Gray's Inn, was sworn in as advocate of the Royal Court, Jersey, Channel Islands.

Appointments

Baxter, J., M.B., D.P.H.: tuberculosis M.O., Wallasey area.
Burgess, C. T. A., M.B.E., M.A., M.B. Camb., F.R.C.S.: visiting consultant asst. general surgeon, Ormskirk hospitals group.
Pooley, Joan, M.B. Lond., D.C.H.: asst. county M.O., Essex.
White, R. M., M.B. Edin., D.P.H.: tuberculosis M.O., Warrington area.

Colonial Service:

Dill-Russell, P. W., M.R.C.S.: deputy director of medical services, Nyasaland.
Galea, G. C., M.D., B.SC. Malta: M.O., Nigeria.
Hardman, J. L., M.R.C.S.: M.O., Nyasaland.
Kellett, F. R. S., M.B. Calcutta: M.O., grade C, Trinidad.
Lewis, L. F. E., M.R.C.P.E., D.P.M.: M.O., grade A, Trinidad.
Ozimek, A. M., MED. DIP. Cracow: M.O., North Borneo.
Ross, A. D., M.B. Edin.: M.O., Somaliland Protectorate.
Slinger, L. A. P., O.B.E., M.A., M.B. Camb., D.P.H.: senior M..B, British Honduras.
Sperber, Karel, O.B.E., M.D. Prague, D.P.H.: M.O., Seychelles.
Sutherland, H. D., M.B. Belf.: senior M.O., Northern Rhodesia.

Diary of the Week

MAY 28 TO JUNE 3

Tuesday, 30th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Prof. G. W. Pickering: Benign and Malignant H tension.
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. F. S. Gorrill: Physiology of the Bone. (demonstration.)
INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5 P.M. Dr. H. J. Wallace: Erythemato-squamous Erupt
INSTITUTE OF OPHTHALMOLOGY, Judd Street, W.C.1
5.30 P.M. Mr. T. K. Lyle: Surgical Treatment of Squint.
EDINBURGH POST-GRADUATE BOARD FOR MEDICINE
5 P.M. (University New Buildings, Teviot Place.) Prof. J. Spence: Staphylococcal Infection in Childhood with s reference to Osteomyelitis.

Wednesday, 31st

INSTITUTE OF DERMATOLOGY
5 P.M. Dr. H. Haber: Histology.

Thursday, 1st

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. E. R. Cullinan: Diseases of the Liver. (First lecture.)
UNIVERSITY OF LONDON
5 P.M. (St. Mary's Hospital, W.2.) Prof. H. M. Evans (University of California): Hormones of the Anterior Hypophysis. (First lecture.)
INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. Prof. Arnold Sorsby: Corneal Dystrophies.
INSTITUTE OF NEUROLOGY, National Hospital, Queen Square, W.C.1
5 P.M. Prof. J. Lhermitte (Paris): Specular Hallucinations.
ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Desmond Curran: Psychiatry demonstration.
UNIVERSITY OF BIRMINGHAM
4 P.M. (Medical School.) Dr. Frances Baird: Hypothyroidism in Childhood. (Last Ingleby lecture.)
HONYMAN GILLESPIE LECTURE
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Prof. C. F. W. Illingworth: Acid Secretion of the Stomach.

Friday, 2nd

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Prof. E. J. Wayne: Modern Antibiotics.
UNIVERSITY OF LONDON
5 P.M. (St. Mary's Hospital.) Professor Evans: Hormones of the Anterior Hypophysis. (Last lecture.)
MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. Redvers Ironside: Clinical neurological demonstration.
HEBERDEN SOCIETY
5 P.M. (B.M.A. House, Tavistock Square, W.C.1.) Prof. Hans Selye: Rheumatic Diseases as Diseases of Adaptation. (Heberden oration.)

Saturday, 3rd

HEBERDEN SOCIETY
10 A.M. (B.M.A. House.) Professor Selye: Rheumatic Diseases as Diseases of Adaptation. (Heberden oration.)

Births, Marriages, and Deaths

BIRTHS

Bonner.—On May 18, the wife of Dr. G. D. Bonner—a daughter.
Brentnall.—On May 13, the wife of Dr. G. C. Brentnall—a daughter.
Caddy.—On May 19, in London, the wife of Dr. David Caddy—a daughter.
Collard.—On May 13, in London, the wife of Dr. P. J. Collard—a daughter.
Dearlove.—On May 13, the wife of Dr. Arthur Dearlove—a son.
Dick.—On May 18, at Kingswood, Surrey, the wife of Dr. H. P. Dick—a daughter.
Edwards.—On May 18, at Didsbury, the wife of Dr. J. Edwards—a son.
Evans.—On April 28, at Lusaka, Northern Rhodesia, the wife of Dr. A. J. Evans—a son.
Farquhar.—On May 13, the wife of Mr. J. B. Farquhar, F.R.C.S.—a daughter.
Harwood.—On May 11, at Carshalton, the wife of Dr. H. F. Harwood—a son.
Hunt.—On May 14, in London, the wife of Mr. Alan Hunt, F.R.C.S.—a daughter.
MacGregor.—On May 15, at Oxford, the wife of Dr. Malcolm MacGregor—a son.
Montagu.—On May 18, the wife of Dr. J. D. Montagu—a son.
Naughton.—On May 20, in Edinburgh, the wife of Dr. James Naughton—a son.
Shorvon.—On May 14, at Sutton, to Dr. Barbara Shorvon (née Bensusan-Butt), wife of Dr. H. J. Shorvon—a son.
Sidey.—On May 17, in London, the wife of Mr. Don Sidey, F.R.C.S.—a son.
Stephen.—On May 14, at Carshalton, the wife of Dr. Stuart Stephen—a daughter.
Tomlinson.—On May 16, at Preston, the wife of Dr. A. M. Tomlinson—a daughter.
Watts.—On May 14, in London, the wife of Dr. Peter Watts—a son.
Woolf.—On May 15, in Edinburgh, to Dr. Cecil Mary Drillien, wife of Dr. Barnet Woolf—a daughter.

DEATHS

Gordon.—On May 17, at Tranwell Wood, Morpeth, Northumberland, William Ingram Gordon, M.B. Aberd.
Greig.—On May 18, at Croydon, David Low Greig, M.R.C.S., D.M.R.E.
Salt.—On May 17, at Burton-on-Trent, Edmund Cecil Salt, B.A., M.B. Camb., aged 78.

PSYCHOSOMATIC MEDICINE

PROBLEMS OF A DUAL APPROACH*

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Dichotomy of Psychosomatic Medicine

AFTER several years of endeavour it remains difficult reconcile the attitudes of practising physicians and rgeons on the one hand, and medical psychologists on e other, towards that branch of medicine which both rties have agreed to call "psychosomatic." Practi-oners of general medicine find their firmest scientific round in the laboratory and the post-mortem room. here the findings are tangible, easy to teach, and suitable r examination; and of their association with advanced rganic disease there is no doubt. In therapy the general hysician has his new specific remedies, sulphonamides nd antibiotics. From all this "reality" the once-onfident dissectors of the psyche have to recede into he mysteries of Freudian mechanism and Freudian nterpretation. From their recesses they all too seldom merge to show convincing correlations between emotion nd functional derangement, or demonstrate successfully he power of psychotherapy to heal ulcers and relieve nuscular spasm. Effective psychotherapy is still more f an art than a science, and its techniques and media re almost incomprehensible to a man trained in purely physical medicine, as all students initially are.

Those who deeply comprehend the media in which the psychiatrist has to work are few; but they set the philosophical tone of the faculty. This involves a philosophical approach to medicine as a whole which makes it hard indeed for the psychotherapist to communicate with his general colleagues to their mutual satisfaction. Also the divergence is often something of a strain to the patients they share: it may be unsettling to the young man with a duodenal ulcer to have his feeling of insecurity or injustice suddenly taken more seriously than his diet, or to the young woman with ulcerative colitis to find a doctor really interested in her emotional dependence upon her mother. Actually, it is often the patients rather than their doctors who succeed in adapting themselves to two conflicting philosophies of health and disease, being prepared on Tuesdays and Fridays to probe the memories of childhood in search of solutions, while on Mondays and Thursdays they will admit, with well-feigned enthusiasm, that the kaolin (or katechu) is really doing them good. Such is their divergence of philosophy that the Tuesday doctor regards the katechu as a sop of suggestion equally to the patient and his colleague, while the Thursday doctor probably holds an ulcerative colitis due to emotional dependence to be at once incomprehensible, incredible, and incurable.

Changing Concepts

It was not with such dichotomy in mind that people like Dr. James Halliday originally advanced the concept of "psychosomatic affection" with its wide claims for the psyche in causation and its emphatic demand that the soma be affected in the event. Dr. Halliday's definition of a psychosomatic affection is "a bodily disorder whose nature can be appreciated only when emotional disturbances . . . are investigated" (Halliday 1943). Such claims for the psyche, made as they are in respect of peptic ulcer, essential hypertension, migraine, asthma, hyperthyroidism, dysmenorrhœa, dermatitis, &c., are sometimes vaguely conceded in theory without any confidence being shown in them in practice. Perhaps what should really be done is to universalise the claim for the psyche in medicine; so that the physician not only becomes willing to look at every case as potentially one of "psychosomatic affection" but comes to *expect* that his patients will in fact present a problem at once of body and soul in every case. Then the diagnostic physician would always ask himself Dr. Halliday's three questions: "Why did the patient take ill when he did?"; "What sort of a man is it who has got this illness?"; and "Why is this particular organ or function affected?" Such questions set the feet of the inquirer upon the track of repressed emotion as a determinant of bodily change. Anyone can recognise the neurotic in whom faulty emotion is a presenting symptom. Among general physicians the question: "Why this flamboyant response?" is a more familiar one than "What hidden emotion may have determined these organic changes?" Once invited to do so, the analyst is ready to take up the hunt arising from the second question as well as the first. But it is for the general physician to flush the quarry.

To the further question "How do somatic changes occur as a result of psychogenic derangement of function?" there are few workers trained and ready to discover the answers. It is a question the answers to which are in themselves worth having and may in their discovery do much to create the shared philosophy which we seek. We need to know what physiological processes are upset, and how irrecoverably, by neurotic states that are so easily reinstated as undue fear of death, inescapable protest against injustice, irrepressible or perverted sexuality, and many severe responses to mildly adverse environments. The planning and execution of such important researches would be easier if more psychotherapists and psychopathologists were also practising experts in other branches of study such as clinical medicine, experimental medicine, and applied physiology.

There is still a further fundamental need—namely, to chart the normal mind. Behind the psychopathology of idiosyncrasy and of character-type there lies the little-explored territory of normal psychophysiology. In organic medicine we ceased to be content to recognise the signs of advanced cirrhosis of the liver, sclerosis of the kidney, or failure of the heart, when something became known of how the liver, the kidney, and the heart should behave in health. Equally we may expect to pass a psychological milestone when we can turn from the mere recognition of a phobia as a fantastic fear of father with repressed aggressiveness to being aware of how normal father-son relations are established and the ways in which infantile aggressiveness ought to be ventilated. We know that we are a long way from such a state of affairs: but those of us who are both psychologically and physiologically minded can at least remind ourselves where to look for normal emotions—namely, in healthy animals and men.

But how to define our normals? We cannot perhaps do better today than accept *instinctual satisfaction* as the goal of the normal mind. It is not easy to catalogue instincts: we note the fundamental urges of man as we become more clearly aware of his functions. Signs of each instinctive desire—of self-assertion, to be loved, to be protected, to protect, sex, life-urge, death-acceptance—we must learn to expect all these from the psyche, each in its place. For the present, much of our information about normal instinct must come from Freudian psychoanalytical teaching: eventually we may hope to correct some at least of its past emphases by the application of necessary coefficients. All deep emotional material obtained by analysis requires partial discounting because of its distortion not only in interpretation but as a result of a rapport which derives a contribution of unknown force and content from the mind of the analyst himself

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* Substance of an opening address to the Royal Medico-Psychological Association at their meeting at Shrewsbury on May 18, 1949.

In trying to establish norms we shall also do well to have some acquaintance with philosophical thought. Denied analytical techniques, philosophers have nevertheless thought a great deal about human nature for a very long time, and they have already exposed a number of fallacies into which the unwary psychologist may easily stumble.

Dysfunction and Organic Change

Armed at last with knowledge about the normal mind, we may hope to set about describing the abnormal in terms of dysfunction. That there is a relation between failure of instinctual satisfaction and dysfunction of appropriate systems of the body already stands out strikingly in any good system of case-history taking. We note, for instance, how often frustration of self-expression—and particularly the expression of aggressiveness—is to be found in cases of bronchospasm. The asthmatic may be stifled with rage, though that is usually the last thing to appear upon the surface. Again, we find complexes concerning fear of death appearing in cardiac neuroses, particularly in palpitations with multiple extra-systoles, effort syndrome, and substernal discomfort (or "pseudo-angina" if we are still allowed that deceptive but alluring term !). Doubts and anxieties about physical security or the sinews of war are the frequent lot of patients with peptic ulceration. The anxiety of such people is often overt. Of 70 cases of duodenal ulceration in patients at a Ministry of Pensions hospital I found undue overt anxiety in 35 and undue hidden anxiety in 23. Judging by one or two heart-to-heart talks with each patient, the overtly anxious had become so predominantly in matters of security to life and limb (they were war cases), while the hidden anxiety concerned life and limb, financial and social security, disturbances to love-life, and doubts of self-valuation—all about equally.

Cardiology shows the variety and confusion of our present clinical attitudes to the psychosomatic problem as a whole. The "either or" attitude is common, one cardiologist writing (in 1949) that "more often than not the differentiation between the pain of ischæmic heart disease and that of psychosomatic (sic) origin can be confidently made on the history." Organic disease is here treated as something quite separate from illness due to emotion. It would surely be more correct to speak of organic and functional heart troubles as frequently occurring together in intricate and fluctuating proportions ? *Is not true angina a psychosomatic disease of purest type, a bodily disorder whose nature can be appreciated only when emotional disturbances are investigated ?* Its cause is obscure: we still know all too little about the mechanism of constriction of the coronary arteries. But true angina can be precipitated by anxious excitement so instantly, and in patients who can undertake such considerable physical exertion in the presence of a calm mind, that the explanation of coronary spasm seems more appropriate than any other. Emotionally induced attacks of substernal pain, typically "vice-like" or aching, or atypical pains in parasternal or left mammary regions (or even internal to the scapular angle behind) may go on for years, and the end, when it comes, be from coronary disease.

One such patient, a pensioner, suffered from attacks of parasternal ache while on leave from minesweeping in 1942, and these continued to be excited by emotion, by mild exercise, or by the smell of new paint, until in 1947 he was found to have an abnormal electrocardiogram (widespread inverted T, with QIII present) and a day or two later he died of angina. Post-mortem evidence was of an old anterior coronary infarct, very narrow calcified coronary arteries, but no recent clot.

Such progress recalls "functional dyspepsia" with hypermotility and spasm preceding the organic ulcer. The mechanism in each case is a muscular spasm—its cause a bodily expression of emotion, mediated by nervous impulses and their chemical effectors, in what is *unconsciously* regarded by the patient as an appropriate organ. It may be easier to understand intestinal hypermotility in an animal anxious to recruit quickly for the coming fray than an emotion which leads to arrest of the heart. Slowing of the heart, or protection of its vessels, may be the primary purpose of the mechanisms involved. But cardiac neuroses cut deeply into character. The complexities of feeling of the human heart in respect of the death-acceptance instinct run very deep indeed.

Problems and Principles of Treatment

For purposes of therapy we have to regard psychosomatic affections in terms of the question "What functional derangement has to be undone ?" In so many of these affections there is, first, a hypertonus of plain muscle—bronchoconstriction, coronary spasm, vascular hypertension, hypermotility of stomach or duodenum, spastic colon. Inflammation and ulceration of endothelium or mucous membrane follow such "hyperkinetic" conditions, provided muscular spasm and ischæmia are maintained long enough. Ulcers which form quickly heal slowly and with scarring. All this has been demonstrated experimentally in the colon of the dog (Lium and Porter 1939) and its relation to the emotion of fear studied in the same animal (Drury et al. 1929). If deep emotional conflicts and fears can be countered with adequate reassurance at the stage of pure muscular spasm or early ulceration we may expect a psychosomatic dysfunction to be cured. In the case of ulcerative colitis the sort of psychotherapy which is sometimes necessary and adequate is indicated by the following case-history:

Miss A. B. suffered from ulcerative colitis from the age of 21 to 24. The picture was of periodic bouts of abdominal pain leading in the course of three or four days to the passage of mucus and blood with pyrexia. This caused her to give up an interesting but difficult secretarial appointment. The diagnosis was made by viewing multiple small ulcers at the pelvirectal junction two years after her symptoms started.

A psychological case-history was taken shortly afterwards. It yielded information at various levels. First it showed a personality in which considerable adult intellectual powers were confused and hampered by too passive and childlike acquiescence in almost total domination by a very stern mother. She did not trust her power of living an independent life. Withal she resented this domination and dependence and envied her carefree colleagues in the office. Secondly, behind this lay a combination of morbid desire and fearful repudiation of sex-feeling which appeared to be based upon unfortunate early experiences with a *reprehensible* grandfather and a naughty elder brother.

A reluctant admission of her emotional overdependence upon her mother made good the first stage of her treatment, reduced her symptoms, and increased her weight and confidence. It culminated in a triumphant but precarious independence when she left her home town amid maternal lamentations and maledictions. (Therapy time: 25 hours during 30 days in hospital.) Full rehabilitation required the elucidation of the deeper emotions described above, which only took some 10 more sessions of psychotherapy and which resulted in a much more normal attitude to herself and others. She completely lost her diarrhœa, mucus, and blood except during the tensions of her visits to her old home. A year later she was able to work in her home town and live regularly at home without any symptoms whatever beyond occasional emotional diarrhœa.

In general the intimate nature of the psychosomatic exchange is made plain to different degrees in different branches of medicine. The enterologist now seldom talks of "functional dyspepsia" as a thing apart from "organic dyspepsia": an ulcer calls him to more strenuous treatment but he knows the psyche to be involved in both. But bronchial asthma may be precipitated as a deadly disease so early in life, and has such striking physical components, that the general physician can hardly believe it to have more than a psychological "overlay." He is staggered when deep analysis cures an blished case. It has to be a very deep analysis, and hould all like it to be successful more often than it is. ypical situation in the psychotherapy of asthma is cated in the following letter from a lady of 35, had had asthma for 8 years, since the engagement ch preceded a "happy" marriage. (This marriage included sterility, dyspareunia, and intermittent idity.) One year after 40 scattered sessions of intense istorical anamnesis" in which much repressed childish ntment and aggressiveness had been ventilated, wrote:

> "Reflecting on the past 12 months I should say I have een 'very fair.' In August I had a shocking attack, nconscious 29 hours, oxygen and a week in hospital. hen the 'best ever' till November, when it started to o back to its old ways. I take as many tablets as ever. do consider the things we found had a bearing upon it: ringing them to light helped at the time, but only tem-orarily. The real cause is still repressed. There's no oubt it does take 200 hours! And in most cases it can't e done. . . . When the unconscious mind does surrender ts hidden clue it will be a fear of some kind."

Short of a full-dress and highly competent Freudian alysis, that is about all one now expects from psycho-rapy in a severe established asthmatic, despite the ntalising psychogenic suggestions that nearly always cur in the superficial presentation of the case. There e strong indications however that the answer is there r the finding. Both in research and in treatment thma is essentially a field for attack on a wide front, m excursions with anti-histamine drugs on the one nd to the fullest help our Freudian colleagues can ve us on the other.

It will be a healthy sign when such an asthma front ists; when, too, the cardiologist asks himself what nctional derangements pave the way—and at what age of the journey his patient now stands, and how retrievably committed—to the coronary ischæmia that tragically intervenes among the most energetic, ough often the least bucolically active, members of ciety; and when the clinical neurologist subscribes ore fully to the dictum of Sherrington: "In all those pes of organism in which the physical and the psychical exist, each of the two achieves its aim only by reason f a *contact utile* between them." Its aim and its failures, oth awaiting our further study.

There is still a plea to be made in the matter of sychosomatic teaching. The other half of the history f patients—the history of their emotional life in relation the symptoms complained of—must be taken if doctors re not to miss the clues which the psyche provides to the rigin of illness. It looks as if this can only happen if teach-g physicians incorporate psychological medicine into edicine as a whole and learn to take these histories hemselves, instead of leaving them to a specialist from department which is still too far separated from the eneral run of clinical thought and practice.

Acknowledgments are here made to the Director-General f Medical Services, Ministry of Pensions, for permission to efer to cases seen in a Ministry of Pensions hospital.

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"... While making due allowance for the first rush of those nxious to avail themselves of the benefits and the pent-p demand, the present position is that the hospital and pecialist service is in the front line instead of being the inal resort for cases first adequately screened by the general ractitioner service. How far this phenomenon is permanent r how far it is a passing phase remains to be seen. What s certain is that the development referred to is disturbing nd to a certain extent unexpected."—Report for the period ctober, 1947, to December, 1949, by the Newcastle upon yne Regional Hospital Board's special area committee for umberland and North Westmoreland.

MULTIPLE-LEAD ELECTROCARDIOGRAMS

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(*Concluded from p. 991*)

BUNDLE-BRANCH BLOCK

A second field in which the use of precordial leads has added materially to our understanding of the E.C.G. is that of bundle-branch block. Up to 1930 the common divergent type of curve was attributed to a lesion of the right bundle-branch, and the rare convergent curves were attributed to lesions of the left bundle-branch. The evidence on which this was based was as follows:

(1) Experimental section of the right bundle-branch is readily performed in the dog and sometimes produces complexes in which the main initial deflection is upwards in lead I and downwards in the axial lead (lead III or ano-œsophageal lead). This curve resembles common-type bundle-branch block in man.

(2) Anatomically in man and animals the right bundle-branch is a long slender delicate strand which does not divide and ramify till far down the interventricular septum. It was thought this rendered it vulnerable to destruction by even minute fibrotic lesions. The left bundle-branch breaks up almost at once into two main divisions which ramify immediately, and is apparently less easily severed by any except very extensive subendocardial scars.

(3) Lewis (1916) from studies of the rotation of the electrical axis during the course of ventricular systole, showed that in the common form of bundle-branch block the rotation was from right to left anticlockwise, corresponding closely to the rotation of the axis observed in the dog when the right bundle-branch was cut.

(4) Histological examination of serial sections from hearts which during life had yielded such curves showed that the lesion in common-type bundle-branch block was on the right side (Cohn and Lewis 1914, Mahaim 1928, Campbell 1929, Taussig 1929).

Oppenheimer and Pardee (1920) reported that in two cases they had found lesions on the side opposite to that predicted from the curves, and Oppenheimer and Oppenheimer (1930) published a further ten cases. Barker et al. (1930) demonstrated the form of extrasystoles produced by stimulating ventricles of the exposed human heart, and Wilson et al. (1932) suggested that in common-type bundle-branch block the right

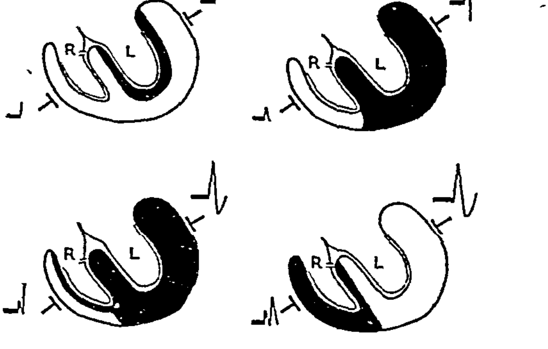


Fig. 15—Deformity of initial deflections in a direct lead from the ventricle after bundle-branch section and its causation.

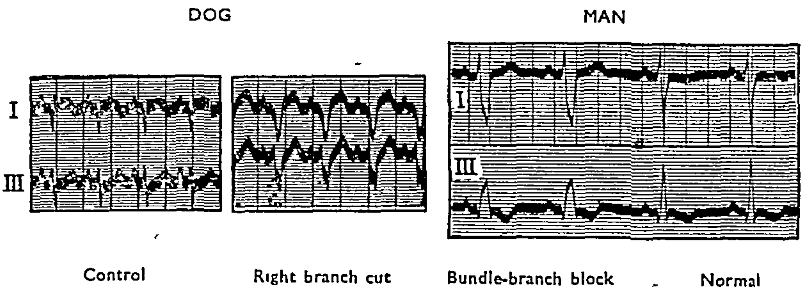


Fig. 16—Canine and human right bundle-branch block.

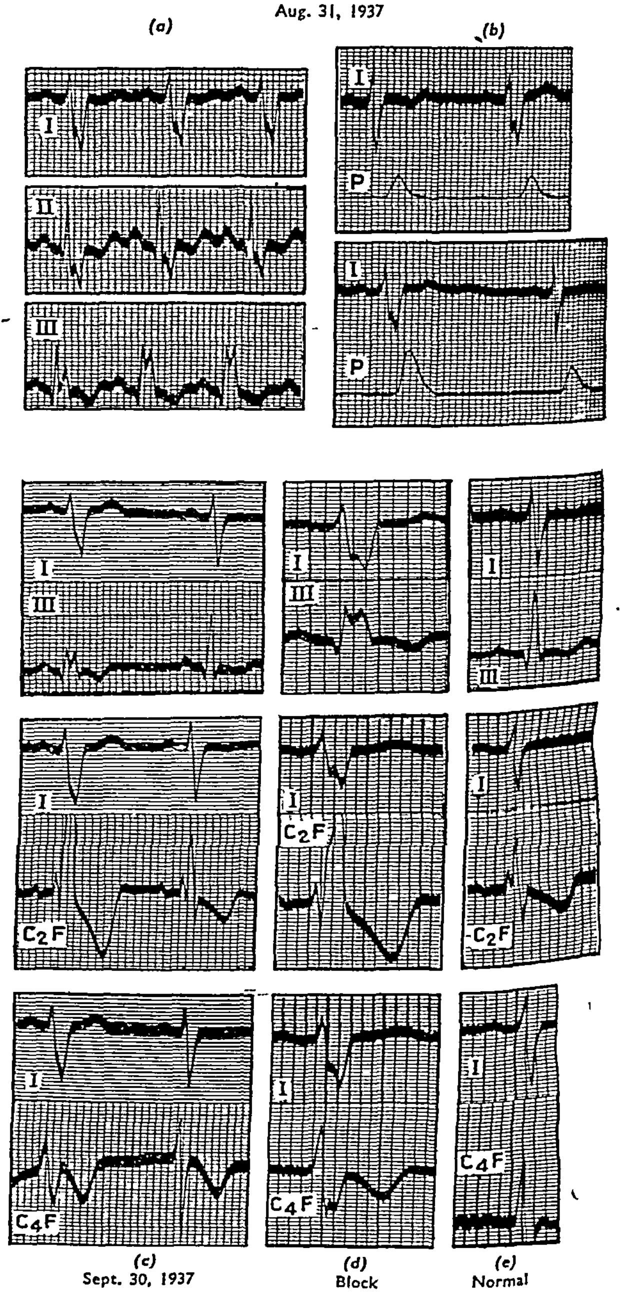
ventricle contracted first—i.e., that left bundle-branch block was present. Experimental studies on dog and cat were confirmatory. But the death-knell of the old concepts was sounded when the evidence from the new precordial leads was available.

Let us return for a moment to consider the E.C.G. by direct leads in normal hearts and in experimental right bundle-branch block (fig. 15). The form of initial deflections in such unipolar direct leads has already been described, and it is only necessary now to make clear that R is shorter and S deeper in leads from over the thin right ventricle, than in leads from the relatively thick left ventricle. When a bundle-branch is severed, the contralateral ventricle is activated normally, while that on the affected side lags inactive till the excitation wave reaches it from the muscle of the opposite ventricle. The lead from the normal side is of normal pattern in its early phases, though the prolongation of ventricular excitation as a whole prolongs the S or later part of the initial complex. The lead from the affected side, however, is grossly aberrant; it may or may not show small early waves, but the conspicuous feature is a late slurred R with a very much delayed intrinsic deflection. As we have seen, this intrinsic deflection signals the arrival of the excitation wave below the electrode, and its genesis is clear from the diagram (fig. 15).

The original experimental work in bundle-branch block was that of Eppinger and Rothberger (1910), who studied the well-marked E.C.G. changes that follow section of one or other branch of the A–V bundle in the dog. This work has been repeated by many workers and analysed in some detail by Rothberger and Winterberg (1913), Lewis (1916), and Wilson and Herrmann (1921). Briefly, section of either bundle-branch in the dog causes gross broadening and splintering of the initial deflections of the E.C.G. After section of the left bundle-branch the main initial deflection in all three standard leads is directed upwards: when the right bundle-branch is cut, the main deflection may be downwards in all three leads, or upwards in lead I and downwards in leads II and III, as stated above.

Wilson and Herrmann (1921), in a most ingenious experiment, showed precisely the mechanism of the production of such curves. In a dog in which the right bundle-branch had been cut they stimulated the right ventricle rhythmically by single break-induction shocks at a rate slightly higher than the spontaneous sinus rhythm. When the stimuli fell in ventricular systole or during the refractory period, the ventricular complexes were those of bundle-branch block; when a stimulus provoked an extra-systole, the resultant complex was practically opposite in form. But when a sinus beat transmitted through the intact left bundle-branch to the left ventricle coincided with a stimulus applied to the right ventricle, so that the chambers contracted synchronously, the resultant ventricular complex was of normal form as in the intact dog. This experiment showed not only that the normal E.C.G. is the resultant of summation of the two ventricular activations, but also that in right bundle-branch block the left ventricle contracts before the right.

Fig. 16 shows the result of cutting the right bundle-branch in a dog in which the right coronary artery had been ligated some days before. The gross change in form of the E.C.G. is apparent. In direct leads from points on the epicardial surface in such animal the leads from the contralate (left) ventricle are but little affected in their initial phases, whereas those from the side of the block are greatly deformed; the late intrinsic* deflection is noteworthy in these leads. Also shown in fig. 16 is an example from a patient in whom unstable bundle-branch block was repeatedly recorded. The general similarity of the changes between the two forms of complex to those produced by section of the bundle-branch in the dog is apparent.



Aug. 31, 1937
(a)
(b)

(c)
Sept. 30, 1937
(d)
Block
(e)
Normal

Fig. 17—Electrocardiograms from a boy, aged 10 years, with inconstant right bundle-branch block.

(a) Standard leads. (b) Lead I with hot-wire sphygmograph of carotid pulse; in each record one complex is normal, the other shows branch block. (c) Electrocardiograms by two leads recorded simultaneously by two galvanometers; in each record the first complex is that of branch block, the second is normal. (d) Simultaneous records as above by various leads during the branch block, recorded on a fast plate. (e) As (d) during normal rhythm.

Note the late intrinsic deflection in right ventricular leads when branch block is present.

g. 17 shows curves from a boy, aged 10 years, with enital heart-disease, in whom the original tracings e on Aug. 31, 1937, show convergent rare-type dle-branch block.

om records made in the following two months it was ent that the block was not permanent but unstable. imes the curves could be made to revert to a more normal simply by deep respiration, and I secured tracings in h the transition was repeatedly recorded.

these experiments two galvanometers were used, making hronous records of lead I together with, at will, lead III, ght ventricular lead, or a left ventricular lead. It will een that there is relatively little difference in the earliest es of the QRS in lead C_4F, irrespective of whether I shows bundle-branch block or not. In the sternal C_2F from the right ventricular region there is, however, iderable difference between the QRS of the two rhythms. the fast plate the time from the beginning of R in lead I he intrinsic deflection in C_2F is about 0·05 sec. in normal hm and more than 0·1 sec. in the rhythm of the bundle-nch block. The delay in right ventricular activation is ifest, and the records are those of intermittent right dle-branch block. It is of interest, and corroboratory, the left ventricular ejection time, as gauged from a ultaneous record of lead I and a hot-wire sphygmograph tid-pulse tracing, is unaffected by the change of rhythm.

here are three main types of human curves which considered to indicate bundle-branch block. In h of these, slurred initial deflections and well-marked ay in the intrinsic deflection are evident in some but all of the precordial leads (fig. 18). In the common ergent pattern the right ventricular leads show small waves and early intrinsic deflections, whereas leads m over the left ventricle show gross delay in the ival of the excitation wave. The E.C.G. is therefore d as showing left bundle-branch block. It will noted that, in some cases when cardiac enlarge-nt is gross, it may be necessary to lead from points round in the left axilla before the electrode records e true left ventricular pattern. Conversely, in the e convergent block (fig. 17) delayed activation of the ht ventricle is apparent in the chest leads.

Wilson et al. (1934d) showed that another group of ses, whose standard leads till then had not been spected as belonging to bundle-branch block, yielded ecordial leads indicating right bundle-branch block. e standard-lead curves of this group vary consider-ly (Bayley 1934) but have in common a broad slurred S lead I. Today such curves are widely recognised, d the condition is known as Wilson-type right bundle-anch block. The incidence of ch curves is high; the convergent rves number about $^1/_{20}$ of the vergent, but the number of curves Wilson-type right bundle-branch ock is about the same as that of e divergent curves. The apparent sparity between the incidence of ght and left bundle-branch block s disappeared.

Another interesting point is the ear relation between the occur-nce of one or other type of bundle-ranch block and the incidence of rain on the corresponding ventricle -e.g., left bundle-branch block in ypertensive failure, and right undle-branch block either transient acute pulmonary embolism or ermanent in Lutembacher's syn-rome. The recognition of right undle-branch block is especially nportant since the diagnosis is till commonly missed, particularly no chest lead, or a single apical ad only, is recorded.

In addition to these three types of curves, however, one encounters now and then in clinical practice curves which do not conform to any of the classical patterns. Two examples are shown in fig. 19. In both of them the standard-lead curves show broad slurred initial deflections but in each the main initial deflection in all three standard leads is directed upward—i.e., is concordant as in left bundle-branch block in the dog. It will be seen from the precordial leads in these two cases that one is a case of left bundle-branch block and one of right bundle-branch block. The precise diagnosis rests on the evidence from the precordial leads; the limb leads alone are misleading. Similarly, downwardly directed concordant curves occur in which there is evidence of defective

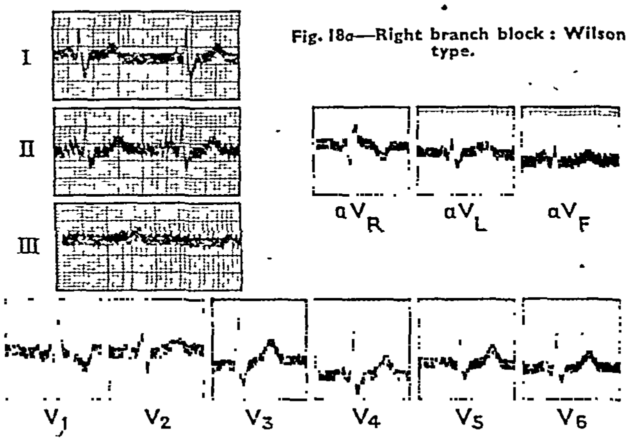


Fig. 18a—Right branch block: Wilson type.

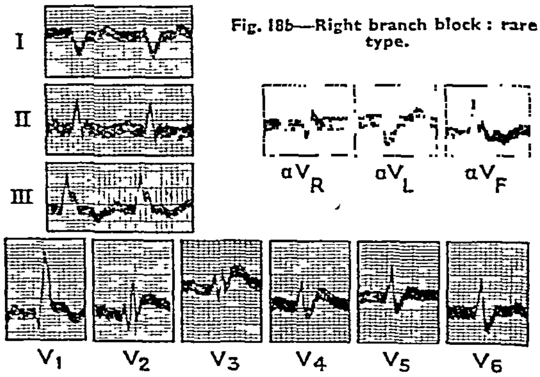


Fig. 18b—Right branch block: rare type.

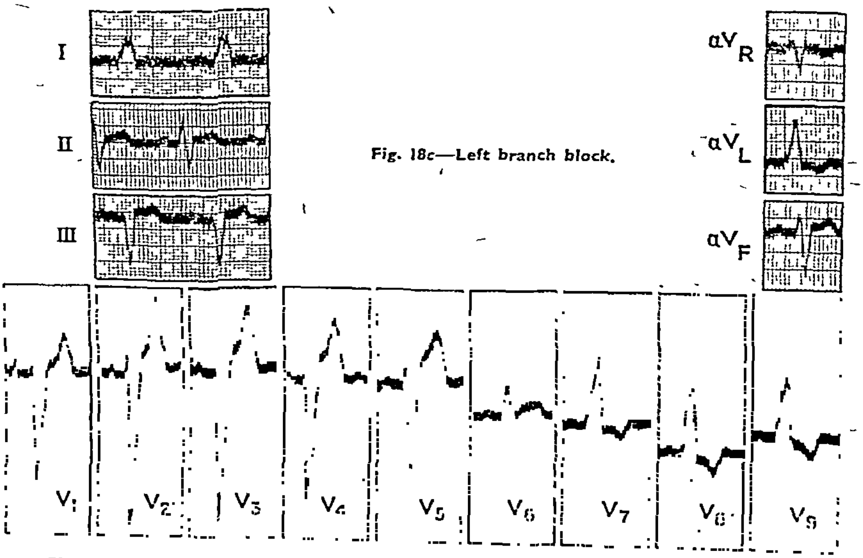


Fig. 18c—Left branch block.

Fig. 18—Clinical cases illustrating three classical types of bundle-branch block in man.

conduction through a bundle-branch. In some cases (fig. 20) there may be affection of both systems—e.g., a complete right bundle-branch transection and division of one of the main subdivisions of the left bundle-branch.

Bundle-branch block may occur in hearts the seat of recent infarction, or myocardial infarction may supervene in a heart the seat of bundle-branch block. In right bundle-branch block the combination of infarct curves and bundle-branch curves may be clear, but in left bundle-branch block the infarct curves are generally masked, a point of some importance. Infarction of the septum with bundle-branch block may cause bizarre records.

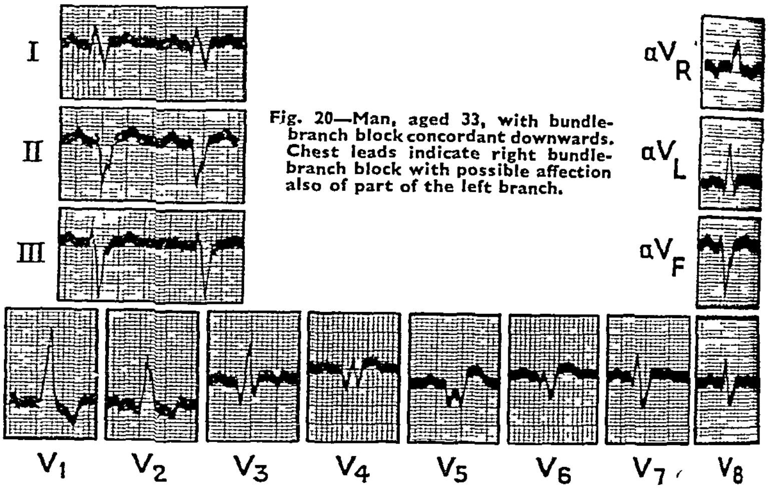


Fig. 20—Man, aged 33, with bundle-branch block concordant downwards. Chest leads indicate right bundle-branch block with possible affection also of part of the left branch.

It has been recorded that the standard-lead curve of left bundle-branch block may change form in striking manner, from divergent to convergent, without change in the precordial E.C.G. (Jones et al. 1949). Such changes can be produced by variation of posture in some people, and are then accompanied by conspicuous changes in the form of the unipolar limb leads.

VENTRICULAR HYPERTROPHY

From the early days of electrocardiography certain patterns in the standard-lead curves have been classed as evidence of right or left ventricular preponderance (Einthoven 1906, 1908), and Einthoven et al. (1913) introduced the concept of the electrical axis and the familiar triangle, so long a bugbear to students and a help to the experienced. Lewis (1925) still agreed that the familiar patterns of large RI and deep SIII and of large SI and tall RIII were the most reliable signs we possessed of preponderance of one or other ventricle in hypertrophied hearts (Lewis 1914, Krumbhaar and Jenks 1917, Herrmann and Wilson 1922, Wilson and Herrmann 1930). It has been recognised for many years, however, that the degree of ventricular hypertrophy found post mortem does not always parallel the classical signs of preponderance in the E.C.G. in life. Patients who had well-marked preponderance curves may show no hypertrophy post mortem, or gross hypertrophy may be found when the E.C.G. in life showed no axis shift. The observation that a pronounced left preponderance curve might swing over to normal during inspiration, only to reappear as the breath was exhaled, proved that the relative mass of the ventricular muscle was not the sole factor producing the curves, but that the position of the heart played a major rôle. From the Einthoven triangle it is easy to work out how a transverse heart yields an E.C.G. showing left ventricular preponderance, and a vertical heart a normal or right ventricular preponderance.

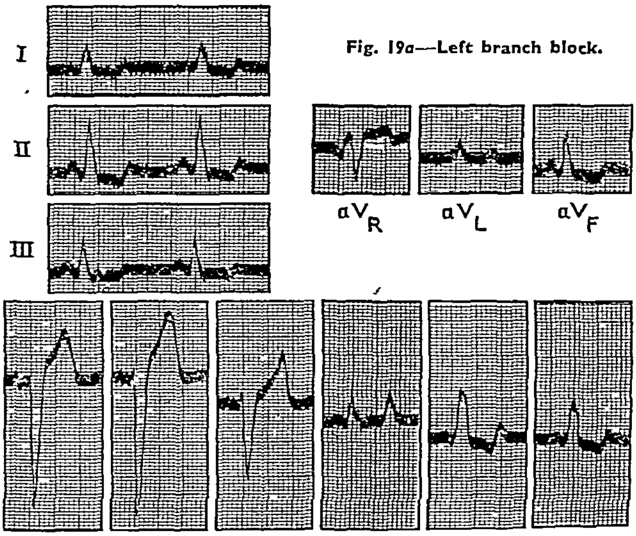


Fig. 19a—Left branch block.

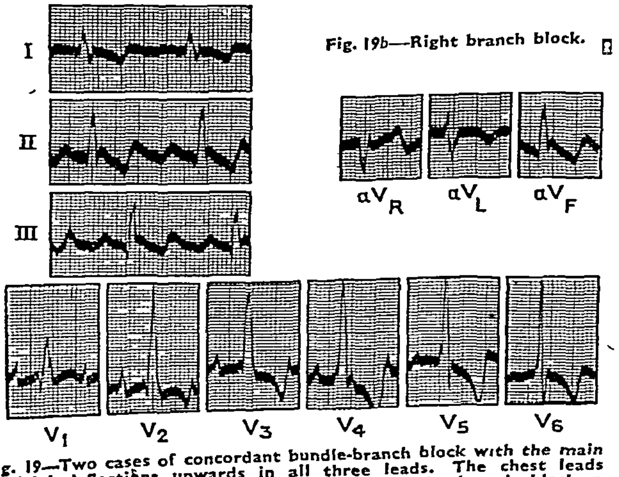


Fig. 19b—Right branch block.

Fig. 19—Two cases of concordant bundle-branch block with the main initial deflections upwards in all three leads. The chest leads indicate left branch block in case *a*, and right branch block in case *b*.

It has been recognised for many years also that, as ventricular hypertrophy progresses, secondary changes begin to appear in the standard-lead E.C.G., the ST segment becoming distorted and displaced from the iso-electric line, and the T waves possibly reversed in sign. It is the rule that such ST displacement is opposite to the sign of the main initial deflection in a given lead, and the T wave is opposed in sign to the Q R S. Thus, in advanced left ventricular preponderance ST is depressed and T inverted in lead I, RT elevated and T upright in lead III, whereas in gross right ventricular preponderance ST is elevated and T upright in lead I, and ST depressed and T inverted in lead III. Such curves have been called those of *left or right* “ ventricular strain ” by some workers—e.g., Katz (1946), a term to which there are grave objections. There is evidence that the ST shift and T reversal are mathematically related to the large initial deflection in the lead concerned, the total area of Q R ST summed algebraically remaining zero (Wilson et al. 1931).

There is now considerable evidence regarding the influence of ventricular hypertrophy on the form of the precordial E.C.G. In brief, leads from points over the hypertrophied ventricle show broadening of the Q R S as a whole, with very tall R waves and with or without a small preceding Q wave, and show ST depression and

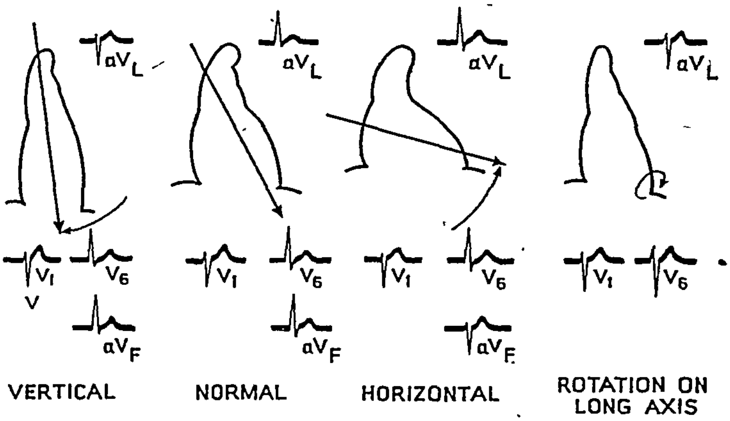


Fig. 22—Effects of cardiac rotation.

nversion of the type referred to above. The rinsic deflection or its equivalent (" intrinsi- d ") may be slightly delayed. The leads m the area over the other ventricle tend to ɔw unusually small R waves and deep S waves. amples from two clinical cases, one of vanced mitral stenosis and one of apparently complicated aortic stenosis, are shown in . 21. It will be noted that in the case of t ventricular hypertrophy the standard-lead rves show no axis shift, though ST and T anges are conspicuous.

The E.C.G. diagnosis of hypertrophy cannot divorced from consideration of the position the heart (Wilson 1943, Goldberger 1947, nes et al. 1949). As in bundle-branch block, e form of the standard-lead curves depends the form of the unipolar limb-lead curves, om pairs of which the standard-lead curves e derived. In fig. 22 the influence of rotation the heart about a horizontal anteroposterior axis shown diagrammatically. In the usual normal sition the left-arm and left-leg curves both resemble e leads from the left of the precordium, as though th these extremities "looked" at the left ventricle the lateral border of the heart. With clockwise tation to the vertical the left-arm lead comes to semble lead V_1 or V_2, while the left-leg lead remains left ventricular form. Conversely, with anti- ockwise rotation the left-arm lead remains of left entricular form, while the left-leg lead adopts the right entricular pattern. It is as though with the vertical eart the left arm looked at the conus of the right entricle, and with the horizontal heart the left leg oked at the right ventricle.

Rotation also occurs commonly along the long axis f the heart. In mitral stenosis, for example, right entricular hypertrophy is commonly associated with lockwise rotation, with the result that the conus comes bulge on the left margin of the cardiac shadow radio- gically. The influence of such rotation is indicated the diagram. Not only is the left-arm lead affected, but also the leads from the left precordium may come to be of right ventricular type with short R and deep S.

A third possible rotation is on a vertical axis, the cardiac apex being rotated forwards or backwards within the chest. Space forbids analysis of this complicating factor.

It is therefore clear that the standard-lead pattern in any given case depends on many factors, of which the degree of ventricular hypertrophy is only one.

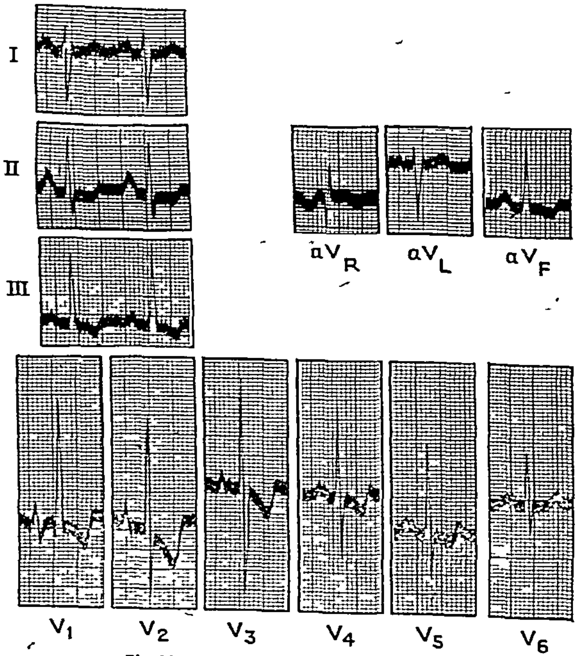


Fig. 21a—Right ventricular hypertrophy.

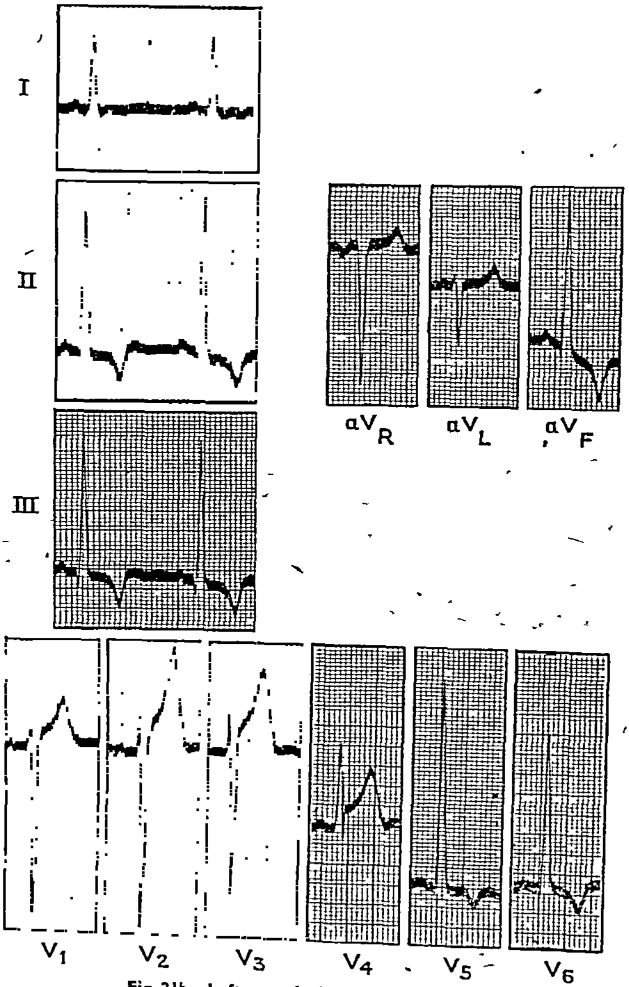


Fig. 21b—Left ventricular hypertrophy.

Fig. 21—Ventricular hypertrophy: *a*, in a case of mitral stenosis; *b*, in a case of aortic stenosis. Note the tall R waves with T-inversion in leads from over the hypertrophied ventricle.

In many cases the precordial leads clearly indicate hypertrophy of one or other ventricle. Examples are shown in figs. 23–25, the case of aortic stenosis without axis shift (fig. 24) being noteworthy. In the radiogram there is no generalised cardiac enlargement, though elongation of the outflow tract of the left ventricle is apparent. The standard-lead E.C.G. shows no axis-deviation, though ST depression and T inversion are gross. The precordial E.C.G. yields evidence of gross muscular hypertrophy of the left ventricle. Again in the case of right ventricular hypertrophy (fig. 25), the E.C.G. was of determining value:

A boy, aged 5 years, was subject to syncopal attacks associated with blanching and present intermittently from a very early age. Clinically he showed neither cyanosis nor clubbing and was ruddy, normally developed, and looked healthy. He had a small pulse and an enormous heart, with a gross basal systolic thrill and murmur transmitted widely up the great vessels. The second sound was present at the base. The oxygen saturation of the blood was over 97%, Hb 102% (Haldane). The initial diagnosis was subaortic stenosis. Radioscopy showed curious slow expansile pulsation *of the vascular pedicle, exactly like that of aortic stenosis* The E.C.G. was that of gross right-ventricular hypertrophy. The ultimate clinical diagnosis was pulmonic stenosis, probably infundibular, with poststenotic dilatation of the pulmonary artery. One day on his way to school the boy dropped dead. Necropsy showed gross valvular pulmonic stenosis with poststenotic dilatation, associated with an enormous right ventricle, vestigial left auricle, and very small left ventricle. No other valvular defect or shunt was present.

The striking transverse lie of the heart at post mortem was consistent with the E.C.G. pattern—the left-leg lead as V_1, the left-arm lead as V_2. It is important that the patterns of unipolar limb leads and precordial leads should be determined for each case, and generalisation from the so-called normal should not be allowed to influence the diagnosis of position.

Despite the striking patterns shown by the chest leads in many similar cases, often no evidence is obtained from precordial leads of ventricular hypertrophy in patien with severe hypertension, who might reasonably be expected to have such a condition. Perhaps the E.C.G. changes are due not to increase in muscle mass alone

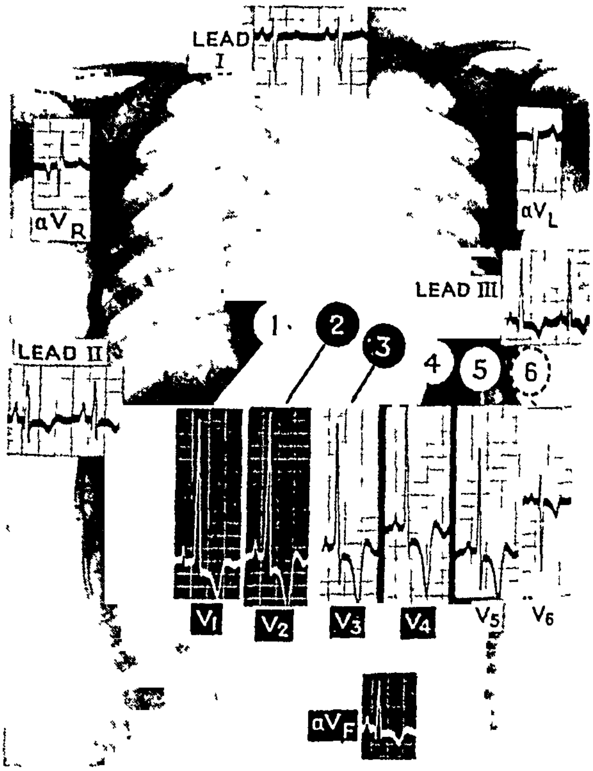


Fig. 25—Radiogram and cardiogram of a case of congenital pulmonary stenosis, confirmed by necropsy, with gross right ventricular hypertrophy and a rudimentary left ventricle. Mounted as in fig 23.

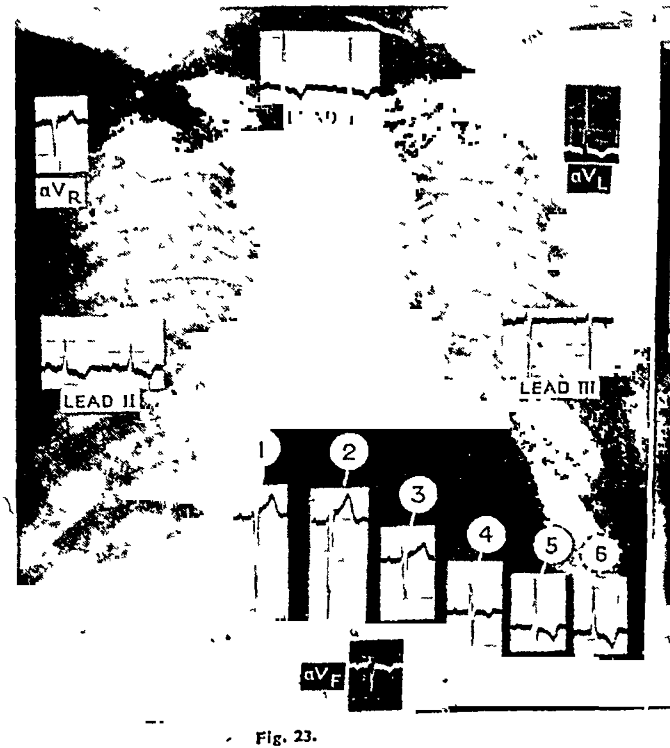


Fig. 23.

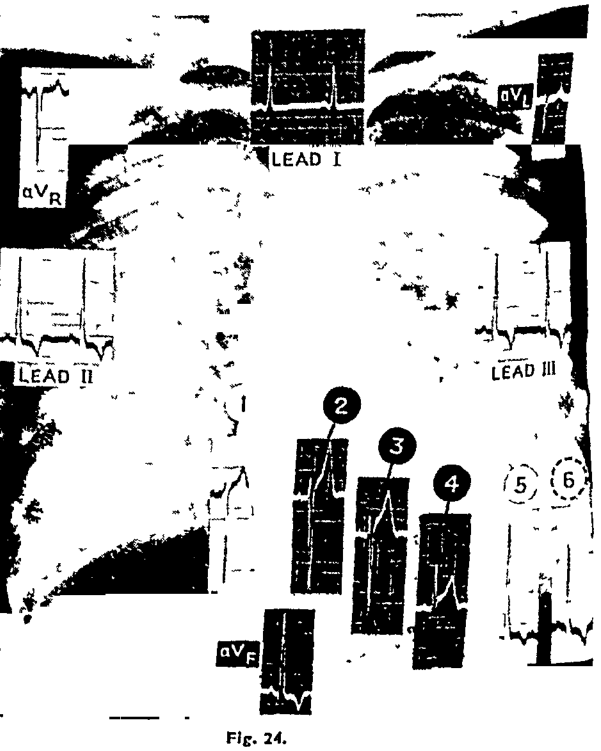


Fig. 24.

Fig. 23—Radiogram and cardiogram of a case of aortic incompetence. The cardiogram is mounted to show relations of the various leads. The unipolar limb leads are at the apices of a triangle, at right and left shoulders, and to the left of the xiphisternum. The standard leads I, II, and III are mounted between the limb leads composing, each standard curve; the chest leads are mounted serially below the positions of the chest electrode, indicated by white circles.

Fig. 24—Radiogram and cardiogram of a case of aortic stenosis mounted as in fig. 23.

t to some other factor secondary to the hypertrophy d only operative in long-standing cases—e.g., impaired od-supply to the fibres consequent on their great crease in diameter, making diffusion from the capillaries s efficient. Certainly the mere thickness of the uscular wall is not responsible for generating an creased voltage, for, as we have seen, direct measurement of the membrane potential of a single nerve-cell elds a value many times greater than the voltage of clinical E.C.G. The thick wall may lead to delay in the tivation of the layers of muscle farthest from the rkinje network, and this would lead to increased sitivity through the time factor. Slight delay in the pearance of the "intrinsicoid" deflection is in fact e of the criteria adopted by some workers for diagnosis hypertrophy curves (Myers et al. 1948a). It is well cognised that on occasion the borderline between ypertrophy curves and bundle-branch block can be ifficult to define. At present active research into the inical recognition and causation of the changes of the .C.G. in ventricular hypertrophy is being pursued in any centres (Kossman et al. 1948, Sokolow and Lyon 949, Myers et al. 1948a, Zuckermann et al. 1948).

CONCLUSIONS

I hope I have shown that the interpretation of cardio-rams today is by no means empirical or by rule-of-humb. There is a background of solid data derived rom animal experiment and corroborated in many nstances by observations on the exposed human heart nd even by leads taken from within its chambers. Rigorous pathological verification of clinical diagnosis as accompanied each step.

It must be emphasised, however, that the E.C.G. is nly one of the clinical bases on which diagnosis rests. The precision of diagnosis is evidence of the progress nade in detecting and defining the extent of lesions. The localisation of infarcts, for example, is clinically ot very important, but the ability so to pin-point their ite means precision in recording and interpretation. Yet some cases of coronary occlusion yield negative E.C.G., commonly in the early stages only, but sometimes throughout their course. As Cassidy (1946) says, the recognition of coronary disease is in the last resort a clinical diagnosis. In prognosis also the evidence of the E.C.G. must be interpreted with care. The E.C.G. shows certain features during the healing of an infarct which differ from those of relapse or recurrence, but in the average case tells us little or nothing about the prognosis. Again, most people with left bundle-branch block have a short expectation of life, but survival for many years is possible. The prognosis must be based on all the clinical data available, of which the E.C.G. is only a part.

For full understanding of the electrical phenomena, both of the individual cell and of the distribution within the body of potentials due to the heart, a considerable knowledge of physics is requisite. He who would penetrate the mysteries that enshroud the electrical phenomena of cellular activity must arm himself with a sharp mathematical probe (Hodgkin and Katz 1949, Wilson et al. 1933a and b). It is no fortuitous coincidence that the leaders of the new school of electrocardiography, like Einthoven, the father of this science, enjoy a mathematical facility which embarrasses the simple clinician. Those of us who lack either natural aptitude or training in this discipline, or both, must rest content with the hypotheses produced by the initiated, testing them rigorously by clinical observation and experiment, but incapable of entering into controversy over the solution of a differential equation here or the validity of a physical law there. The cry of the world is always for "practical men," and the dreamer and abstract researcher are little esteemed by their fellows; but it is to the pure research-worker, concerned with fundamental principles as opposed to applied science, that we owe in large measure the great advances of knowledge. So in electrocardiography our clinical superstructure today is built on the foundations laid by a few men, whose names have been repeatedly cited here.

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ARTANE IN THE TREATMENT OF PARKINSONISM

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BELLADONNA and its alkaloids have long been our mainstay in the treatment of parkinsonism, resisting the challenge of newer preparations. The latest of these is 'Artane' (Lederle Laboratories), trihexyphenidyl, or 3-(1-piperidyl)-1-phenyl-1-cyclohexyl-1-propanol hydrochloride, a potent antispasmodic now obtainable in this country. In America it has undergone extensive pharmacological trials and clinical tests in the past three years, with very favourable reports. In a study of 117 patients Doshay and Constable (1949) found artane to be an unusually mild drug resembling atropine in its control of sialorrhœa, cycloplegic effects, and cerebral stimulation, but free from the toxic effects of atropine on the cardiac vagus, blood-pressure, and circulation. It was remarkably free from disturbing side-reactions, it was not contra-indicated in the presence of hypertension or cardiac or renal disease, and no special precautions were necessary during its administration. Other favourable results have been reported by Corbin (1949a and b), who also found subjective improvement in spasmodic torticollis, facial spasm, and torsion spasm ; Dow and Rosenbaum (1949) ; Schwab and Tillmann (1949), who compared the effectiveness of artane alone and combined with 'Parpanit' and 'Benadryl' ; and Canelis et al. (1949), who noted more improvement than with atropine or hyoscine or a combination of the two, and remarked that patients did not develop tolerance to the drug, that the dose did not have to be increased to maintain its action, and that oculogyric crises were prevented or controlled.

In the present series twelve patients with parkinsonism were observed for 3–6 weeks : seven were of the postencephalitic, two of the senile, and two of the idiopathic group, and one was post-traumatic. In addition, the effect was noted on one patient with choreo-athetosis and one patient with hepatolenticular degeneration (Wilson's disease).

DOSAGE

The recommended dose is 8–10 mg. daily but varies with the patient, the senile and idiopathic type requiring smaller doses than the postencephalitic. In the present series the initial dose was 2·5 mg. (half a scored 5 mg. tablet), increasing by this amount each day to a total of 12·5 mg. in five doses. Where this amount was exceeded no greater improvement was obtained, and the patients developed side-reactions. For its effect on salivation the tablet was given before meals to the postencephalitic patients.

CASE-RECORDS

Case 1.—A male nurse, aged 42, had had postencephalitic parkinsonism for five years. There was no history of acute encephalitis. For more than six weeks he had been speechless. Atropine, parpanit, benadryl, and amphetamine had produced little or no effect.

On admission the patient lay motionless in a state of torpor for hours and had to be fed. He was moderately spastic but had no tremor. He was doubly incontinent.

Response to Artane.—Within forty-eight hours the patient spoke, recognised his family and friends, became alert, and moved about. He was less spastic and fed himself. He was still incontinent, but able to attend physiotherapy.

Case 2.—A man, aged 48, had had postencephalitic parkinsonism for thirteen years. There was no history of acute encephalitis. He had improved on parpanit, but treatment had lapsed. He was expressionless, apathetic, and immobile, and had bad days, when he could not swallow, drooled at the mouth, and had to be fed. He had oculogyric crises weekly.

Response to Artane.—He became alert, walking smartly with arm-swinging, fed himself, and no longer had bad da or oculogyric crises.

Case 3.—A woman, aged 43, had had acute encephalitis twenty years previously, after which postencephalitic parkinsonism had gradually developed. She was expressionless, had severe left-sided tremor, and constantly cried and complained of abdominal pain.

Response to Artane.—This was rapid. She became alert, walking smartly, with much reduced tremor. Abdominal pain was less, and the patient said she thought she had cancer. She cried less.

Case 4.—A woman, aged 35, had had sleeping sickness at the age of 11 years. Symptoms of parkinsonism had begun eleven years ago. There were now severe coarse tremor of the arms and legs, champing of the jaws, and moderate spasticity. The patient had sialorrhœa, oculogyric crises weekly, and could not feed herself.

Response to artane was immediate. The patient became alert, salivation was reduced, jaw champing ceased, and there was minimal tremor of left arm only. The patient fed herself, had no oculogyric crises, and helped in the ward. She had not felt so well since the onset of her illness.

Case 5.—A woman, aged 42, had had postencephalitic parkinsonism for three years, but had no history of acute encephalitis. She had slightly improved under treatment with stramonium and parpanit. She was expressionless and had severe tremor of the arms, very spastic legs, and indistinct speech.

Response to Artane.—Tremor was reduced, but spasticity unchanged. Speech was clearer. The patient could walk up and down stairs. Treatment was stopped inadvertently, and the patient relapsed in three days to her previous condition. She improved again on resuming artane, and asked to be allowed to continue with the drug.

Case 6.—A man, aged 50, had had acute encephalitis thirty years ago. Symptoms of parkinsonism had started fifteen years ago. He was expressionless, with a greasy face, and showed pill-rolling and tremor of both arms, and severely spastic arms and legs. He had oculogyric crises.

Response to Artane.—The patient felt 100% better. He was less spastic and could dress and undress himself and attend to his needs. He felt better on artane than he had on parpanit. Sweating was unchanged. The oculogyric crises ceased.

Case 7.—A man, aged 61, had had acute encephalitis in 1921, after which parkinsonism had gradually developed. He was obese and bedridden. He had a monotonous voice and tremor and spasticity of arms and legs. A good result had been obtained with parpanit, but the patient had been uncooperative.

Response to Artane.—The patient greatly improved, and said that artane was "better than hyoscine or belladonna." He could raise himself in bed and feed himself. His speech was clearer, his tremor had almost gone, and his spasticity was reduced.

Case 8.—A man, aged 45, had developed parkinsonism after a head injury in 1940. He had adopted an attitude of flexion, had a coarse tremor, mostly right-sided, and tremor of the head and tongue. He dragged his right leg and could not walk upstairs unaided or feed himself. He had obtained moderate relief from parpanit, belladonna, and benadryl.

Response to Artane.—The patient became alert, and his face regained expression. His spasticity and tremor were greatly reduced, and he stood upright, walking briskly, with his right leg not dragging. He fed himself and walked upstairs unaided.

Case 9.—A woman, aged 72, had had senile parkinsonism for ten years, with spasticity of legs, and tremor of left arm and leg. On artane she became more cheerful, with reduced tremor and spasticity, and felt less stiff.

Case 10.—A woman, aged 74, had had senile parkinsonism for two years. She showed a fixed expression, tremor and pill-rolling of her left hand, and spasticity of all limbs. Artane produced no change.

Case 11.—A woman, aged 67, had had idiopathic parkinsonism for three years. She was flexed and expressionless, with a moderate spasticity, no tremor, and shuffling gait. 'Rabellon' and parpanit improved her initially. Benadryl had no effect.

Response to Artane.—The patient became alert, with spasticity reduced, could undertake fine movements with her hands, and found it less effort to talk.

Case 12.—A man, aged 68, had had idiopathic parkinsonism r five years. He was expressionless, and had a monotonous oice. Rigidity and tremor were more marked on the left de.

Response to Artane.—Rigidity and tremor were much educed, and the patient walked better. His voice and xpression were unchanged.

Case 13.—A man, aged 60, had severe choreo-athetosis ollowing a bombing incident in 1941. His mentality was not mpaired. He could read, but fed himself with great difficulty and acrobatic skill. His speech was indistinct.

Response to Artane.—He temporarily improved, his speech ecame more distinct, and his movements, though of same requency and range, were less violent and more controlled. Feeding was less difficult. After a fortnight's treatment the patient's condition relapsed. No effect was obtained with 25 mg. of artane daily.

Case 14.—A man, aged 31, had hepatolenticular degeneration (Wilson's disease) which had been first noticed at the age of 18 months. He was mentally clear, humorous, and cheerful. His movements were violent and uncontrolled, partly a tremor and partly clonic movements of the limbs. His speech was indistinct and he had to be fed. Parpanit had had no effect.

Response to Artane.—Articulation became much more distinct, and tremor reduced. The patient could now be shaved, without his head having to be held steady, but he could not feed himself.

TOXIC REACTIONS

Like all antispasmodic drugs, artane leads to cerebral excitation, but it does not cause convulsions even with massive doses: it possesses half the mydriatic and an eighth of the antisialogogue potency of atropine, and its inhibitory effect on the vagus is only a hundredth of that of atropine (Doshay and Constable 1949). In laboratory animals no ill effects have been observed on the blood-pressure, respirations, blood-count, kidneys, liver, metabolism of sugar, growth, or reproductive organs. Artane is rapidly excreted without a tendency to accumulation (Corbin 1949b), and few toxic signs were seen during its trials in America. Side-reactions, less severe than with atropine, may be headache, giddiness, slight cycloplegia, and dryness of the mouth, but these may be avoided by giving a small initial dose and gradually increasing it (Schwab and Tillmann 1949). In the present cases two patients complained of temporary blurring of vision and one experienced nausea and amnesia for recent events when taking 12·5 mg. of artane daily which was relieved by reducing the dose without affecting the degree of improvement. Case 14 became talkative and restless and sang throughout the night. This condition cleared when the night dose was omitted. After taking 20 mg. daily for nine days he complained of dizziness, blurred vision, headache, and depression. This was prevented by reducing the dose to 12·5 mg. daily. Serious reactions reported in four cases by Corbin (1949b) were acute mental confusion, extreme agitation, and extreme dizziness and vomiting, and individual complaints were tinnitus, sore mouth, and increased diuresis. None of these were seen in the present cases. Examination of the blood weekly in all patients showed no decrease in the number of red cells, white cells, or platelets. There was no albuminuria.

DISCUSSION

The smallness of this series and the short period of observation allow preliminary observations only. These however, indicate that artane is a powerful remedy possessing the advantages of the belladonna alkaloids without their disadvantages. Removal of inertia, relaxation of spasm, and reduction in tremor are achieved, but not at the expense of dryness of the mouth and paralysis of accommodation. Nor is it necessary to increase the dose to the limit of tolerance to achieve the greatest benefit. Where artane is effective it is so immediately and dramatically. This must be seen to be appreciated. The patient becomes cheerful, alert, and more responsive. Thus, after the second dose, case 1 was roused as from a lengthy hibernation. Relaxation of rigidity and reduction in tremor lead to increased activity and independence. The previously helpless patient can dress and feed himself, climb stairs unaided, and walk erect, swinging the arms. An extreme example was case 4. On admission she was severely undernourished from inability to feed herself, with violent tremor. On the second day she fed herself comfortably, and after a week she was clearing away ward crockery without endangering it. Case 8 was similarly improved. Where there is much rigidity its relaxation may reveal a latent tremor (Corbin 1949a) or tremor may be aggravated (Schwab and Tillmann 1949). In this trial rigidity and tremor were equally affected, though other workers have found artane more effective against spasticity. It was more successful in the postencephalitic group, controlling oculogyric crises, than in the senile and idiopathic groups, and the improvement initially obtained in the patient with choreo-athetosis was not maintained.

Since we cannot cure but only relieve parkinsonism, and since artane does this effectively, it should be tried on a large scale so that its place in the treatment of the disease can be properly assessed.

SUMMARY

Artane, a new antispasmodic, has been tried in twelve cases of parkinsonism, one case of choreo-athetosis, and one case of hepatolenticular degeneration.

Initial results suggest that it is a drug of low toxicity and high potency in overcoming mental hebetude, relaxing spasm, and reducing tremor.

A large-scale trial is necessary to confirm these findings.

I am very grateful to Dr. R. P. Kemp, Dr. H. Fuld, and Dr. R. M. Evans, for permission to treat the patients admitted under their care.

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ATROPHY OF THE GASTRIC GLANDS PRODUCED BY BETA RAYS

HISTOLOGICAL FINDINGS IN ANIMALS

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From the Wilkie Surgical Research Laboratory and the Department of Medical Physics

In the past year we have been investigating the possibility of producing atrophy of the gastric glands by β-irradiation, and so reducing the secretory function of the stomach without affecting its function as a reservoir.

The idea arose from the work of Palmer and Templeton (1939), who treated duodenal-ulcer patients by irradiating the gastric fundus and body with X rays from the exterior. In a proportion of their patients they produced achlorhydria and hypochlorhydria, but the method had the disadvantage that adjacent structures (pancreas and liver) were also irradiated. It seemed to us possible to overcome this disadvantage by using an intragastric source of β rays, which would largely be absorbed in the gastric wall. The method has been tried experimentally in dogs, and our preliminary histological findings are presented here; in a later paper we shall report the results of studies on secretion.

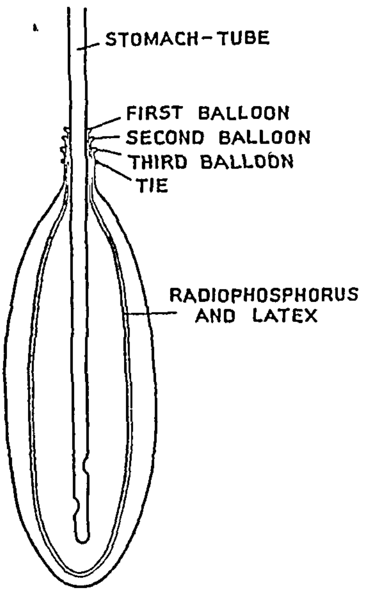

Fig. 1—Radioactive balloon assembly as intragastric source of β rays. P^{32}-latex layer is vulcanised between inner and middle balloons. When inner balloon is inflated, whole assembly assumes shape of stomach and lies in contact with mucosa.

METHOD

Source of β Rays

The intragastric source of β rays consisted of three balloons firmly attached to a 16 r. stomach-tube (fig. 1). Between the inner and middle balloons a mixture of 75 millicuries of P^{32} with latex was distributed as evenly as possible in the following way:

Manipulations were carried out in a chamber of $^1/_2$-inch 'Perspex' into whose sides lead-lined gloves were fixed (fig. 2). Monitoring showed that no β rays passed through this perspex. The inner balloon was passed over a glass test-tube large enough to hold it taut. The P^{32}, in the form of 1 ml. of phosphoric acid, was neutralised with $N/10$ sodium hydroxide and next mixed with 1 ml. of latex solution. The mixture was painted on the balloon as evenly as possible, the test-tube being constantly rotated in a stream of warm air. When all the P^{32}-latex mixture had been thus applied, the balloon was transferred to an oven, where it was vulcanised at 110°C for 15 minutes. It was next inverted, and the assembly was completed by passing a balloon inside it and covering it with a third balloon. The necks of three balloons were finally firmly cemented to the stomach-tube.

By this technique the radioactive material was made an integral part of the apparatus and could not escape into the stomach even if the balloon burst. This precaution is essential, since P^{32} is readily absorbed from the alimentary tract and, in the quantities used in this work, would cause widespread tissue damage and particularly rapid and severe anæmia.

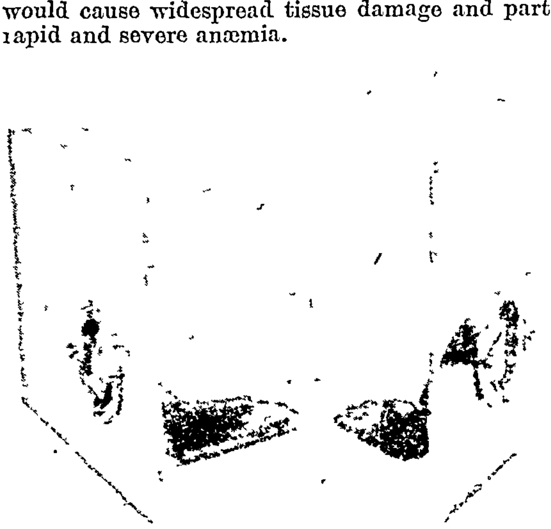

Fig. 2—Perspex chamber used in construction of radioactive balloon assembly. *Monitoring showed that no β rays penetrated the ½-inch perspex.*

Experimental Procedure

Four dogs were used throughout the study. They were trained to swallow a stomach-tube for the studies on secretion which will be subsequently reported.

For the introduction of the balloon assembly anæsthesia was induced with intravenous thiopentone and maintained with intratracheal ether. With suitable precautions the balloon assembly was passed into the stomach, and under radioscopic control it was gently inflated with barium emulsion to distend the stomach and to ensure that the balloon was in intimate contact with the mucosa (fig. 3). The balloon was left in position for periods ranging from 5 to 9 hours, depending on the extent of decay of the P^{32} and on the size of the stomach. From 39 to 74 days after the β-irradiation, biopsy specimens were taken from the stomach, and sections were stained with *hæmatoxylin and eosin.*

Fig. 3—X-ray film of radioactive balloon in position in stomach; *fundus* and antrum of stomach are well shown.

Dosage

The maximum penetration of P^{32} β rays in tissue is approximately 8 mm., but most of the biological action takes place in the first few millimetres. The problem of relating the dosage in this type of irradiation to that in normal X-ray therapy is still under consideration and as yet no accurate measurement in *röntgens* i possible. The dosage-rate was calculated approximately from the activity of the balloon and its surface area whe in the stomach. The time of irradiation was then adjuste to give an average dose of 5000r to the gastric mucos of each dog. Under these conditions the first few mill

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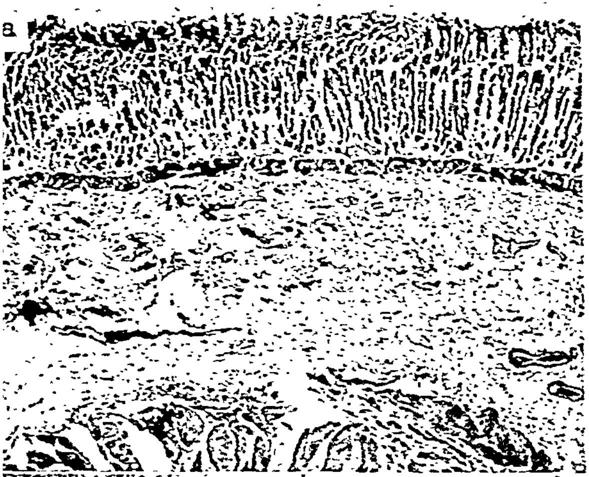
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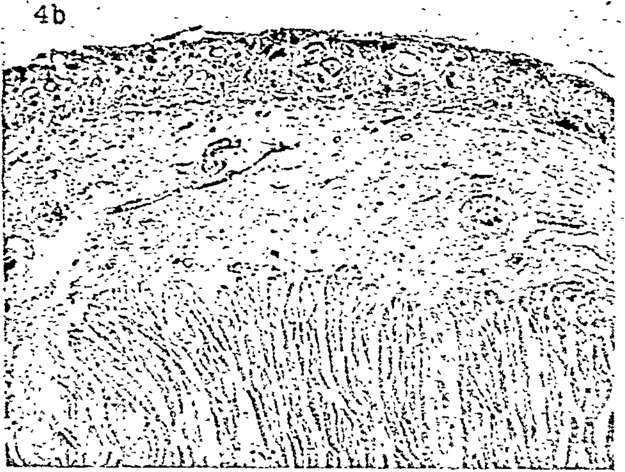
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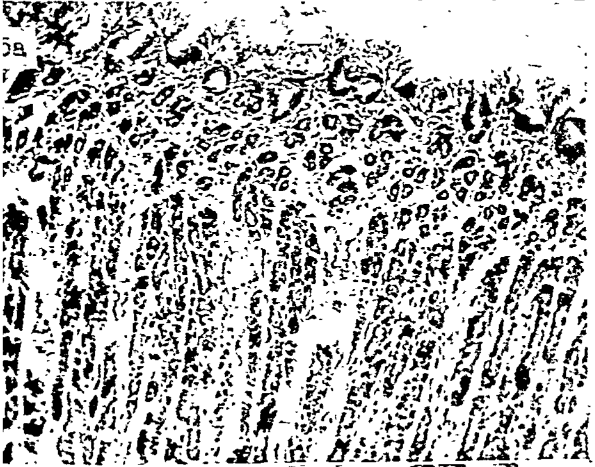
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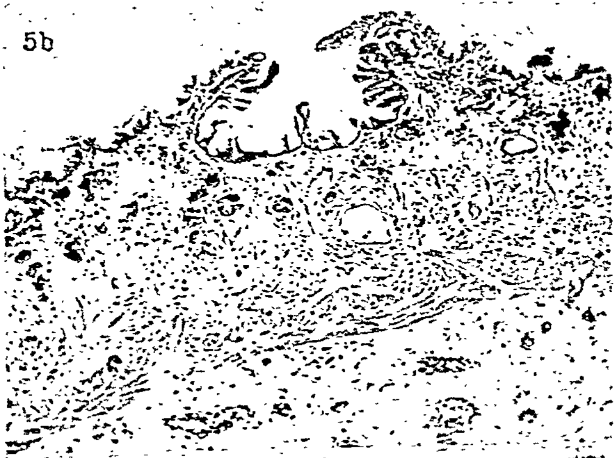
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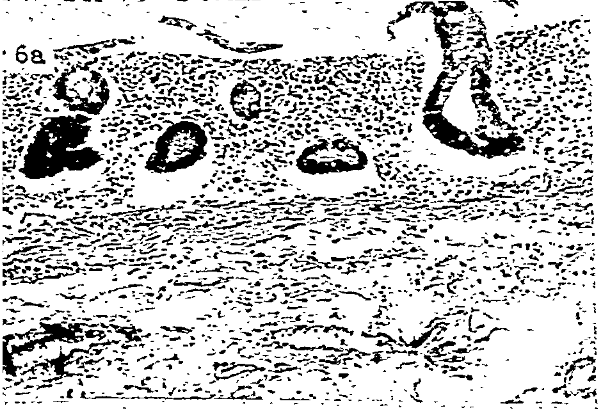
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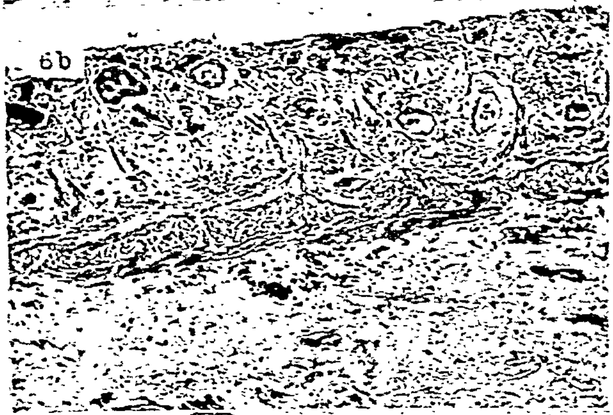
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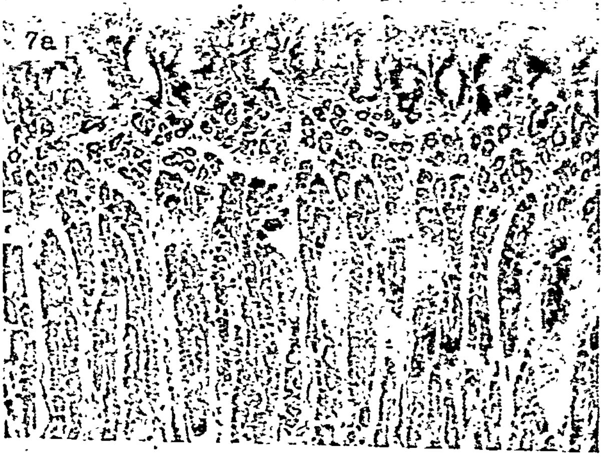
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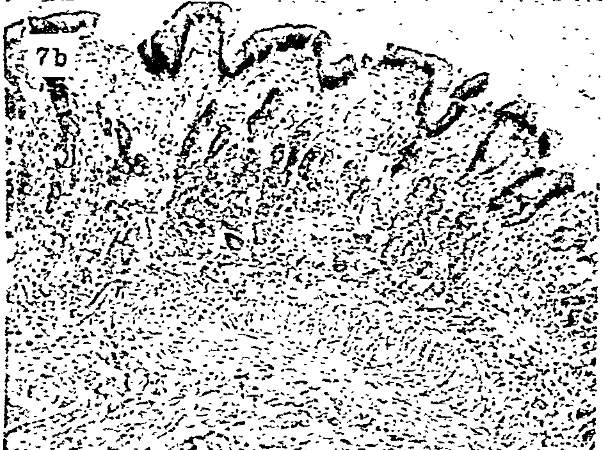
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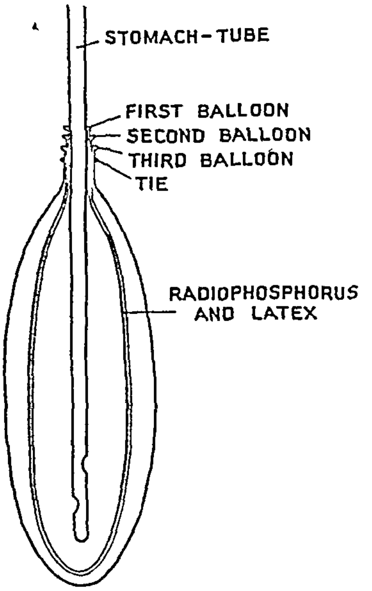

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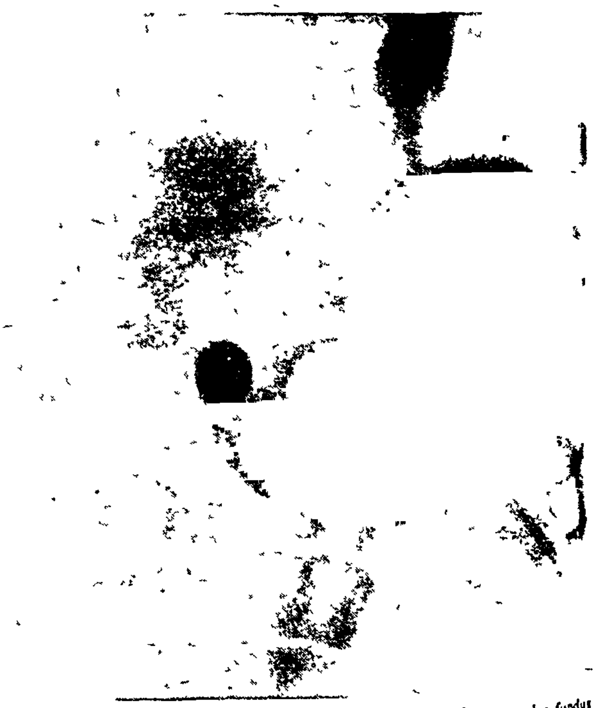

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Fig. 7—Gastric mucosa in dog 3: *a*, normal; *b*, after exposure t β rays, showing well-marked atrophy of gastric glands though no so complete as in dog 1.

The disease subsides by lysis in 1–2 weeks, though the patient may die, either in the acute stage or after a lingering illness. Deaths in 6 out of 9 cases (Sims and French 1948), and 4 out of 16 cases (McLachlan and Gillespie 1936) have been recorded. Highly infectious, the condition spreads rapidly among patients suffering from any form of skin disease.

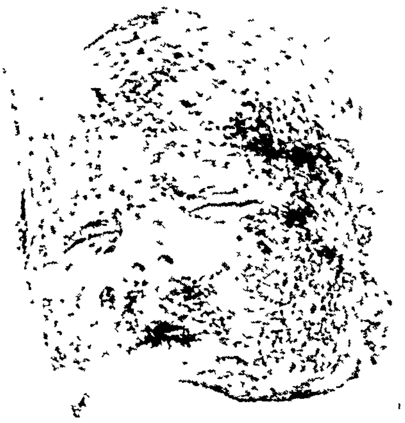
Fig. 2—Appearance of face at the height of the eruption.

Treatment, including sulphonamides and penicillin, has hitherto proved ineffective. The following case appeared to respond dramatically to 'Aureomycin' by mouth.

CASE-REPORT

A male infant, aged five months, was admitted to hospital on March 20, 1950, suffering from infantile eczema. The eruption had begun at the age of three weeks; and on admission the anterior half of the scalp and the forehead, cheeks, and chin were affected by a confluent oozing eczema. Patches of dry scaly eczema were found on the limbs and trunk.

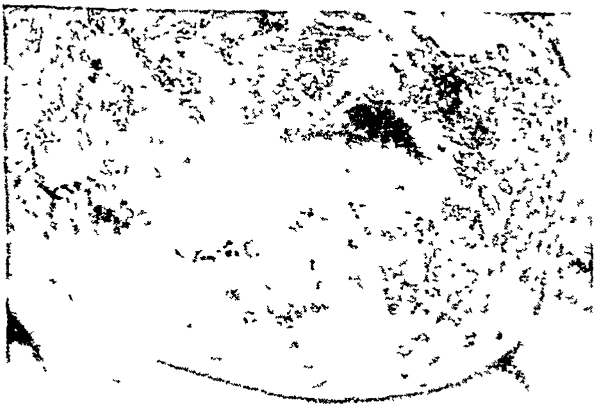
Fig. 3—The lower part of the face, showing labial ulcers.

The baby was well-developed, and there were no other abnormalities.

Treatment was begun with compresses of lead lotion to the moist areas, and oily calamine lotion to the dry. Progress was satisfactory for the first two days, but on March 23 the face was inflamed and swollen, and feeds were taken badly. Next day a profuse eruption of umbilicated pustules appeared on the left side of the head and face, and the baby was obviously ill. A diagnosis of Kaposi's varicelliform eruption was made, and treatment with aureomycin was instituted—250 mg. a day in four equal doses. Locally saline compresses were applied for twenty-four hours, and thereafter penicillin compresses—500 units per ml.

By next day the temperature had risen to 104°F (fig. 1); the eruption had spread to the chin and right cheek; and the left side of the face was raw and bleeding (fig. 2). The baby was semi-comatose, and small ulcers were found on the buccal and labial mucous membranes (fig. 3). In spite of this, feeds were taken well. There was obvious cervical and occipital lymphadenitis.

The condition altered little during the next two days, except that the pustules began to dry and scale and two fresh lesions appeared on the normal skin of the right index and middle fingers. On March 28, however, there was remarkable improvement. The temperature returned to normal, where it remained. No further pustulation occurred, and for the first time since March 24 the baby summoned up enough energy to cry while its dressings were being done. Recovery subsequently was uninterrupted, and except for two small areas in the occipital region, where there had been deep ulcers, no scarring resulted. Aureomycin was continued until April 3, since relapses occur in this condition. At no time was there any difficulty in giving the drug, and the baby only vomited once—on March 28, after the crisis.

Careful questioning of both the baby's parents and the hospital staff did not reveal any possible source of infection.

DISCUSSION

Kaposi's varicelliform eruption may take a mild and afebrile form. I can, however, find no report of a severe case with a high temperature spontaneously remitting by crisis after only four days of the disease. Control of the superadded staphylococcal infection by local penicillin is an unsatisfactory explanation for the sudden recovery in this case, since previous reports show that penicillin has no effect on the disorder. It seems, therefore, that aureomycin may have had a direct curative action, and its further use in this condition would appear justified. Unfortunately, although samples of blood and pustule fluid were obtained the day after the eruption appeared, it was not found possible to identify the virus.

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VACCINIA SIMULATING VARIOLA

IN AN ECZEMATOUS CHILD

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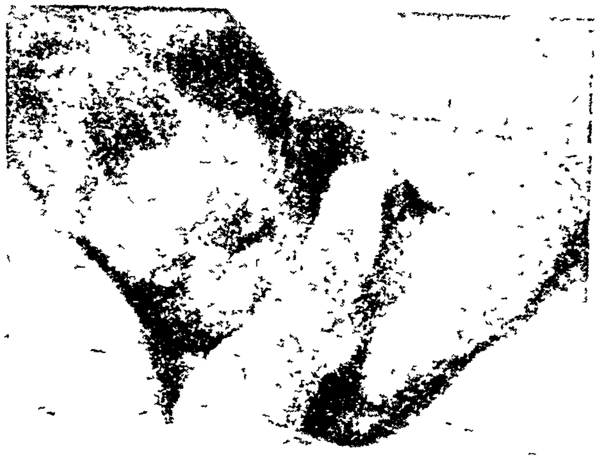
Generalised vaccinia is an uncommon but serious complication of vaccination and has a mortality-rate of 15–20%. About two-thirds of the cases occur in children with skin disease, especially eczema.

A boy, aged 6 years, was admitted to the children's ward in St. Mary's Hospital, Portsmouth, on Sept. 17, 1949, with acute pustular eczema of the face. His temperature was 102·8°F, and he complained of severe headache, was fretful, had severe anorexia and excessive thirst, and looked ill, as if the eczema had become secondarily infected. A swab from


Vaccinia resembling variola.

metres of the tissue would probably receive a dose of 20,000–25,000 r.

RESULTS

Histological Changes.—All four dogs showed atrophy of the tubular glands of the stomach, though in different degrees. The mucosa in dog 1 shows extreme atrophy (figs. 4 and 5), resembling that of achylia gastrica (fig. 6). There is a loss of almost all the tubular glands and an increase in the fibrous-tissue framework of the mucosa. In the absence of glands the intertubular prolongations of the muscularis mucosæ are prominent. Occasionally cystic spaces are present, lined by flattened degenerated epithelial cells. Similar though less marked changes are seen in the other animals (fig. 7).

No significant change is seen in the gastric submucosa or muscularis, but in dog 1 there is slight thickening of the vessel walls (fig. 4). The absence of fibrosis in the muscularis suggests that most of the β rays have been absorbed in the mucosa.

Epithelial-cell Counts.—A rough index of the loss of secreting epithelial cells was obtained by counting the number of those cells per high-power (× 600) field when the edge of the field was immediately adjacent to the muscularis mucosæ. For each slide four random fields were counted by two observers. The results, shown graphically in fig. 8, indicate the extreme atrophy in dog 1.

Health of the Dogs.—All the dogs are in good health, with normal food intake and satisfactory nutrition. Dog 1 lost weight for 6 weeks but has now regained it and is of average weight for its size and type.

DISCUSSION

Most forms of treatment for duodenal ulcer have as their aim a reduction in the free hydrochloric acid in the stomach. Though the basis of this is largely empirical, there is some evidence (James and Pickering 1949) that patients with duodenal ulcer secrete larger amounts of more acid juice at nights than do normal persons.

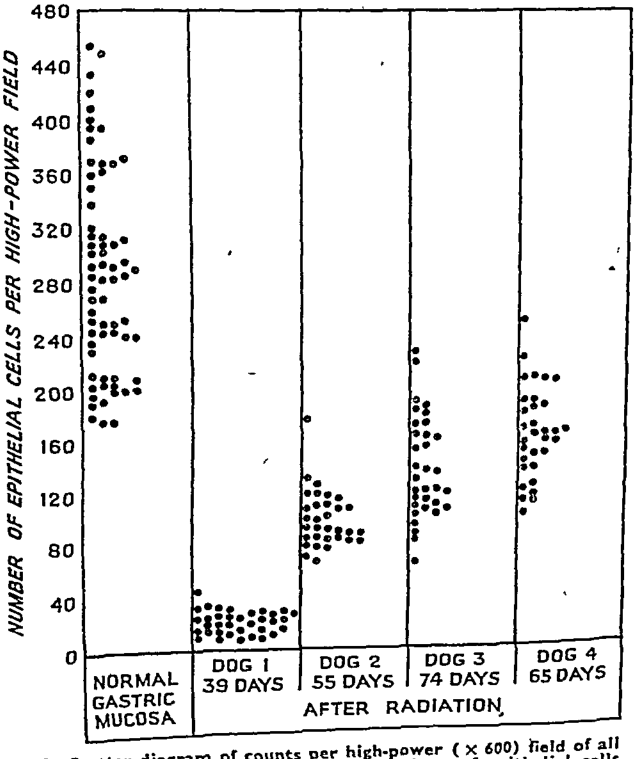


Fig. 8—Scatter diagram of counts per high-power (× 600) field of all epithelial cells. Normal control on left. Loss of epithelial cells after exposure to β rays is extreme in dog 1.

At the present time the operation of partial gastrectomy is the most effective method of producing a permanent reduction in gastric acidity, but this is not achieved without cost to the patient: The mortality is considerable (2–8%), the reservoir function of the stomach is lost, food capacity is poor and loss of weight common, and recurrent jejunal ulceration occurs in a small proportion (1–2%) of cases.

If the method described here will produce hypochlorhydria safely and consistently in animals, we hope that it will prove useful in the non-operative management of duodenal ulcer in man.

SUMMARY

The stomachs of dogs were exposed to β rays from an intragastric balloon in which was incorporated a layer of latex containing P^{32}.

Biopsy specimens of gastric mucosa were taken at intervals from 39 to 74 days after irradiation.

Various degrees of atrophy of the gastric glands were produced, and the underlying submucosa and muscularis were histologically normal.

We wish to thank the Tracer Elements Subcommittee of the Medical Research Council for the supply of P^{32}; and the North British Rubber Co. and the London Rubber Co. for technical advice.

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KAPOSI'S VARICELLIFORM ERUPTION TREATED WITH AUREOMYCIN

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M.B. Camb., M.R.C.P.
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Kaposi's varicelliform eruption is a syndrome due to virus infection of skin already the site of eczema or dermatitis. The patient is usually a baby or a child suffering from infantile eczema, although adults may be affected. The virus may be: (*a*) that of herpes simplex, when the condition is called disseminated cutaneous herpes simplex; or (*b*) the vaccinia virus, the condition then being known as eczema vaccinatum. It is also possible that other viruses may cause the disease (Leverton and Whitlock 1949). In all cases, however, the clinical features are the same.

The onset is abrupt, with a high swinging temperature and severe toxæmia. At the same time a profuse eruption appears on the eczematous skin, consisting of vesicles which quickly become umbilicated pustules 2–4 mm. in diameter. Coalescence and rupture of these leaves a raw, bleeding, oozing patch. The process spreads rapidly, with severe inflammatory swelling, involving all the eczematous skin; and not infrequently pustules also appear on normal skin. Local lymphadenitis and gangrenous ulceration in pressure areas are other features.

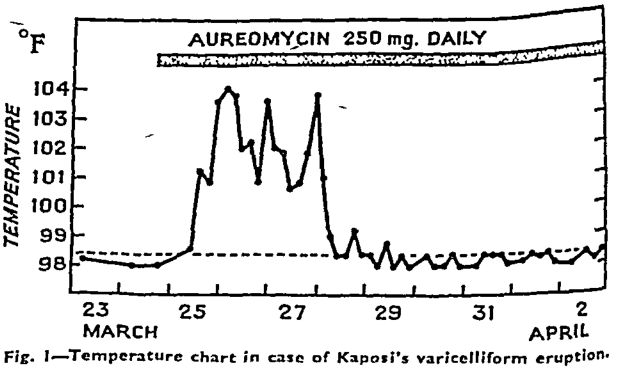

Fig. 1—Temperature chart in case of Kaposi's varicelliform eruption.

THE LANCET

LONDON: SATURDAY, JUNE 3, 1950

W.H.O.

THE World Health Organisation, whose third annual assembly has just been held at Geneva, has made an impressive start. One of the difficulties facing such a body is that in creating an international staff it must avoid taking too many from one country and must ensure the adequate representation of less highly developed countries. The need for members of the staff to adjust to the international atmosphere and to uproot themselves from their familiar patterns of life has engendered stresses in the young organisation. Nevertheless, an observer will be impressed by the spirit of enthusiasm of the staff, by the rapidity of expansion of the work, and by the evidence on all sides of friendliness and good human relations. The same friendliness and tolerance was to be seen among the delegates to the assembly; and if, at times, enthusiasm became damped, this might be ascribed to the enormous complication of the agenda and the long hours of work on detail. The assembly was faced with a number of unsolved political, administrative, and clinical problems. The communication of ideas and meaning is never easy in committee, but the obstacles are much increased when a large proportion of the delegates have imperfect command of either of the languages in use. Many misunderstandings and unduly long discussions would not have occurred had all delegates been perfectly at home in either English or French.

It could not be expected that W.H.O., which is composed of nations, would remain unaffected by political tensions. National delegations include lawyers and diplomats as well as doctors. Several national delegations appeared to be hampered by restrictive instructions from their own governments, and their consequent lack of powers of discretion tended to lower the standard of the discussions. The attitude of the Eastern European countries, which, with the exception of Yugoslavia, are at present abstaining from participation, could not be ignored. The very liberal constitution of W.H.O. makes no provision for resignation of a member State; but the continued absence, particularly, of nations holding a seat on the executive board confronted the assembly with a dilemma. Political influence could also be discerned in an unsuccessful proposal that individual members of the executive board should be directly responsible to their own governments, instead of to the organisation: in this proposal the politician was aiming at closer control. An opportunity to decrease this political influence in W.H.O. was, we feel, missed when the United Kingdom decided to stand for re-election to the executive board. The decision to stand down for a period would have set a precedent which could not have been ignored and which would have freed the board from any suggestion of subjection to power politics. The organisation awaits the emergence of a Great Power which will set such an example. In the more limited sphere of administration, the balance between doctors and lawyers was weighted in favour of the latter by the number of doctors who seemed to be thinking and acting as lawyers. Unfortunately there seemed to be some foundation for the comment made on various sides that the delegations of the British Commonwealth and of the United States of America were less helpful to the progress of the meeting than other delegations, being unduly occupied with points of order and procedure. On the other hand there was no evidence of voting in blocs or solid political groups, or of any carefully preconceived campaigns. From the standpoint of W.H.O., the value of the contributions made by national delegations varies directly with their readiness to act on behalf of the whole world, and inversely with their compulsion to follow their government's policy and consider the interests of their own nations. The spirit of international coöperation was perhaps most apparent in the Scandinavian and Latin delegations.

An excessive itemisation of the programme, lacking in qualitative discrimination, led during the discussion of concrete subjects, such as communicable diseases, to a kind of "arms race" among the countries particularly concerned, who wanted to raise expenditure regardless of the budget any limitations of the whole programme. Some delegates succumbed to the temptation to display special knowledge, and committees patiently endured many uninvited lectures. At times the programme committee, lost in discussion about individual diseases, lost sight of even health itself; at other times broad programmes of medicosocial amelioration received their justification in the somewhat unworthy terms of anticipated increase in industrial production, and the like. These programme difficulties can be overcome by improved preparation and greater experience of delegates, but this is a national matter on which W.H.O. can exert only a limited influence. It may be hoped, however, that time and growing experience will provide the solution to these incidental problems and thus leave the organisation free to tackle its proper job. Its approach to its task is far-seeing and broadly conceived, and its work is energetic and enthusiastic. There is ample good will, both among staff and delegations; the organisation is itself conducive to international harmony, which is more than can be said of all international agencies; and there is a growing realisation that the promotion of health is a world-wide concern. The absence, for political reasons, of certain nations is sincerely regretted and recognised as a source of weakness to W.H.O.; but the opportunities for work which remain are almost unlimited, and there is always the possibility that political influence in the sphere of health may abate and make coöperation possible in the future.

Recently medical readers have had the advantage of seeing a comprehensive review of W.H.O.'s work, published by the *British Medical Journal* in an "international health number" on May 6. Generally, however, this work receives little publicity, and the ordinary citizens of most countries know little or nothing about it. The reason is that the solid achievements of positive health work rarely make news, and that the only activities of the organisation which the pustules showed the presence of coagulase-positive *Staphylococcus aureus.*

Treatment and Progress.—Penicillin 50,000 units was given four-hourly, but the eczema gradually became worse, the pustules beginning to coalesce and weep. On Sept. 19, when the boy's temperature was 104°F, he was put on barrier nursing, and the dosage of penicillin was increased to 100,000 units four-hourly. On Sept. 21 the rash had spread all over the body and he was much worse, having severe toxæmia with delirium at times. One of us (I. M. M.) was then asked to say whether the case was one of smallpox or not.

The Rash (see figure).—A confluent pustular mass covered the face from the eyes to the chin, and there were a few scattered circular pustules on a slightly indurated base on the forehead. The scalp, mouth, and eyes were clear of lesions. A semi-confluent pustular rash covered the extensor surfaces of both forearms, and discrete lesions were present on the outer sides of both upper arms. The lesions on the extensor surfaces of the forearms much resembled variola, in that they were circular and umbilicated and had slightly indurated bases. These lesions extended along the backs of the hands to the fingers, but there were none on the palms. On the trunk were three or four circular umbilicated pustules scattered across the shoulders on the back and two on the chest but none on the abdomen. There were several similar lesions on the genitals, and on the legs the appearance and distribution of the lesions were similar to those on the arms. No lesions were found on the soles.

Diagnosis.—The diagnosis, which had to be made before it was possible to obtain a full history, was that this case was not one of variola, in spite of the similarity of the rash to that of variola. Crusts from the pustules, with scrapings from the bases of the pustules, were sent to Colindale Laboratory for bacteriological examination. Eczema vaccinatum was tentatively diagnosed.

Previous History.—Three hours later the boy's parents were interviewed. They said he had been subject to eczema since the age of 6 weeks and had recently been treated for it in hospital, both in Great Ormond Street, London, and in Portsmouth. He had been discharged from St. Mary's Hospital, Portsmouth, as recently as May, 1949. Both parents denied that he had been in contact with any recently vaccinated person; nor had the boy himself ever been vaccinated.

Course of Illness.—The patient was transferred to Crabwood Smallpox Hospital, Winchester, under the care of one of us (R. A. G.). Systemic treatment was begun with sulphadimidine and penicillin, and the lesions were treated with proflavine. In spite of tepid sponging the temperature remained at 103–105°F. Nothing abnormal was found in the blood. On Sept. 23 an interim report was received from Colindale Laboratory that the crusts and scrapings of the pustules were positive up to 1/64 (of 1/100 original) for vaccinia-variola in a complement-fixation test. The patient was given an injection of postvaccinal-encephalitis serum, but this seemed to have little effect. The pyrexia continued. On Sept. 25 signs of pneumonia appeared. During the night the boy's temperature rose to 107·2°F. Death took place the following afternoon.

Later inquiries showed that the boy had been playing in bed with a recently vaccinated infant still in an infectious state. A final report was received from Colindale Laboratory on Sept. 26 that egg-culture was positive for vaccinia.

We wish to thank Dr. Roderick Mackay, of Fareham, for the photograph and for obtaining the patient's previous history.

Reviews of Books

Postgraduate Gastroenterology

HENRY L. BOCKUS, M.D., professor of gastroenterology, University of Pennsylvania. Philadelphia and London: W. B. Saunders. 1950. Pp. 670. 50*s*.

PROFESSOR BOCKUS needs no introduction to those interested in gastro-enterology, and any book edited by him is certain of a welcome. Here are the printed proceedings of a postgraduate course in gastro-enterology given in December, 1948, under the aegis of the American College of Physicians. The volume covers many recent advances and includes symposia, panel discussions, and a few case presentations and clinical conferences. Twelve main topics are discussed by the 50 contributors, and the sections on gastric secretion, the œsophagus, and the pancreas are especially stimulating and provocative. Gastro-enterologists will find this an up-to-date appendix to the larger textbooks on the subject, but all physicians will be grateful for the full and balanced accounts of such things as vagotomy, gastric carcinoma, gastro-intestinal allergy, hepatitis, and non-specific enteritis.

Children of Today and Tomorrow

ETHEL DUKES; MARGARET HAY. London: Allen & Unwin. 1949. Pp. 249. 12*s*. 6*d*.

THIS popular book, inspired by high ideals, takes a middle-of-the-road common-sense position, from the standpoint that "spiritual values are absolutely essential in family relationships." So far, so good. But it does not seem to allow sufficiently for the good intentions of the human beings under discussion: e.g., "If only parents knew what harm can be done to their children physically, mentally and emotionally, by their stupid refusal to coöperate in marriages . . . ." Most parents, as a matter of statistical fact, *do* coöperate in marriage. Of the minority who fail to, many make superhuman efforts to endure the all but unendurable for the sake of their children. The authors do not point out that men, women, and children inevitably have defects in their characters, and that because of these they suffer and make one another suffer. In the second place they do less than justice to the psychotherapist, by underestimating the difficulty of his task. It is understandable that a book for general circulation should omit some of the more sordid details of mental disturbance: but surely the educated reader has by now ceased to regard sexual feelings and interests as sordid; and, surely, he has heard or is willing to hear that some extremely violent and unpleasant ideas actuate those whose overt behaviour is unacceptable? Parts II and III, however, give a good idea of how much can be done by superficial therapy and will be of interest to medical and social-science students who want to get some idea of what goes on in the play room of a child-guidance clinic.

Medical Diseases of the Kidney

An Atlas and Introduction. J. F. A. McMANUS, M.D., associate professor of pathology, Medical College of Alabama, Birmingham, Alabama. London: Henry Kimpton. 1950. Pp. 176. 42*s*.

THIS study, illustrated by 100 whole-page photomicrographs, is designed to bring the clinician and pathologist together over this difficult branch of medicine. The emphasis on the histology of the kidney, and particularly on the finer structure of the glomerulus, will be specially welcome to the many workers who are acquainted with Professor McManus's use of the periodic acid-Schiff stain for the demonstration of basement membranes. A section on normal histology is followed by others on acute and chronic renal disease, with special attention to the lesion of the crush syndrome, pyelonephritis, eclampsia, and diabetes mellitus, besides various forms of Bright's disease. Probably the illustrations, most of which are excellent, will be valued more than the text. But it is a pity that the magnifications of these are not given, and the stain used is seldom mentioned, though obviously for most it was periodic acid-Schiff stain. The text is unfortunately marred by many slips that suggest careless proof-reading, and is so loosely written that the meaning is not always clear. Nevertheless it is stimulating and provocative. The author believes that hyaline-droplet "degeneration" represents reabsorption of protein by the tubule-epithelium. But, if this is so, why is it so inconstant in proteinuria, and how does he account for the similar cytoplasmic change in other cells of the body? And many will question whether chronic pyelonephritis is the most prevalent of all renal diseases found at necropsy. Again, the statement that the larger renal arteries are normally of elastic type, like the aorta, cannot escape challenge and is belied by an illustration (fig. 25) which shows the usual muscular type. It seems that there is some confusion between elastic arteries and the "elastosis" of persistent hypertension. These criticisms, made in passing, do not alter the fact that this is a valuable contribution and a spur to further thought and investigation.

Patient	' Eosinophils per c.mm.		Change
	10 A.M.	2 P.M.	
Male 1	131	56	− 57%
Male 2	38	75	+ 99%
Female 1	363	106	− 71%
Female 2	213	350	+ 64%

It needs no elaborate calculation to see that these *normal* variations come within or exceed the range of changes regarded as of pathological significance.

The conclusion to be drawn from all this is that a reasonable figure for a patient's normal eosinophil-count cannot be obtained from a single count, or from several counts made at the same time. To minimise these spontaneous variations, **Rud** proposes that four counts should be made at fifteen-minute intervals in the afternoons of each of five or six successive days, and the average of these 20–24 counts will fairly represent the normal level. Even then the range of variation within the "normal" is large. For instance, he estimates 126 eosinophils per c.mm. as the mean count for absolutely normal persons. He then calculates that counts from 40 to 228 per c.mm. should be regarded as the normal range for males and 42–245 per c.mm. for females. In other words, at this level, reductions of less than 68% are not significant, and normal increases of up to 80% must be reckoned with. The only answer to this sort of variation is to perform *repeated* tests with A.C.T.H. as **Rud** does for normals. If, indeed, any reliance at all is to be placed on eosinophil-counts, not only must technique be first-class but a programme of repeated four-hourly A.C.T.H. tests must be undertaken if any useful estimate of adrenocortical function is to be made from the counts. No-one familiar with the inescapable variations of cell counting will be surprised that only big changes in eosinophil-counts are likely to be significant. That they should be so large as **Rud** affirms is unexpected but not improbable. It is clear that his results must be taken seriously and carefully examined before diagnostic significance is attached to variations in the eosinophil-count.

Substitutes for Curare

In the last few years curare has been accepted as one of the routine adjuncts to general anæsthesia for major surgery, first in Canada[1] and the U.S.A.,[2] and then, as supplies improved, in Britain[3] and elsewhere. An inevitable result has been a search for cheaper, and if possible better, synthetic substitutes. The broad principles relating chemical structure to curare-like action were familiar to pharmacologists long before **Griffith** drew the attention of anæsthetists to these muscle-relaxants, and many such substances had already been synthesised and investigated experimentally.[4] But the first synthetic substitute for curare to be given a wide clinical trial was 'Myanesin' or mephenesin, introduced[5] in 1947. This is a glycerol ether which produces relaxation of the skeletal muscles superficially resembling that of curare, but it acts at spinal-cord or basal-ganglia level, whereas curare neutralises the action of acetylcholine at the myoneural junctions; the action of mephenesin is therefore not reversed by neostigmine, the recognised antidote to curare. Unfortunately, the commercial preparations of mephenesin sometimes produced hæmoglobinuria through intravascular hæmolysis, and severe thrombophlebitis occasionally developed at the site of injection. After a good deal of controversy most anæsthetists have accepted the view that the risk of these side-effects is too serious for mephenesin to be used further in routine anæsthesia.

Then last year two other synthetic substitutes were introduced—'Flaxedil' or tri-(β-diethylaminoethoxy) benzene triethiodide,[6] and C10 or decamethonium iodide. Quantitative experiments on animals and on human volunteers have shown that flaxedil, in about five times the dosage, has an effect practically indistinguishable from that of *d*-tubocurarine and similarly reversed by neostigmine. So far the favourable reception of this drug by anæsthetists has been undisturbed by dissension. It has the advantage over curare of being readily miscible with thiopentone, so the two can be given in one syringe: it is also cheaper and has not the same tendency to induce bleeding. In recent reports on its clinical use, **Doughty**[7] has emphasised its value with thiopentone in preventing laryngeal spasm during intubation; and **Ruddell**[8] has described its use with intravenous pethidine and gas-and-oxygen as approaching the ideal combination for major surgery.

The position of C10 is less happy, mainly because no satisfactory antidote for it has yet been found. The first clinical report[9] noted that the antidote was not neostigmine but pentamethonium iodide (C5), another member of the methonium series. And later experience has proved that neostigmine or physostigmine, instead of counteracting the effects of C10, may increase its relaxant action.[10] Both pentamethonium and hexamethonium iodide (C5 and C6) have a potent blocking action on autonomic ganglia, like that of tetraethylammonium bromide (T.E.A.B.). In anæsthetised patients they produce a sharp fall in blood-pressure, which **Davison**[11] describes as "profound" and the manufacturers' leaflet as "precipitate"; while **Hewer** et al.[12] refer to the state of affairs as "an alarming degree of circulatory collapse." **Davison** has made the interesting suggestion that this fall in blood-pressure after the injection of C5, which may amount to 75%, could be made use of in surgery to obtain a bloodless field. However, such an effect will certainly be undesirable in a patient already suffering from paralysis of the respiratory muscles. Apart from the difficulty over an antidote, the efficiency in anæsthesia of any newcomer to the group of relaxants must be measured with the well-tried *d*-tubocurarine as yardstick, and it is not yet clear that C10 possesses any advantages over the natural drug. The muscular paralysis it causes usually lasts a shorter time than that of curare, but occasionally, for reasons not yet understood, recovery may be delayed, and the delay seems to be a real hazard. **Gray**[13] reports four such cases, in one of which muscular power did not return for are sure of commanding headlines in the newspapers are the repercussions of some political misfortune. Unhappily, this state of ignorance breeds apathy and enables the more chauvinistic elements of the press to attack W.H.O. on the ground that good money is being poured down an international drain with no hope of adequate return. In fact, however, the total expenditure of W.H.O. for the year 1951 is limited to 6,300,000 United States dollars (about £2 million); though the comparison is misleading, we may recall that this represents about 1/200th part of the cost of the National Health Service to Britain. Nobody would hold that the existence of an international organisation absolves member nations from their responsibility for the health of their own citizens, and the bulk of expenditure on health must be a national matter. Nevertheless health has many vitally important international ramifications which can only be dealt with by international action. Moreover, the progress of civilisation depends on the willingness and ability of more highly developed countries to bring aid to backward communities. W.H.O. is now empowered to spend money on international health work at the rate of only about one farthing per head of world population per year; and while expenditure remains at this level the world must be prepared to entertain only very modest hopes and expectations of what the organisation will achieve. All who can see beyond the boundaries of their own countries will be anxious to see it given a better chance to rise to the occasion.

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[1] Griffith, H. R., Johnson, G. E. *Anesthesiology*, 1942, 3, 418.
[2] Cullen, S. E. *Surgery*, 1943, 14, 2.
[3] Mallinson, F. B. *Lancet*, 1945, ii, 75.
[4] Ing, H. R. *Physiol. Rev.* 1936, 16, 527.
[5] Berger, F. M., Bradley, W. *Lancet*, 1947, i, 97. Mallinson, F. B. *Ibid*, p. 98.
[6] Mushin, W. W., Wien, R., Mason, D. F. J., Langston, G. T. *Ibid*, 1949, i, 726.
[7] Doughty, D. G. *Ibid*, May 13, p. 899.
[8] Ruddell, J. S. *Ibid*, May 20, p. 953.
[9] Organe, G., Paton, W. D. M., Zaimis, E. J. *Ibid*, 1949, i, 21.
[10] Paton, W. D. M., Zaimis, E. J. *Brit. J. Pharmacol.* 1949, 4, 381.
[11] Davison, M. H. A. *Lancet*, Feb. 11, p. 252.
[12] Hewer, A. J. H., Lucas, B. G. B., Prescott, F., Rowbotham, E. S. *Ibid*, 1949, i, 817.
[13] Gray, A. J. *Ibid*, Feb. 11, p. 253.

The Significance of Eosinophil-counts

EOSINOPHIL-COUNTS have come into prominence lately because it has been found that administration of pituitary adrenocorticotropic hormone (A.C.T.H.) reduces the number of eosinophils in the peripheral blood. The A.C.T.H. acts by stimulating the adrenal cortex to secrete corticosterone; so, theoretically, the eosinopenia after giving A.C.T.H. could be used as an indicator of adrenocortical function. We recently[1] noted that a test on this basis has been proposed to detect patients who have poor adrenocortical reserves and would therefore be liable to surgical shock if submitted to operation, and also shocked patients who are likely to benefit from treatment with extracts of adrenal cortex. An obvious extension of this use of A.C.T.H. is the estimation of adrenocortical function in patients with endocrine disorders, and this subject has been reviewed by PRUNTY.[2]

In a normal person, A.C.T.H. increases the excretion of 17-ketosteroids and 11-oxysteroids, and increases uric acid excretion in relation to creatinine excretion; but reduction in the eosinophil-count is far and away easier and quicker to estimate than either of these effects. PRUNTY also estimates the ratio of uric acid to creatinine excretion, which is within the competence of most hospital biochemical departments. He describes two proposed methods of conducting the A.C.T.H. test. The first is the "four-hour A.C.T.H. test"; here a single intramuscular dose of 25 mg. of A.C.T.H. is given and estimations are carried out just before and four hours after the dose. In the "forty-eight hour A.C.T.H. test" 10 mg. of A.C.T.H. is given six-hourly, day and night, for forty-eight hours—making a total of 80 mg.; and the estimations are done just before the test and four hours after the last dose of A.C.T.H. The eosinophil-count in the four-hour test is the quickest way of obtaining the desired answer, and it could even be used in the outpatient clinic. PRUNTY gives figures to show that in the normal person there is a fall in the eosinophils of 50–98%, the average being 75%; in Addison's disease the range was from + 12% to − 8%; three patients with Simmonds's hypopituitarism gave + 24%, − 4% and − 17%, and four with chromophobe adenoma of the pituitary varied from − 15% to − 45%. These figures are thought to reflect the reduced adrenocortical function in Addison's and hypopituitary diseases.

Such a test as this, easy of application and economical in the scarce A.C.T.H., is designed for widespread application. But before it is put into practical use it would be as well to know the normal variations in eosinophil-counts. Fortunately this point has been exhaustively examined by FINN RUD[3] of Oslo. Since eosinophils are relatively few it is important to have a proper counting technique. All forms of "dry counting"—i.e., estimating the eosinophil percentage of the total leucocyte-count by examining dry stained smears or coverslip preparations—have proved in many hands hopelessly inaccurate for a purpose such as this. RUD therefore turned to the "wet" techniques, in which the eosinophils are counted directly in a hæmocytometer. Here the difficulty is to prepare a dilution fluid which will enable the eosinophil cells to be counted easily and to be clearly distinguished from other leucocytes, particularly neutrophil polymorphs. After experiment, RUD concluded that a solution containing magdala-red instead of eosin gave the best staining, and he, like DUNGER,[4] includes acetone to destroy the red cells. He used a large counting-chamber (the Fuchs-Rosenthal) and an ordinary white-cell pipette for giving a 1 : 20 dilution. Blood is obtained from a puncture, and according to LUCEY[5] the finger and not the ear should be used; if citrated venous blood is used, the count must be made quickly because the eosinophils tend to gather into clumps not dispersed by subsequent shaking.

The statistics of leucocyte counting in the hæmocytometer have often been worked out, and, having regard to the relatively small number of cells that will be counted even over the whole area of the large chamber used, changes of less than about ± 30% cannot be expected to be significant. But RUD's elaborate statistical analysis of a large mass of material shows that, in fact, the eosinophil-count of a normal person varies through an even wider range in the 24 hours and from day to day. During the day the *average* eosinophil-count rises in the morning and afternoon to a maximum in the evening, and then falls again; digestion, though traditionally blamed, has no influence on the variation. Unfortunately *individual* counts vary greatly and may go up or down during the day. The following figures, taken from RUD's table, show eosinophil-counts on normal persons taken at 10 A.M., and four hours later, at 2 P.M.

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[1] Leading article, *Lancet*, April 15, p. 719.

[2] Prunty, F. T. G. *J. clin. Path.* 1950, 3, 87.

[3] Rud, F. The Eosinophil-count in Health and Mental Disease. Oslo: Johan Grundt Tanum Forlag. 1947.

[4] Dunger, R. *Münch. med. Wschr.* 1910, 57, 1942.

[5] Lucey, H. C. *J. clin. Path.* 1950, 3, 146.

e treatment of peptic ulcer. So far Fitzgerald and ›hy have treated 62 cases with 15 g. of urea four to ; times daily, their object being to raise the blood- to 60–80 mg. per 100 ml. for periods up to six months. ing in mind that many of their cases had already ed refractory to other treatment, their results seem uraging, particularly in patients with anastomotic :s. But they add that the urea is unpalatable, ıent doses have to be taken, and the blood-urea levels t be watched.

MEDICINE IN 1850

r. Ashworth Underwood, curator of the Wellcome orical Museum, has got more rare and curious things how than he has space to show them. The museum ow housed at 28, Portman Square, London, in a se of charm and character ; but the galleries are not enough to allow of any large permanent display. He herefore arranging a series of small exhibitions, of ch that on the history of the microscope has now ı open for some time. However annoying this em may be for foreign doctors (who often arrive ious to see some special treasure of which they have rd, only to find it is not for the moment on view), it the merit of bringing various aspects of medical ory under detailed review, thus enabling the regular tor to study them more precisely and even enjoy ıe agreeable trifles which might otherwise never have ı the light. On May 30 a pleasing exhibition on ledicine in 1850 " was opened by Prof. Henry Sigerist, ose visit to this country is a momentous event for his fellow medical historians.

One of a curator's excitements is that of making expected finds among his own material. Dr. Underwood had the pleasure of discovering a hitherto undescribed trait of Liebig—a fine and lively piece of work— ned and dated by Wilhelm Trautschold. This, of ırse, has a place of honour in the new exhibition ; d a drawing, by the same artist, of Liebig's laboratory Giesson, in 1842, is also on view. The exhibition is anged under subjects, beginning with physics (one the original electrical piles made by Volta is there) d ranging through chemistry, biology, anatomy, ysiology, and pathology to medicine and surgery. One ing strikes home from many of the well-planned cases : w little importance we now attach to style and finish our equipment. Here are early microscope slides autifully mounted in scarlet and gilt paper ; shells and sects, prepared for microscopy on little ivory discs, attractive as the pieces of a mah-jongg set ; Galvani's sulator of twisted Venetian glass like a sugar-stick ; bber as it first reached us in the form of decorated ıgs or pouches to which wooden nozzles were fitted to ake syringes ; the endless varieties of early stethoscope, this wood or that wood, gracefully shaped, lovingly ›lished ; the beautiful teaching model of the ear and l its parts carved in ivory ; the elaborate papier-mâché rain which shows relations as no diagram could ever o ; and plate after lovely plate of coloured diagrams nd drawings—the infusoria from Ehrenberg's *Atlas*, ıe open pages of Cruveilhier's *Anatomie pathologique u Corps Humain* and Carswell's *Pathological Anatomy*, nd the engravings printed in colour which Richard Say id from Bright's own preparations.

To see these things is to long for the return of leisured raftsmanship. But the exhibition shows too how far ıodern technique has been able to carry some early ieces of ingenuity. Here are the first photomicrographs —daguerreotypes taken in 1844 by Léon Foucauld, orking with Alfred Donné. There was no known ıethod of reproducing the daguerreotypes, so engravings ere made from them, and published in 1845. Then there re the thermometers—shrinking from massive and bent orms to the first self-registering form, with an air-speck hich could be lost for ever by too resolute a shaking-down, and then to Clifford Allbutt's short thermometer, near kin to the modern type. The sphygmograph and the laryngoscope, too, have had interesting stories. Blood-transfusion, first tried in the 17th century, and demonstrated to Pepys and others at the Royal Society, slept forgotten for over a hundred years, and was revived in the early 19th century with a deal of apparatus : its history is well told here. The development of the hypodermic needle has its place too—and a teasing problem it was for those who had to solve it. This exhibition will have as much charm for laymen as for doctors, and fortunately it has been thrown open to them as well as to the profession. Until further notice it will be on view on every weekday, Saturdays included, from 10 A.M. to 5 P.M.

DELAYED EFFECTS OF RADIATION

It is a disquieting fact for the radiologist, and particularly for the radiotherapist, that doses of the ionising radiations sometimes give rise to long-delayed reactions which are usually serious. One could find no better illustration of the essential difference between the reactions of ordinary chemical or physical media and those of the living cell. Living structures do not react quantitatively to X rays and radium or neutrons, they react specifically ; when exposed to radiations they may seem completely unaffected, and yet in time, perhaps after several years, a reaction may appear. This is typified by the late reaction of the human lens reported in two different groups of ten people, the first being victims of the atom-bomb explosions in Japan,[1] and the second scientists working on the cyclotron.[2] Here the late reaction consisted in changes in the posterior cortex of the lens, tending in severe cases to produce complete opacity. In the first group the latent periods before visual symptoms appeared ranged from 6 months to $2^1/_2$ years. In the second group the severe effects (in 3 patients) did not develop fully until about 3 years after exposure to the radiation. These cyclotron workers had never been exposed to more than a " safe dose " of neutron and γ radiation, but it was continued for some years ; the cumulative doses they received were estimated at about 50n. Perhaps the nervous strain that these people were subjected to was a contributory factor.

Another kind of delayed effect may follow irradiation with radium or X rays for the control of uterine hæmorrhage if pregnancy occurs after this treatment. Giles[3] reported two such cases in which radium had been used before conception. In both of these the pregnancy ended in abortion, but Giles referred to the low abortion-rate claimed by D. P. Murphy in similar cases. Apparently no systematic study has yet been made of the children born of such parentage, but no-one would suppose that the considerable dose of radium commonly given for these uterine conditions could leave normal ovaries and uterus. Giles urged that if radium treatment is the method of choice the dose should be large enough to ensure an artificial menopause. Looking still further down the time-scale, H. J. Muller and Frank Ellis have both drawn attention to the danger that lies ahead for future generations if their forebears now living are unduly exposed to radiation ; for the gene mutations so caused may be passed down from generation to generation. This danger is limited by the fact that damaged genes are recessive, and a total dose of some 300r would be required to double the natural rate of spontaneous mutation. Few radiation workers are likely to receive more than 20r in ten years.[4] But men and women doing work which exposes them to larger doses should perhaps find their life partners in other professions.

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1. Cogan, D. G., Martin, S. F., Kimura, S. J. *Science*, 1949, 110, 654.
2. Abelson, P. H., Kruger, P. G. *Ibid*, p. 655.
3. Giles, A. M. *J. Obstet. Gynæc.* 1949, 56, 1041.
4. Evans, R. D. *Brit. J. Radiol.* 1950, 23, 175.

several hours. It was perhaps a pity that C10 was put on the market soon after its first clinical tests. The anæsthetics committee of the Medical Research Council and Royal Society of Medicine had arranged for a large-scale clinical trial, but only an interim report[14] was published. Much more experience will be needed before its place in anæsthesia can be fully assessed.

Annotations

UNIVERSITY STUDENTS

If the science of human ecology is to justify its name, we may expect increasing attention to be paid to the relation between different groups within society, and in particular to the ways in which such groups become differentiated and maintain themselves. University students are a group of almost boundless interest to the sociologist, since they are highly diverse in both origin and destination, respecting neither social, economic, nor geographical boundaries; and yet within this diversity they show clearly some of the main trends of social development at the present time.

The Universities' Group of P.E.P.[15] have investigated the origins of students at six university institutions. The principal change in recent years has, of course, been in the direction of more equal representation at the university of students from different economic levels; but the stage which this process has reached varies widely between different universities. Information on this point was collected from four universities. According to the P.E.P. figures, the proportion of sons of manual workers rises from 7·7% at one of the two ancient universities (Camford) to 28·8% at a college of the University of Wales, with intermediate percentages at two modern English universities. For comparison, the proportion of manual workers in the employed population generally is given as 66·1%. Professional and administrative workers, who comprise 9·3% of the employed population, account for 66% of Camford students and 44·2%, 27·3%, and 25·8% of students at the other three institutions. Women students are found to come from slightly higher social and economic strata than the men. Educational statistics show a similar gradient, ranging from Camford, where 52% of the students come from fee-paying schools, to a college of the University of Wales with 6%. During the last twenty years the number of overseas students has risen only slightly, and their proportion has actually fallen. The most notable change is in the institutions they attend; the red-brick universities now attract their full share, and in consequence Oxford and Cambridge, London, and Edinburgh—traditional goals of Commonwealth and foreign students—take rather fewer than they did twenty years ago. United Kingdom students, it is found, have become more peripatetic; about 40% of men come from homes more than thirty miles away from the university—though this radius obviously has a very different significance in London and in Oxford or Cambridge (where the proportion is over 90%).

Most of the trends shown in this report conform with expectation. No more is claimed by the authors than that they are giving "some degree of statistical precision to what had been before only general impressions"; and they have been careful not to confuse testimony as to fact with political advocacy. The importance of this type of social accountancy is that it enables discussion of future policy to start from a basis of agreed knowledge.

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[14] Organe, G. *Ibid*, 1949, i, 773.
[15] University Students: a Pilot Survey. Political and Economic Planning, 16, Queen Anne's Gate, London, S.W.1.

CANCER OF THE UTERINE CERVIX

Cancer of the uterine cervix comes second to cancer of the breast as a cause of death in women, yet it is probably the most curable of the major cancers. It is often said that the first step towards better results is more prompt diagnosis by the general practitioner: but Harnett,[1] describing a five-year follow-up of 955 cases, shows that the patient herself, and not the doctor, is responsible for most of the delay. Only 45·5% of patients consulted their doctors within three months of noticing the first symptom, which was usually vaginal hæmorrhage; but 79·1% of all patients were referred to hospital at the time of their first visit to the doctor. Among 55 cases in stages I and II treated by Wertheim's hysterectomy the five-year survival-rate was 52·7%, while among 221 in stages I and II treated with radium alone the survival-rate was 40·7%. These samples, however, are not comparable. Of the cases treated surgically, 34 were in stage I and 21 in stage II (a ratio of roughly 3 to 2); while of those treated with radium alone 87 were in stage I and 134 in stage II—almost a reversal of the proportion. The survival-rate for all cases, treated by any method, was 27·7% at five years.

This account, which refers to cases seen in London hospitals during 1938 and 1939, may be compared with a report from Stockholm,[2] which shows that the crude survival-rate among 7675 cases of cancer of the cervix treated by radiotherapy in ten contributing hospitals between 1936 and 1941 was 37·8%. Clearly during the last twenty years radiotherapy has improved the prognosis of this form of cancer.

The Cancer Act of 1939 included provision for complete registration of cancer, one of the objects being the statistical comparison of methods of treatment. This part of the Act still stands, and one or two regions have started complete registration. Is it too much to ask that registration should now be extended to the whole country?

GASTRIC UREASE AND PEPTIC ULCER

The work of Fitzgerald and Murphy[3] on the distribution and function of the enzyme urease may throw some light on the pathology of peptic ulceration. This enzyme, which splits urea into ammonia and carbon dioxide, has been found in the gastric mucosa of several species of animals, and its concentration in the mucosa can be increased by feeding with extra protein or with urea. Fitzgerald and Murphy suggest that the ammonia formed by the urease may have an intramucosal neutralising action, thus protecting the stomach from digestion by its own acid. This idea seems to be supported by their finding the urease particularly in association with the acid-producing parietal cells. It was also present in the floor of an ulcer. Fitzgerald and Murphy demonstrated in man that raising the blood-urea by giving urea by mouth reduced the amount of acid and increased the amount of ammonia in the gastric contents after the injection of histamine; the amount of ammonium ion present did not completely cover the reduction in the amount of acid. Since the total chloride secreted did not fall, it is clear that they were dealing with neutralisation and not with suppression of secretion. The mechanism is a potentially powerful one, for the OH ions derived from 300 mg. of urea could neutralise 100 ml. of $N/10$ acid. Consideration of gastric blood-flow suggests that an arteriovenous difference in the concentration of urea of only 2–3 mg. per 100 ml. would supply enough urea to neutralise 100 ml. of $N/10$ acid per hour in man.

The neutralisation of gastric acid by gastric urease suggested that the administration of urea might be useful

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[1] Harnett, W. L. *Brit. J. Cancer*, 1949, 3, 433.
[2] Fifth Volume of Annual Reports on the Results of Radiotherapy in Cancer of the Uterine Cervix: Statement of Results Obtained in 1941 and Previous Years. Ed. by J. Heyman. Stockholm, 1949.
[3] Fitzgerald, O., Murphy, P. *Lancet*, 1949, ii, 1108; *Irish J. med. Sci.* March, 1950, p. 97.

Last November. the council had postponed for six months lgment on *Eric Frederick St. John Lyburn*, registered as of Clinic (Tunbridge Wells) Ltd., Tunbridge Wells, M.B. Dubl. 30), against whom they found proved charges of advertising espect of the Lyburn Clinic, Tunbridge Wells. Dr. Lyburn ended and presented testimonials.

Mr. N. Leigh Taylor, for the complainants, the Medical fence Union, handed copies of the *Daily Telegraph*, for c. 8, 1949, containing, under the heading "Doctor Rejoins," report that Dr. Lyburn, speaking at Pembury, had announced that he was rejoining the National Health Service, d of the *Daily Mirror*, for Feb. 10, 1950, containing a otograph of Dr. Lyburn in an ultraviolet bath at his clinic, th an accompanying caption.

In reply to his counsel, Mr. E. M. Gorst, K.C., Dr. Lyburn d that the clinic was no longer called the Lyburn Clinic and name did not appear on the plate. He had made the nouncement at Pembury as a politician. He did not make appointment with the *Daily Mirror* photographer; he d the photographer to wait until he had had his treatment, t the photographer was in a hurry and suggested Dr. burn should be photographed in this way. Dr. Lyburn reed with Mr. Taylor that the press were usually present at litical meetings. Asked if he made the announcement of return to the service with the intention of arousing applause, . Lyburn replied: "I leave it to you. I spoke as a litician. I have a right to speak in Britain, Mr. Taylor; s not Russia."

The Legal Assessor asked whether Dr. Lyburn did not iow that the photograph was going to appear in the *Daily irror*. Dr. Lyburn said that many people sent for his otograph as a parliamentary candidate—the B.M.A. sent r it. The Legal Assessor: "What did you think was going happen to it?" Dr. Lyburn replied he did not know.

After consideration *in camera*, the President announced iat the Registrar had not been directed to erase Dr. Lyburn's ame from the Register. Dr. Lyburn then thanked the uncil and started to ask the council to support the idea of agnostic clinics; but he was stopped by the President, ho pointed out that he had already announced that the se was concluded.

Joseph Kevin Conlan, registered as of 81, Strubbington venue, North End, Portsmouth, M.B. Durh. (1940), appeared efore the council charged with having been fined at Durham 1948 on two counts of obtaining money by false pretence, her offences being taken into consideration, and of having een sentenced to six months' imprisonment at Portsmouth ty quarter session in July, 1949, for obtaining money with itent to defraud by falsely pretending that a cheque was a ood and valid order. The council at their sitting in ovember, 1949, had adjourned the inquiry.

Dr. Conlan said he had never had any intention to defraud. he first offences took place when he took to alcohol when eling depressed after treatment for illness. With regard to he second offences, he had no idea that there was not the oney in the bank; he had a joint account with his wife. e now took no alcohol, his health seemed very much better, nd he had obtained a post as an assistant.

The council found the convictions alleged against Dr. onlan proved and postponed judgment for two years, Dr. onlan to appear at the end of one year and produce estimonials.

John Matthew Campbell, registered as of Dromore, Omagh, o. Tyrone, M.B. N.U.I. (1942), had been found to have been onvicted of driving a motor-car whilst under the influence f drink or drugs; at the council's session in May, 1948, udgment was postponed for a year. In May, 1949, the ouncil postponed judgment further until November, 1949, ecause Dr. Campbell wrote stating that he was unable to ttend owing to indisposition and had been unable to produce estimonials because he had been at sea; and in November he council again postponed consideration of the case. At he present sitting Dr. Campbell did not attend. The Registrar was directed to erase his name from the Register.

NEW CASES

Stewart Quarterman Servanté, registered as of 7, West Road, ambridge, M.R.C.S. (1925), was charged with having been onvicted at Cambridge Assizes of procuring a miscarriage nd sentenced to 18 months' imprisonment. A letter was ead from the governor of the prison, stating that Servanté ad been informed of the council's letter and refused to attend. he council directed the Registrar to erase his name from the Register.

Peter Augustine Smyth, registered as of 33, Lillie Road, London, S.W.6, M.B. N.U.I. (1927), was charged with having been convicted and fined in 1947 for being under the influence of drink when in charge of a motor vehicle, and in 1949 for driving a car under the influence of drink or drugs and with driving in a dangerous manner. Dr. Smyth was present, and was represented by Mr. N. Richards, on behalf of the Medical Protection Society. The council found the convictions proved and postponed judgment for 12 months.

Garden Hepburn Swapp, D.S.O., registered as of 8, Bath Street, Stonehaven, Kincardineshire, M.B. Aberd. (1928), appeared charged with having been convicted and fined in 1945 and in March and September, 1949, for being in charge of a motor-car while under the influence of drink. The council found the convictions proved and postponed judgment for 12 months.

The council also postponed judgment for 12 months in the case of *Thomas Dunbar*, registered as of 63, Finlay Drive, Glasgow, M.B. Glasg. (1943), whom they found to have been convicted and fined in 1949 of driving a motor vehicle when under the influence of drink and without due care, and in 1950 of being in charge of a motor vehicle while under the influence of drink, for which he had been sentenced to a month's imprisonment and disqualified from holding or obtaining a licence for 30 years.

Council Business

Dr. J. P. Hedley presented the finance committee's report on the accounts of the General Medical Council and branch councils for 1949, which showed that expenditure exceeded income by £4000. Introducing the report of the public-health committees, Sir Andrew Davidson said there had been a continued fall in the numbers taking the certificates and diplomas in public health. Dr. H. Guy Dain asked whether this fall was a matter for concern. Sir Andrew replied that it was not possible to state its exact cause. After a war there was always an increase in the numbers of persons taking such courses. In the case of the certificate in public health there was a reduction of 58 out of a total of 240—roughly a quarter. In the diplomas there was a fall of about 80 out of about 240—roughly a third. At the moment the fall did not give cause for alarm. The fall last year was about the same as in 1948.

The President presented the report of the Pharmacopœia committee, containing the report from the British Pharmacopœia Commission. Prof. W. J. Dilling, he said, has been elected chairman of the committee. Sales of the *B.P. 1948* now total 37,770, and the Addendum, containing a number of new monographs and completely revised sections on antitoxins and vaccines, would be published later in the year. It was proposed to amend the requirements for sterile materials for injection so as to require that ampoules of injections should contain a definite excess over the actual dosage prescribed, this practice having been recognised by the Home Office. Consultation with the pharmacopœial authorities in the Dominions and the United States had continued, and the commission recommended that the provisions of the *International Pharmacopœia* to be published by the World Health Organisation should be adopted for the *British Pharmacopœia*, subject to a reservation about the right of introducing modifications in details.

Nine years ago, in the same German air-raid which destroyed the Queen's Hall, the house of the General Medical Council, 44, Hallam Street, London, which is also the headquarters of the Dental Board of the United Kingdom, was extensively damaged by fire. Now the damage is being repaired and other improvements made. Before the fire was put out it damaged, among other parts of the building, the rooms occupied by the British Pharmacopœia Commission as laboratories. The General Medical Council's building, which was specially constructed for its purpose, was opened in 1916; the Dental Board part was added later, in the same style.

In the council chamber the coat of arms of Sir Herbert Lightfoot Eason, president from 1939 until his death in 1949, has been added to the stained-glass arms and monograms of previous presidents in the window behind the President's chair.

(*To be concluded*)

Special Articles

GENERAL MEDICAL COUNCIL

SESSION MAY 23–27.

OPENING the 177th session of the council, Prof. DAVID CAMPBELL, the president, welcomed Sir Archibald Gray as representative of the University of London in succession to the late Sir Herbert Eason. He referred to the retirement from the Ministry of Health of Sir Wilson Jameson, who was a member of the council from 1942 to 1947, and said that, Sir Wilson "gave support of inestimable value to three causes, medical education as a whole, education in public health in particular, and the promotion of legislation by which these ends and the effective organisation of the council for their duties might be better secured. It is no secret that the emergence of a Medical Bill into practical politics, and the principles of many of its provisions, are due largely to his influence and persuasiveness."

In his address the President recapitulated the main provisions of this Bill, which, he said, "will, I trust, be read a third time and passed by the House of Lords, to be sent to the House of Commons, within the next hour." Under the Act of 1886 success in a qualifying examination had been made the primary condition of registration in the Medical Registrar; but experience had convinced those best able to form an opinion, including the Goodenough Committee who reported in 1944, that this is not now enough. It was therefore proposed to make a fundamental change in the conditions of registration of persons qualified in the British Islands by requiring them to render satisfactory service as house-officers, for a period to be laid down by regulations, before they can be fully registered as registered medical practitioners. Meantime they would be registered only provisionally.

> "Service in approved places may consist of employment either in medicine, in surgery, or in midwifery (or in posts involving the practice both of medicine and of surgery, or of all three subjects); or it may consist of employment in an approved health centre by a registered medical practitioner in the provision of general medical services, or in the provision of outpatient services.
>
> "The allocation of time between the alternative forms of employment, within the period of service as a whole, is to be determined by regulations of the council which fix a period or minimum period of employment in medicine or in surgery, and a period spent in midwifery which may be counted, at the option of the house-officer, as time spent in either of the other two subjects. The council may also fix by regulations the period of employment in a health centre which may be counted as time spent either in medicine or in surgery. Licensing bodies are to apportion the time spent in posts involving the practice both of medicine and of surgery, or of both subjects and midwifery as well.
>
> "We may, I understand, assume that the expressions 'medicine' and 'surgery,' as subjects in which posts may be held, include the branches of these subjects which are commonly referred to as specialties."
>
> "Provisional registration will put house-officers in the position of registered medical practitioners so far as is necessary for the purposes of their work, and will make them subject to professional discipline.
>
> "The requirement of satisfactory service after qualification, is not to come into operation immediately on the passing of the Act but with effect from an appointed day to be fixed by the Privy Council, who will doubtless first wish to be satisfied that sufficient posts are available to absorb the candidates successful at qualifying examinations."

Some anxiety, the President said, had been expressed in the House of Lords as to whether enough posts will be found before the appointed day is fixed, and as to whether they will be adequately paid. In reply Lord Shepherd had expressed the Government's opinion and intention "that these interns shall occupy house-posts, and that the rate for the job shall be paid."

The Bill, continued the President, proposed that disciplinary jurisdiction under the Medical Acts shall be transferred from the council as a whole to a committee known as the Medical Disciplinary Committee, appointed by the council.

> "The committee are to consist of the President, who will be chairman, and 18 other members, of whom at least 6 are to be elected members and at least 2 lay members of the council. Disciplinary cases are normally to be heard by not more than 9 members of the committee, and arrangements are to be made for securing that at least 1 layman is eligible to attend every hearing. Cases are only to be heard by more than 9 members if it appears to the President, or a member of the committee authorised by the committee to act on his behalf, that there are circumstances requiring the presence of a greater number. In either event, the quorum of the committee is to be 5; and since all acts of the committee are to be decided by the votes of a majority of the members present, the President is relieved after more than 90 years of the apprehension of having to give the casting vote which in business other than discipline will still be his under the Act of 1858."
>
> "Specific power is conferred upon the committee to administer oaths and to compel the attendance of witnesses and the production of documents by subpoena," and "an interesting change in long-standing practice is made by a requirement that the rules shall provide for the committee to record a finding of 'not guilty' in cases of alleged infamous conduct in a professional respect in which they judge that the allegation has not been proved."
>
> "Appeals are to lie to the Judicial Committee of the Privy Council, whose comprehensive jurisdiction and unimpeachable standing have, I think, won them unanimous acceptance both in the House of Lords and elsewhere as the best tribunal to whom the persons concerned could possibly resort."

The effect of the Bill was to increase the number of members of the council to 47. There would be 11 elected members instead of 7; there would be 8 Crown nominees instead of 5 (5 being registered medical practitioners and 3 laymen); and representation was given to the Royal College of Obstetricians and Gynæcologists. The President hoped that the Bill would go far to meet two criticisms of the present system. Of late years, and not only under the pressure of a great war, it had been felt that disciplinary business was inevitably absorbing the attention of the council as a whole to the detriment of their educational business: and that such educational business as was done was, again inevitably, concentrated in the hands of too few members, at the loss of contributions of value from the whole body. Conversely, while every member had been anxious to take his share in disciplinary business as one of his obligations, some members were less convinced than others of their aptitude for judicial work, and would be glad to be set free to concentrate their energies on the many-sided problems of medical education.

Professor Campbell concluded his address by expressing the council's appreciation of the spirit in which the Lords most concerned had addressed their minds in the amendment and improvement of the Bill.

Disciplinary Cases

POSTPONED JUDGMENTS

The council did not direct the Registrar to erase from the Register the names of the following practitioners who appeared for postponed judgment: *Hugh Boyd Gillespie*, registered as of 16, Blairhall Avenue, Langside, Glasgow, M.B. Glasg. (1935); *William Allan*, registered as of 31, Hill Crest, Burnley Road, Sowerby Bridge, Yorkshire, M.B. Glasg. (1926); *Malcolm Andrew Graham-Yooll*, registered as of Elm Tree House, Pembroke, M.B. Edin. (1923); *Norman Fraser Stock*, registered as of 4, Priestfield Road, Edinburgh, M.B. Edin. (1935); and *Francis Murray*, registered as of 417, Evelyn Street, London, S.E.8, M.R.C.S. (1930).

resented a breakdown of the service. Among other asures, he proposed that all hospitals should set aside % of their beds for the treatment of tuberculosis es. If the teaching hospitals were unable to do this. y should allocate 10% of their nursing staff for work sanatoria. Tuberculosis nurses must be fully protected preventive measures, including immunisation. and by ovisions guaranteeing them adequate financial support ould they contract the disease in the course of their ork. The value of B.C.G. vaccination had been amply monstrated in other countries. and this method of ophylaxis should be widely used here. In supporting e resolution. which was carried unanimously, Dr. A. L. COBS pointed out that many young doctors were norant of the common features of pulmonary tubercu- sis, since they rarely saw cases in the teaching hospitals.

A resolution moved by Dr. A. G. SIGNY urged that e teaching hospitals be brought under the control of e regional boards in England as they are in Scotland. he gap between the standards of teaching and non- aching hospitals. he declared. was increasing. owing the vastly different financial positions of the two oups under the N.H.S. A "levelling upwards" could ly be achieved by unified control.

Dr. A. RAPOPORT initiated a long discussion on general ractice. He urged that the greatest publicity be given o the Collings report, which should be discussed on the idest scale. The report had been much criticised, but he facts it revealed had not yet been seriously refuted. he meeting agreed that the widespread adoption of roup practice from health centres was essential for the olution of this problem. and that a satisfactory general- ractitioner service must be a full-time salaried service.

Dr. R. TEPPER drew attention to the serious difficulties acing hospital registrars. owing to their professional nsecurity. He vigorously rebutted the suggestion that he salvation of registrars lay in their mass emigration. Ir. H. SANSOM deplored the existence of a colour bar hich prevented many medical students from finding atisfactory living accommodation and from making dequate professional and social contacts in this country. Other resolutions on a crowded agenda called for the ntroduction of a forty-hour week for all health workers. and for checks on the prescribing of proprietary medicines.

A presentation was made to Dr. D. Elizabeth Bunbury and Dr. L. T. Hilliard on their retirement from office in the association. The officers for 1950–51 are: president, Mr. SOMERVILLE HASTINGS; vice-presidents, Dr. JOULES and Dr. D. STARK MURRAY; hon. secretary, Dr. GILLILAND; hon. treasurer, Mr. H. H. BARST; hon. editor of the *Bulletin*, Dr. H. I. WINNER.

Public Health

Statistics for Eire

THE following statistics for Eire in 1949 have been reported[1]:

Births.—The rate was 21·4 per 1000 population—0·5 below the rate for 1948. Illegitimate births accounted for 3·1% of the total.

Deaths.—The rate was 12·7 per 1000 population, being 0·5 above the rate for 1948. The death-rate from pulmonary tuberculosis was 0·7 per 1000, and from other forms 0·2, the rates for 1948 being 0·8 and 0·2. Deaths from puerperal causes were at the rate of 1·6 per 1000 births registered (0·1 from puerperal infection and 1·5 from other puerperal causes), compared with 1·4, 0·2, and 1·2 for 1948. The infant-mortality rate was 51 per 1000 births registered, compared with 49 in 1948.

The population at the middle of 1949 is provisionally estimated at 2,991,000.

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[1] Quarterly Return of the Marriages, Births, and Deaths registered during the December Quarter, 1949; and Yearly Summary, 1949. Government Publications Sale Office, 3–4, College Street, Dublin. Pp. 76. 6d.

In England Now

A Running Commentary by Peripatetic Correspondents

SATED with coloured string and raffia, poster paints, looms, and cross-stitch, occupational therapists may like to consider a new way of hand-printing which I saw demonstrated the other day. All they need is a strip of linoleum about 18 in. long and 6 in. wide, some plastic paint, one of those rubber things house-painters use for putting a fine oak grain on otherwise inoffensive doors, a chip of wood, and an old sheet or some such thing to print on. You cover the lino nice and thickly with paint, then take your grainer (or whatever it may be called) in hand, and trace any little fine pattern you like on the wet surface—delicate scrolls of fine lines, shell-like spirals, ribbons, or wreaths of mist. Then to give the design a bit of body you take your chip and add a few crosses or stars, flowers or stripes, at convenient intervals. After that you turn the strip of lino over on to the fabric and thump it down with a stone. The result is quite lovely, much finer and more delicate than a lino cut, and of course much less trouble to do. I saw this "scraper printing," as it's called, demonstrated at a show given in London by Bocquet and Freeman (who invented the method). They live at 20, Mount Pleasant, Cheshunt, Herts, and as far as I can make out the whole family spends its time hand-printing: one exceptionally nice design was done by an eight-year-old daughter. But think what outlets it gives for the troublesome or unstable: plenty of thick luscious paint to slap about, plenty of scope for creative urges, a fine opportunity to work off aggression in thumping down the lino with a large smooth stone, a rewarding result for relatively little trouble, and a chance to put any bit of old stuff to a new and pleasant purpose. I can hardly wait to begin.

* * *

Since I came to live in Blankshire I have been impressed by the number of women in the countryside and the little towns who seem to bear a vague family resemblance to one another—broad stout women with fat kindly faces and rather slow pleasant voices. They are recognisable everywhere. Even in these hilly and isolated districts where there is much intermarriage, they could not all be relations. Then it struck me that, of course, I was looking at all stages of thyroid deficiency in a mild and pleasant community, ranging from the almost normal to extreme myxœdema. This last is exemplified in the owner of a greengrocer's shop in a little seaside town forty miles from here. Customers haunt the shop to gaze at her vast bulk and listen to her good-natured croak, and I have often myself looked at her with awe, reflecting that her proper place should be Examiners' Hall.

It is perhaps only by chance that a woman in my own hamlet has an adenoma of the thyroid, said to be benign, and a boy of 12 living opposite her has a conspicuously enlarged thyroid gland. But many of the people one sees about display developmental anomalies that one would not expect to find in a rich agricultural county, though they are common enough among the poor in towns—figures too slight or too squat: features out of proportion: large faces with a suggestion of acromegaly: small faces (especially in the men) as though the bones have hardly grown since childhood: or slight exophthalmos. The children in the nearby village, I notice, are fine as babies: but after the age of 3 or 4 years they often get pale and skinny, and though lively enough they suffer far too much from respiratory affections and illnesses of every kind. Even on our hill-top, where the well-fed children (and on the whole they are well fed) should be models of health, there is frequent sickness; nearly all of the twenty-odd youngsters are small for their age—one girl of 10 who is exceptionally well grown is nevertheless sallow and languid—and all are pale except two 3-year-olds. Three children are obviously subnormal mentally.

It looks as though there may be a deficiency of iodine, and perhaps also of trace elements, throughout the county.

Then there are the tadpoles. In our garden we have a very small concrete pool which we planted last year with

LONDON EXECUTIVE COUNCIL

The First Two Years

THE largest executive council—that for the county of London—serves a population estimated at 3,389,850 in the middle of 1949. The proportion on doctors' lists under the National Health Service is still growing, the total having risen from 3,169.243 at April 1, 1949, to 3,291,270 on the same date this year.

The council's work is described by Mr. C. H. Lyon, clerk of the council, in an up-to-the-minute report on the period from July 5, 1948, to March 31 this year.

REGISTRATION

The National Health Service Act confronted the council with formidable registration difficulties which were not unlike those faced by the London Insurance Committee in the early months of 1913. In those days, partly because the index slips received by the committee were not always clearly legible, it became necessary to re-sort the index register of insured persons entitled to medical benefit into numerical (i.e., membership-number) order. In preparing for the start of the National Health Service the council was required to rearrange the index in alphabetical order. Unless the whole population could be renumbered, there was no alternative; but this rearrangement

> "once again confronted the council with the difficulties of identification and association with records already held. New registrations bearing the person's National Registration identity number cannot, with certainty, be identified with those bearing approved societies and membership numbers. A difficulty also arises with persons who change their surnames or use an alternative christian name. . . . Particularly is this noticeable in applications for ophthalmic benefit (form O.S.C.2) as the form makes no provision for statement of a maiden name. Thus the work of registration is retarded and a measure of inflation is unavoidable. Only the return to a numerical system of filing and a central index register [maintained under National Health Insurance] will, it is suggested, provide an efficient and economically maintained register, and what is even more important, reduce the coefficient of inflation."

MEDICAL PRACTITIONERS

At the inception of the service, 1918 doctors were included in the London medical list; of these 1818 were engaged in general practice. By March 31 this year the number had grown to 1958. On April 1, 1949, 219 practitioners had been given permission to employ an assistant, and by March 31 this year the total had increased to 263. The number of partnerships in the area is 238, affecting 517 practitioners (202 are in partnerships of two practitioners, 31 of three practitioners, and 5 of four practitioners). The average number of persons per list was 1656 on April 1, 1949, and 1670 on the same date this year.

The following is an analysis of the size of practitioners' lists (discounting assistants):

No. of patients	*No. of practitioners*
Nil	65
1–500	370
501–1000	185
1001–1500	183
1501–2000	176
2001–2500	187
2501–3000	177
3001–3500	185
3501–4000	151
4001–4500	94
4501–5000	65
5001–5500	49
5501–6000	31
6001–6500	22
6501–7000	10
7001–7500	7
7501–8000	1

"Practitioners," says the report, "have coöperated with the council in complying with the terms of the allocation scheme." The position on April 1, 1949, and on the same date this year was as follows:

	1949	*1950*
(*a*) Practitioners with a partner or an assistant, and a list in excess of 4000	96	157
(*b*) Practitioners without partner or assistant, and a list in excess of 4000	70	33*
(*c*) Practitioners with an assistant, but list in excess of 6400	10	7*
(*d*) Two-practitioner partnership with combined lists in excess of 8000	9	7*
(*e*) Partnerships of more than two practitioners, with total lists exceeding an average of 4000 for each practitioner	3	2
(*f*) Total no. of lists with over 1000 patients	188	206

* Application of the 5% tolerance lately authorised by the Minister of Health further reduces the numbers at (*b*), (*c*), and (*d*) from 33, 7, and 7 to 7, 3, and 4.

The average number of patients per principal differs widely between the various boroughs, ranging, at Dec. 31 last year, from 3266 in Greenwich to 525 in Hampstead.

Grants for training assistants have been approved in 48 cases, and at March 31 this year 30 practitioners were training assistants. Practitioners receiving fixed annual payments at March 31, 1949, totalled 150.

During the period ended March 31, 1949, the Medical Practices Committee declared 6 vacancies. In 48 cases practices were dispersed. In addition, 27 practitioners withdrew who had not accepted any patients, while in 31 cases practices were transferred to a practitioner regarded as the "logical successor."

In the period from April 1, 1949, to March 31, 1950, the 103 withdrawals were dealt with as follows: vacancies advertised, 14; practices dispersed, 48; practitioners with no patients, 10; practices transferred to "logical successor," 31.

OTHER FEATURES

Applications for glasses.—The number of applications seems to be decreasing slightly. For each month in 1949 and the first quarter of this year the average daily figures were as follows: *2302, 2477, 2508, 2115,* 2056 1827, 1570, 1513, 1786, 2057, 1758, 1303, 1518, 1733, and 1836.

Dentists.—The number of dentists available grew from 435 at July 5, 1948, to 1069 at March 31, 1949, and 1090 at March 31 this year.

Pharmaceutical Service.—The monthly total of prescriptions increased from 887,036 in July, 1948, to 1,234,993 in August, 1949; and the average cost per prescription from 26·63*d*. to 38·45*d*.

Foreign Visitors.—In the year ended June 30, 1949, 1093 visitors to this country received medical treatment while temporarily resident in London; and during the period from July 1, 1949, to March 31, 1950, a further 2879 were treated.

Estimates.—Gross expenditure in the current financial year is estimated at £11,352,825, of which £102,825 will be required for administration; £2,750,000 for general medical services, £2,500,000 for pharmaceutical services, £3,500,000 for general dental services, and £2,500,000 for supplementary ophthalmic services.

SOCIALIST MEDICAL ASSOCIATION

THE twentieth annual general meeting of this association, held in London on May 20 and 21, was attended by health workers from all parts of Great Britain. Mr. SOMERVILLE HASTINGS, M.P., presided.

Dr. I. C. GILLILAND moved a comprehensive policy resolution on behalf of the council. This called for the provision of health centres, and for the introduction of an industrial health service integrated with the present health services. It opposed the imposition of any charges for benefits under the N.H.S., and urged that all grades of health workers be employed on a full-time salaried basis.

An emergency resolution on the tuberculosis service was moved by Dr. HORACE JOULES, who declared that the time-lag of many months between the diagnosis of pulmonary tuberculosis and the initiation of treatment d were compensated with digitalis before operation, ile another minor group showed renal insufficiency fore operation. All of them died, mostly within a year ter operation.

In the patients with primary malignant hypertension the control series the time of observation was counted om the date of their first symptoms even if the retinal udates were first observed later. In the operated ries the time of observation was always counted from e operation. This method of calculation gave a higher gnificance to the difference between the operated and on-operated patients than is shown by the figures.

The period of observation has been divided into one-ar intervals. The mortality-rate is expressed in rms of deaths per 1000 patients per annum.

The table shows that the prognosis is constantly better the operative than in the control series. In patients ith retinal exudates the difference is highly significant both sexes and also in men belonging to group III. he significance of the lower mortality-rate in operated omen in group III is less than in men, but still 60%. n the more favourable group II we need a longer follow-p time to decide if the neurosurgical treatment signifiantly improves the prognosis, but we already have early twice as high a mortality-rate in the male controls s in the operated series in this group and no mortality mong 58 operated women against 21 deaths in 122 ontrols.

Our figures demonstrate the importance of reckoning he prognosis in hypertensive men and women separately; he life expectancy in patients without retinal exudates is wice as high in men as in women.

Sundsvall, Sweden. SVEN HAMMARSTRÖM.

SIR,—I have read with great interest the article of April 8 by Professor Platt and Dr. Stanbury. Sympahectomy in arterial hypertension has been extensively studied in Italy since 1924 when my teacher, Prof. Nicola Pende, demonstrated its physiopathological basis and ndications at the Congress of Internal Medicine at Padua.

The physiological principles in sympathectomy were being worked out as early as 1904, when Professor Pende was performing experimentally adrenal denervation with resection of the splanchnic and solar plexuses. This resulted in slow atrophy of the adrenal medulla and—an interesting fact—operation on the left side led, in his experiments, to adrenal medullary atrophy on the right side also. From clinical observations on essential hypertension, the modern researches of Goldblatt, and the undeniable importance of the kidney and adrenal gland in the genesis of hypertension, one can conclude that the splanchnic plexus and abdominal angiospasm play an important part in essential hypertension.

This concept is universally accepted today; disagreement arises only over the selection of cases for sympathectomy, and the modifications of the operation originally devised by Pende, which consists essentially in the resection of large and small splanchnic nerves on the left side. The only indication for operation is pure essential hypertension. It is necessary to exclude cases with a blood-urea over 50 mg. per 100 ml., with hyposthenuria, with sclerosis of the aorta or coronary vessels, with a diastolic blood-pressure exceeding 130–140 mm. Hg, or with serious changes in the fundus oculi. But one can obtain dramatic results even in patients who have had a cerebral catastrophe or who have incipient sclerosis of the retinal vessels, and also in subjects over 50 years of age.

The statistics of Italian surgeons such as Donati, Alessandri, Pieri, Arrigoni and Ciminata, Giordano, Valdoni, Ciceri, Stropeni, Mingazzini, and Bani, show that Pende's operation gives very favourable results; and all admit that even if the blood-pressure is not greatly lowered symptoms are relieved and working capacity improved. We have no sure evidence on the natural evolution of permanent hypertension, and we cannot therefore declare that only mild hypertension has been benefited by sympathectomy. On the other hand, we know that the condition of patients long regarded as having mild benign hypertension can suddenly deteriorate, with serious disturbances of the general circulation; cerebral hæmorrhage; left-sided cardiac failure with attacks of cardiac asthma, pulmonary œdema, or angina pectoris; or nephrosclerosis and uræmia.

The operative mortality with Pende's operation, limited to left subdiaphragmatic splanchnicotomy, is nil. We believe that the operation suggested by Pende, and the modifications and the extensions of this operation, can, in a large proportion of well-selected cases, give either real recovery or greater improvement than any medical treatment. This opinion is shared by the French surgeons, Fontaine and Leriche; by American surgeons; and also by J. Quénu and M. Gandy, who in their book on surgical technique have declared Pende's procedure to be the operation of choice.

Institute of Medical Pathology
and Clinical Methodology,
University of Rome.

G. DE BONIS.

BLOOD DESTRUCTION IN HÆMOLYTIC DISEASE OF THE NEWBORN

SIR,—The letter from Dr. Küster and Dr. Krings in your issue of May 20 raises once more the problem of the ætiology of nuclear staining in erythroblastosis fœtalis.

Leaving aside the question of the applicability of conclusions from animal experiments such as they describe to the naturally occurring disease in man, it may be accepted as a working hypothesis that the two main factors involved are vascular damage and hyperbilirubinæmia. The nature and cause of the vascular damage remain obscure; and no claims have been made, as far as I am aware, that any present form of treatment influences it. As for the hyperbilirubinæmia, Küster and Krings seem to assume that this is a direct effect of excessive blood destruction. This appears to me to be an unwarranted assumption. Leonard,[1] reviewing 55 cases of erythroblastosis fœtalis, pointed out that there was no relation between the degree of blood destruction, as estimated by the extent of the anæmia, and the severity of the jaundice. The two factors varied independently of each other. She attributed the jaundice in great part to impaired liver function.

Two conditions may be cited in which these factors can be observed in isolation. Acholuric jaundice, when it appears in newborn infants, is characterised by acute anæmia due to episodic destruction of the abnormal erythrocytes. In most cases this anæmia is not associated with jaundice. Abt [2] is categorical on this point: "When the illness is first manifested in early infancy jaundice may be entirely absent, even though there is indisputable evidence of a considerable increase in destruction of blood." This is supported by David and Minot,[3] who state: "In the infant icterus is usually slight—pallor and splenomegaly being the most outstanding physical findings." Thus anæmia of severe degree due to in-vivo blood destruction can occur with little or no appreciable jaundice.

In the so-called physiological jaundice of the newborn it has been demonstrated by Findlay et al.[4] that the icterus is not due to excessive blood destruction but almost certainly to hepatic inefficiency. In these cases there is certainly a fall in blood values during the period

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1. Leonard, M. F. *J. Pediat.* 1945, 27, 249.
2. Abt, A. F. *Amer. J. Dis. Child.* 1940, 60, 812.
3. David, J. K., Minot, A. S. *Ibid*, 1944, 68, 327.
4. Findlay, L., Higgins, G., Stanier, M. W. *Arch. Dis. Childh.* 1947, 22, 65.

a pygmy water-lily, some watercress, and, at the edges, arum lilies. This early spring Nature provided filamentous algæ, dragonfly nymphs, two newts, and numerous *Culex* larvæ, so I added two goldfish to eat the larvæ. Only frog spawn was missing. Children, however, have a natural affinity for these things, and very soon two jam-jars arrived in small hands, providing enough tadpoles to make the pool a home from home for the goldfish. All went well. The fish throve, the mosquitoes disappeared, the dragonflies emerged and flew about the garden; by mid-May the water-lily and the arums blossomed (yes, this *is* England). The tadpoles wriggled their tails and ate. Then we decided to buy a hose to replace ours lost in the war, and naturally went on to fill the pool to capacity. It took a lot of water, for the pond, though shallow, slopes gently at each end and has more surface than we thought; but it looked nice when full. Now, I am beginning to grow uneasy. The tadpoles have doubled their bulk since the pond was filled but show no signs of metamorphosis; before that a few had developed rudiments of hind legs, but these have now vanished—swallowed up in fat, perhaps! It would take a modernistic schizophrenic writer to describe the sinister little pool crowded with enormous infantile tadpoles, always eating. Through the clear water one sees the floor dotted with the bloated creatures resting between meals. The algæ have nearly disappeared; but disturb what is left and swarms of stout tadpoles that have been feeding on it will emerge. The watercress quivers all day with jostling bodies, and the water between the green leaves is black with a heaving mass. They fling themselves avidly on any drowned slug or worm, which quickly disappears. As I watched them I was reminded of the large myxœdematous women crowding buses, streets, village stores, and shops always seeking food (true, not for themselves but for their families). The goldfish remain invisible and perhaps feel much as would delicately nurtured white women of high rank on the films when abandoned in a kraal of Hottentots.

The common factor in the environment of humans and tadpoles seems to be our drinking-water. I cannot help asking myself whether, in the case of the tadpoles, a large influx of this water has changed the rhythm of metamorphosis because there is something anti-thyroid about it. Anyway, it is adult frogs I am aiming at and not ranine Peter Pans; so next time I go into the town I am going to get some thyroid extract for them.

* * *

The greatest tragedy in medicine is a beautiful theory slain by an ugly fact. Throughout the weekend, my H.P. had been struggling with an asthmatic who had stubbornly resisted all the usual remedies for bronchospasm. On Monday morning he invited my coöperation with a new machine devised to administer some adrenaline preparation by inhalation. Having been duly assembled the thing proceeded to do its stuff with a reassuring purr, and within 10 minutes the patient's dyspnœa was completely relieved.

Alas! with an inquisitiveness bred by admiration out of ignorance I then inspected the apparatus and discovered that owing to faulty valves it had not been working at all. And if this was not a bad enough start for the week, I was next introduced to a striking developmental anomaly, one of incomplete fusion of most of the upper part of the body. "There's a familial incidence," exclaimed the H.P. excitedly; "his sister has a hare-lip. We *must* send all the details to Dr. Parkes Weber." "She's the patient's wife, not his sister," quietly observed an iconoclastic staff nurse.

* * *

After old Joe Honeysuckle had been away a long time his daughter reported that he would not be coming back to tend the garden, because he had "persistent amenia," a diagnosis which got me guessing until I heard that he was being treated with liver injections.

* * *

From the *Prison Officers' Magazine*:

BIRTHS·

(Held over until next month)

Hard labour, we presume.

Letters to the Editor

SYMPATHECTOMY FOR HYPERTENSION

SIR,—In your leading article of April 22, you refer to the need for more knowledge of the prognosis in hypertensive cases not treated surgically, for the purpose of comparison with operative series. Such a comparison has been made by Keith, Woolf, and Gilchrist[1] and recently by Bechgaard and myself.[2]

We compared the prognosis in a consecutive series of 251 cases submitted to lower dorsal or lumbodorsal sympathectomy at Olivecrona's clinic at the Serafimer Hospital, Stockholm, with a non-operative series of 453 cases followed up for 2–10 years. The control series was selected by the same principles as the surgically treated cases from about 130,000 records from hospitals in Copenhagen and Stockholm. We divided our patients into four groups and used a new classification of hypertensive disease, based on the signs and symptoms, which we have found essential in judging the prognosis. Men and women are dealt with separately.

Group I is not included in our study, for it contains cases with uncomplicated hypertensive disease without marked subjective symptoms. We do not believe that sympathectomy is justified in this group, where we know life expectancy to differ little from that of normotensives.

Group II includes those with marked subjective symptoms but without signs of myocardial damage. They may show left axis deviation in the electrocardiograph (E.C.G.) and/or relative enlargement of the left ventricle if the heart-volume is within normal limits according to teleradiography. The retinal changes in the patients in our second group are classified as group I or II according to Keith and Wagener.

Group III includes those with the same eyeground changes or, in addition, retinal hæmorrhages with or without signs of thrombosis of the retinal vessels. Patients in group III further show one or more of the following signs of cardiovascular damage: negative T_1 in the E.C.G., heart-volume above the predicted normal (500 c.cm. per sq. m. body-surface in men and 450 ml. per sq. m. in women, or the transverse diameter of the heart greater than one-half the inner thoracic diameter), residual damage after cerebral insult, and constant albuminuria.

COMPARISON OF PROGNOSIS IN 453 UNOPERATED HYPERTENSIVES AND 251 HYPERTENSIVES AFTER SYMPATHECTOMY

—	IV		III		II	
	Men	Women	Men	Women	Men	Women
Unoperated:						
No. of cases	69	25	83	94	42	122
Deaths	68	24	57	44	9	21
Mortality-rate (per 1000)	307	330	181	80	41	20
Operated:						
No. of cases ..	38	41	35	50	29	58
Deaths	18	16	9	8	4	0
Mortality-rate (per 1000)	150	96	52	33	25	..
Error of mean of differences (per 1000)..	80	115	56	37	42	45
Significance of differences of means in unoperated and operated patients (%)	93·5	98	98	59·3	30	..

In *Group IV* we include all hypertensives with definite retinal exudates and/or papillary protrusion, since we found the life expectancy to be about the same if the patients in this group did or did not have papillary protrusion.

Patients with cardiac decompensation at rest, auricular fibrillation, myocardial infarct, or renal insufficiency were not included in the non-operated series. A few patients in the operated series had cardiac insufficiency

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1. Keith, M. A., Woolf, B., Gilchrist, A. R. *Brit. Heart J.* 1949, 9, 287.
2. Hammarström, S., Bechgaard, P. *Amer. J. Med.* 1950, 8, 53.

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Our figures demonstrate the importance of reckoning the prognosis in hypertensive men and women separately; the life expectancy in patients without retinal exudates is twice as high in men as in women.

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The statistics of Italian surgeons such as Donati, Alessandri, Pieri, Arrigoni and Ciminata, Giordano, Valdoni, Ciceri, Stropeni, Mingazzini, and Bani, show that Pende's operation gives very favourable results; and all admit that even if the blood-pressure is not greatly lowered symptoms are relieved and working capacity improved. We have no sure evidence on the natural evolution of permanent hypertension, and we cannot therefore declare that only mild hypertension has been benefited by sympathectomy. On the other hand, we know that the condition of patients long regarded as having mild benign hypertension can suddenly deteriorate, with serious disturbances of the general circulation; cerebral hæmorrhage; left-sided cardiac failure with attacks of cardiac asthma, pulmonary œdema, or angina pectoris; or nephrosclerosis and uræmia.

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Leaving aside the question of the applicability of conclusions from animal experiments such as they describe to the naturally occurring disease in man, it may be accepted as a working hypothesis that the two main factors involved are vascular damage and hyperbilirubinæmia. The nature and cause of the vascular damage remain obscure; and no claims have been made, as far as I am aware, that any present form of treatment influences it. As for the hyperbilirubinæmia, Küster and Krings seem to assume that this is a direct effect of excessive blood destruction. This appears to me to be an unwarranted assumption. Leonard,[1] reviewing 55 cases of erythroblastosis fœtalis, pointed out that there was no relation between the degree of blood destruction, as estimated by the extent of the anæmia, and the severity of the jaundice. The two factors varied independently of each other. She attributed the jaundice in great part to impaired liver function.

Two conditions may be cited in which these factors can be observed in isolation. Acholuric jaundice, when it appears in newborn infants, is characterised by acute anæmia due to episodic destruction of the abnormal erythrocytes. In most cases this anæmia is not associated with jaundice. Abt[2] is categorical on this point: "When the illness is first manifested in early infancy jaundice may be entirely absent, even though there is indisputable evidence of a considerable increase in destruction of blood." This is supported by David and Minot,[3] who state: "In the infant icterus is usually slight—pallor and splenomegaly being the most outstanding physical findings." Thus anæmia of severe degree due to in-vivo blood destruction can occur with little or no appreciable jaundice.

In the so-called physiological jaundice of the newborn it has been demonstrated by Findlay et al.[4] that the icterus is not due to excessive blood destruction but *almost certainly* to hepatic inefficiency. In these cases there is certainly a fall in blood values during the period

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4. Findlay, L., Higgins, G., Stanier, M. W. *Arch. Dis. Childh.* 1947, 22, 65.

of the jaundice, but this fall continues for a considerable period after the jaundice has disappeared.[5] The two conditions are for a time coincidental but there is no direct causal relation between them.

The same state of affairs appears to me to exist in erythroblastosis fœtalis. There are three processes at work: (1) the anæmia due to the destruction of the sensitised erythrocytes; (2) vascular damage of uncertain type and unknown cause; and (3) hepatic dysfunction, also of doubtful origin.

The claim that replacement transfusion will reduce the incidence of kernicterus seems thus to be based on faulty reasoning. It may do so, but the matter certainly requires proof; and I suggest that a controlled experiment such as that suggested by Mollison and Cutbush[6] is very definitely needed. Replacement transfusion is not entirely devoid of risk. I know of two cases in which sudden death, apparently due to acute heart-failure, occurred while the replacement was being effected. The risk, whatever its magnitude, may well be worth taking if it can be shown that the procedure does reduce the incidence of kernicterus. However, I feel that at the moment there are too many enthusiasts and not enough critical observers at work in this field.

Derbyshire Hospital for Sick Children, Derby. DUNCAN MACAULAY.

AUREOMYCIN AND SULPHADIAZINE IN ABORTUS FEVER

SIR,—In the following case of abortus fever 'Aureomycin' and sulphadiazine were administered together:

The patient was a farmer, aged 45, who, with a sore on his thumb and abrasions on both hands, had attempted to deliver a cow of a stillborn calf. Unable to do so, he called in a veterinary surgeon, who diagnosed ruptured uterus; the calf was dead. Two weeks later the farmer began to feel out of sorts; he was easily fatigued and irritable, and had occasional headaches; and on Jan. 8, having become feverish, he had to take to his bed. His own doctor first saw him on Jan. 11, when the chief symptoms were headache, aching limbs, heavy sweats, and constipation. Examination did not reveal any signs other than fever (100°F); pulse-rate 90 per min. During the next few days, no additional signs developed, and the cause of the fever was not suspected, since no history had been elicited regarding this man's obstetric performance (which had included an intra-uterine examination).

A Widal agglutination test on Jan. 15 was completely negative. A white blood-cell count showed leucopenia with pronounced increase in mononuclear cells (white cells 6500 per c.mm.; polymorphs 45%, lymphocytes 20%, monocytes 35%).

Since the clinical condition did not improve, and the pyrexia, tachycardia, sweats, and headache continued, a second Widal test was made on Jan. 19; and a standard suspension of *Brucella abortus* was agglutinated at a titre of 1/1280.

On admission to hospital on the 16th day of the known febrile state (Jan. 22) and six weeks after the infection was contracted, this patient's general condition was good, considering the duration of the fever. Pulse-rate 120 per min.; temperature 100°F. He was somewhat disorientated and could give no clear account of his illness. The abdomen showed moderate generalised distension; the spleen was not palpable. Headache, of varying intensity, was referred to the frontal region, and was usually most severe in the early evening. After a drenching sweat in the late evening of each day, the headache became less intense and the fever abated, rising again gradually to 100°F about 6 P.M. An enema on the morning after admission relieved the abdominal distension and produced a formed fæcal mass which had a heavy putrid odour resembling hydrogen sulphide gas.

Bacteriological examination of this stool and of three consecutive specimens of urine revealed no *Br. abortus*; blood-culture was also negative. A rising agglutination titre was found in consecutive specimens of blood-serum and on Feb. 13 the titre was positive at 1/5120.

The newer antibiotics have been used in the treatment of abortus fever, and streptomycin combined with sulphadiazine produced a cure in a severe case.[1] Aureom therapy is reported to have proved successful in three cases. I decided to use aureomycin because it could be given in capsules by mouth.

Oral therapy with aureomycin hydrochloride in a dosage of 500 mg. six-hourly was commenced at 10 P.M. on Jan. No signs of intolerance were observed, and at the end twenty-four hours the dose was increased to 1 g. six-hourly. This dosage was continued for four days, but no signs of clinical improvement, other than a slight reduction in the pulse-rate, were apparent. Headache, fever, and sweats continued. On the evening of Jan. 29, sulphadiazine therapy —2 g. initially followed by 1 g. four-hourly—was commenced. Within thirty-six hours the patient's condition improved greatly. The temperature fell to normal; the pulse-rate was reduced; headache was less intense; and the stool obtained after an enema was not offensive in odour. Within seventy-two hours the pulse-rate decreased further, headache and sweating ceased, and an uneventful convalescence was established.

On the third day of normal temperature the dosage of aureomycin and sulphadiazine was reduced by half, and was continued at this level until one week of freedom from headache, sweats, and fever had elapsed. The patient was discharged from hospital on Feb. 15, six weeks after the onset of the known febrile state. He has not relapsed.

During the last week of March, a record of the patient's evening temperature showed him to be afebrile; a blood culture was negative; and his blood-serum agglutinated a standard suspension of *Br. abortus* at a titre of 1/250 (highest When last heard of, on April 4, he was well and doing a full day's work.

Thus in this case aureomycin alone caused no clinical improvement; but aureomycin and sulphadiazine together were successful.

I wish to thank Dr. L. M. Dowsett, director of the Emergency Public Health Laboratory, Norwich, for the bacteriological work, which indicated the diagnosis in this case

Isolation Hospital, Dereham, Norfolk. A. J. O'CONNOR.

SOCIAL PHILOSOPHY OF WILFRED TROTTER

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> "The method I have used is frankly speculative, and I make no apology for it because the facts are open to the observation of all and available for confirmation or disproof. I have tried to point out a way; I have tried not to exhort or persuade to the use of it—these are matters outside my province."

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Braziers Park School of
Integrative Social Research,
Ipsden, Oxon.
J. NORMAN GLAISTER
Director of Studies.

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[5] Findlay, L. *Ibid*, 1946, 21, 195. Mackay, H. M. M. *Ibid*, 1933, 8, 221.

[6] Mollison, P. L., Cutbush, M. *Lancet*, 1948, ii, 522.

[1] Eisele, C. W., McCullough, N. B. *J. Amer. med. Ass.* 1947, 135, 1053.

[2] Wilson, A. Medical Annual, 1949. Bristol; p. 15.

UMIN-ACTIVE ANTISERA IN RHESUS TYPING

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The use of albumin-agglutinating anti-D sera should be encouraged, but not their haphazard and uncontrolled use. In this region saline and albumin-agglutinating anti-D sera are issued to hospitals under certain conditions:

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4. When these conditions have been fulfilled (or are said to have been fulfilled) selected absorbed specific anti-D sera are issued, their specificity having previously been checked by the Blood Group Reference Laboratory, Lister Institute. The sera are of two varieties, selected for their suitability for use with two techniques: (*a*) saline anti-D for use with the standard tube technique, for planned transfusions; and (*b*) albumin anti-D for use with the Diamond technique, for emergency transfusions. They are not guaranteed to be suitable for other techniques.

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6. Cross-matching difficulties and anomalous results should be referred to the regional transfusion centre.

The conditions laid down are not always fulfilled, and there are many difficulties in carrying out the scheme though these are gradually being overcome.

It is hoped that this letter will help pathologists who wish to initiate or extend rhesus investigations in their hospitals to appreciate that some thought and care in planning will be required, and that a certain amount of training or special experience in this type of work would not be a disadvantage.

Regional Blood Transfusion Centre,
Sheffield.

R. H. MALONE.

T.E.A.B. IN RHEUMATOID ARTHRITIS

SIR,—As an outcome of Dr. Howell's report of Feb. 4, and the subsequent letter from Dr. Heyman and his colleagues in your issue of April 1, I should like to state briefly my experiences with tetraethylammonium bromide (T.E.A.B.) in 35 cases of rheumatoid arthritis treated in the medical department of this institute.

Our reason for trying T.E.A.B. was the well-known fact that even in the more severe cases sympathectomy [1] and blockade of the sympathetic ganglia [2] have given a certain amount of relief. We, at this institute, are at present performing a systematic investigation into the reaction of the autonomic nervous system in patients with rheumatoid arthritis; and the experiences with T.E.A.B. have formed a link in these investigations of which a fuller account will be published shortly.

As a test for the function of the autonomic nervous system we use the reaction of the arteriovenous anastomoses to indirect heating. This method, described by Christiansen, Fog, and Vanggård [3] is a modification of the methods of Gibbon and Landis [4] and Uprus, Gaylor, and Carmichael.[5] By this method we found, in cases of rheumatoid arthritis, such deviations from normal in the autonomic reactions that we were prompted to see what effect T.E.A.B. would have.

We used as controls 15 medical students who were not suffering from vascular disease or rheumatoid arthritis.

After cooling the hands until the skin-temperature (measured at the pulp of the 3rd finger by thermo-elements of copper-constantan) was about 16°C, 5 ml. of 10% T.E.A.B. ('Etylon') was given intravenously during $^1/_2$ min. After 2–3 min. the skin-temperature of the finger had risen on average by 13·2°C (max. 17°C, min. 8°C). At the same time all subjects had paræsthesiæ, shivering, ptosis, paresis of accommodation, and fall of blood-pressure (by about 20%). Normal physiological conditions were re-established in 30 min.

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5. Uprus, V., Gaylor, J., Carmichael, E. A. *Clin. Sci.* 1936, 2, 301.

of the jaundice, but this fall continues for a considerable period after the jaundice has disappeared.[5] The two conditions are for a time coincidental but there is no direct causal relation between them.

The same state of affairs appears to me to exist in erythroblastosis fœtalis. There are three processes at work: (1) the anæmia due to the destruction of the sensitised erythrocytes; (2) vascular damage of uncertain type and unknown cause; and (3) hepatic dysfunction, also of doubtful origin.

The claim that replacement transfusion will reduce the incidence of kernicterus seems thus to be based on faulty reasoning. It may do so, but the matter certainly requires proof; and I suggest that a controlled experiment such as that suggested by Mollison and Cutbush[6] is very definitely needed. Replacement transfusion is not entirely devoid of risk. I know of two cases in which sudden death, apparently due to acute heart-failure, occurred while the replacement was being effected. The risk, whatever its magnitude, may well be worth taking if it can be shown that the procedure does reduce the incidence of kernicterus. However, I feel that at the moment there are too many enthusiasts and not enough critical observers at work in this field.

Derbyshire Hospital for Sick Children, Derby. DUNCAN MACAULAY.

AUREOMYCIN AND SULPHADIAZINE IN ABORTUS FEVER

SIR,—In the following case of abortus fever 'Aureomycin' and sulphadiazine were administered together:

The patient was a farmer, aged 45, who, with a sore on his thumb and abrasions on both hands, had attempted to deliver a cow of a stillborn calf. Unable to do so, he called in a veterinary surgeon, who diagnosed ruptured uterus; the calf was dead. Two weeks later the farmer began to feel out of sorts; he was easily fatigued and irritable, and had occasional headaches; and on Jan. 8, having become feverish, he had to take to his bed. His own doctor first saw him on Jan. 11, when the chief symptoms were headache, aching limbs, heavy sweats, and constipation. Examination did not reveal any signs other than fever (100°F); pulse-rate 90 per min. During the next few days, no additional signs developed, and the cause of the fever was not suspected, since no history had been elicited regarding this man's obstetric performance (which had included an intra-uterine examination).

A Widal agglutination test on Jan. 15 was completely negative. A white blood-cell count showed leucopenia with pronounced increase in mononuclear cells (white cells 6500 per c.mm.; polymorphs 45%, lymphocytes 20%, monocytes 35%).

Since the clinical condition did not improve, and the pyrexia, tachycardia, sweats, and headache continued, a second Widal test was made on Jan. 19; and a standard suspension of *Brucella abortus* was agglutinated at a titre of 1/1280.

On admission to hospital on the 16th day of the known febrile state (Jan. 22) and six weeks after the infection was contracted, this patient's general condition was good, considering the duration of the fever. Pulse-rate 120 per min.; temperature 100°F. He was somewhat disorientated and could give no clear account of his illness. The abdomen showed moderate generalised distension; the spleen was not palpable. Headache, of varying intensity, was referred to the frontal region, and was usually most severe in the early evening. After a drenching sweat in the late evening of each day, the headache became less intense and the fever abated, rising again gradually to 100°F about 6 P.M. An enema on the morning after admission relieved the abdominal distension and produced a formed fæcal mass which had a heavy putrid odour resembling hydrogen sulphide gas.

Bacteriological examination of this stool and of three consecutive specimens of urine revealed no *Br. abortus*; blood-culture was also negative. A rising agglutination titre was found in consecutive specimens of blood-serum and on Feb. 13 the titre was positive at 1/5120.

The newer antibiotics have been used in the treatment of abortus fever, and streptomycin combined with sulphadiazine produced a cure in a severe case.[1] Aure therapy is reported to have proved successful in three I decided to use aureomycin because it could be giv capsules by mouth.

Oral therapy with aureomycin hydrochloride in a d of 500 mg. six-hourly was commenced at 10 P.M. on Jan. No signs of intolerance were observed, and at the end twenty-four hours the dose was increased to 1 g. six- This dosage was continued for four days, but no sign clinical improvement, other than a slight reduction in pulse-rate, were apparent. Headache, fever, and continued. On the evening of Jan. 29, sulphadiazine t —2 g. initially followed by 1 g. four-hourly—was comme Within thirty-six hours the patient's condition imp greatly. The temperature fell to normal; the pulse was reduced; headache was less intense; and the sto obtained after an enema was not offensive in odour. Wi seventy-two hours the pulse-rate decreased further, headache and sweating ceased, and an uneventful convalescence was established.

On the third day of normal temperature the dosage of aureomycin and sulphadiazine was reduced by half, and was continued at this level until one week of freedom from headache, sweats, and fever had elapsed. The patient was discharged from hospital on Feb. 15, six weeks after the onset of the known febrile state. He has not relapsed.

During the last week of March, a record of the patient's evening temperature showed him to be afebrile; a blood culture was negative; and his blood-serum agglutinated a standard suspension of *Br. abortus* at a titre of 1/250 (highest) When last heard of, on April 4, he was well and doing a fu day's work.

Thus in this case aureomycin alone caused no clinical improvement; but aureomycin and sulphadiazine together were successful.

I wish to thank Dr. L. M. Dowsett, director of the Emergency Public Health Laboratory, Norwich, for the bacteriological work, which indicated the diagnosis in this case.

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In patients with rheumatoid arthritis T.E.A.B. gave very different results.

Of 35 patients, 4 had no rise of skin-temperature at all; 12 had a rise of 1–3°C; 2 a rise of more than 15°C; and the remainder a rise of 5–15°C. The average rise was 6·5°C in these patients, compared with 13·2°C in the control group.

10 patients were treated for three weeks with T.E.A.B. in doses of 5 ml. intramuscularly in the morning and at noon on every other day. The dosage was arranged in this way because we found that patients often collapsed up to 6 hours after intramuscular injection of T.E.A.B.; so we had to keep them in bed for 6 hours or more after the injection. This, of course, was undesirable because of the rheumatoid arthritis, so we gave two injections on one day with a subsequent free day. During this period the only other treatment was a little massage and movements.

Of the 10 patients, 7 felt no relief at all; in 3 we found objectively less swelling of fingers, elbows, and knees, and less stiffness, but the results were in no way as good as those seen after physiotherapy, electrotherapy, and especially injection of gold sodium thiosulphate.

This conclusion was reached by clinical estimation, and it must be judged in this light. However, after three weeks' treatment with T.E.A.B. all 10 patients reacted in exactly the same way to indirect heating as before the blockade. Consequently the relief described can hardly have resulted from anything but improved peripheral circulation. As long as this is maintained, it will restrict swelling of periarticular tissues and improve joint function; but improvement by this mechanism is greater and longer continued when obtained by the common physical treatment.

Finsen Institute,
Copenhagen.

ANTON FLØYSTRUP.

STREPTOMYCIN IN ACUTE MILIARY TUBERCULOSIS

SIR,—I should like to state that, so far as choroidal tubercles are concerned, our experience in Dublin confirms that reported on May 20 by Professor Illingworth and Dr. Lorber from the department of child health, University of Sheffield. In this hospital we, too, have found no choroidal tubercles among some 100 cases of uncomplicated tuberculous meningitis seen since October, 1947. In the few cases of tuberculous meningitis where choroidal tubercles have been found, miliary tuberculosis has been present as well. *Because of this, I have taught* my students during the last two years that choroidal tubercles, while common in miliary tuberculosis, are not found in tuberculous meningitis without miliary tuberculosis.

House of Recovery and Fever Hospital,
Cork Street, Dublin.

C. J. MCSWEENEY.

ULCERATIVE COLITIS

SIR,—I was very interested in the two papers by Dr. Rice-Oxley and Dr. Truelove in your issues of April 1 and 8. Having seen a great number of cases of so-called ulcerative colitis during and since the war, I should like to call attention to the need to exclude the specific infections which may cause illnesses that may be clinically indistinguishable from it—bacillary dysentery, amœbic dysentery, and tuberculous colitis. In typical cases of ulcerative colitis I have found *Entamœba histolytica* present, and have come to the conclusion that the majority are in reality amœbic dysentery with secondary infections. A few illustrative cases can show this point:

A woman, aged 57, ill for many years, and diagnosed as having ulcerative colitis. Disorder recognised in 1946 after a contact—a girl, aged 6 years—had been taken ill with typical amœbic dysentery.

A man, aged 33, ill since 1930, having spent many months in hospital each year. *E. histolytica* found in 1947.

A woman, aged 49, ill since 1937 with "ulcerative colitis." Recognised in 1946 as amœbic dysentery; developed amœbic liver abscess in the same year.

Such cases should be treated with full doses of insoluble sulpha drugs, penicillin, and emetine bismuth iodide. I wholeheartedly agree with Professor Hardy, Mr. Dickson Wright, and others that for all practical purposes the psychological aspect of ulcerative colitis can be ignored.

London, W.1.

LEO RAU.

PROPHYLACTIC NEOSTIGMINE IN ELECTRO-CONVULSIVE TREATMENT

SIR,—In impending respiratory paralysis after curare and electrically induced convulsions, intravenous neostigmine is an effective and indispensable antidote. Up to now, however, routine injections of neostigmine do not seem to have been used prophylactically. This may be partly because of the difficulty of giving intravenous injections immediately after a convulsion, when motor excitement is still present.

There are good reasons for giving a prophylactic injection of neostigmine in every case, irrespective of the degree of curarisation. Even after apparently moderate curarisation a convulsion may be followed by inhibition of respiratory movements and even by respiratory paralysis. Immediately after a convulsion it is at first impossible to differentiate between respiratory paralysis and reflex asphyxia. Since several minutes may elapse before intravenous neostigmine takes effect, delay here is a serious disadvantage.

The following method of giving neostigmine and curare before inducing a convulsion is comparatively free from risk:

> The curare having been injected into a vein in the usual way, the needle is left in position while another syringe, containing neostigmine 1 mg., is attached to it. A pneumatic bandage (such as is used in estimating blood-pressure) previously placed proximal to the site of injection is now inflated to a pressure exceeding arterial blood-pressure—e.g., 250 mm. Hg.
>
> The neostigmine is now injected into the vein, and the needle is removed without the bandage being deflated. Slight pressure on the site of injection and later the application of surgical tape prevent hæmorrhage from the vein. As soon as a major convulsion starts, the bandage is promptly deflated. The technique is quite simple and hardly increases the treatment time.

The latent period before the action of neostigmine is appreciable is $^{1}/_{2}$–$1^{1}/_{2}$ minutes from the end of the convulsion, when the restricted movements of the thorax will be seen to become completely free in the course of 10–15 seconds. The diarrhœa and nausea often associated with neostigmine therapy and occurring during the two hours immediately after the treatment may in most cases be effectively prevented with 0·5–1 mg. of atropine sulphate.

The peripheral circulation is apt to be deficient both during and after a major convulsion with, *inter alia*, a rise in venous pressure.[1,2] To investigate whether this might seriously delay the effect of the injected neostigmine I have carried out circulation tests with fluorescein; 2 ml. of 10% sodium fluorescein was added to the neostigmine. The pneumatic bandage was deflated at the onset of a major fit, and the fluorescein could be shown with Wood's glass in the conjunctivæ in every one of 30 patients before the end of the attack.

At my suggestion treatment since August, 1948, at the department of psychiatry, South Hospital, Stockholm, has been along the following lines.

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1. Altschule, M. D., Tillotson, K. J. *Arch. Neurol. Psychiat.* 1948, 59, 469.
2. Silfverskiöld, B. P., Amark, C. *Acta med. scand.* 1943, 113, 191.

l patients treated with electroconvulsions and curare receive ine intravenous neostigmine. No patient is given more a 1 ml. of *d*-tubocurarine (Squibb) per 20 kg. of body-ght. For the first treatment all patients receive this dose 0·5 ml. With this dosage no appreciable decrease is as le noted in the force of muscular contractions during a vulsion, but in ergograph test without E.C.T. the curare ct is clearly demonstrable.[3]

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SIR,—I should like to state that, so far as choroidal tubercles are concerned, our experience in Dublin confirms that reported on May 20 by Professor Illingworth and Dr. Lorber from the department of child health, University of Sheffield. In this hospital we, too, have found no choroidal tubercles among some 100 cases of uncomplicated tuberculous meningitis seen since October, 1947. In the few cases of tuberculous meningitis where choroidal tubercles have been found, miliary tuberculosis has been present as well. Because of this, I have taught my students during the last two years that choroidal tubercles, while common in miliary tuberculosis, are not found in tuberculous meningitis without miliary tuberculosis.

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Such cases should be treated with full doses of ins sulpha drugs, penicillin, and emetine bismuth i I wholeheartedly agree with Professor Hurst, Dickson Wright, and others that for all practical the psychological aspect of ulcerative colitis can ignored.

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PROPHYLACTIC NEOSTIGMINE IN ELECTRO-CONVULSIVE TREATMENT

SIR,—In impending respiratory paralysis after curare and electrically induced convulsions, intravenous neostigmine is an effective and indispensable antidote. Up to now, however, routine injections of neostigmine do not seem to have been used prophylactically. This may be partly because of the difficulty of giving intravenous injections immediately after a convulsion, when motor excitement is still present.

There are good reasons for giving a prophylactic injection of neostigmine in every case, irrespective of the degree of curarisation. Even after apparently moderate curarisation a convulsion may be followed by inhibition of respiratory movements and even by respiratory paralysis. Immediately after a convulsion it is at first impossible to differentiate between respiratory paralysis and reflex asphyxia. Since several minutes may elapse before intravenous neostigmine takes effect, delay here is a serious disadvantage.

The following method of giving neostigmine and curare before inducing a convulsion is comparatively free from risk:

The curare having been injected into a vein in the usual way, the needle is left in position while another syringe, containing neostigmine 1 mg., is attached to it. A pneumatic bandage (such as is used in estimating blood-pressure) previously placed proximal to the site of injection is now inflated to a pressure exceeding arterial blood-pressure—e.g., 250 mm. Hg.

The neostigmine is now injected into the vein and the needle is removed without the bandage being deflated. Slight pressure on the site of injection and later the application of surgical tape prevent hæmorrhage from the vein. As soon as a major convulsion starts, the bandage is promptly deflated. The technique is quite simple and hardly increases the treatment time.

The latent period before the action of neostigmine is appreciable is 1/2–1 1/2 minutes from the end of the convulsion, when the restricted movements of the thorax will be seen to become completely free in the course of 10–15 seconds. The diarrhœa and nausea often associated with neostigmine therapy and occurring during the two hours immediately after the treatment may in most cases be effectively prevented with 0·5–1 mg. of atropine sulphate.

The peripheral circulation is apt to be deficient both during and after a major convulsion with, inter alia, a rise in venous pressure.[1,2] To investigate whether this might seriously delay the effect of the injected neostigmine I have carried out circulation tests with fluorescein; 2 ml. of 10% sodium fluorescein was added to the neostigmine. The pneumatic bandage was deflated at the onset of a major fit, and the fluorescein could be shown with Wood's glass in the conjunctiva in every one of 30 patients before the end of the attack.

At my suggestion treatment since August, 1948, in the department of psychiatry, South Hospital, Stockholm, has been along the following lines.

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National Assistance

In answer to a question Dr. SUMMERSKILL stated that at the end of April, 1950, regular weekly grants of National Assistance were being paid to 1,192,000 persons.

Sanatorium Waiting-lists

In answer to a question, Mr. A. BEVAN stated that approximately 11,000 people suffering from tuberculosis were waiting for beds in sanatoriums.

Under-doctored Areas

Mr. SOMERVILLE HASTINGS asked the Minister whether it was necessary for a doctor to provide himself with a surgery as a first preliminary to submitting his name for inclusion in the medical list as a principal in an under-doctored area.—Mr. BEVAN replied : It is not necessary for a doctor to have a surgery before he applies for inclusion, but the Medical Practices Committee may make the granting of an application conditional upon his acquiring one within a specified time.

Cost of Drugs

Mr. HASTINGS asked the Minister what was the average annual cost of drugs per insured person under the National

Health Insurance Act before July 5, 1948; and how this compared with that of drugs ordered by general practitioners for their patients under the National Health Service Act.—Mr. BEVAN replied: The average annual cost of providing pharmaceutical services per insured person in the 12 months ended July 5, 1948, was 6*s.* 8*d.* In the 12 months ended March 31, 1950, the average cost per head of the civilian population of providing such services was 14*s.* 7*d.*

Staff Attendance Book

Surgeon Lieut.-Commander R. F. B. BENNETT asked the Minister under what authority a book was to be placed in the Maudsley Hospital, S.E.5; for the recording of the times of attendance of full-time medical staff.—Mr. BEVAN replied: I understand that the board of governors have under consideration arrangements for recording not the times but the fact of attendance. The matter is one within the discretion of the board of governors.

Notification of German Measles

Sir W. WAKEFIELD asked the Minister what steps had been taken to publicise the dangers of german measles in early pregnancy, and the need to notify this illness in order to minimise deafness at birth in children.—Mr. BEVAN: The evidence of danger so far available is indefinite, and an inquiry on a national basis is about to be made.

Obituary

LEONARD GRAHAM BROWN

M.C., M.A., D.M. OXFD, F.R.C.S.

Mr. L. Graham Brown, senior surgeon to the ear, nose, and throat department of Charing Cross Hospital, died in London on May 23.

He was born at Brisbane in 1888, the second son of the late John Graham Brown, who came of an Ulster family. Already in his school days at Brisbane Grammar School he was an all-round athlete. Besides rowing, swimming, running, and shooting he was junior champion gymnast of Queensland in 1905, and in 1908 he played rugby for Queensland against an Anglo-Welsh team led by A. F. Harding. Soon after this, with a Rhodes scholarship, he began his studies at Balliol College, Oxford. In 1910 he was awarded his rugby blue and in 1912 he captained the Oxford XV. As a forward he played eighteen times for England between 1911 and 1922, when he was captain. While at Oxford he also rowed for Balliol.

[Lafayette

In 1912 he took his B.A. with honours in natural science, and three years later he qualified from the London Hospital. During the 1914–18 war he served with the R.A.M.C., rising to the rank of lieut.-colonel. In 1918 he was awarded the M.C. and mentioned in despatches. After demobilisation he took his B.M. in 1919, his D.M. the following year, and the F.R.C.S. in 1923. He held an aural registrarship at the London Hospital before he settled in consultant practice. In due course he was appointed to the staff of Charing Cross Hospital and of the North Middlesex Hospital. He examined for the D.L.O. for the Royal College of Surgeons. For his presidential address to the section of otology of the Royal Society of Medicine in 1944 he chose as his subject Twenty-Five Years' Practice in Mastoid Surgery, and he also contributed the chapter on diseases of the ear to *Hutchison's Index of Treatment* and a monograph on inflammations of the external ear and external auditory meatus to *Nelson's Medicine of the Ear.*

After ten years' service as vice-president of the Rugby Football Union he was elected president in 1948 and he held office till 1949. During the late war he was medical superintendent of Charing Cross Hospital.

E. D. D. D. writes: "Known as Bruno to a large circle of his friends, he was the best of colleagues, calm, courteous, never angry; and he accepted any adv with a smile. His imperturbable, equable temperam with a complete absence of thrust, and perhaps fact that he put on some weight after he gave 'rugger,' was interpreted by a few as apathy. whatever Bruno undertook he did well and ac success in his own quiet way. His mastoid surgery *conservative and original, easily and skilfully* perfo He excelled at his successful enucleation of tonsils children by the reverse guillotine. His dexterity celerity in this operation, which so many find to learn, was remarkable. A day's golf, or ski-ing in crystal-clear Alps, with Bruno was a joy and a de He was a natural leader, inspiring confidence, and men followed him. As a colleague and loyal friend was easy to obtain his complete understanding cordial collaboration. He was a great gentleman who be remembered for many years."

In 1915 Mr. Graham Brown married Margaret Jane Menzies of Edinburgh, and they had two daughters.

EDGAR WILLIAM TODD

M.A., M.D. CAMB., D.P.H.

Dr. E. W. Todd, who died in Jamaica on May 11, at the age of 60, had been acting director of the London County Council antitoxin establishment at Sutton until he went to the United States in 1946.

From King's School, Canterbury, he went to Trinity College, Cambridge, and then to St. Thomas's Hospital graduating B.A. in 1911. After doing Red Cross work in the Balkan War he took the Conjoint diploma in 1915; and he served in the Royal Navy as temporary surgeon-lieutenant until 1919, spending much time in Arctic waters. He obtained the D.P.H. of Durham University in 1919, and he graduated M.B. the *following* year. In 1923 he proceeded to his M.D. degree. After holding house-appointments at the Norwich and Norfolk General Hospital, St. Thomas's Hospital, and St. Bartholomew's Hospital, he began research work in the inoculation department at St. Mary's Hospital. The stimulus of contact with Wright, Fleming, Freeman, Colebrook, Fry, Hare, and their colleagues remained with him and he spent the rest of his life on bacteriological research.

In 1927 he went to the Rockefeller Institute with a medical fellowship. Here again the stimulus of laboratory colleagues, especially Mrs. Lancefield, Avery, and Swift, proved lasting, and Todd's interest from that time wavered little from hæmolytic streptococcal infections, in particular rheumatic fever. When, in 1930, he was appointed bacteriologist to the L.C.C. antitoxin establishment, then situated at the Belmont laboratories, Todd settled down to long days of work at the laboratory bench, barely finding time to eat sandwiches at midday. During this period the two hæmolysins produced in hæmolytic streptococcus cultures, one oxygen-labile and the other oxygen-stable, were characterised and the titration of antistreptolysin in patients' blood-sera was developed as an aid to the diagnosis of streptococcal infections, particularly in rheumatic fever.

When the new laboratories at Carshalton were completed, and the director, *Dr. R. G. White,* retired, resources had to be devoted to war-time requirements. Todd found it increasingly difficult to give his whole time to laboratory work, and at the end of the war he returned to New York to spend a year at the Rockefeller Institute. When Dr. Alvin Coburn started the Rheumatic Fever Research Institute in Chicago, Todd joined him; but while on holiday symptoms of his *illness* appeared and he returned with his wife to Jamaica, where he remained, until his death, except for a brief visit to the U.S.A. for medical treatment.

L. F. H. writes: "Edgar Todd had a single-minded devotion to research and few recreations except walking and peaceful weekends at a tiny cottage at Newdigate in Surrey. Although he was a member of the Pathological Society, of the section of pathology of the Royal Society of Medicine, and of the Medical Research Club, he could not be persuaded to read papers in public. He was my colleague for 16 years and I can only endorse the regret of *Sir Allen Daley,* who writes, 'It is a great tragedy that he has been cut off at the height of his career.'"

DR. B. A. PETERS

M. writes: "From his school days Dr. Peters was nensely interested in chemistry, and he carried this erest with him throughout his life. In consequence applied a wealth of biochemical knowledge to medical blems and he wrote many articles from a biochemical nt of view. His knowledge of this specialty was far d away above the head of the average medical man d often, in his enthusiasm, Dr. Peters assumed owledge in others which did not necessarily exist. r many years he was a member of the Biochemical ciety. Living during the greatest period of advance the treatment of infectious diseases, Dr. Peters proached all the problems with scientific care, and, as he s always willing to apply experimental tests, he wrote any useful papers on such subjects as diphtheria, arlet fever, gastro-enteritis, erysipelas, and immunisaon, on which he held sound practical views.

"As a man, Dr. Peters was consistently upright. friend of children, he took the greatest pleasure in eir company; with adults he tended to be shy, but s friendship, once gained, was something to depend n and to be valued. He belonged to the race of great inical teachers, and his knowledge of humanity, medine, biochemistry, birds, and flowers can ill be spared. r. Peters had become an institution, so benevolent and ise, that it is unbelievable that his advice is no longer vailable."

We regret to announce the death of Prof. FRANZ OLHARD, the distinguished clinical nephrologist, of rankfort-on-Maine.

Appointments

BRAND, T. A., M.D. Brist., D.C.H.: consultant pædiatrician, Newport and East Monmouthshire and North Monmouthshire hospital groups.

COUCH, A. H. C., M.D. Lond., M.R.C.P., D.C.H.: asst. chest physician (senior registrar), East Suffolk and Ipswich area.

RICHARDSON, H. J., L.R.C.P.E., D.A.: consultant anæsthetist, Peterborough area.

ROSS, N. A., M.B. Lond., D.P.H.: consultant venereologist, Stamford, Peterborough, and King's-Lynn area.

WALKER, A. L., M.A., M.B. Camb., F.R.C.S., F.R.C.O.G.: consultant gynæcological surgeon, Wembley Hospital.

Appointed Factory Doctors:

ELLIS, E. A., B.A., M.B. Dubl.: Great Yarmouth district.

HARDING, G. I., M.R.C.S., D.P.H.: Staines district.

MILLER, H. D., M.B. Glasg.: Jarrow district.

ROSS, W. C., L.R.C.P.E.: Tain district.

Births, Marriages, and Deaths

BIRTHS

CANTRELL.—On May 19, the wife of Dr. G. L. Cantrell—a daughter.

HORDER.—On May 16, in London, the wife of Dr. John Horder—a son.

JACKSON.—On May 22, to Dr. Shirley Jackson (née Williams), wife of Dr. R. H. Jackson—a son.

JOHNSON.—On May 22, in London, the wife of Dr. T. E. Johnson—a daughter.

RAMPLING.—On May 24, in Manchester, the wife of Dr. A. E. Rampling—a son.

STOTT.—On May 15, at Nakuru, Kenya, the wife of Dr. Hugh Stott—a daughter.

TURTLE.—On May 19, the wife of Dr. J. B. Turtle—a son.

MARRIAGES

BROOK—SENIOR.—On May 18, in Manchester, Alexis Brook, M.B., to Maureen Senior.

REES—TARVER.—On May 20, at Wing, Bucks, Harland Rees, F.R.C.S., to Helen Marie Tarver.

DEATHS

BROWN.—On May 23, in London, Leonard Graham Brown, M.C., M.A., D.M. Oxfd, F.R.C.S., aged 62.

BROWN.—On May 21, in Edinburgh, Donald Thomas Alexander Brown, M.S. Lond., F.R.C.S.E., aged 28.

EEMAN.—In February, at Amersham, Peter Derek Eeman, M.B. Camb.

PADDLE.—On May 24, at Botleys Park, Chertsey, Kenneth Cecil Lawrence Paddle, M.C., M.R.C.S., D.P.M.

PATERSON.—On May 23, at Ipswich, Arthur William Paterson, M.B. Aberd., aged 79.

SNOWDEN.—On May 20, at Bournemouth, Arthur de Winton Snowden, C.B.E., M.A., M.D. Camb.

TOWNLEY.—On May 24, in Manchester, Herbert Townley, M.B. Manc.

WALLA.—On May 23, in London, Sohrab Hodi Walla, L.R.C.P.E., D.P.H., aged 65.

WELPLY.—On May 21, at Welwyn Garden City, Gilman Chinnery Welply, M.R.C.S., aged 41.

Notes and News

PROPHYLACTIC INOCULATION AND POLIOMYELITIS

AT a meeting on May 4, the London Medical Service Committee considered a parent's complaint that a practitioner had been negligent in inoculating an infant boy who was later found to have poliomyelitis. The complainant said that on Dec. 6, 1949, he took his child to this doctor for inoculation against diphtheria. The doctor gave the injection, stating that immunisation against whooping-cough was also included. On Dec. 24, the child appeared to be unwell. He later began to develop the symptoms of a cold, together with vomiting and diarrhœa; and his parents took him to the doctor, who expressed the opinion that the boy was suffering from bronchitis and prescribed medicine. On Jan. 6, the parents took the baby for the second injection against diphtheria. They informed the doctor that the child still had the symptoms of a cold, and inquired whether it would be in order for the injection to be given. The practitioner replied that it would; and he gave the injection into the boy's left buttock. The child continued to have diarrhœa and the symptoms of a cold; and he was attended a number of times by the practitioner and his assistant. On Jan. 23, the complainant, after consulting a textbook on child care, formed the opinion that the symptoms were consistent with poliomyelitis. That morning the practitioner's assistant visited the patient; later the assistant and the principal saw the patient together; and it was arranged for him to be admitted to hospital, where he was found to have poliomyelitis. From a conversation which he had with a doctor at the hospital, the complainant concluded that his son's condition resulted from the whooping-cough immunisation. Further inquiries strengthened this conviction; and he decided that the practitioner should have been warned by the child's symptoms after the first injection and should have refrained from administering the second. He contended that the practitioner's action in proceeding with the second injection amounted to negligence.

The practitioner testified that when giving both the first and the second injections he was satisfied that, although the child had a slight cold, there was nothing in his condition to contra-indicate their administration. He was confident that these injections had not caused the poliomyelitis.

The complainant informed the committee that the child was likely to be permanently affected in the left leg. The committee reported to the executive council that "his understandably intense feeling on the subject has led him to make inquiries into the technical aspects of immunisation, and we found on questioning him that he has obtained advice from an organisation which is opposed to vaccination and like treatment and has accordingly formed views which are not in conformity with the body of medical opinion." The committee was satisfied that the doctor had exercised due care and attention.

University of Oxford

The Osler memorial medal has been awarded to Sir Ernest Kennaway, D.M., F.R.S., honorary fellow of New College.

University of London

The governing body of the British Postgraduate Medical Federation has awarded postgraduate travelling fellowships for 1950–51, tenable for one year, to: G. L. W. Bonney, M.S., F.R.C.S., of the Institute of Orthopædics (orthopædic surgery, Manchester and Scandinavia); P. J. Hare, M.B., M.R.C.P., of University College Hospital (dermatology, France and Switzerland); H. O. Jones, M.S., F.R.C.S., of King's College Hospital (thoracic surgery, Leeds and Scandinavia); J. S. Pegum, M.B., M.R.C.P., of Guy's Hospital (dermatology, France and Switzerland); D. J. Robertson, B.S., F.R.C.S., of St. Bartholomew's Hospital (vascular surgery, Edinburgh and Scandinavia).

University of Liverpool

At recent examinations for the D.T.M. & H., the following were successful:

B. O. Barry, T. Briceno-Maaz, L. H. Chandler, C-S. Chou, E. W. R. Fairley, D. E. Freeman, J. B. Henderson, L. H. Holroyd, A. W. Iljon, C-L. Lee, T. P. Niyogi, A. B. Raper, D. K. Sen, K. C. Trivedi, A. F. Tuboku-Metzger, C. E. M. Wenyon.

Dr. L. H. Holroyd has been recommended for the Milne medal in tropical medicine, and Dr. A. B. Raper for the Warrington Yorke medal in tropical hygiene.

Royal College of Physicians of London

On Tuesday and Thursday, June 20 and 22, at 5 P.M., Prof. J. H. Dible will deliver the Humphry Davy Rolleston lectures at the college, Pall Mall East, S.W.1. He is to speak on Degeneration, Necrosis, and Fibrosis in the Liver.

Royal College of Obstetricians and Gynæcologists

At a meeting of the college held on May 20, with Prof. Hilda Lloyd, the president, in the chair, the following were elected to the council:

Dugald Baird, Aberdeen, W. E. Barnie-Adshead, Birmingham, A. M. Claye, Leeds, Victor Lack, London, Gilbert Strachan, Cardiff, R. C. Thomas, Croydon (as representatives of the fellows); A. M. Sutherland, Glasgow, Stanley Way, Newcastle upon Tyne (as representatives of the members); W. A. G. Bauld, Montreal, Sir William Gilliatt, London, C. D. Read, London, B. H. Swift, Adelaide, Leslie Williams, London (coöpted for the ensuing year).

The following were admitted to the fellowship:

H. G. E. Arthure, Elinor F. E. Black, J. H. Boyd, Robert Everett, P. J. Ganner, Kathleen M. D. Harding, F. J. Haydon, K. A. K. Hudson, T. I. Hughes, B. L. Jeaffreson, R. W. Knowlton, Joyce Morgan, J. S. Quin, D. A. O'C. Quinlan, L. M. Snaith, G. R. Stoneham, Margaret Moore White.

The following were admitted to the membership:

J. A. Bentham, D. W. Briggs, H. McK. [illegible] Choul [illegible] Reginald Cutt [illegible] H. J. [illegible] Harper, W. F. I [illegible] Pullat [illegible] Love, Sarah-Macaskill, A. S. Majury, A. T. [illegible], J. G. Napier, F. P. Pigott, J. H. McK. Pinkerton, C. C. Pre[illegible] jannayagam, T. M. Roulston, J. H. Rout [illegible] inha, Zubaida Haji Yousof Sobani, W. A. S [illegible] George Winchester.

International Exhibition of Medical Photography

At 4 P.M., on Saturday, June 10, Sir Heneage Ogilvie will open this exhibition, which is being held by the medical group of the Royal Photographic Society, at 11, Chandos Street, London, W.1, from June 12 to 24. Opening hours are 10 A.M. to 5 P.M. (Wednesdays 10 A.M. to 8 P.M.).

Review of Maternity Benefits

The National Insurance Advisory Committee, under the chairmanship of Sir Will Spens, are reviewing the payments for maternity now made under the insurance scheme, and considering whether any improvements can be made in the allowances provided under the 1948 scheme without adding to the present liability of the National Insurance Fund for maternity. Organisations and persons who wish to submit representations should write to the secretary of the committee, 30, Euston Square, London, N.W.1, before Thursday, Aug. 31, 1950.

At present the National In[illegible]'s are: a maternity grant of £4 with an [illegible] £1 a week during the four weeks after th[illegible]; or, for women normally in employment, a maternity grant of £4 with a maternity allowance of 36s. a week starting six weeks before the week in which the baby is expected and continuing until six weeks after—that is, usually for 13 weeks (about £27 in all). The grant [illegible] are paid subject to contribution [illegible] ontributions may have been paid by [illegible] Payment of maternity allowance [illegible] ord of employment and credits for weeks of unemployment or sickness in the year before the allowance begins.

North-West Metropolitan Regional Hospital Board

At a meeting on May 16, the board considered what action should be taken in response to a recommendation by the local medical committee for the County of London that laboratory facilities be made directly available to general practitioners. The board agreed that:

1. Hospit[illegible]s be asked to state: (*a*) the hospitals th[illegible]ndertake pathological investigations for [illegible]. (*b*) the additional staff and accommodation that would be required at those hospitals which cannot at present undertake the work.

2. The service should cover only the simplest of tests, these to be determined *after consultation with the pathologist or his assistant.*

3. Since the Public Health Laboratory Service is also setting up a scheme whereby much bacteriological work could be done for general practitioners, some correlation between the two services should be made to prevent duplication.

The board was informed that a protest had been made against its decision to advertise the vacant post of pædiatrician at the Royal London Homœopathic Hospital without stating in the advertisement that it was necessary for candidates to hold a qualification in homœopathy (see *Lancet*, May 6, p. 888). The Ministry of Health had confirmed that an undertaking was given that the character of this hospital —if incorporated in the National Health Service—would not be changed; and the board decided to require candidates for the appointment to be members or fellows of the Faculty of Homœopathy.

Withdrawal from W.H.O.

Hungary has announced its intention to withdraw from World Health Organisation.

The Old Westminster Hospital

Demolition of the old Westminster Hospital, opposi Westminster Abbey, is now going ahead rapidly. The site, being cleared for the erection of the new Colonial Office. B for the war the old hospital would have been pulled do earlier; *during the war it was used as a hostel for Servicem*

The Child and His Environment

This has been chosen as the main subject for discu at the annual conference which the National Associa for Maternity and Child Welfare are holding at F House, Euston Road, London, N.W.1, from June 28 to The speakers will include Dr. Fraser Roberts, Dr. Eman Miller, Prof. R. S. Illingworth, Dr. John Bowlby, and D Dorothy Makepeace. Further particulars may be had fro the secretary of the association, 5, Tavistock Place, Lond W.C.1.

Nurses and Midwives Whitley Council

The joint public-health and midwives standing committe of the Nurses and Midwives Whitley Council have agre with the management side on new salary scales for publ health nurses and domiciliary nurses and midwives, in th light of the Industrial Court's recent award raising the salari of non-resident district nurses with district training from scale of £300–£405 to £340–£465. The grades covered b the new agreement include health and tuberculosis visitor school nurses, and district nurses and midwives. Detai will not be available immediately, but the new scales wi take effect from Feb. 1, 1949.

Diary of the Week

JUNE 4 TO 10

Monday, 5th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. Michael Kremer: Frontal Lobe Syndromes.
INSTITUTE OF OPHTHALMOLOGY, Judd Street, W.C.1
5.30 P.M. Dr. Macdonald Critchley: Problem of Awarene and Non-awareness of Visual Field Defects.

Tuesday, 6th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. Evan Jones: Hypertension.
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. F. S. Gorrill: Anatomy and Physiology of the Spleen. (Arnott demonstration.)
INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: Pigmentary Conditions of the Skin.
UNIVERSITY OF EDINBURGH
5 P.M. (University New Buildings, Teviot Place.) Mr. Daniel Bovet, D.SC. (Rome): The Discovery of the Antihistamines. (Cameron prize lecture.)

Wednesday, 7th

WEST LONDON HOSPITAL MEDICAL SCHOOL
8.30 P.M. (11, Chandos Street, W.1.) Sir James Learmonth: Surgery of the Sympathetic Nervous System. (Alex Simpson Smith lecture.)
INSTITUTE OF PSYCHIATRY, Maudsley Hospital, S.E.5
4.30 P.M. Dr. E. Stengel: Psychiatry lecture-demonstration.
INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. Miss K. Tansley, D.SC.: Electroretinography.
UNIVERSITY OF EDINBURGH
5 P.M. Prof. H. M. Evans (University of California): Hormones of the Anterior Hypophysis.

Thursday, 8th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Prof. N. B. Capon: Urinary Infections in Childhood.
UNIVERSITY OF LONDON
5.30 P.M. (King's College, Strand, W.C.2.) Prof. L. S. Ston (Yale University): Development of Normal and Abnorma Vision Observed in Animals with Transplanted Eyes.
INSTITUTE OF NEUROLOGY, National Hospital, Queen Square, W.C.1
5 P.M. Sir James Learmonth: Combined Neurovascular Lesion of the Extremities.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. H. Gordon: Lupus Erythematosus.
HONYMAN GILLESPIE LECTURE
5 P.M. (Edinburgh University New Buildings.) Dr. G. A. Grant Peterkin: Drug Rashes.

Friday, 9th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. E. N. Allott: Metabolism of Potassium.
INSTITUTE O[illegible]
5.30 P.M. [illegible] of Exudative Uveitis.
MAIDA VALE [illegible]
5 P.M. Dr [illegible] demonstration.

THE GENERAL PATHOLOGY OF VIRUS INFECTIONS*

F. M. BURNET
M.D.Melb., Hon. Sc.D.Camb., F.R.S.
DIRECTOR OF THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH; PROFESSOR OF EXPERIMENTAL MEDICINE IN THE UNIVERSITY OF MELBOURNE

THE general pathology of virus infection is clearly too vast a subject to be covered in a single lecture. I have chosen it because I feel that there is scope for the formulation of a simple framework of ideas which may make it easier to understand the situation in any particular virus disease. Rightly or wrongly I have the impression that many people have considerable difficulty in seeing any common features in the pathology or immunology of measles, influenza, and herpes simplex—to take three diseases familiar to everyone. From these or other examples of human virus infections one can see diseases of short or long incubation period, some that confer lifelong subsequent immunity, some that persist like trachoma or recur from within like herpes simplex, and some that show short-lasting immunity like the respiratory infections. My task is to look for the common factors, if any, within this multiform behaviour of human virus diseases.

There is no universally accepted definition of a virus; the one I prefer is that a virus is a parasitic micro-organism considerably smaller than most bacteria, which is capable of multiplication only within living susceptible host cells. This definition is elastic enough to allow one to include or exclude the rickettsiæ and psittacosis-type organisms as circumstances require! As they appear to be intermediates between bacteria and "true" viruses, one must expect to find it necessary to seek analogies sometimes in one group, sometimes in the other.

The time has passed, at least in the case of the animal viruses, when it was necessary to withhold the term organism from a virus. It is now some years since anyone has seriously spoken of viruses as non-living protein molecules. The crux of the definition is the limitation of virus growth to the interior of the susceptible cell. This restriction determines the general form of the techniques that must be used in experimental virology. Instead of the bacteriological medium in test-tube or petri dish we have the mouse brain or the cavities of the developing chick embryo as the standard substrates for virus multiplication in the laboratory. The restriction to intracellular growth also automatically determines the framework for our discussion of the general pathology of virus infection. Any typical virus disease—influenza, yellow fever, smallpox, or what not—is initiated in nature by a very small inoculum, perhaps involving in the first instance one or two cells only. If the disease develops, very many more cells are involved, symptoms appear, and the patient dies or recovers.

We can look at that process at two levels: (1) as it involves the individual cell; and (2) as it concerns the susceptible cells of the body as a whole.

1. At the microscopic (cellular) level we have to consider:

(*a*) The entry of virus into the cell.
(*b*) The process of intracellular multiplication.
(*c*) Liberation of virus and cell damage or disintegration.

2. At the macroscopic level we have:

(*d*) The process by which infection spreads from the site of initiation to the other susceptible cells.
(*e*) The process by which infection is overcome.

I shall necessarily have to treat each of these phases in summary and rather dogmatic fashion, but somehow I do not think that I shall leave any of you with the feeling that all is now understood about the pathology of virus infection. I shall be disappointed in fact if here and there I cannot pass over to you some of my own enthusiasm for the idea that in the study of virus action on cells and organisms we have one of the most potent tools for the advancement of fundamental biology. There is an enormous field to be explored within the living cell, and perhaps I could express my own attitude to virus research by saying that we start from clinical medicine—from the patient with influenza, smallpox, or herpes—and pass almost at once to the fundamental biological problems of reproduction, mutation, and survival, in their most generalised form. In the end we shall, I hope, return with ideas and techniques that are directly applicable to human benefit—or at least to the satisfaction of human desires.

Virus Entry into the Cell

To multiply within a cell, the infecting virus particle must pass through the cell surface into the interior. In very many instances this seems to present no difficulty. A wide range of cells, particularly those of mesenchymal origin, have the potential capacity to take small foreign particles into their substances. Many viruses too can multiply within a wide range of cell types including macrophages. At the present time it is reasonable to assume that for those viruses without very marked tissue specificity, and especially for those that are introduced into the body through a traumatised area, no specific mechanism for passage through the cell surface is necessary. Sometimes the trauma required is the bite of a mosquito, as in yellow fever; viruses like herpes simplex and lymphogranuloma venereum probably enter through slight abrasions of mucous surfaces. Such viruses will not be further discussed in this section, but I am by no means certain that a new approach in the future may not show that we are wrong in assuming that no special means exists by which the virus makes contact with and passes through the surface of cells particularly suitable for its multiplication. Biological phenomena have a habit of appearing simple until we find the appropriate tools to investigate them.

INTERACTIONS AT CELL SURFACE

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At the Walter and Eliza Hall Institute my colleagues and I have spent most of the last four or five years in work arising out of Hirst's discovery that influenza virus will agglutinate red cells of several species. Similar work has been going on elsewhere, and from the combined effort a fairly clear picture has emerged of the process by which this virus becomes attached to and enters the cells susceptible to its action—i.e., the cells lining the respiratory tract.

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* University of London lecture given on May 9.

Royal College of Physicians of London

On Tuesday and Thursday, June 20 and 22, at 5 P.M., Prof. J. H. Dible will deliver the Humphry Davy Rolleston lectures at the college, Pall Mall East, S.W.1. He is to speak on Degeneration, Necrosis, and Fibrosis in the Liver.

Royal College of Obstetricians and Gynæcologists

At a meeting of the college held on May 20, with Prof. Hilda Lloyd, the president, in the chair, the following were elected to the council:

Dugald Baird, Aberdeen, W. E. Barnie-Adshead, Birmingham, A. M. Claye, Leeds, Victor Lack, London, Gilbert Strachan, Cardiff, R. C. Thomas, Croydon (as representatives of the fellows); A. M. Sutherland, Glasgow, Stanley Way, Newcastle upon Tyne (as representatives of the members); W. A. G. Bauld, Montreal, Sir William Gilliatt, London, C. D. Read, London, B. H. Swift, Adelaide, Leslie Williams, London (coöpted for the ensuing year).

The following were admitted to the fellowship:

H. G. E. Arthure, Elinor F. E. Black, J. H. Boyd, Robert Everett, P. J. Ganner, Kathleen M. D. Harding, F. J. Hayden, K. A. K. Hudson, T. I. Hughes, B. L. Jeaffreson, R. W. Knowlton, Joyce Morgan, J. S. Quin, D. A. O'C. Quinlan, L. M. Snaith, G. R. Stoneham, Margaret Moore White.

The following were admitted to the membership:

J. A. Bentham, D. W. Briggs, H. McK. Carey, Florence J. G. Chouler, Robert Crawford, Reginald Cutts, M. S. Ellensweig, H. J. Fisher, Elizabeth M. Harper, W. F. Harper, J. S. Hesketh, Pullat Kalyanikutty, J. A. Love, Sarah Macaskill, A. S. Majury, A. T. Marshall, J. D. Martin, J. G. Napier, F. P. Pigott, J. H. McK. Pinkerton, C. C. Pretorius, Sangarapillai Rajanayagam, T. M. Roulston, J. H. Routledge, Aroon Chandra Sinha, Zubaida Haji Yousof Sobani, W. A. Souter, Alexander Starritt, George Winchester.

International Exhibition of Medical Photography

At 4 P.M., on Saturday, June 10, Sir Heneage Ogilvie will open this exhibition, which is being held by the medical group of the Royal Photographic Society, at 11, Chandos Street, London, W.1, from June 12 to 24. Opening hours are 10 A.M. to 5 P.M. (Wednesdays 10 A.M. to 8 P.M.).

Review of Maternity Benefits

The National Insurance Advisory Committee, under the chairmanship of Sir Will Spens, are reviewing the payments for maternity now made under the insurance scheme, and considering whether any improvements can be made in the allowances provided under the 1948 scheme without adding to the present liability of the National Insurance Fund for maternity. Organisations and persons who wish to submit representations should write to the secretary of the committee, 30, Euston Square, London, N.W.1, before Thursday, Aug. 31, 1950.

At present the National Insurance maternity benefits are: a maternity grant of £4 with an attendance allowance of £1 a week during the four weeks after the baby is born (£8 in all); or, for women normally in employment, a maternity grant of £4 with a maternity allowance of 36*s*. a week starting six weeks before the week in which the baby is expected and continuing until six weeks after—that is, usually for 13 weeks (about £27 in all). The grant and the attendance allowance are paid subject to contribution conditions. The qualifying contributions may have been paid by either the husband or wife. Payment of maternity allowance depends on the woman's record of employment and credits for weeks of unemployment or sickness in the year before the allowance begins.

North-West Metropolitan Regional Hospital Board

At a meeting on May 16, the board considered what action should be taken in response to a recommendation by the local medical committee for the County of London that laboratory facilities be made directly available to general practitioners. The board agreed that:

1. Hospital management committees be asked to state: (*a*) the hospitals that are willing and able to undertake pathological investigations for practitioners immediately; (*b*) the additional staff and accommodation that would be required at those hospitals which cannot at present undertake the work.

2. The service should cover only the simplest of tests, these to be determined after consultation with the pathologist or his assistant.

3. Since the Public Health Laboratory Service is also setting up a scheme whereby much bacteriological work could be done for general practitioners, some correlation between the two services should be made to prevent duplication.

The board was informed that a protest had been made against its decision to advertise the vacant post of pædiatrician at the Royal London Homœopathic Hospital without stating in the advertisement that it was necessary for candidates to hold a qualification in homœopathy (see *Lancet*, May 6, p. 888). The Ministry of Health had confirmed that an undertaking was given that the character of this hospital —if incorporated in the National Health Service—would not be changed; and the board decided to require candidates for the appointment to be members or fellows of the Faculty of Homœopathy.

Withdrawal from W.H.O.

Hungary has announced its intention to withdraw from World Health Organisation.

The Old Westminster Hospital

Demolition of the old Westminster Hospital, opposite Westminster Abbey, is now going ahead rapidly. The site being cleared for the erection of the new Colonial Office. But for the war the old hospital would have been pulled down earlier; during the war it was used as a hostel for Servicemen.

The Child and *His Environment*

This has been chosen as the main subject for di at the annual conference which the National Assoc for Maternity and Child Welfare are holding at F House, Euston Road, London, N.W.1, from June 28 to The speakers will include Dr. Fraser Roberts, Dr. Emanuel Miller, Prof. R. S. Illingworth, Dr. John Bowlby, and Dr. Dorothy Makepeace. Further particulars may be had from the secretary of the association, 5, Tavistock Place, London, W.C.1.

Nurses and Midwives Whitley Council

The joint public-health and midwives standing committee of the Nurses and Midwives Whitley Council have agreed with the management side on new salary scales for public health nurses and domiciliary nurses and midwives, in the light of the Industrial Court's recent award raising the salaries of non-resident district nurses with district training from a scale of £300–£405 to £340–£465. The grades covered by the new agreement include health and tuberculosis visitors, school nurses, and district nurses and midwives. Details will not be available immediately, but the new scales will take effect from Feb. 1, 1949.

Diary of the Week

JUNE 4 TO 10

Monday, 5th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. Michael Kremer: Frontal Lobe Syndromes.
INSTITUTE OF OPHTHALMOLOGY, Judd Street, W.C.1
5.30 P.M. Dr. Macdonald Critchley: Problem of Awareness and Non-awareness of Visual Field Defects.

Tuesday, 6th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. Evan Jones: Hypertension.
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. F. S. Gorrill: Anatomy and Physiology of the Spleen. (Arnott demonstration.)
INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: Pigmentary Conditions of the Skin.
UNIVERSITY OF EDINBURGH
5 P.M. (University New Buildings, Teviot Place.) Mr. Daniel Bovet, D.SC. (Rome): The Discovery of the Antihistamines. (Cameron prize lecture.)

Wednesday, 7th

WEST LONDON HOSPITAL MEDICAL SCHOOL
8.30 P.M. (11, Chandos Street, W.1.) Sir James Learmonth: Surgery of the Sympathetic Nervous System. (Alex Simpson Smith lecture.)
INSTITUTE OF PSYCHIATRY, Maudsley Hospital, S.E.5
4.30 P.M. Dr. E. Stengel: Psychiatry lecture-demonstration.
INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. Miss K. Tansley, D.SC.: Electroretinography.
UNIVERSITY OF EDINBURGH
5 P.M. Prof. H. M. Evans (University of California): Hormones of the Anterior Hypophysis.

Thursday, 8th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Prof. N. B. Capon: Urinary Infections in Childhood.
UNIVERSITY OF LONDON
5.30 P.M. (King's College, Strand, W.C.2.) Prof. L. S. Sto (Yale University): Development of Normal and Abnorm Vision Observed in Animals with Transplanted Eyes.
INSTITUTE OF NEUROLOGY, National Hospital, Queen Square, W.C
5 P.M. Sir James Learmonth: Combined Neurovascular Lesio of the Extremities.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. H. Gordon: Lupus Erythematosus.
HONYMAN GILLESPIE LECTURE
5 P.M. (Edinburgh University New Buildings.) Dr. G. Grant Peterkin: Drug Rashes.

Friday, 9th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. E. N. Allott: Metabolism of Potassium.
INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. Mr. F [illegible] of Exudative Uveiti
MAIDA VALE HOS
5 P.M. Dr. S. N [illegible] demonstration.

THE GENERAL PATHOLOGY OF VIRUS INFECTIONS *

F. M. BURNET

M.D.Melb., Hon. Sc.D.Camb., F.R.S.

RECTOR OF THE WALTER AND ELIZA HALL INSTITUTE OF EDICAL RESEARCH; PROFESSOR OF EXPERIMENTAL MEDICINE IN THE UNIVERSITY OF MELBOURNE

THE general pathology of virus infection is clearly so vast a subject to be covered in a single lecture. I ave chosen it because I feel that there is scope for the ormulation of a simple framework of ideas which may make it easier to understand the situation in any particular virus disease. Rightly or wrongly I have the mpression that many people have considerable difficulty n seeing any common features in the pathology or mmunology of measles, influenza, and herpes simplex—o take three diseases familiar to everyone. From these or other examples of human virus infections one can see diseases of short or long incubation period, some that confer lifelong subsequent immunity, some that persist like trachoma or recur from within like herpes simplex, and some that show short-lasting immunity like the respiratory infections. My task is to look for the common factors, if any, within this multiform behaviour of human virus diseases.

There is no universally accepted definition of a virus: the one I prefer is that a virus is a parasitic micro-organism considerably smaller than most bacteria, which is capable of multiplication only within living susceptible host cells. This definition is elastic enough to allow one to include or exclude the rickettsiæ and psittacosis-type organisms as circumstances require! As they appear to be intermediates between bacteria and "true" viruses, one must expect to find it necessary to seek analogies sometimes in one group, sometimes in the other.

The time has passed, at least in the case of the animal viruses, when it was necessary to withhold the term organism from a virus. It is now some years since anyone has seriously spoken of viruses as non-living protein molecules. The crux of the definition is the limitation of virus growth to the interior of the susceptible cell. This restriction determines the general form of the techniques that must be used in experimental virology. Instead of the bacteriological medium in test-tube or petri dish we have the mouse brain or the cavities of the developing chick embryo as the standard substrates for virus multiplication in the laboratory. The restriction to intracellular growth also automatically determines the framework for our discussion of the general pathology of virus infection. Any typical virus disease—influenza, yellow fever, smallpox, or what not—is initiated in nature by a very small inoculum, perhaps involving in the first instance one or two cells only. If the disease develops, very many more cells are involved, symptoms appear, and the patient dies or recovers.

We can look at that process at two levels: (1) as it involves the individual cell; and (2) as it concerns the susceptible cells of the body as a whole.

1. At the microscopic (cellular) level we have to consider:

(*a*) The entry of virus into the cell.
(*b*) The process of intracellular multiplication.
(*c*) Liberation of virus and cell damage or disintegration.

2. At the macroscopic level we have:

(*d*) The process by which infection spreads from the site of initiation to the other susceptible cells.
(*e*) The process by which infection is overcome.

I shall necessarily have to treat each of these phases in summary and rather dogmatic fashion, but somehow I do not think that I shall leave any of you with the feeling that all is now understood about the pathology of virus infection. I shall be disappointed in fact if here and there I cannot pass over to you some of my own enthusiasm for the idea that in the study of virus action on cells and organisms we have one of the most potent tools for the advancement of fundamental biology. There is an enormous field to be explored within the living cell, and perhaps I could express my own attitude to virus research by saying that we start from clinical medicine—from the patient with influenza, smallpox, or herpes—and pass almost at once to the fundamental biological problems of reproduction, mutation, and survival, in their most generalised form. In the end we shall, I hope, return with ideas and techniques that are directly applicable to human benefit—or at least to the satisfaction of human desires.

Virus Entry into the Cell

To multiply within a cell, the infecting virus particle must pass through the cell surface into the interior. In very many instances this seems to present no difficulty. A wide range of cells, particularly those of mesenchymal origin, have the potential capacity to take small foreign particles into their substances. Many viruses too can multiply within a wide range of cell types including macrophages. At the present time it is reasonable to assume that for those viruses without very marked tissue specificity, and especially for those that are introduced into the body through a traumatised area, no specific mechanism for passage through the cell surface is necessary. Sometimes the trauma required is the bite of a mosquito, as in yellow fever; viruses like herpes simplex and lymphogranuloma venereum probably enter through slight abrasions of mucous surfaces. Such viruses will not be further discussed in this section, but I am by no means certain that a new approach in the future may not show that we are wrong in assuming that no special means exists by which the virus makes contact with and passes through the surface of cells particularly suitable for its multiplication. Biological phenomena have a habit of appearing simple until we find the appropriate tools to investigate them.

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In 1941 Hirst discovered a most effective tool for the study of the interaction of influenza virus and the cell surface, in the form of the hæmagglutination reaction. Many years previously, however, work in which I myself played a part showed that bacterial viruses had also specific relationships with the surfaces of the bacteria they infected, and that methods could be devised for the study of these relationships. From work on these two groups of viruses what is really no more than a probable provisional generalisation can be made—namely, that, when a virus must invade and infect a cell through an intact surface exposed to the environment, a special mechanism for this purpose is usually demonstrable. So far the great bulk of investigation has been done with viruses of the influenza group, including mumps and Newcastle disease of fowls, and in this lecture I shall discuss only this group.

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* University of London lecture given on May 9.

The basic experiments are all due to Hirst (1942). He showed first that agglutination of red cells was associated with adsorption of the virus on to the cell surface. There is adequate evidence that agglutination is simply due to the fact that by adsorption of a virus particle to two adjacent cells a bridge between the two can be formed. When a sufficiency of these bridges form, the cells clump together and are deposited in the characteristic granular masses. Hirst's second finding was that if a mixture of virus and red cells is kept at 37°C with intermittent shaking, and the proportions of the virus free and bound to the cells respectively are estimated at suitable periods, a regular sequence of adsorption and elution is observed. The virus is first very rapidly and almost completely removed from the fluid; then after an hour or two it begins to reappear; and eventually it is present in virtually its original amount. Simultaneously the red cells have ceased to be agglutinated and if they are then collected, washed, and re-tested with fresh virus they are quite inagglutinable. On the other hand the eluted virus is still fully capable of producing the same sequence of effects on fresh cells. The virus in other words displays all the characteristics of enzymic action. For ease of discussion we can describe the sequence as adsorption of virus particles on to receptors of the cell surface, with subsequent destruction of receptors and release of the virus. I should point out that in any actual experiment it is not a matter of one virus particle taking an hour to be liberated from one receptor. The process is one in which there is probably a rapid sequence of successive adsorptions and elutions, adsorption only ceasing to dominate the picture as the number of available receptor sites begins to approach zero.

These experiments were done with red cells, which are not susceptible to infection by influenza virus. Hirst (1943) was again first to show that by using the excised ferret lung an essentially similar process of adsorption and elution takes place. Fazekas de St. Groth (1948a) has studied this process in very great detail, using the more convenient mouse-lung preparation. He has found that, without exception, all the essential phenomena shown by the red-cell surface can be duplicated by the use of the cells lining the respiratory tract.

There is, however, one important difference. In the living animal, virus introduced into the lung via the trachea is absorbed but it is not released. The virus units instead enter the cells, initiating infection.

SOME QUESTIONS

This general reaction between virus and cell surface poses a number of important questions. At the chemical level we would like to know what is the nature of the components responsible for the initial mutual adsorption, and what is the functional nature of the virus enzyme concerned—in other words, what is its substrate, and what is the chemical change induced in the substrate? At the biological level we have the very pertinent question, how can it be shown that this mechanism is in fact involved in the process of infection?

I cannot here describe the experimental and logical processes by which at least partial answers to these questions have been obtained. Some workers would probably consider that the true answers are less definite than those I am going to give. In outline we believe that the receptor substance, which is both the cell component responsible for adsorbing the virus and the substrate of its enzyme, is a mucopolysaccharide probably present in the form of a meshwork on the cell surface and intimately related to lipid and protein components. With slight reservations I consider that the adsorption is mediated through the same groups on the virus surface which function as the enzyme. The enzyme is functionally identical with an enzyme secreted by the cholera vibrio, which we refer to as receptor-destroying enzyme (R.D.E.). This enzyme, which has now been concentrated and partially purified by Ada and French, is a biological reagent of extraordinary interest. Its substrate is present in a wide variety of cell surfaces and tissue extracts and is in particularly high concentration in all human glandular mucins that we have tested. Evidence obtained by Gottschalk and Lind (1949) indicates that a dialysable product results from the action of either influenza virus or R.D.E. on ovomucin. This appears to be an amino-acid-sugar compound that has not yet been fully characterised. I have no doubt that relatively soon the enzyme will be purified and its chemical action fully defined.

The clearest evidence of the importance of these reactions for the process of cell infection can be obtained from Stone's experiments (1948) in which susceptible animals—mouse or chick embryo—were treated with the receptor-destroying enzyme at varying times before infection. In all instances protection to some degree was observed. With some virus strains the protection afforded was very high, with others almost negligible. In the course of these experiments, and in others by Fazekas de St. Groth (1948b), it became clear that cell receptors are constantly being renewed so that no long-lasting protection by this means was ever observed.

This is a very cursory treatment of a topic that could be expanded indefinitely, but I hope it is enough to indicate the general nature of the interaction between virus and cell surface which takes place with influenza virus. Very recently it has been reported that another group of viruses, responsible mainly for encephalitis in animals, will agglutinate mammalian red cells. This will almost certainly lead to an intensive study along somewhat similar lines of the mechanism involved with these neurotropic viruses. There is a rich field for discovery here: if I may be excused for mentioning a completely irresponsible "hunch," I believe the most important thing to be found about poliomyelitis virus is how it enters the nerve-cell.

Nature of Intracellular Multiplication

A virus particle enters a susceptible cell. At the end of a period of the order, usually, of a few hours, the cell has disintegrated partially or almost completely, and a brood of perhaps 50 or 100 fresh virus particles has been set free. In other, apparently similar, cells infection is not followed by multiplication of virus and destruction of the cell. An immense variety of problems arise when we try to determine what happens within the cell between entry of the virus and the liberation of the new generation. The infection of bacteria by phage provides the most suitable experimental material for this problem; but I am here concerned essentially with viruses responsible for human disease, of which the one most convenient for study is influenza virus.

In this field the situation is far less clear than in regard to the surface changes, but much more exciting. Biology, and especially biochemistry, has in recent years been coming much closer to the fundamental problems of replication of organic pattern, of gene-enzyme relationship, and of the provision of building-stones and energy for protein synthesis in the cell. It seems likely that the virus worker may soon be providing an important technical means of assisting in this problem of what takes place within the living cell.

At the present time we are at the stage of exploration and accumulation of rather unrelated experimental data. May I first indicate some of the lines of experimental approach that are available.

The oldest approach is the morphological: there are undant records and pictures available of the histogical changes produced—the various types of inclusion dy and of associated degenerations. In more recent ars the greatly increased interest in the function of cleic acids has been carried over into the virus field, d it has been shown by standard histochemical methods at in the early stages of infection there is with several iruses a great increase in the cytoplasmic concentraon of ribonucleic acid. This is generally interpreted as dicating increased protein synthetic activity in the cell.

Then we have rather ill-defined quantitative data in egard to the disappearance and reappearance of virus bsorbed by susceptible cells in suitable situations. here is no doubt that influenza virus apparently disppears when the cell is entered, in the sense that extracts f the infected cells show much less virus by any available test than would be the case if virus were simply dded to a comparable suspension of ground-up normal ells. Whether this means that the virus particles ctually are converted in the first stage of infection to another form lacking infectivity and the other characteristic features of the virus is a more difficult question. Hoyle (1949) finds that a soluble (smaller-particle) antigen, detectable by complement-fixation, appears before the stage at which the next generation of virus particles is liberated, and he favours the view that this antigen is composed of the smaller units into which the virus breaks down after effective entry into the cell. Much more study is required before this hypothesis can be regarded as established.

INTERFERENCE BETWEEN VIRUSES

A third approach is through the study of interference between viruses. To give a very simple example of this phenomenon I may mention a variant strain of influenza virus "*neuro* W.S.," which unlike any other influenza virus produces fatal encephalitis in mice. If an appropriate amount of this virus (say a 1 : 1000 dilution of a standard brain emulsion) is mixed with normal egg fluid, and injected into mice, all will die in 5 to 7 days with the usual signs of infection of the central nervous system. If, however, the same amount is mixed with egg-fluid virus of a normal influenza virus the mixture will provoke no symptoms. It seems that if one type of influenza virus, which cannot multiply in certain cells, enters them first it renders them incapable of supporting the multiplication of another strain which would normally flourish there. There are many examples of this phenomenon, which has been recently reviewed by Henle (1950). Most workers think that, while under special circumstances this interference may occur at the cell surface, it usually depends on intracellular reactions. Again there are hopes that the analysis of the qualitative and quantitative aspects of interference will lead us deep into the nature of the intracellular environment.

There are a number of puzzling phenomena which may be in some way related to interference and in their turn throw light on intracellular processes. Latent infection is one. How for instance does the herpes virus persist in the deeper epidermal cells of the affected areas of skin between attacks of herpes? Even in the most acute type of experimental infection with a virus like influenza it is most unusual to find every cell showing gross evidence of infection. Some which must have been exposed to infection escape completely. Then there is at least one virus disease of mice in which infection of the young in utero may initiate a lifelong infection in which virus seems to be present in every tissue of the body without producing symptoms or histological changes. All these phenomena show that there is some delicate balance within the cell which determines whether or not an entrant virus will flourish.

MULTIPLICATION OF VIRUSES

The final approach to which I want to refer is one that has been the centre of my own experimental interest during the past year. This is concerned with the production of recombinants from simultaneous infections with two recognisably different strains of virus. It is possible for instance to inoculate mice intracerebrally with a mixture of the neurotropic strain I mentioned earlier, "neuro W.S.," and the serologically distinct non-neurotropic strain MEL, which will give a partial interference effect. By appropriate manipulations virus can be recovered from such a mouse, which, after being proved to be a single type by passage at high dilution, is neurotropic but with the immunological character MEL of the second virus. Enough such experiments have been done to justify a brief consideration of their implications. It seems that in some way the genetic material of two virus particles entering a cell must mingle and then be rearranged. Either the two particles fuse into a zygote, within which some type of rearrangement of genetic units takes place before multiplication begins, or the two particles break down into smaller genetic units which multiply independently to provide a pool from which in the later stages the new generation of virus particles is built up.

Taken as a whole, this evidence in regard to the intracellular multiplication of virus points rather strongly toward the latter alternative. As a working hypothesis applied specifically to the influenza viruses I should suggest that on entering the susceptible cell the virus particle breaks down into a relatively large number—perhaps 200–500—of subunits which are essentially self-reproducing entities. Each is small enough to make some necessary intimate contact with a cellular enzyme system which can provide; for the replication of the virus subunit, the necessary flow of energy and building-stones. As the replication proceeds there is an urgent drain on the protein-synthetic mechanism of the cell, shown first by the increase in ribonucleic acid, and later, as the whole structure begins to break down, by gross morphological changes. From the pool of many thousand subunits present toward the end of the process, there is a reaggregation into the appropriate bundles that make up the infective virus particle.

This hypothesis is quite frankly no more than the speculation which at the moment seems to me to offer the best synthesis of the facts in regard to influenza virus, and the best framework on which to devise further experimental work. If it turns out to be true for influenza virus, I shall be surprised if it is not applicable to most other animal viruses. An essentially similar hypothesis is already current in regard to bacterial virus multiplication (Delbrück and Bailey 1946, Delbrück 1949), and in fact the phage investigations provide one of the strongest reasons for favouring the theory of virus reproduction by simpler subunits.

Spread of Virus Infection in the Body

I have spent so much time on the cellular processes of virus infection that I shall have to pass over the problem of the spread of infection in the body in even more summary fashion. I shall limit my remarks to giving some account of two investigations carried out in my laboratory on the pathogenesis of experimental and natural mousepox (ectromelia) and of experimental influenza in mice. This use of the laboratory mouse as an experimental model of a human disease has its limitations which must never be forgotten. Nevertheless these two investigations, by Fenner on mousepox and by Fazekas de St. Groth on influenza, appear to be remarkably relevant to the understanding of human smallpox and similar exanthematic diseases on the one hand and of the respiratory virus infections on the other.

EVIDENCE FROM MOUSEPOX

Fenner's work has been published in full (1948, 1949). It was concerned primarily with elucidating the processes concerned in the spread of mousepox in groups of mice, and secondarily with a study of the nature of the incubation period between infection and the appearance of the generalised rash. Not only is mousepox serologically similar to variola: a mouse population can be protected against mousepox by vaccination (with vaccinia virus) just as effectively as a human community can be protected against smallpox. In addition it produces an essentially similar skin rash in those mice which do not die acutely, with an incubation period only a little shorter than that of the human disease.

As a result of very extensive and painstaking titrations of the virus content of different organs in the course of infection, Fenner gave the following picture of the pathogenesis of mousepox. The primary infection takes place through some trauma, often minimal, of the skin. Multiplication in the cells at the site of entry gives rise eventually to a macroscopic primary lesion essentially by spread to contiguous cells. Before this stage, however, dissemination via the regional lymphatics and the blood has begun. Most of this virus of the primary viræmia passes to, and infects, cells of the liver and spleen. When multiplication in these organs produces a high virus content, there is a more intense secondary viræmia which is responsible for the initiation of the generalised skin rash. Liberation of the virus into the environment is largely from animals in the stage when the lesions of the rash are breaking down and much infective material is shed. At about the same time, in surviving animals, antibody in the serum is rising rapidly and virus becomes no longer detectable in the internal organs.

If we can generalise from these experiments we can expect to find in any virus disease with a long incubation period the following sequence:

1. A site of primary infection and multiplication.
2. Passage of the virus to those organs best equipped to remove foreign particles from lymph or blood.
3. Multiplication in lymphoid tissue, spleen, or liver, with eventual liberation in much greater concentration into the blood.
4. Symptomatic infection of the skin, general mucous membranes, or other organs.
5. Relatively rapid appearance of antibody, with recovery unless the initial onslaught was too severe.

EVIDENCE FROM INFLUENZA

In the experiments of Fazekas de St. Groth (in the press) with influenza virus the situation was very different. Here the infection in the mice was initiated by administering the virus intranasally, and multiplication of the virus was limited to the cells lining the respiratory tract. There is no direct involvement of anything but the respiratory epithelium of the bronchial tree, including the smallest bronchioles. It is still not quite clear what the connection is between the bronchiolar lesions and the consolidated areas of the lung that are the normal indices of infection used in experimental work on influenza. Any examination of a lung showing minimal lesions, however, will indicate that the process involves areas representing divisions of the bronchioles. An interesting comparison is with a lung infected with a minimal dose of psittacosis virus so as to produce isolated focal lesions. These are quite unrelated to bronchiolar distribution, forming dark spherical lesions which spread centrifugally from the point of initiation.

An influenza virus particle lodges, we may assume, on the surface of a bronchiolar epithelial cell. If it enters the cell the virus multiplies, and, with necrosis of the cell, a second generation of virus particles is liberated on the respiratory surface. Ciliary move will ensure that infection spreads centripetally and centrifugally along the respiratory passages. A simple proof of this can be obtained by inoculating mice with a dose of virus which will produce only one or two small areas of consolidation. On the following day some of the mice are inoculated intranasally with normal saline. This will sweep down into the smaller bronchioles some of any infective virus that may be present in upper levels of the bronchial tree. It will be fou that the mice receiving the second dose of saline will with complete consolidation of the lungs, in contrast the trivial lesions of those receiving one inocula only.

Uncomplicated acute influenza in human beings is essentially a bronchiolitis, as far as can be judged in the absence of direct histological studies on uncomplicated cases. In experimental monkey infections we found (Burnet 1941) that histological damage was rather strictly limited to the bronchioles; the bronchial and tracheal epithelium was apparently normal. What is to be stressed is that infection by viruses of this type is infection over the surface of a sheet of susceptible cells. Passage of virus into lymph-channels undoubtedly occurs, and probably small amounts reach the blood; but in neither case is the virus conveyed to susceptible cells. This surface character of the infection is of great significance in understanding the part played by immunity in influenza.

THE STUDY OF MUMPS

There is one disease, mumps, which may well combine to some extent the characteristics of both the types of infection that I have described. The virus is functionally very similar to the influenza viruses and has essentially the same reactions with the red-cell surface. In all probability there is an initial silent surface infection of influenzal type with entry into the blood-stream. Whether the parotitis results directly from this, or (like the rash in mousepox) results from a secondary viræmia, has yet to be determined. One of the outstanding problems in the pathology of infectious disease is to ascertain the nature of the primary infection in such diseases as measles, smallpox, chickenpox, rubella, and mumps. Only two of these viruses, mumps and variola, can be conveniently handled in the laboratory, and it is from one of these two diseases that we can hope to gain the information.

The Production of Symptoms

Very little work seems to have been done relevant to the means by which symptoms are produced in virus disease. With large doses of influenza virus, as well as of viruses of the psittacosis group and some rickettsiæ, acute toxic effects can be demonstrated in experimental animals. These are not due to any soluble toxin but appear to be referable to some surface activity of the infective particles. It is doubtful whether they have much significance in the actual manifestations of disease. It is probably best at present to look on the intensity of symptoms as essentially a measure of the cell damage that is occurring—the symptom-producing agents being soluble products from the breaking-down cells. The more sudden the liberation of such products the more acute the symptoms. On this view, the sudden onset of symptoms in influenza would be associated with the infection and damage of a large area of bronchiolar epithelium. There is nothing to suggest that it is a manifestation of invasion of the blood-stream by the virus.

Antibody in Virus Disease

For many years there has been a recurrent tendency by the more sceptical of pathologists to decry the rôle of circulating antibody in infectious disease. The fact that phoid bacilli can grow quite actively in the presence of 'antityphoid serum- is apt to over-impress a young thologist. In virus disease we have a rather more ect approach to the significance of antibody than the cteriologists. The normal means of titrating antidy is not in the test-tube but by the direct functional t of seeing whether, when mixed with virus, it will event infection of susceptible cells. If I were teaching munology I should be inclined to start not with ecipitins and agglutinins but with the immune response mumps, influenza, and yellow fever. In these diseases e immediate significance of antibody can be experientally demonstrated; the complications which arise, hen antigen-antibody aggregation reactions in the st-tube are introduced, can be left until later.

CONTRASTS

In yellow fever we have a disease whose whole pidemiology is dominated by the immune response, nd which is due to a virus which can be studied with elative ease. The child born in an endemic region ormally suffers a mild infection, and on recovery remains mmune to yellow fever in most cases *for life.* This mmunity is so regularly associated with measurable ntibody in the blood that all surveys of the extent of ellow fever in Africa or elsewhere are based on such xaminations for antibody.

There is one generalisation in regard to immunity n virus disease which appears to be without exception. Antibody is effective in preventing infection of a cell if it can make contact in adequate concentration with the virus particle before it enters the cell. In yellow fever the conditions for fulfilling this requirement are ideal. The primary infection is associated with a veritable flooding of the blood and tissues with virus, providing an intense stimulus to antibody production. When an immune person is bitten by an infected mosquito the virus must be exposed to maximal antibody concentration in the blood before it can reach the liver or any other suitable nidus for its multiplication.

In influenza we have a very different state of affairs. The virus spreads from cell to cell in the film of liquid bathing the surface of the respiratory epithelium. If our principle is sound, what will determine immunity or not to influenza is the presence of an adequate concentration of antibody, of appropriate serological type, in this surface film. Fazekas de St. Groth has recently completed some beautiful experiments which have established this directly for experimental influenza in the mouse. He has tackled the question with a whole-hearted application of all available techniques, particularly those involving the use of the mouse lung *in vitro.* The experiment I wish to describe was a comparison of the immunity to challenge of two groups of mice both immunised intraperitoneally with an influenza A vaccine. One of them was given in addition an influenza B vaccine intranasally. This second group was far more resistant to challenge with influenza virus A than the one receiving only the homologous vaccine intraperitoneally. Analysis of the levels of A and B antibody in blood and in washings of the respiratory surface of the excised lung, plus a variety of control experiments, showed that the increased immunity was directly correlated with a measurable increase in the available A antibody on the bronchial surface which followed the administration of the heterologous vaccine.

It is difficult to guess what is the actual concentration of antibody in the normal film in terms of that in the blood, but it is almost certainly considerably lower. Immunity against any given epidemic of influenza must be a complex of many factors, even if we forget about the further complication of the dose and degree of dispersion of the infecting dose. The factors will include the titre of circulating antibody and the immunological appropriateness of this antibody to the current serological type of virus, and in addition the relative concentration of antibody in the respiratory film of fluid to that in the blood. This probably varies considerably from one individual to another, and will be modified by minor pathological states of the respiratory tract. Non-specific effects due to the presence and physical state of inhibitory mucoids may also modify the surface conditions in ways which have not yet been assessed.

Finally we may mention herpes simplex; here the virus for the most part remains dormant in certain areas of skin epithelium. It is entirely intracellular and uninfluenced by the large amount of circulating antibody that is always present. When activation by fever occurs, the virus multiplies in a cell which it has not been required to enter. Necrosis and liquefaction, therefore, take place, and give the typical blisters; but, unless the conditions are most exceptional, the virus infection does not extend beyond its initial site. In this circumscription of the lesions we may see one function of the antibody.

It is probably fair to summarise the opinion of most of those concerned with virus disease as a belief that, *in any virus disease in which effective invasion of* susceptible tissues occurs, recovery and subsequent immunity are functions of the production of circulating antibody. The effectiveness of that antibody is determined by the considerations of access to the virus particle before it can enter the susceptible cell that I have just been discussing.

Conclusion

Perhaps I might conclude with a very brief summary of the points I have tried to make.

1. Virus infection is essentially an intracellular process.

2. For some, but not all, viruses there is a rather elaborate mechanism by which the cell membrane is passed.

3. Multiplication of virus within the cell is in all probability a more complex process than binary fission. I am strongly inclined toward the view *that the virus* particle must break down into smaller elements *before* it can make use of the protein synthetic mechanism of the cell for its own replication. And I believe that the further study of this process may throw more light on the protein synthetic mechanism of the cell than any other available experimental attack.

4. The spread of infection is determined (*a*) by the range of cells which are susceptible to virus infection and necrosis, and (*b*) by the anatomical relationship of those cells.

5. Symptoms in virus diseases result from chemical and morphological by-products of the primary cell damage: there is no clear evidence of any toxic products of the virus as such.

6. Recovery and immunity are predominantly determined by the production of antibody. The effectiveness of antibody will depend on the concentration in which it is present at the points where it can block the virus before generalisation occurs.

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TREATMENT OF PERNICIOUS ANÆMIA WITH PARENTERAL LIVER EXTRACT

A REVIEW OF FIFTY-ONE PATIENTS BETWEEN 1940 AND 1948

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THE amount of anti-pernicious anæmia principle required for initial and maintenance therapy of pernicious anæmia varies from patient to patient. However, many American studies involving large numbers of patients followed for many years suggest that after adequate initial treatment the great majority can be kept in full clinical, neurological, and hæmatological remission on 2 ml. of concentrated liver extract (15 U.S.P. units per ml.) a month (Murphy and Howard 1939, Alt and Young 1940, Evans and Jordan 1941, Strauss et al. 1942, Haden and Bortz 1948).

Wilkinson (1949a and b) has stated that considerably larger doses of liver extract have been required in this country for the adequate treatment of pernicious anæmia than were needed before the war. Further, the dose of liver extract that some workers in this country (Callender and Witts 1949, McSorley 1949) considered advisable for the maintenance treatment of pernicious anæmia appears to be larger than that found necessary by the American workers mentioned above.

These observations have provoked considerable discussion and correspondence (*Lancet* 1949). Impotent extracts and an increase in the amount of anti-pernicious anæmia principle required, perhaps as a result of decreased protein intake, have been suggested as causes.

The object of the work described here was to determine the incidence of relapse in a group of patients with pernicious anæmia treated with parenteral liver extract during 1940–48 and to analyse the causes.

TECHNICAL METHODS

The blood-counts reported in the first part of this paper were done on peripheral blood, and those in the second part on venous blood.

Red-cell counts were done at a dilution of 1 : 200 with Burker or Neubauer counting-chambers. When peripheral blood samples were used, about 500 cells were counted. 3000 cells were counted for the red-cell counts detailed the second part of the paper.

Hæmoglobin was estimated by various modifications of the alkaline-hæmatin and cyanhæmatin methods. Readings were made with a photoelectric colorimeter.

Packed cell volume was measured by Wintrobe's method. The tubes were centrifuged at 3000 r.p.m. for 30 minutes

Effects of Three British Liver Extracts (1940–48)

The red-cell counts of 27 women and 24 men who attended the outpatient department in 1940–48 shown in figs. 1 and 2. The period of follow up individual patients varied from 1 to 11 years. patients were included who had not been recei maintenance injections for at least a year. No new patients were included after the end of 1947. Patients attending in 1940 had been attending for treatment for 1–4 years.

The data are presented as the yearly means of red-cell counts done on each patient. Red-cell counts were usually done at 1–3 month intervals. The total number of observations in a given year is indicated in the upper part of the figure, and the mean of the counts of all the patients attending in that year in the lower part.

The 51 patients were taken from a total of 62 patients attending during this period; 11 patients who did not attend regularly for injection, or who developed serious intercurrent disease during treatment, were excluded.

The patients included in this series came from working-class families. None showed evidence of gross dietary deficiency. Their ages were those of any similar group of patients with pernicious anæmia. Many had the normal complaints of their age; some had arteriosclerosis; others had a raised blood-pressure; and a few had chronic bronchitis. No attempt has been made to assess the importance of these factors.

The patients were treated with three brands of liver extract:

Extract A: a refined liver extract prepared by the Dakin and West process, used during the whole period.

Extract B: an extract described by the manufacturers as "crude," of which 4 ml. was stated to produce an adequate response, and of which the average maintenance dose recommended was 4 ml. monthly; used only after 1944.

Extract C: another brand of refined extract, used only for one patient.

Each batch of these extracts was reported by the manufacturers to have produced a satisfactory hæmatological and clinical response over a period of 14 or 15 days in at least one patient with typical pernicious anæmia in severe relapse, in doses of 2 ml., 4 ml., and 1 ml. respectively. The responses were stated to have been judged by the usual criteria of the reticulocyte response and the subsequent increase in the number of red cells (Minot et al. 1928, Isaacs et al. 1938, Riddle 1940, Della Vida and Dyke 1942).

The initial and maintenance doses of liver extract given to each patient in th present series varied and was determine by the patient's requirements and by th past experience with the extract con cerned. Injections for maintenanc treatment were given in most cases 4-weekly intervals. After 1947 no injec tions were given at intervals of less tha 4 weeks.

RESULTS

From figs. 1 and 2 and table I it wi be seen that there is a tendency for th red-cell count to fall during the perio of observation. This is particularl noticeable after 1946 in the case o both men and women, but the mea

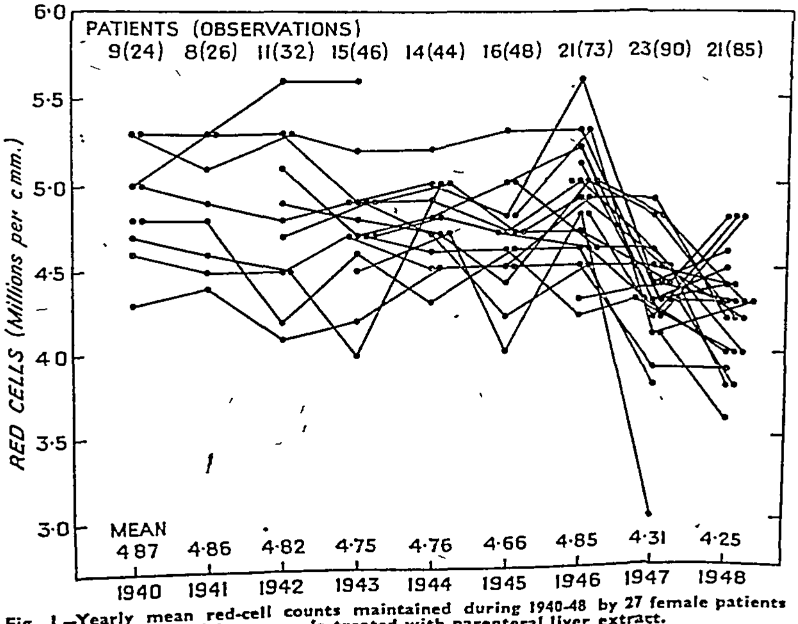
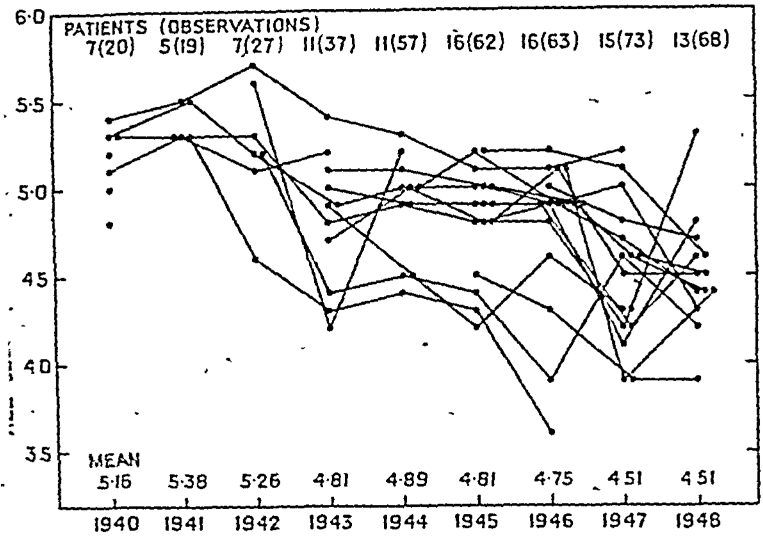


Fig. 1—Yearly mean red-cell counts maintained during 1940–48 by 27 female patients with pernicious anæmia treated with parenteral liver extract.



ig. 2—Yearly mean red-cell counts maintained during 1940–48 by 24 male patients with pernicious anæmia treated with parenteral liver extract.

early blood-counts of several patients were unsatisfactory rom 1943 onwards.

In tables II and III are shown the amounts of extract A nd extract B used during this period; the latter was nly used extensively after 1944. From these tables it s evident that the red-cell counts decreased in spite of the use of the same or increased amounts of liver extracts.

In fig. 3 are illustrated the proportion of patients treated with extract A who gave definite evidence of relapse while under this treatment. A patient was considered to be in relapse if there was a decrease in two successive counts of at least 500,000 red cells per c.mm. below the previously maintained level, and/or if clinical symptoms of inadequate treatment developed, such as a persistent loss of well-being and energy, glossitis, paræsthesiæ, or definite signs of subacute combined degeneration of the cord or of peripheral neuritis.

These results confirm that a large number of patients treated with this extract relapsed after 1946. Some patients did, however, relapse from 1943 onwards. It is noteworthy that only 3 out of 29 patients who received a maintenance dose of extract A 4 ml. a month relapsed before the later part of 1946. No record could be found of a patient relapsing on this dose before 1944.

Nine patients were treated with a monthly dose of extract B 4–6 ml. during 1945–46. All remained in excellent remission. During 1947–48 10 out of 12 patients who had received this amount relapsed.

DISCUSSION

Evidence has been presented which indicates that during the period of observation the red-cell counts and clinical condition of patients with pernicious anæmia deteriorated on doses of liver extract previously found adequate for keeping them in remission. The most dramatic decreases in red-cell counts took place after 1946, but there is some evidence which suggests that deterioration started earlier.

These results confirm the widespread impression that larger doses of liver extract than previously used have been recently required to maintain patients in remission. The cause of this must have been that either the extracts were less potent or that there was an increase in the requirements of patients for the anti-pernicious anæmia principle (or principles?).

It is possible that individual requirements for liver extract may increase during the course of pernicious anæmia. It seems unlikely, however, that this has played a significant part in causing the decreases in the blood-counts observed in this series, for the patients have relapsed irrespective of the date of the onset of the disease. Further, several of the patients maintained on 2 ml. or 4 ml. of extract A before 1943 had had pernicious anæmia from the late '20s or early '30s. Nor has such a dramatic increase in requirements been noted in other long-term studies. Most of the patients in this series were old and poor, and their intake of animal protein was not likely to have been much greater in 1936–44 than in the succeeding years. The amounts of vitamin C in their diets may, however, have been less than in their pre-war diets. Most of these patients have received iron and vitamin-C supplements during relapse; in no case was any improvement seen. Therefore, though a dietary deficiency cannot be altogether excluded, a decrease in the potency of the extracts used seems to be by far the most likely cause for the relapses observed. It is realised that extracts of the Dakin and West type have given irregular results in the past (for example, in the cases reported by Wilkinson and Israëls 1947), and relapses in patients on maintenance therapy might be due to the issue of an exceptionally poor batch of extract. However, the cases reported have shown evidence of a consistent decrease in potency between 1947 and 1949.

TABLE II—AMOUNTS OF EXTRACT A USED IN 1940–48

Year	No. of patients treated	No. of patients receiving 2 ml. a month	No. of patients receiving 4 ml. a month	No. of patients receiving 6–8 ml. a month
1940	16	9	6	1
1941	13	7	5	1
1942	18	9	8	1
1943	26	9	15	2
1944	24	7	15	2
1945	23	7	14	2
1946	24	6	14	4
1947	23	3	18	2
1948	17	1	10	6

The evidence presented below supports the view that the relapses observed were due to a decrease in the potency

TABLE I—RED-CELL COUNTS IN 51 PATIENTS WITH PERNICIOUS ANÆMIA ON MAINTENANCE TREATMENT WITH PARENTERAL LIVER EXTRACT IN 1940–48

Year	1940	1941	1942	1943	1944	1945	1946	1947	1948
Mean red-cell count (millions per c.mm.) .. .. Standard error	4·99 ± 0·077	5·06 ± 0·105	4·98 ± 0·112	4·78 ± 0·073	4·82 ± 0·054	4·75 ± 0·018	4·81 ± 0·070	4·38 ± 0·066	4·35 ± 0·061
No. of patients (men and women)	16	13	18	26	25	32	37	38	34

The difference between the mean red-cell counts of 1946 and 1947 would occur by chance less than 1 time in 1000 (P = < 0·001). As regards the mean red-cell counts in the remaining years there is no real difference between the values in any two successive years. However, if all the values for 1940, 1941, and 1942 are compared with those for 1943, 1944, and 1945, there is a difference which again would only occur by chance once in 1000 times (P = < 0·001).

TABLE III—AMOUNTS OF EXTRACT B USED IN 1945–48

Year	No. of patients treated	No. of patients receiving 4 ml. a month	No. of patients receiving 6 ml. a month	No. of patients receiving 8–12 ml. a month
1945*	9	4	0	5
1946	13	7	2	4
1947	14	8	3	3
1948	16	7	5	4

* One patient in this group started maintenance treatment in 1944.

of liver extracts and not to an increase in patients' requirements for anti-pernicious-anæmia principle.

Effect of American Concentrated and Refined Extract

Two batches of an extract made by Lederle Laboratories and sold under the name of 'Concentrated Solution Liver Extract Parenteral' (15 U.S.P. injectable units per ml.) were given to 25 unselected patients attending Hammersmith Hospital for maintenance injections of liver extract. 19 patients were from the series already described above. The other 6 patients started their treatment after 1947 and were not included above for this reason. In most cases Lederle's extract was administered in doses anticipated to be equivalent to those of the liver extracts used previously. It was considered that, if a given dose of extract was reputed to be capable of satisfying the clinical test of potency commonly used in this country, the potency of that dose should be roughly equivalent to 15 U.S.P. injectable units. This method of comparison is admittedly crude, but it is perhaps better than a comparison based on volume alone.

Injections had previously been given at monthly intervals in all but 2 cases. The same intervals were used for the new extract, which was given in each case for four months. Blood-counts were done at 2–4 week intervals for at least 3 months before the change of treatment, and were continued at similar int during the period of treatment with Lederle's extract. Vitamin C 100–200 mg. daily and ferrous sulphate gr. 9–12 daily were given for at least three months before the change of treatment. Patients were not informed of a change to a new extract, and direct questioning was avoided.

The extract was also given to 3 patients in moderately severe relapse who had neglected treatment for 3–9 months (cases 26, 27, and 28). Case 26, when first admitted, responded only very slightly to two separate injections of as much as 8 ml. of two different batches of extract C. She had, in consequence, been considered to be a possible case of refractory megaloblastic anæmia and had been treated with folic acid, to which she responded well. Case 27 had not maintained a red-cell count above 3,800,000 per c.mm. on extract C 2 ml. a fortnight. Case 28 had responded moderately well to extract B 8 ml weekly. These three patients were given 2 ml. (30 U.S.P. units) of Lederle's extract at fortnightly intervals. These injections were continued for four months.

RESULTS

Of the 28 patients treated with Lederle's extract 23 showed either a clinical or a hæmatological response or both. Of the 25 who had been previously receiving regular maintenance injections of other liver extracts 20 responded. All 3 patients (cases 26, 27, and 28) who had neglected treatment responded far more satisfactorily to the new extract than they had to the extracts previously used.

Details of their responses are given in table IV and in figs. 4 and 5. The initial red-cell counts of each patient are the mean of the counts of the two months before treatment was changed. The final recorded red-cell counts are the mean of the counts of the third and fourth months after the new injections were started. Three or four months were allowed to elapse so that the

TABLE IV—RESPONSES OF 28 PATIENTS WITH PERNICIOUS ANÆMIA TO A CONCENTRATED REFINED LIVER EXTRACT

—	Case no.	Monthly dose of British extracts (ml.)	Subsequent monthly dose in ml. of Lederle's concentrated liver extract (15 U.S.P. units per ml.)	Red-cell count during treatment with British liver extract (million per c.mm.)	Mean corpuscular volume during treatment with British liver extract (c.μ)	Red-cell count after treatment with Lederle's concentrated liver extract (million per c.mm.)	Mean corpuscular volume after treatment with Lederle's concentrated liver extract (c.μ)	Increase in red-cell count (million per c.mm.)*	Difference in mean corpuscular volume (c.μ)	Clinical improvement
Men	1	4 (A)	2	4·25	112	5·05	94	0·80	– 18	++
	2	4 (A)	2	4·75	100	5·00	93	0·25	– 7	+
	3	4 (A)	2	4·30	107	5·15	98	0·85	– 9	++
	4	4 (A)	2	4·55	105	5·00	92	0·45	– 13	++
	5	4 (A)	2	5·25	101	5 30	95·5	0·05	– 5·5	++
	6	6 (A)	2	4·50	104·5	4·90	96	0·40	– 8·5	++
	7	8 (A)	4	4·25	111·5	5·20	96	0·95	– 15·5	+++
	8	6 (C)	2	4·30	98	4·70	88	0·10	– 10	+
	9	4 (A) or (B)	2	4·65	100	5·00	96	0·35	– 4	+
	10	4–8 (B)	2	3·40	125	4·30	110	0·90	– 15	+
Mean ..	..	..	..	4·42	106·4	4 96	95·8	0·54	– 10 6	..
Women ..	11	4 (A)	2	4·10	100	4·75	97·5	0·35	– 2·5	++
	12	4 (A)	2	4·15	102·5	4·40	94	0·25	– 8·5	+
	13	4 (A)	2	4·70	102	4·90	96·5	0·20	– 5·5	+
	14	4 (A)	2	4·20	103·5	4·40	100	0·20	– 3·5	Nil
	15	6 (A)	3	4·35	106	4·80	94·5	0·45	– 11·5	+
	16	8 (A)	2	3·65	103	3·80	100	0·15	– 3	Nil
	17	4 (C)	4	3·60	107	4·70	88	1·10	– 19	++
	18	4 (B)	1	4·85	101	5·50	96	0·65	– 5	+
	19	4 (B)	1	3·70	106·5	4·30	95·5	0·60	– 11	++
	20	4 (B)	2	4·25	101	4·80	94	0·55	– 7	+++
	21	6 (B)	2	4·20	103·5	4·30	99	0·10	– 4·5	Nil
	22	6 (B)	2	4·15	118	4·80	101	0·65	– 17	+++
	23	8 (A) or (B)	2	4·60	94	4·60	92	0·00	– 2	Nil
	24	8 (B)	2	3·90	113	4·70	100	0·80	– 13	+
	25	12 (B)	3	4·30	102	4·10	100	0·10	– 2	Nil
Mean ..	..	..	..	4·20	104·2	4·61	96 6	0·41	– 7·6	..
Patients who had neglected treatment ..	26	..	4	3·30	120	4·60	98	1·30	– 22	+++
	27	..	4	3·00	125	4·50	100	1·50	– 25	+++
	28	..	4	3·20	117	5 55	100	2·35	– 17	+++
M		..	..	3·17	120 6	4·88	99·3	1·72	– 21·3	..
Mea		..	..	4·17	106·8	4·78	96·6	0·61	– 10·2	..

andard error of each difference is ± 0·16 million per c.mm. and is based on 70 degrees of freedom.

l-cell counts might become steady at new levels. ere was naturally evidence of improvement before this those patients who responded to treatment.

In fig. 4 are recorded the changes in red-cell counts; nost without exception there were a significant crease in the count and an accompanying decrease in ean corpuscular volume (fig. 5). The mean red-cell unts of the men and women increased to within limits at compare well with those of other patients treated ith Lederle's extract and on whom blood-counts were ade on venous blood * (Evans and Jordan 1941, Strauss al. 1942).

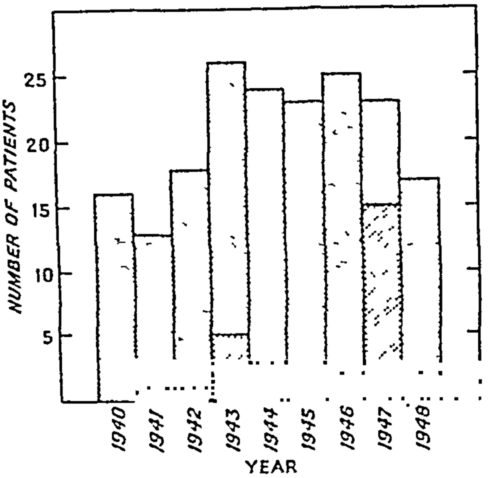


Fig. 3—Incidence of relapse of pernicious anæmia in patients receiving regular injections of extract A: each column indicates number of patients attending for treatment; hatched area of each column indicates number of patients who relapsed.

The clinical improvement in all those who responded was as striking as the hæmatological improvement. Many patients said they were better than they had been for years. There was improvement in well-being and appetite and increase in energy and spirit. Glossitis or paræsthesiæ if present disappeared, as well as the common feeling of "needing an injection" towards the end of the month.

The red-cell counts and blood picture of two patients treated with a monthly injection of Lederle's extract 1 ml. became normal within three months.

In 15 out of 19 patients treated with 2 ml. a month there was a definite response to the change of treatment. The blood-count and mean corpuscular volume in 13 of these patients became normal. Cases 10, 22, and 24 improved considerably but would probably have benefited from larger doses. Only in 4 patients in this group (cases 14, 16, 21, and 23) was there no definite change in either clinical or hæmatological state; in 1 patient the blood picture was normal before treatment; and in 3 there was a mild macrocytosis which persisted in spite in the change of treatment.† These patients were in good clinical remission before the change in treatment.

Four patients were treated with a monthly dose of 3 or 4 ml. of Lederle's extract. 3 responded well; their blood-counts and mean corpuscular volume became normal. In 1 patient no significant change was detected; slight macrocytosis persisted (case 25).

The blood-counts of the 3 patients who had neglected treatment were well within normal limits by the third month after treatment with Lederle's extract had been initiated. A mild macrocytosis persisted, however, and possibly the doses they received were still suboptimal.

Discussion

In the first part of this paper evidence was presented which indicated that the blood-counts of patients with pernicious anæmia who attended Hammersmith Hospital for maintenance injections of liver extract were definitely lower from 1946 onwards than they had been previously. This fall had taken place despite the fact that these patients had received the same, or even larger, doses of liver extract. It was suggested that the probable cause of this was that the liver extracts were less potent than formerly.

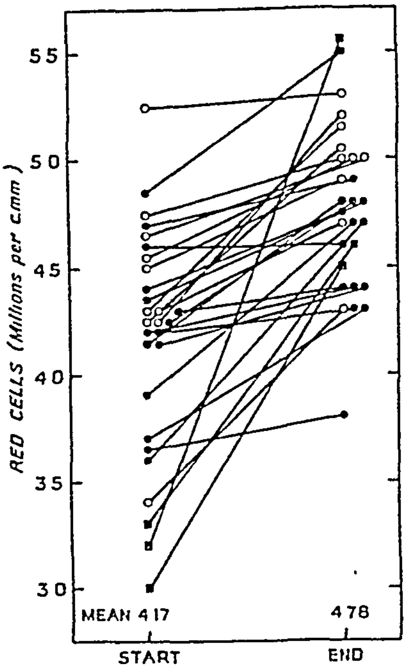


Fig. 4—Effect of treatment with Lederle's concentrated liver extract (15 U.S.P. units per ml.) on red-cell counts of 28 patients with pernicious anæmia, 25 of whom had previously been receiving regular injections of other extracts: black and open circles, *red-cell counts of the 25 patients*; black circles, red-cell counts of females; open circles, red-cell counts of males; black squares, red-cell counts of 3 patients who had neglected treatment for 3-9 months.

In the second part of this paper, evidence is presented which supports this view. In 23 of 28 patients treated with Lederle's liver extract there was a definite and often dramatic improvement. This response followed the use, in most cases, of doses considered to be equivalent to those of the brands previously used, equivalence being judged on the basis of the reputed potency of the extracts as revealed by clinical trial. The two batches of Lederle's extract were therefore significantly more potent.

The work described in part 2 does not necessarily indicate what would be the maintenance requirements in this country of patients treated with such an extract. The results are those of the treatment of patients in mild or moderately severe relapse. They do, however, suggest that the probable requirements of these patients, if

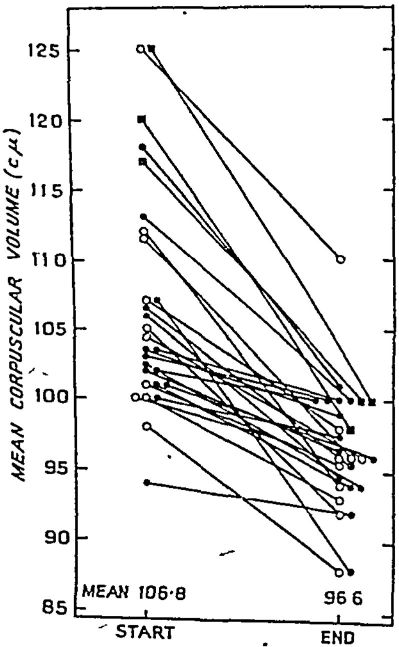


Fig. 5—Effect of treatment with Lederle's concentrated liver extract (15 U.S.P. units per ml.) on mean cell volume of the same patients as in fig. 4.

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* Red-cell counts made on venous blood are reported to be 5% lower than those made on peripheral blood (Strauss and Burchenal 1942).

† It is not known if still larger amounts of liver extract would have abolished this macrocytosis. In 1 patient at least, doses of 80–100 μg. of vitamin B_{12} a month did not alter the blood picture.

maintained with this extract, would not be significantly greater than those found desirable in America—i.e., 1 or 2 ml. (15–30 U.S.P. units) a month, 2 ml. (30 U.S.P.) a month being the optimal dose for most patients (Haden and Bortz 1948).

On the basis of the results reported here it is felt that the use of relatively impotent liver extracts was the main reason why patients in this country had required such large doses for adequate treatment.

Two batches of the concentrated liver extract produced by Lederle Laboratories were used in this work. It is not known if this high potency is characteristic of all batches of this extract. It has been demonstrated by microbiological assay that the amount of vitamin B_{12} in the various brands of liver extract available in this country and in America varies considerably (Rickes et al. 1948, Cuthbertson et al. 1949, Shaw 1949a). It is probable also that the potency of batches produced by the same process may vary. Nevertheless it is noteworthy that, for two years before Lederle's extract was used, no batches of comparable potency were found among any of the British extracts used in this series, except some samples of extract B produced in 1944, and kindly supplied by Dr. J. Mills. Many more of the patients subsequently treated successfully with Lederle's extract had been treated for periods up to a year or more with many different batches of other extracts without significant alteration in their condition.

At first sight it is difficult to reconcile the relative therapeutic impotency of extracts with the manufacturers' claim that all batches of liver extract are submitted to clinical trial before issue. Though it has been suggested that not all batches of liver extracts are subjected to clinical trial (Wilkinson 1949a), most reputable manufacturers have apparently been at pains to obtain clinical trials on their products (Shaw 1949b, Smith and Cuthbertson 1949). Further, Callender and Witts (1949) have noted a similar relative impotency at high red-cell counts with extracts they have themselves clinically tested.

The unsatisfactory nature of the clinical test as a method of accurate quantitative assay is well known and has been recently emphasised by Shaw (1949b). It is felt, however, that the wide variation found in practice between the potency of extracts said to have passed satisfactorily the clinical test, and the fact that extracts which give satisfactory clinical tests when given to patients with low red-cell counts are relatively impotent in similar doses at higher red-cell counts for maintenance, indicate that the clinical test is not only a poor method of assay of the relative potency of extracts but also an unsatisfactory guide to the requirements of a patient for anti-pernicious anæmia, whatever the red-cell count.

These discrepancies can be explained by the following considerations. It is becoming clear that extracts of widely different content of anti-pernicious anæmia factor produce only relatively small differences in hæmatological effect when given to patients with pernicious anæmia in *severe* relapse. So-called satisfactory responses may be observed with low red-cell counts, without the complete requirements of the patients being satisfied. This, coupled with the fact that different patients differ in their responses to the same dosage of anti-pernicious anæmia factor, probably explains how "satisfactory" clinical trials may be obtained when extracts of inferior therapeutic potency are administered to patients in severe relapse—a state in which they are usually deemed particularly suitable for trial purposes. These considerations also probably explain the apparent anomaly that a patient's requirements for the anti-pernicious anæmia principle may seem to be greater with a high red-cell count than with a low one.

When the work described here was nearly finished, microbiological assay of the vitamin-B_{12} content of liver extracts became possible. One of the batches Lederle's extract has been assayed; it con 22–25 µg. per ml.‡ Where it has been possible to batches of British extracts used in this hospital, t vitamin-B_{12} content has been found to be much sm It is too early to be certain whether the vitamin-B group of substances is the only therapeutically ac material in liver extract or whether any parti method of microbiological assay measures all the "vita-min B_{12}" present. The assay results, however, in instance support and parallel the clinical findings.

It should be emphasised that all American ext are not considered to be necessarily more potent those obtainable in this country. The information avail suggests that considerable variation exists in Ameri too (Rickes et al. 1948, Haden and Bortz 1948). Furth it is to be hoped that the combined use of clinical tri and microbiological assay of the vitamin-B_{12} content of liver extracts will lead to a higher and more constan level of potency in liver extracts and solve some of the difficulties that have beset both clinicians and manufacturers.

Summary

The clinical and hæmatological condition of 51 patients with pernicious anæmia who received maintenance treatment with parenteral liver extracts during 1940–4 is reviewed. The red-cell counts and clinical condition of the patients deteriorated during this period. Deterioration was greatest from the end of 1946 onwards, but in some patients it began earlier.

Twenty-eight patients previously treated with other liver extracts were given injections of two batches of concentrated refined liver extract (15 U.S.P. units per ml. prepared by Lederle Laboratories. The red-cell cou and clinical condition of most of these patients strikingly improved. The new extract was given in doses judged to be equivalent to the doses of the liver extract previously used.

It is suggested that the use of relatively impotent liver extracts was the main reason why the condition of the patients deteriorated between 1940 and 1948.

An explanation is suggested for the anomaly of obtaining an apparently satisfactory clinical trial with liver extracts of unsatisfactory therapeutic potency.

I wish to thank Dr. J. V. Dacie for his advice and encouragement throughout this investigation; the physicians of the Postgraduate Medical School for permission to treat their patients; the Lederle Laboratories Division of the American Cyanamid Company for supplying the liver extract used and Mr. J. Linehan and Mr. L. Wallett for technical help.

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‡ The assay of this material with *Lactobacillus leichmanii* 3 (A.T.C.C. 7830 or A.T.C.C. 4797) as test organism was 25 µg./m of vitamin B_{12} (Lederle Laboratories). With *L. lactis* Dorn the assay was 22 µg./ml. of vitamin B_{12}.

TREATMENT OF SYPHILIS DURING PREGNANCY

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In treating syphilis during pregnancy, we have two bjects: (1) to protect the unborn child, and (2) to cure he expectant mother, who may soon become pregnant gain. This paper records the results of treating 300 regnant women with penicillin in conjunction with rsenic and bismuth.

MORBIDITY AND MORTALITY OF INHERITED SYPHILIS

Kampmeier (1946) found that, when syphilis goes untreated, pregnancy terminates in miscarriage or stillbirth in 24% of cases; in 20% the offspring are born healthy and in 56% they are born with syphilitic infection. Of the infected infants one in four will die in the first month and some of the other three may develop late manifestations. Women with untreated syphilis are said to have a stillbirth-rate 8 times higher than that of non-syphilitic women, and the mortality-rate of their infants in the first week of life is 3 times the normal. Inherited syphilis makes the child more prone to intercurrent infections, and generally speaking, of all the children born to untreated syphilitic women, 40% die before attaining the age of one year. The incidence of premature births is no higher for syphilitic pregnant women than for others.

FIELD OF INVESTIGATION

The 300 patients were drawn from rural, urban, heavy industrial, and seaport areas in the counties of Northumberland and Durham and the cities of Newcastle upon Tyne and Gateshead.

As the local incidence of contagious syphilis in females of childbearing age increased tenfold during the war years, routine Wassermann blood-tests for women attending antenatal clinics were introduced in 1943. Between 1944 and 1949, 71,645 such tests were performed and 515 (0·7%) women with a "positive blood" were referred to our department for further examination. Of 398 who attended, 62 were found to be free from syphilis, 36 were receiving treatment elsewhere, another 60 had already received an adequate amount of arsenic and bismuth, 35 were chronic defaulters, and the remaining 205 were infected and untreated.

The incidence of positive Wassermanns (0·7%) is perhaps slightly lower than that for other areas in Great Britain; 1%, the established figure for Norway, is probably nearer the actual figure for this country. According to Kampmeier (1946), Beck and Daily maintain that about 10% of syphilitic pregnant women give a negative Wassermann, and it is therefore possible that more than 0·7% of the women tested were in fact infected.

To these 205 pregnant women thus found to be syphilitic and hitherto untreated, I have added another 95 patients who reached the clinic through other channels. Of the total 300, 132 (44%) suffered from primary or secondary syphilis, 122 (41%) had no symptoms at all, 7 (2%) showed evidence of late infections (e.g., tabes dorsalis or tertiary lesions), and 39 (13%) had congenital syphilis. Latent infection was treated as energetically as contagious syphilis; for the infected female who is no longer contagious can still transmit the disease to the fœtus as long as twenty years after acquiring the infection. Those suffering from inherited syphilis were given treatment rather for their own benefit than to safeguard the fœtus. Beerman et al. (1942), reviewing recent literature, concluded that "third generation syphilis, if it exists, must be uncommon since most of the reported cases fall down when subjected to critical analysis and the strict criteria of Fournier and Finger."

TREATMENT SCHEDULE

Arsenic ('Novarsenobillon' or 'Stabilarsan') was administered intravenously: the initial dose of 0·3 g. was repeated after ninety-six hours; thereafter 0·45 g. was given for nine weeks at intervals of seven days. At the same time 0·2 g. of bismuth oxychloride was given by deep intramuscular injection once weekly for thirteen weeks. Altogether, the thirteen-week schedule included 2·6 g. of bismuth and 4·65 g. of arsenic.

A course of penicillin was given before (in the majority of cases), during, or after the completion of, the arseno-bismuth part of the treatment. Irrespective of the frequency of administration and the type of preparation employed, a total of 2·4–3 mega-units was given to patients with seronegative primary syphilis and a dose of 4 mega-units to all the others. In deciding the initial dosage of penicillin we took account at first of the possibility of actual or threatened abortion; but experience showed this precaution to be unwarranted. For those patients (the majority) who were admitted to hospital, the original three-hourly aqueous-injection schedule was soon replaced by 0·3 mega-unit of oil-wax injections given twice daily for five to seven days according to the type of infection. Domestic difficulties and bed shortage, especially the former, precluded a longer sojourn in hospital, but it was an advantage to admit the patient for a few days (1) because it ensured that she received her full quota of penicillin, (2) because it won her future coöperation, (3) because it provided a rest, welcomed and appreciated by many harassed housewives, and (4) because it solved the problem of attendance at the clinic, which distance and lack of transport often made difficult. Of 20 women who were permitted to attend as outpatients for once-daily oil-wax injections—over a period of eight to fourteen days, according to the type of syphilis—2 had to come into hospital to complete their treatment and 3 failed to bring their infants for examination.

The above penicillin-arseno-bismuth schedule, known as a P.A.B. unit, was at first regarded as adequate for contagious and latent syphilis in expectant mothers. However, when 600 patients (409 males and 191 females) suffering from seropositive contagious syphilis were treated in this clinic with one P.A.B. unit, the number of relapses was 16 (2·67%) of which 3 were clinical and 13 were serological. (The observation period ranged from six months in all to forty-two months for 34 patients.) Though this relapse incidence was small, we thought that better results would be obtained by giving 2 P.A.B. units or more, and from July, 1948, onwards this became our custom. It is still too early to say whether the results are better.

Since a P.A.B. unit required thirteen weeks to complete, those reporting late in pregnancy could only receive a full course of penicillin, plus a varying fraction of heavy metal, before delivery. Of the 300 women in our series, 33 (11%) failed to complete their course of arsenic and bismuth, since they reported no earlier than the third trimester of pregnancy. This lateness was attributable to the fact that some rural antenatal clinics are only held monthly, and to the belief of some women that there is no need to go to the clinic before the sixth month. But lateness in starting treatment did not seem to make much difference to the effects on the child, and the course was concluded after recovery from the confinement. Likewise, satisfactory results seemed to be obtained irrespective of the virulence or type of maternal infection (table I).

RESULTS

Table I shows the results of pregnancy in the 300 women who before delivery received a full course of

TABLE I—OUTCOME OF PREGNANCY IN 300 WOMEN WHO RECEIVED AT LEAST 1 P. + ¼ A.B.

Type of syphilis	Abortion	Stillbirth	Alive and well	Congenital syphilis	Died in first month	Died in first year	Unknown	Total
Contagious	3	5	112	—	3	3	6	132
Early latent	1	—	58	—	1	—	4	64
Late latent	1	4	50	—	1	1	1	58
Late ..	—	—	5	—	—	1	1	7
Congenital	—	1	36	—	—	—	2	39
Total ..	5	10	261	—	5	5	14*	300

* 3 infants born full-term alive and apparently well but the mothers refuse to have them tested. 11 mothers left the district.

penicillin plus at least a quarter of the course of arsenic and bismuth (1 P. + ¼ A.B.). It will be seen that satisfactory results were obtained irrespective of the virulence or type of maternal infection.

Of the abortions, 1 was self-induced, 2 were probably not syphilitic in origin since they occurred before the sixteenth week of pregnancy, and no apparent cause could be found for the remaining 2. Of the deaths in the first month, 3 were attributable to convulsions and a 4th to pneumonia, which also accounted for the death of another under twelve months. Unfortunately, since none of these 4 children were in hospital when they died, necropsies were not performed. Of the 10 stillborn children 1 was examined post mortem, with negative findings; but the part played by syphilis in the other 9 is difficult to assess.

When the outcome of pregnancy in these women under treatment is compared with the outcome of their previous pregnancies (table II) it is clear that treatment protects the fœtus. Excluding an adverse stillbirth-rate, the figures bear comparison with those of the city of Newcastle upon Tyne during the same period. No doubt, however, the figures for the city, being so much larger, are less liable to statistical error.

MANIFESTATIONS OF INTOLERANCE OF TREATMENT

Apart from local discomfort and stiffness—noticeable especially amongst those receiving the original three-hourly aqueous injections of impure calcium penicillin salt, which also often produced low-grade fever—penicillin produced no untoward results. Arsenic and bismuth were very well tolerated save in 2 patients who developed on their limbs localised patches of erythema accompanied by itching and irritation, which readily responded to dimercaprol (BAL) administered twice daily for two days and three days respectively. Each treatment with dimercaprol consisted in deep intramuscular administration of the contents of one ampoule (2 ml. of a 5% solution) as supplied at that time by the Medical Research Council. In our experience the use of dimercaprol has almost always arrested arsenical dermatitis when given in the early stages, and has thereby considerably reduced the dangers attendant on neoarsphenamine treatment.

COMMENTS ON TREATMENT

Antisyphilitic treatment given in pregnancy should attempt not only to safeguard the fœtus but also to cure the mother. It should occupy the least possible time and preferably should be completed during pregnancy. Does penicillin meet all these requirements? Its main advantage is that it enables the treatment schedule to be shortened: in pre-penicillin days arsenic and bismuth treatment, to give optimum results, had to be started by the fifth month of pregnancy at the latest. With modern products, penicillin very rarely produces signs of intolerance, or pain and discomfort.

As to protection of the fœtus, Goodwin and Moore (1946), Ingraham et al. (1947), and a host of other authors report excellent results from its employment, by itself, during pregnancy. The frequency of administration and the total dosage remain to be determined, and the original scheme by which 2·4 mega-units was given at intervals of two to three hours over seven and a half days can produce adverse results (Cole et al. 1946) Speiser et al. (1947) advocate at least 4 mega-units, while Ingraham et al. (1947) report an unfavourable pregnancy outcome in 5% of women with symptoms of early syphilis and in 1·6% of those with early latent infection, irrespective of the type of penicillin course used. The Council of Pharmacy and Chemistry (1948) state that satisfactory results attend the administration of 4–6 mega-units, given in divided doses every two to three hours for eight to fifteen days. But such frequent treatment must be a strain on staff and patient alike, and few expectant mothers in our part of this country can afford to stay in hospital longer than a week. Also the question arises whether such treatment will prove equally effective in exterminating the maternal disease, especially the early contagious stage.

Moore (1948) estimates that relapse occurred in 25–35% of those suffering from contagious syphilis who had been given 2·4 mega-units in three-hourly doses over seven and a half days. More recently (1949), advocating 10 injections of 0·6 mega-unit of procaine penicillin in aluminium monostearate, given daily or less frequently, he estimates that in early contagious syphilis a 10–15% relapse-rate may be anticipated. While appreciating that the patient need not be in hospital for the latter form of treatment, the relapse-rate is still high. Administration of aqueous penicillin three-hourly, or of procaine aluminium stearate penicillin daily, is designed to maintain an adequate blood-penicillin level; but it is by no means the unanimous opinion that penicillin treatment should be planned with this end in view.

With all due admiration for such enterprise, I prefer more conservative therapy and still adhere to the suggestions made in 1945 by Colonel L. W. Harrison (then chief adviser in venereology to the Ministry of Health) concerning the combined use of penicillin and heavy metals. Much has been written about the toxicity of arsenic and bismuth in pregnancy, but is it really so formidable? In the present series the very few who manifested intolerance responded remarkably well to the early administration of dimercaprol. This valuable drug has proved very successful when administered in

TABLE II—OUTCOME OF PREGNANCY IN INFECTED AND HEALTHY WOMEN

Group	Total no. of pregnancies	Child alive and well (%)	Abortion (%)	Stillbirth (%)	Congenital syphilis (%)	Died in first month (%)	Died in first year (%)
Previous pregnancies in 202 women in present series* (untreated)	279	70·2†	9·5	6·4	2·1	6·4	5·4
Current pregnancies* (treated)	286	91·1	1·8	3·5	—	1·8	1·8
Control group‡							
1945	4836	—	—	2·8	—	2·4	4·0
1946	6079	—	—	2·8	—	2·4	4·1
1947	6449	—	—	2·7	—	2·1	4·4
1948	5373	—	—	2·8	—	2·1	3·9

* Excludes those where current pregnancy outcome is unknown.

† Only 73% of these were examined since in the remainder coöperation was not forthcoming for various reasons—e.g., refusal to bring the children.

‡ Newcastle statistics, kindly supplied by Dr. W. S. Walton, medical officer of health.

the outpatient department to all showing early signs and symptoms of intolerance to heavy-metal treatment.

It may be suggested that penicillin alone should be given during pregnancy, to protect the fœtus, and the arseno-bismuth part of the treatment should be deferred until pregnancy is over. A careful analysis of the problem of default in this department has provided overwhelming evidence against such a procedure, since a large proportion of pregnant women with latent infection fail to appreciate the gravity of the disease and default after confinement.

DIAGNOSIS OF INFANTILE INHERITED SYPHILIS

Except in virulent infection, signs of inherited syphilis are seldom well developed before the third week of life. A thorough clinical examination—especially of the skin, mucosal surfaces, abdominal viscera, and skeletal system—may fail to reveal any abnormality; nutrition may be normal or nearly so; yet the mother's history of inadequate treatment in pregnancy should warn the clinician that the infant may be infected. In such cases radiological investigation of the long bones shortly after birth may reveal widespread epiphyseal or periosteal abnormalities. Where serological findings in early infancy are giving cause for anxiety, radiological examination must be repeated even if the initial findings were negative. Further examination is similarly called for where there are radiological abnormalities but the serum test is negative. Intensive bismuth therapy during the last few weeks of pregnancy may cause increased density in the metaphyseal regions during the first six weeks of life, but repeated X-ray examination during the ensuing weeks will reveal a reduction in the density. If they become apparent later than the sixth or eighth week of life, bone abnormalities may be due to other conditions, such as rickets, familial hæmolytic anæmia, or erythroblastosis.

That the diagnosis may rest on serological examination alone is shown by a review of 58 consecutive cases of inherited syphilis in children under five years of age reporting at this clinic: of 39 under one year of age 12 (31%) showed no clinical evidence of the disease, and 7 of the other 19 were likewise clinically negative. In the absence of clinical or radiological evidence, however, an initial positive result with the Wassermann test (which is the one employed in this clinic) is possibly of no real significance. It may merely indicate the transfer of syphilitic reagin from the maternal to the fœtal circulation, in which case (*a*) the degree of positivity will not exceed that of the mother and (*b*) the result will become negative by the fourth month at latest. The infant which preserves its initial high titre or maintains a high fluctuating level beyond the early weeks of life, should be regarded as infected. Occasionally an infected infant appears healthy, has a negative *initial* blood test, but shows a steadily rising titre in the first few months of life.

SUMMARY

In 300 pregnant women, syphilis was treated with penicillin and also arsenic and bismuth. All the women received their scheduled dosage of penicillin (2·4 to 4·0 mega-units) and at least a quarter of their scheduled dosage of arsenic (4·65 g.) and bismuth (2·6 g.) before delivery, but in 33 cases the course of arsenic and bismuth had to be completed after the child was born.

As regards the outcome of pregnancy, the results were very satisfactory, even when the disease was virulent and treatment was begun late.

Penicillin with small amounts of arsenic and bismuth will protect the fœtus; but it may not fully cure the mother. A conservative form of treatment is therefore advisable, and it is suggested that all syphilitic pregnant women should have a full course of arsenic and bismuth as well as penicillin. Such treatment is well tolerated.

In the first few weeks of life a positive Wassermann reaction, in an apparently healthy infant, does not necessarily imply that infection has been inherited, and a negative reaction does not necessarily imply that infection has *not* been inherited. Repeated serological examination is necessary before reaching a conclusion.

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EXCRETION OF INTRAVENOUSLY ADMINISTERED DEXTRAN *

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PARTLY hydrolysed dextran was introduced as a plasma substitute by Grönwall and Ingelman (1944, 1945). These and other investigators, such as Thorsén (1947, 1949), have expressed the opinion that in vivo dextran is oxidised and broken down. Ingelman (1949) found that in rabbits given thyroid extract intravenously administered dextran disappeared from the blood more rapidly than usual; and he suggested that the increased metabolism accelerated the breakdown of dextran.

Several groups of workers, including Grönwall and Ingelman (1944, 1945), Bohmansson et al. (1946), and Bull et al. (1949), have reported that 20–30% of the injected dextran is excreted by the kidneys during the first 24 hours. Bull et al. (1949) concluded that the fate of the remaining 75% was still in doubt. By chemical quantitative and serological non-quantitative methods, they found that a small amount of dextran was retained in the body tissues, the lymph-nodes and spleen having the highest content. Even 56 days after administration, dextran could be detected serologically in the tissues. Certainly a small amount of dextran is normally taken up by the reticulo-endothelial system.

Bull et al. (1949) found no sign of enzymatic breakdown of dextran when it was incubated with blood, tissue extracts, and tissue suspensions. Indeed, taking into account the specificity of the diastatic enzymes of the body, enzymatic breakdown of dextran seems improbable; and this substance is probably eliminated in some other, unknown, way.

The high permeability of the liver sinusoids and of the capillaries of the intestinal wall led us to investigate the possible elimination of dextran from the blood in these organs.

EXPERIMENTAL RESULTS

For the analyses of dextran two methods of estimation were used:

1. Treatment of the media with glacial acetic acid and basic lead acetate. After filtration, the dextran content was determined polarimetrically, + 190° being taken as the specific rotation of dextran. Proteins were removed by boiling with Sörensen reagent.

2. The method described by Hint and Thorsén (1947) for estimating dextran in blood.

Uptake by liver and intestine.—Rabbits narcotised with 'Dial' were given dextran intravenously. Blood

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* Communication to a staff meeting of the Surgical Clinic, Karolinska Sjukhuset, Stockholm, on Feb. 24, 1950.

TABLE I—OUTCOME OF PREGNANCY IN 300 WOMEN WHO RECEIVED AT LEAST 1 P. + $^1/_4$ A.B.

Type of syphilis	Abortion	Stillbirth	Alive and well	Congenital syphilis	Died in first month	Died in first year	Unknown	Total
Contagious	3	5	112	—	3	3	6	132
Early latent	*1*	—	*58*	—	*1*	—	*4*	*64*
Late latent	1	4	50	—	1	1	1	58
Late ..	—	—	5	—	—	1	1	7
Congenital	—	1	36	—	—	—	2	39
Total ..	5	10	261	—	5	5	14*	300

* 3 infants born full-term alive and apparently well but the mothers refuse to have them tested. 11 mothers left the district.

penicillin plus at least a quarter of the course of arsenic and bismuth (1 P. + $^1/_4$ A.B.). It will be seen that satisfactory results were obtained irrespective of the virulence or type of maternal infection.

Of the abortions, 1 was self-induced, 2 were probably not syphilitic in origin since they occurred before the sixteenth week of pregnancy, and no apparent cause could be found for the remaining 2. Of the deaths in the first month, 3 were attributable to convulsions and a 4th to pneumonia, which also accounted for the death of another under twelve months. Unfortunately, since none of these 4 children were in hospital when they died, necropsies were not performed. Of the 10 stillborn children 1 was examined post mortem, with negative findings; but the part played by syphilis in the other 9 is difficult to assess.

When the outcome of pregnancy in these women under treatment is compared with the outcome of their previous pregnancies (table II) it is clear that treatment protects the fœtus. Excluding an adverse stillbirth-rate, the figures bear comparison with those of the city of Newcastle upon Tyne during the same period. No doubt, however, the figures for the city, being so much larger, are less liable to statistical error.

MANIFESTATIONS OF INTOLERANCE OF TREATMENT

Apart from local discomfort and stiffness—noticeable especially amongst those receiving the original three-hourly aqueous injections of impure calcium penicillin salt, which also often produced low-grade fever—penicillin produced no untoward results. *Arsenic and* bismuth were very well tolerated save in 2 patients who developed on their limbs localised patches of erythema accompanied by itching and irritation, which readily responded to dimercaprol (BAL) administered twice daily for two days and three days respectively. Each treatment with dimercaprol consisted in deep intramuscular administration of the contents of one ampoule (2 ml. of a 5% solution) as supplied at that time by the Medical Research Council. In our experience the use of dimercaprol has almost always arrested arsenical dermatitis when given in the early stages, and has thereby considerably reduced the dangers attendant on neoarsphenamine treatment.

COMMENTS ON TREATMENT

Antisyphilitic treatment given in pregnancy should attempt not only to safeguard the fœtus but also to cure the mother. *It should occupy the least possible time and* preferably should be completed during pregnancy. Does penicillin meet all these requirements? Its main advantage is that it enables the treatment schedule to be shortened: in pre-penicillin days arsenic and bismuth treatment, to give optimum results, had to be started by the fifth month of pregnancy at the latest. With modern products, penicillin very rarely produces signs of intolerance, or pain and discomfort.

As to protection of the fœtus, Goodwin and Moore (1946), Ingraham et al. (1947), and a host of other authors report excellent results from its employment, by itself, during pregnancy. The frequency of administration and the total dosage remain to be determined, and the original scheme by which 2·4 mega-units was given at intervals of two to three hours over seven and a half days can produce adverse results (Cole et al. 1946). Speiser et al. (1947) advocate at least 4 mega-units, while Ingraham et al. (1947) report an unfavourable pregnancy outcome in 5% of women with symptoms of early syphilis and in 1·6% of those with early latent infection, irrespective of the type of penicillin course used. The Council of Pharmacy and Chemistry (1948) state that satisfactory results attend the administration of 4–6 mega-units, given in divided doses every two to three hours for eight to fifteen days. But such frequent treatment must be a strain on staff and patient alike, and few expectant mothers in our part of this country can afford to stay in hospital longer than a week. Also the question arises whether such treatment will prove equally effective in exterminating the maternal disease, especially the early contagious stage.

Moore (1948) estimates that relapse occurred in 25–35% of those suffering from contagious syphilis who had been given 2·4 mega-units in three-hourly doses over seven and a half days. More recently (1949), advocating 10 injections of 0·6 mega-unit of procaine penicillin in aluminium monostearate, given daily or less frequently, he estimates that in early contagious syphilis a 10–15% relapse-rate may be anticipated. While appreciating that the patient need not be in hospital for the latter form of treatment, the relapse-rate is still high. Administration of aqueous penicillin three-hourly, or of procaine aluminium stearate penicillin daily, is designed to maintain an adequate blood-penicillin level; but it is by no means the unanimous opinion that penicillin treatment should be planned with this end in view.

With all due admiration for such enterprise, I prefer more conservative therapy and still adhere to the suggestions made in 1945 by Colonel L. W. Harrison *(then chief adviser in venereology to the* Ministry of Health) concerning the combined use of penicillin and heavy metals. Much has been written about the toxicity of arsenic and bismuth in pregnancy, but is it really so formidable? In the present series the very few who manifested intolerance responded remarkably well to *the early administration of dimercaprol.* This valuable drug has proved very successful when administered in

TABLE II—OUTCOME OF PREGNANCY IN INFECTED AND HEALTHY WOMEN

Group	Total no. of pregnancies	Child alive and well (%)	Abortion (%)	Stillbirth (%)	Congenital syphilis (%)	Died in first month (%)	Died in first year (%)
Previous pregnancies in 202 women in present series* (untreated)	279	70·2†	9·5	6·4	2·1	6·4	5·4
Current pregnancies* (treated)	286	91·1	1·8	3·5	—	1·8	1·8
Control group‡							
1945	4836	—	—	2·8	—	2·4	4·0
1946	6079	—	—	2·8	—	2·4	4·1
1947	6449	—	—	2·7	—	2·1	4·4
1948	5373	—	—	2·8	—	2·1	3·9

* Excludes those where current pregnancy outcome is unknown.

† Only 73% of these were examined since in the remainder coöperation was not forthcoming for various reasons—e.g., refusal to bring the children.

‡ Newcastle statistics, kindly supplied by Dr. W. S. Walton, medical officer of health.

the outpatient department to all showing early signs and symptoms of intolerance to heavy-metal treatment.

It may be suggested that penicillin alone should be given during pregnancy, to protect the fœtus, and the arseno-bismuth part of the treatment should be deferred until pregnancy is over. A careful analysis of the problem of default in this department has provided overwhelming evidence against such a procedure, since a large proportion of pregnant women with latent infection fail to appreciate the gravity of the disease and default after confinement.

DIAGNOSIS OF INFANTILE INHERITED SYPHILIS

Except in virulent infection, signs of inherited syphilis are seldom well developed before the third week of life. A thorough clinical examination—especially of the skin, mucosal surfaces, abdominal viscera, and skeletal system—may fail to reveal any abnormality; nutrition may be normal or nearly so; yet the mother's history of inadequate treatment in pregnancy should warn the clinician that the infant may be infected. In such cases radiological investigation of the long bones shortly after birth may reveal widespread epiphyseal or periosteal abnormalities. Where serological findings in early infancy are giving cause for anxiety, radiological examination must be repeated even if the initial findings were negative. Further examination is similarly called for where there are radiological abnormalities but the serum test is negative. Intensive bismuth therapy during the last few weeks of pregnancy may cause increased density in the metaphyseal regions during the first six weeks of life, but repeated X-ray examination during the ensuing weeks will reveal a reduction in the density. If they become apparent later than the sixth or eighth week of life, bone abnormalities may be due to other conditions, such as rickets, familial hæmolytic anæmia, or erythroblastosis.

That the diagnosis may rest on serological examination alone is shown by a review of 58 consecutive cases of inherited syphilis in children under five years of age reporting at this clinic: of 39 under one year of age 12 (31%) showed no clinical evidence of the disease, and 7 of the other 19 were likewise clinically negative. In the absence of clinical or radiological evidence, however, an initial positive result with the Wassermann test (which is the one employed in this clinic) is possibly of no real significance. It may merely indicate the transfer of syphilitic reagin from the maternal to the fœtal circulation, in which case (*a*) the degree of positivity will not exceed that of the mother and (*b*) the result will become negative by the fourth month at latest. The infant which preserves its initial high titre or maintains a high fluctuating level beyond the early weeks of life, should be regarded as infected. Occasionally an infected infant appears healthy, has a negative initial blood test, but shows a steadily rising titre in the first few months of life.

SUMMARY

In 300 pregnant women, syphilis was treated with penicillin and also arsenic and bismuth. All the women received their scheduled dosage of penicillin (2·4 to 4·0 mega-units) and at least a quarter of their scheduled dosage of arsenic (4·65 g.) and bismuth (2·6 g.) before delivery, but in 33 cases the course of arsenic and bismuth had to be completed after the child was born.

As regards the outcome of pregnancy, the results were very satisfactory, even when the disease was virulent and treatment was begun late.

Penicillin with small amounts of arsenic and bismuth will protect the fœtus; but it may not fully cure the mother. A conservative form of treatment is therefore advisable, and it is suggested that all syphilitic pregnant women should have a full course of arsenic and bismuth as well as penicillin. Such treatment is well tolerated.

In the first few weeks of life a positive Wassermann reaction, in an apparently healthy infant, does not necessarily imply that infection has been inherited, and a negative reaction does not necessarily imply that infection has *not* been inherited. Repeated serological examination is necessary before reaching a conclusion.

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EXCRETION OF INTRAVENOUSLY ADMINISTERED DEXTRAN *

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PARTLY hydrolysed dextran was introduced as a plasma substitute by Grönwall and Ingelman (1944, 1945). These and other investigators, such as Thorsén (1947, 1949), have expressed the opinion that in vivo dextran is oxidised and broken down. Ingelman (1949) found that in rabbits given thyroid extract intravenously administered dextran disappeared from the blood more rapidly than usual; and he suggested that the increased metabolism accelerated the breakdown of dextran.

Several groups of workers, including Grönwall and Ingelman (1944, 1945), Bohmansson et al. (1946), and Bull et al. (1949), have reported that 20–30% of the injected dextran is excreted by the kidneys during the first 24 hours. Bull et al. (1949) concluded that the fate of the remaining 75% was still in doubt. By chemical quantitative and serological non-quantitative methods, they found that a small amount of dextran was retained in the body tissues, the lymph-nodes and spleen having the highest content. Even 56 days after administration, dextran could be detected serologically in the tissues. Certainly a small amount of dextran is normally taken up by the reticulo-endothelial system.

Bull et al. (1949) found no sign of enzymatic breakdown of dextran when it was incubated with blood, tissue extracts, and tissue suspensions. Indeed, taking into account the specificity of the diastatic enzymes of the body, enzymatic breakdown of dextran seems improbable; and this substance is probably eliminated in some other, unknown, way.

The high permeability of the liver sinusoids and of the capillaries of the intestinal wall led us to investigate the possible elimination of dextran from the blood in these organs.

EXPERIMENTAL RESULTS

For the analyses of dextran two methods of estimation were used:

1. Treatment of the media with glacial acetic acid and basic lead acetate. After filtration, the dextran content was determined polarimetrically, + 190° being taken as the specific rotation of dextran. Proteins were removed by boiling with Sörensen reagent.

2. The method described by Hint and Thorsén (1947) for estimating dextran in blood.

Uptake by liver and intestine.—Rabbits narcotised with 'Dial' were given dextran intravenously. Blood samples were withdrawn simultaneously from the carotid artery, from the portal vein by direct puncture and from the hepatic vein by means of a ureteric catheter introduced via the jugular vein. The dextran content was determined by the method of Hint and Thorsén (1947). No evidence was found of significant dextran uptake by, or clearance from, blood in the liver or intestine; and if there is any uptake in these organs, it amounts to about 0·5 mg. of dextran per ml. of blood passing through them.

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* Communication to a staff meeting of the Surgical Clinic, Karolinska Sjukhuset, Stockholm, on Feb. 24, 1950.

Incubation of dextran with tissue extracts.—Incubation of dextran with blood and extracts of ground liver tissue (the latter produced by extracting the ground tissue for 24 hours with cold Ringer's solution at + 2°C under sterile conditions) at 38°C, revealed no breakdown of dextran, judged by dextran and glucose determination. Incubation with glycerin extracts of pancreas and pig's intestine for 96 hours gave the same result.

Excretion into the gastro-intestinal canal.—In fasting rabbits, under dial anæsthesia, the gastro-intestinal canal was divided at the pylorus and at the ileocæcal valve. The œsophagus was not tied off from the cardia. A cannula was inserted at the pylorus, and another into the lower end of the ileum. The dextran content in the stomach and small intestine was measured polarimetrically during 6 hours after the intravenous administration of 40 ml. of 6% dextran in physiological saline. In the gastric juice, about 190 mg. of dextran was found in about 110 ml. of juice, while about 26 mg. of dextran was found in about 35 ml. of intestinal juice; the intestinal juice contained no dextran during the first 3 hours of the experiment.

A cat (2·5 kg.), after fasting for 24 hours, was given 40 ml. (2400 mg.) of a 6% dextran solution intravenously. The distal part of the common bile-duct was ligated and the duodenum divided at the pylorus just proximal to the duodenojejunal flexure; and a cannula was inserted into the common bile-duct. The proximal end of the duodenum was closed. The œsophagus was not tied off at the cardia. Cannulæ were inserted into the stomach through its pyloric end and into the distal end of the duodenum; the gastric juice, bile, and pancreaticoduodenal juice were collected separately. The juices were taken up during 8 hours 50 minutes; and the dextran content was determined by the Hint-Thorsén method. Tests before the administration of dextran showed none to be present.

Altogether 0·24 g. of dextran was found in the gastric juice (8 ml.) and 0·44 g. in the pancreaticoduodenal juice (22 ml.). No dextran could be found in the bile (1 ml.). Thus in about 9 hours, 28% of the injected dextran was excreted into the alimentary canal.

CLINICAL STUDIES

Three subjects with no symptoms or signs of urinary disease, who had fasted for 15 hours, were given 800 ml. of 6% dextran intravenously. Histamine was given subcutaneously in the ordinary dose. The gastric juice was collected through a gastric tube during 4 hours. The results are shown in table I. Fæces collected during the following 24 hours contained no dextran. (In further experiments human fæces, diluted with two parts of physiological saline and filtered, were incubated with dextran for 46 hours at 38°C. The dextran was found to have been broken down fairly rapidly.)

TABLE I—RECOVERY OF DEXTRAN FROM GASTRIC JUICE IN MAN

Case no.	Gastric juice recovered (ml.)	Dextran in gastric juice	
		%	Total (g.)
1	95	0·18	0·17
2	43	0 26	0·11
3	54	0 09	0 05

ACUTE INTESTINAL OBSTRUCTION

Three cases of ileus in man were studied.

Case A.—A man, aged 43, was operated on for ureteri calculus. The operation, by the retroperitoneal route, wa completed without difficulty. On the 4th day after operatio *paralytic ileus and gastric atonia developed. On the 6th da* a gastric and an intestinal fistula were made. The patien was given 800 ml. of 6% dextran and large quantities o plasma, blood, and albumin each day. There seemed to b no great disturbances of the water and electrolyte balance On the 10th day we started to estimate the dextran conten of the urine and of gastric juice from the fistula. The result are shown in table II. On the evening of the 12th da di-isopropylfluorophosphonate (D.F.P.) was tried as a las resort to cure the atonia. An abundant outflow (3600 ml through the gastric fistula followed; this juice containe a very large quantity of dextran—3·6%.

TABLE II—RECOVERY OF DEXTRAN IN A CASE OF INTESTINA ILEUS

—	Days after onset of ileus						
	10	11	12	13	14	15	16
6% dextran intravenously:							
Volume (ml.) ..	800	800	800	800	800	800	8
Dextran content (g.)	48	48	48	48	48	48	4
Gastric juice from fistula:							
Volume (ml.) ..	1300	1100	3600	1400	2100	1750	—
Dextran content (g.)	0·1	0·1	100	5	0	0	—
Dextran in urine (g.) ..	15	5	0	12	14	12	—
Blood non-protein nitrogen content (mg. per 100 ml.)	75	75	150	192	172	210	23

Case B.—This patient was a man, aged 29, suffering from lead intoxication, ileitis, and ileus. Three days after on intravenous administration of 48 g. (800 ml.) of 6% dextran his gastric juice was collected through a cannula. It containe 0·74% dextran.

Case C.—A man, aged 42, suffering from ileus and anuria following an operation for cancer of the rectum, received 10 litres of 6% dextran solution in the course of nine days Three days after the last administration, 0·3% dextran was present in the blood, and 0·81% in the gastric juice.

EFFECT OF INTESTINAL OBSTRUCTION

In order to investigate the possible deleterious effect of a certain intestinal content of dextran in acute intestinal obstruction some preliminary experiments were performed on rats.

Under ether anæsthesia the small intestine of 30 rats was ligated with silk, under sterile conditions, about 10 cm above the ileocæcal valve. The animals were divided into three groups of 10. Into the intestinal lumen of these animals was injected through a fine needle 3 ml. of (*a*) physiological saline, (*b*) 0·5% dextran, or (*c*) 1% dextran. The mortality-rate and the total fluid content in the lumen of the stomach and small intestine at the time of death were determined. After death the proximal and distal ends o the stomach and small intestine were clamped and taken out After removal of the mesentery from the intestine, the flui in the lumen was allowed to run out into a measuring-tube

No significant difference was found in the mortality rate of the control animals and those injected wit dextran: 50% of the animals, died 20–24 hours afte the operation, and about 30% 30–36 hours after th operation. A quite significant difference in the intestina fluid content was, however, found; the content i animals injected with 1% dextran was one and a ha times or twice that in the control animals.

Possibly the rather short survival-time of all th animals obscures the eventual drawbacks of dextra The increase in the fluid content of the intestine of th animals injected with dextran suggests, however, tha dextran may cause harmful retention of fluid at thi site. In acute obstruction of the small intestine such a effect is undesirable.

CONCLUSIONS

From these experiments it seems that when dextran administered intravenously some that is not excreted rough the kidneys or deposited in the reticulo-dothelial system leaves the body after elimination into e alimentary canal.

This dextran is split, probably in the lower part of e intestinal canal. Elimination by this route cannot rm the normal body. With ileus, however, the effect dextran in causing accumulation of fluid in the testinal lumen is undesirable and probably harmful. cases of acute intestinal obstruction dextran must, erefore, be administered very cautiously.

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GENERAL ANÆSTHESIA FOR BRONCHOGRAPHY IN CHILDREN

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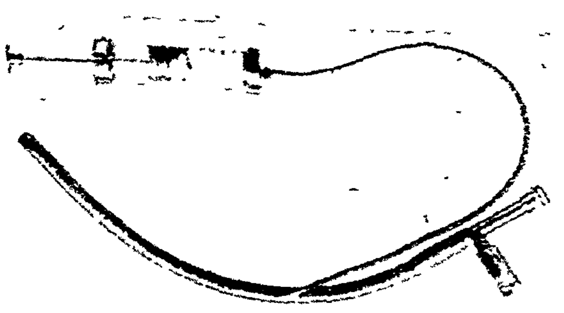
THE modern treatment of bronchiectasis and other pulmonary disease by segmental lobectomy makes perfect bronchograms essential. In children these can only be obtained with certainty if the anæsthesia is good and there is coöperation between the surgical team and the radiologist.

Various methods of anæsthesia have been used for bronchography in children. One of the more recent is that devised by Baker (1941), which involved the giving of bromethol and hyoscine as premedication, and nitrous oxide, oxygen, and ether by a closed-circuit technique for the maintenance of anæsthesia, the iodised oil being introduced through a catheter passed down an endotracheal tube, and the circuit being made airtight by the introduction of a pharyngeal pack. This method, although satisfactory in some respects, has some shortcomings: an explosive mixture is used; no closed circuit can be guaranteed to be airtight; and the endotracheal tube is partially blocked by the introduction of the catheter.

In our hands other methods are unsatisfactory either because of the anæsthetic used or because of the methods of introduction of the oil. In devising a method of general anæsthesia for bronchography the main factors which have to be considered are an unobstructed airway, exclusion of the risk of an explosion, and quiet respirations. During the past two years in the chest unit at the Warwick Hospital a method has been worked out which fulfils these considerations.



The special intratracheal tube with Cobb's type endotracheal tube junction and syringe attached to side tube.

APPARATUS

A special endotracheal tube has been constructed (see figure) with a side tube for the introduction of the radiopaque fluid. This endotracheal tube has a special advantage in that the airway is in no way obstructed as when catheters are placed within an ordinary endotracheal tube.

The other requisites are an ordinary Boyle's machine without an ether bottle (London County Council 1936); a Cobb's endotracheal tube junction to allow suction to be carried out in an emergency; and the other instruments necessary for endotracheal intubation.

PREOPERATIVE TREATMENT

When a patient has sputum, it may be necessary for him to be treated as an inpatient before undergoing bronchography, because it is desirable to get rid of accumulated sputum if good bronchograms are to be obtained. Such inpatient treatment will consist of postural drainage twice a day for $^1/_2$–1 hour, penicillin inhalation, and expectorant mixtures.

TECHNIQUE

Anæsthesia is induced with 5% intravenous sodium thiopentone given slowly; 0·5–1·0 g. is given to children aged 4–12 years.

Direct laryngoscopy is performed, and the larynx sprayed with a few minims of 5% cocaine.

The special endotracheal tube well lubricated with 'Nupercaine' ointment is introduced into the trachea as far as the entry of the side tube, enabling the largest endotracheal tube to be passed.

The endotracheal tube is next connected with the Cobb's junction to the Boyle's machine (half-open).

The gases flowing through the Boyle's machine are nitrous oxide and oxygen in equal volumes passing over trichlorethylene (contained in the chloroform bottle). The patient is now ready for the injection of the radiopaque fluid down the side tube of the endotracheal tube, and it is possible to get the fluid in any particular lung area that is required, by placing the patient in the necessary position.

DISCUSSION OF TECHNIQUE

By using this method the risk of explosion is eliminated, because trichlorethylene is non-explosive below 25·5°C at the normal pressure of 740–760 mm. Hg in an atmosphere of 100% oxygen (Jones and Scott 1943). The airway is unobstructed by catheters and, so long as the iodised oil is given slowly, no obstruction is likely to occur. The respirations are quiet and slow. There is definite inspiratory and expiratory phases; this fact gives adequate time for X-ray exposures in the expiratory phase of respiration.

In an emergency the bronchial tree can be sucked dry and 100% oxygen given with such ease that no danger exists.

The patient can be readily moved into any position without any interruption of anæsthesia.

SUMMARY

A method of balanced anæsthesia for bronchography in children and a special *endotracheal tube* for the introduction of radiopaque fluids into the bronchial tree are described.

We wish to thank Mr. J. Leigh Collis, M.D., F.R.C.S., consultant thoracic surgeon, Warwick Hospital, for his encouragement and advice, and Dr. M. Israelski, of the X-ray Department, Warwick Hospital, for his coöperation. The endotracheal tube was constructed to our specification by Medical & Industrial Equipment Ltd., 12, New Cavendish Street, London, W.1.

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Reviews of Books

Manual of the International Classification of Diseases, Injuries, and Causes of Death

Vol. II. *Alphabetical List.* H.M. Stationery Office. 1950. Pp. 524. 30*s.* the two volumes.

THOUGH the World Health Organisation's classification[1] has been obtainable in this country for the past year, the index volume has only lately made its appearance. But the delay seems to be amply justified by the fact that every effort has been made to compile a really full index of the diagnostic terms employed in British and American medical circles. Medical-Latin equivalents are also included for such English terms as are not easily recognisable by persons of non-English-speaking countries.

The new international index is thus much fuller than that of the American Standard Classified Nomenclature, though the numerous coded categories of the latter permit of much more differentiation between diagnoses. It may at last provide medical statisticians with what they have long needed—a diagnostic index so extensive that competent lay persons are able to assign correct codings to the most obscure diagnoses, with only occasional recourse to medical advice. And the value of statistics based on the W.H.O. classification will of course be considerably enhanced by the greater uniformity of interpretation that will be achieved by using this exceptionally comprehensive index for assigning cases to categories. Though vol. I classified all diseases, morbid conditions, and types of injury into 800 categories, there are over 40,000 entries in the main index of vol. II, which also has a separate index for causes of stillbirth and an additional index to external causes of injury.

Words are entered under both British and American spellings, and it has been deemed necessary to include many unsatisfactory terms in use, together with the names of certain surgical operations associated with specific diseases, since surgeons not uncommonly write down the name of the operation performed rather than the name of the disease necessitating it.' The compilers of the index have wisely added a useful introductory guide to its use.

The Pathology of Articular and Spinal Diseases

DOUGLAS COLLINS, O.B.E., M.D. Lpool, reader in clinical pathology, University of Leeds. London: Edward Arnold. 1949. Pp. 327. 35*s.*

THIS valuable book is the outcome of fifteen years' special interest in bone and joint pathology. Dr. Collins quotes Smith Petersen's findings that the new articular surfaces which are fashioned during the operation of 'Vitallium' cup arthroplasty become covered with hyaline cartilage, and concludes that repair and regeneration of articular cartilage are possible, though the process is not usually very active. Rarefaction of bone, he points out, is only a radiological term; for the accurate study of such a dynamic process as bone metabolism, the combined findings of the radiologist, biochemist, and pathologist must be correlated. He divides osteo-arthritis pathologically into four grades ranging from destruction of superficial articular cartilage to complete destruction of cartilage and eburnation of underlying bone. Marginal osteophytes, he points out, are made by the recasting of the joint under the influence of altered mechanical forces. Arthritis, too, he suggests, always results from altered mechanical conditions leading to loss of harmony between form and function. A straightforward account of gout is followed by a chapter on bacterial arthritis. Dr. Collins thinks that gonococcal arthritis always results from a light bacteræmic infection of joints, and joint tuberculosis almost always arises by hæmatogenous spread from the lungs; bone and joint tuberculosis are intimately connected. He maintains that there are many clinical types of rheumatoid arthritis and that there are no pathological grounds for distinguishing these as different diseases; indeed, in a later chapter he supports, on pathological grounds, the American contention that ankylosing spondylitis is a manifestation of rheumatoid arthritis. The specific lung changes in rheumatoid arthritis, described by other workers, are not mentioned, but he discusses Hench's work on the effects of 'Cortisone' and A.C.T.H. on rheumatic fever, rheumatoid arthritis, and other conditions. His clear thinking on osteo-arthritis of the spine is most welcome: he points out that osteophytes on the margins of the vertebral bodies are not true manifestations of osteo-arthritis—they are an incidental finding and no known clinical syndrome is associated with them. For the picture associated with such osteophytic outgrowths he uses the word osteophytosis, reserving osteo-arthritis for the condition that affects the diarthrodial *posterior intervertebral* joints

The book is beautifully illustrated by photographs, microscopical sections, diagrams, and reproductions of radiographs.

Biomicroscopy of the Eye

Vol. II. M. L. BERLINER, M.D., assistant professor of clinical surgery (ophthalmology), Cornell University, New York. *London: Cassell. 1949. Pp. 785. £12 12s.*

THE first volume of this work made it seem likely that we were at last to see an authoritative text on the slit-lamp appearances of the eye. This second, and presumably concluding, volume fully bears out that promise. It deals with the iris, lens, zonule, and vitreous, and with what little has been achieved with fundus examination. In comprehensiveness it challenges comparison with the classical volumes of Vogt, but most readers will probably prefer Berliner because the text is smoother and less broken up by case-histories. He gives accounts of some conditions which are only doubtfully distinct clinical entities: for example, the description of gonococcal iritis leaves the impression that slit-lamp appearances support the view that this is a distinct entity. It is however fair to add that in such accounts he is quoting observations by others rather than giving a personal view. Where slit-lamp findings have clarified clinical pictures, his detailed descriptions are beyond criticism, and he is catholic enough to include accounts of axial cataract, though, like most slit-lamp authorities, he is apparently unconvinced of its existence. The 82 colour plates carried by the two volumes are in themselves an excellent atlas. The book is likely to remain, for many years to come, the most balanced exposition of knowledge on the biomicroscopy of the eye and the definitive work in English.

What are You Doing Here? (Edinburgh: International Publishing Company. 1950. *Pp.* 128. 10*s.* 6*d.*).—Mrs Cecil G. Trew gives a short account of her experiences as a surgical artist with the Army in Europe, during three months in the winter of 1944. As the book is in the nature of a personal record for friends, it does not describe the work she did—though some little sketches of war scenes illustrate the text.

Modern Treatment Year Book, 1950 (Published for the Medical Press by Baillière, Tindall, and Cox. 1950. Pp. 346 17*s.* 6*d.*).—This annual survey of modern treatment again makes its welcome appearance under the imprimatur of Sir Cecil Wakeley and a team of experts. The selection of articles covers a wide field of medical and surgical practice to keep the general practitioner well informed. He may not himself be able to carry out all the forms of treatment recommended, but an intelligent knowledge of new procedures is bound to be useful to him.

List of Fungi Recorded and Pathogenic for Man and Higher Animals in Britain (London: Cambridge University Press. 1950. 2*s.*).—Dr. G. C. Ainsworth's list[1] is an ample and selective compilation of the bibliography of pathogenic fungi of medical and veterinary interest found in Great Britain in both indigenous and imported disease. The fungi are arranged in taxonomic groups and under each name is given a list of references, many of which are amplified by notes indicating the principal features of the paper. Two indexes are included—one giving the hosts with their associated parasites, and the other the list of fungi in alphabetical order, with the authorities. Dr. Ainsworth's painstaking work should prove of great value to writers of papers on fungus diseases.

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[1] See *Lancet*, 1949, i, 743.

[1] Reprinted from *Transactions of the British Mycological Society*, 1949, 5, 318.

THE LANCET

LONDON: SATURDAY, JUNE 10, 1950

Unification of Government Medical Services

THE appointment of Sir JOHN CHARLES as chief medical officer to the Home Office as well as to the Ministries of Health and Education is a welcome innovation.

In this country the arrangements for medical advice to Government departments have been made piecemeal. As each department has felt the need for such advice it has produced its own organisation and recruited its advisers—with little apparent reference to the medical advisory structures existing in other departments, and with all kinds of anomalies of salaries and status. We have never had a unified service such as has existed in the United States for 150 years in the U.S. Public Health Service; nor have we adopted the Australian system whereby all doctors in the service of the federal government are medical officers of the federal department of health, lent by its director-general—who must himself be a doctor—to the other departments. From the time when Sir JOHN SIMON was appointed central medical officer to the Board of Health in 1855, the number of our Government departments, and their need for medical advice, has increased until today there are no less than twenty such departments with medical advisory structures of various types, the large majority including whole-time medical officers. The first small step towards unification was attempted by the Ministry of Health Act in 1919, which laid down that medical inspection and treatment of school-children should be transferred from the Board of Education to the Ministry of Health. This has never been carried out; but, perhaps because of Sir GEORGE NEWMAN's intimate connections with the board, the chief medical officer of the Ministry of Health was appointed also to the post of C.M.O. of the Board (now Ministry) of Education. For the next 30 years the position was unchanged; and, though Sir WILSON JAMESON's efforts to achieve liaison and coördination were successful, his known wish for unification was unfulfilled. Now the ice is perhaps again beginning to melt, and it is logical that the Home Office, with its special commitments for the care of children and for civil defence, should be the first to come into closer relation with the Ministry of Health.

The advantages of a unified medical service, say on Australian lines, would be manifold; and opinions in its favour have been expressed by professional bodies including the British Medical Association. Even admitting that some of the separate services are highly specialised, the pooling of doctors in one service would ease the problems of temporary shortages of staff and would facilitate secondment for all sorts of desirable purposes, not only within Great Britain but for the Colonial and other posts which are now so hard to fill. Considerable overlapping, as for example between Labour, National Insurance, Pensions, and Health on such matters as reablement and industrial hygiene, might be avoided; indeed many difficulties of the National Health Service would have been less if reform of the Government medical services could have been introduced at the same time. A unified approach and machinery for salary and other establishment questions would become possible, and it would be an advantage to all parties if the doctors in the smaller departments, when they feel frustrated by lay chiefs, could turn for guidance and support on professional matters to a professional chief outside their department. Admittedly, at the previous rate of progress we could not expect such unification much before A.D. 2450; but a Government which has displayed so much interest in medical organisation could choose no better time than the present for setting this part of its house in order.

The Growth Hormone

IT was not easy to realise, when listening to Prof. HERBERT M. EVANS's lively address at the Royal Society of Medicine on May 24, that this young-old man is one of the pioneers of modern endocrinology. Nevertheless, it was EVANS and LONG[1] who in 1921 injected a simple saline extract from the anterior pituitary lobe into young rats and produced experimental gigantism. This was the first time that the administration of any extract of the anterior lobe had been shown experimentally to affect an animal. It was two years before ALLEN and DOISY[2] studied the œstrous cycle of the mouse by the vaginal-smear technique, thus providing a sufficiently delicate method of biological assay of œstrogens to form a basis for the development of modern knowledge of the ovarian hormones. It was six years before ASCHHEIM and ZONDEK[3] discovered a potent gonadotropin in the urine of pregnant women and thus pointed the way to the present views on the relation between the pituitary, the ovaries, and the uterus in the menstrual cycle and in pregnancy. It was eight years before LOEB[4] injected an anterior pituitary extract which produced thyroid enlargement in guineapigs. Not only does the credit for the first discovery of the growth hormone belong to EVANS, but most of the subsequent work which eventually led to the isolation of the pure hormone[5] was done in his institute in the University of California, where careful studies have since been made of the properties and functions of this compound.

The growth hormone (or "somatotropin" as EVANS prefers to call it) is a protein not easily soluble in water and readily destroyed by pepsin, trypsin, and boiling. Its molecular weight is 44,250, and the protein, which contains no prosthetic groups, has 369 peptide linkages. The presence of the amino and tyrosine groups is essential for growth promotion. The functions of this hormone have been intensively

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1. Evans, H. M., Long, J. A. *Anat. Rec.* 1921, 21, 61.
2. Allen, E., Doisy, E. A. *J. Amer. med. Ass.* 1923, 91, 1018.
3. Aschheim, S., Zondek, B. *Klin. Wschr.* 1927, 6, 1322.
4. Loeb, L. *Amer. J. Path.* 1929, 5, 71.
5. Li, C. H., Evans, H. M. *Science,* 1944, 99, 183.

studied in animals in the past six years, though no observations have yet been made on the human subject. It might be expected that one of its main effects would be on skeletal growth. After hypophysectomy a calcium barrier, the "closing membrane," appears between the epiphysis and diaphysis, and though some epiphyses never unite, longitudinal growth is prevented by this barrier. Injection of growth hormone leads to the immediate disappearance of the closing membrane and initiation of active chondrogenesis and osteogenesis. In the temporomandibular joint, for instance, the entire head of the mandible is converted into cartilage cells. Alkaline phosphatase has been shown to be indispensable in bone-formation,[6] and it is not surprising that there is a rise in the plasma alkaline-phosphatase level after administration of growth hormone. There is also retention of inorganic phosphorus.

Ever since the classical work of HOUSSAY [7] it has been recognised that the anterior pituitary exerts a profound influence on carbohydrate metabolism. The pituitary's adrenocorticotropic hormone (A.C.T.H.) stimulates the adrenal gland to secrete the group of cortical hormones, the 11-oxysteroids, consisting of KENDALL'S Compounds E ('Cortisone') and F and possibly factors present in the "amorphous fraction," which increase gluconeogenesis (the conversion of proteins to sugar) and therefore increase the storage of sugar in the liver as glycogen and also cause a rise in the blood-sugar level and sometimes glycosuria. This effect is entirely independent of any action on the islets of Langerhans. In contrast, the effect of growth hormone is intimately associated with pancreatic function, and it has been shown that pure growth hormone stimulates the β-islet cells. In some circumstances this leads to secretion of insulin with subsequent hypoglycæmia. On the other hand, the studies of Prof. F. G. YOUNG and his colleagues have made it clear that protracted administration of pituitary extracts containing growth hormone may induce permanent diabetes associated with degeneration of the β-cells. In his Sidney Ringer lecture at University College Hospital, YOUNG pointed out that, in some species, growth hormone exhibits growth-promoting properties in the tissues of young animals, which are primarily attuned to growth, whereas in adults of the same species extracts containing the hormone produce not growth but diabetes. This fact may have clinical significance, for a syndrome has been recognised in which pregnancy gives rise to maternal "obesity" and large babies (usually with a birth weight of over 10 lb.), and later in life these mothers may develop diabetes.

Growth hormone also exerts a fundamental effect on protein metabolism. A.C.T.H. is a "protein-waster": through the agency of 11-oxysteroids it mobilises protein from the skin, the matrix of the bones, and the peripheral vessels to convert it into glycogen. Growth hormone is a "protein-sparer": it produces nitrogen retention and a positive protein balance. Rats treated with growth hormone and maintained on a constant diet put on weight. They look "fat" compared with their control litter-mates kept on the same diet, but analysis of the carcass reveals that their "obesity" is due to increase in the protein content and consequent water retention, and that the fat content is low. YOUNG suggests that there is a depletion of their fat stores, the fat being "burnt" to supply the necessary energy for retaining protein and building it up into muscle and other tissues to account partially for their increased weight. Nitrogen retention leads to water retention, and the fluid content of their tissues is significantly higher than in the control animals. It is possible that some types of human "obesity" belong to this metabolic pattern. Clinicians often find difficulty in avoiding the conclusion that the "obesity" in some of their patients is largely due to fluid retention though the physiologist may have little evidence of it. Postpartum obesity, or obesity occurring during pregnancy and increasing thereafter, is a well-recognised syndrome. This may perhaps be associated with over-activity of growth hormone during pregnancy; and indeed, the maternal obesity—large baby—diabetes syndrome already referred to suggests that this overactivity does sometimes occur in pregnancy. In these circumstances weight would increase without any change in appetite or food intake.

Another property of growth hormone is its action on lactation. FOLLEY and YOUNG [8] have shown that administration of pure growth hormone to cows with failing lactation increases the milk yield. This method appears, moreover, to be more efficient than treatment with prolactin or with iodinated proteins. YOUNG regards lactation as essentially a manifestation of "growth."

Thus a good deal is known about the experimental effects of pure growth hormone in animals. Its clinical potentialities however have not yet been probed. Crude anterior pituitary extracts with potent growth-promoting properties in animals have been used in cases of pituitary infantilism, achondroplasia, and other types of dwarfism, but they have been almost uniformly disappointing. Though pure somatotropin was isolated six years ago, none has yet been obtainable for clinical use. This is understandable, since the yield of material from animal pituitaries must necessarily be small in terms of human dosage. Furthermore the clinical indications will probably be limited. Dwarfism due to pituitary failure is rare, most cases being a result of constitutional or genetic defect. Nevertheless, when clinical trials are practicable the results will be watched with interest.

Blood-cells under the Electron Microscope

WE have become familiar with the appearance of minute bodies like viruses or the smaller bacteria when photographed through the electron microscope at high magnifications. The viruses are mostly too small to be seen with the optical microscope, so the electron microscope is particularly suitable for detecting them and rendering their profiles visible. But the electron microscope can also be used for studying the details of larger objects if they can be made thin enough, can be mounted on a sufficiently thin and non-distorting support, and can be properly dried.

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[6] Moog, F. *Biol. Rev.* 1946, 21, 41.

[7] Houssay, B. A., Magenta, M. A. *Rev. Asoc. méd. argent.* 1924, 37, 389.

[8] Young, F. G. *Biochem. J.* 1945, 39, 515. Cotes, P. M., Crichton, J. A., Folley, S. J., Young, F. G. *Nature, Lond.* 1949, 164, 992.

This seems a formidable programme for blood-cells, but it has been solved in several ways. In all the methods the cells are supported by a film of 'Formvar,' a plastic material. When a glass coverslip is coated with a thin film of formvar, leucocytes and red cells will stick to the film, and. even more important, the leucocytes will flatten out so that their cytoplasm is extended as a thin layer. The leucocytes on formvar films can be fixed and dried in various ways, and the film can be transferred to the object screen of the electron microscope without distortion. The first electron photomicrographs of platelets were published in Germany in 1939[1]; more recently most of the hæmatological work with the newer techniques has been reported from the U.S.A. and France.

The method adopted by Rebuck and Woods[2] was to scrape small lesions on the forearm skin of volunteers exposing the corium. Formvar-coated coverslips were kept in contact with the lesions for different periods, during which leucocytes migrated and stuck to the formvar. The leucocytes were then fixed by rapid freezing and dehydration in vacuo. Tissues were also used in the same way to make imprint preparations on formvar films. After fixation the films were transferred to electron microscope screens and no metallic shadowing was added. The photographs of cells treated in this way show much detail in both cytoplasm and nucleus. In a small histiocyte or monocyte with a horseshoe-shaped nucleus, at a magnification of × 5400, the nucleus appears very distinctly as a black network of thick strands and many black masses with scattered white areas in the interstices; the cytoplasm appears as a much finer network with the white interspaces occupying the larger area. At × 18,000 it is clear that the structure of the whole cell is an interlacing network, the nucleus being constructed of relatively coarse strands and fibrils with few interstices, and the cytoplasm of relatively fine strands with large spaces between them. At × 94,000 the blurred picture, like lumps of cotton-wool on a black background, shows that the fibrillar crosspieces are anchored to, but do not cross, the nuclear membrane. The granules of neutrophil granulocytes, which were indistinct under the optical microscope, when magnified 18,000 times by the electron microscope are clearly seen as rounded, oval, or rod-shaped objects: at × 72,000 they are as much as an inch across. Eosinophil granules are spherical and larger still. Pictures of lymphocytes at × 5400 are not very clear, though the nuclear pattern of coarse chromatin masses can be made out and contrasted with the fine chromatin pattern and clearly demarcated nucleoli of immature forms. For some later pictures, instead of freeze-drying, Rebuck[3] fixed the cells by immersion in osmic acid and drying in air. In these the nuclear structure is rather obscure though it is definable up to × 6800, the cytoplasm is uniformly black, and specific granules are poorly defined.

The French workers have made much use of "shadowing" the cell structure with a vaporised heavy metal, thus producing relief pictures like the well-known ones of viruses. As in these the nucleus appears as an amorphous white mass, only cytoplasmic detail can be studied, but these details are remarkably clear even at × 15,000. Bessis[4] studied blood-platelets by this method and showed that they start as rounded forms but later throw off many long thin processes like the dendrites of nerve-cells. Their cytoplasm contains numerous minute bodies—at × 20,000 they are about 1 mm. across—which remain after mechanical destruction of the platelets. Similar bodies were found in the cytoplasm of polymorphs and they are presumably connected with the structure of protoplasm. Bernhard and colleagues[5] preferred a slightly different technique. In heparinised blood, kept at 37°C, they immersed formvar-coated coverslips for varying times. Leucocytes stuck to the formvar and spread out, whereas rinsing with saline removed all the red cells. The preparation was then fixed in osmic acid vapour and dried over phosphorus pentoxide. They also added metallic shadowing; so their preparations show cytoplasmic detail only. The most striking of their findings concerns the cytoplasmic dendritic processes that leucocytes throw out under these conditions. On a film that has been immersed in blood for 10 minutes a polymorph × 6300 appears as a roughly oval cell about 7 inches long with a few dendritic processes. After immersion for half an hour many very long dendritic processes appear; these are very fine branching filaments with thickenings at the junction points, and the processes from one leucocyte sometimes appear to anastomose with those from other leucocytes. Lymphocytes form much fewer dendrites and they are short and stubby, more indented than branched, whereas monocytes, even on films immersed for 20 minutes, show no cytoplasmic protrusions at all.

How far are these appearances artefacts, produced by the preliminary preparation? The network pattern of the cells dried at low temperature in vacuo may well be nearer the real thing than the structure seen after osmic acid treatment, since such chemical fixation is likely to alter the arrangement of molecules in the protoplasm. In dried frozen preparations ice-crystals may be formed, and it is difficult to say how far the reticular structure observed is a result of these. Rebuck and Woods[2] point out that the reticular structure can also be seen in cells that have not been frozen, and such appearances certainly fit in with the present-day view that protoplasm is composed of a framework of linear molecules. So far the electron microscope studies of blood-cells, though they have perhaps added to our knowledge of the minute structure of the cells, have produced nothing which is applicable to disease or which immediately alters our views on the significance of the stained artefacts we are accustomed to use for diagnostic purposes. Since electron microscopy yields information especially about the cytoplasm, this is not really surprising. Other methods of studying cytoplasmic detail, such as supravital staining and phase-contrast microscopy, have also contributed little to the refinement of diagnosis. For the time being, at any rate, the electron microscope is not a desirable or necessary addition to the equipment of the clinical hæmatology department. Finances being as they are, this is just as well.

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1. Wolpers, C., Ruska, H. *Klin. Wschr.* 1939, 18, 1077, 1111.
2. Rebuck, J. W., Woods, H. L. *Blood,* 1948, 3, 175.
3. Rebuck, J. W. *Amer. J. clin. Path.* 1949, 19, 217.
4. Bessis, M. *Pr. méd.* 1949, 57, 954.
5. Bernhard, W., Braunsteiner, H., Febvre, H. L., Harel, J. *Ibid,* 1950, 58, 472.

Annotations

DISEASES OF ADAPTATION

From ancient times many of the great clinicians have been well aware that the patient's emotional life has something to do with illness. Physicians such as Sydenham and Heberden studied the whole man. But the structural concept introduced by Virchow led to the separation of illness from the mind, and a consideration of disease as merely a disorder of organs and cells. With this separation of disease into different pathological entities, physicians became specialists, each attending to one or other of these diseases. As E. Weiss has put it, "medicine then interested itself in the study of the organism as a physiological mechanism impressed by blood chemistry and other methods of investigation, but unimpressed and even holding in contempt the psychological background of the patient which was not considered as scientific as the results of laboratory studies." But fortunately there are many signs that physicians are again realising that in health and disease there is a need to study man as a whole, the complete man. Thus, in our last issue Ranyard West urged that every doctor should ask himself Halliday's three questions: (1) Why did the patient take ill when he did? (2) What sort of man is it that has got this illness? and (3) Why is this *particular organ or function* affected? We have to discover how somatic changes occur as a result of psychogenic derangement of function, or of stress in general.

The great part that hormones play in the animal economy is generally recognised. How widespread is the influence of the hypothalamus on the endocrine system, and how the secretion of the anterior lobe of the pituitary body, and hence indirectly the activity of the thyroid gland and adrenal cortex, are under the control of the nervous system, was demonstrated in 1947 and 1948 by G. W. Harris and J. D. Green, while D. M. Hume in 1949 showed that the anterior hypothalamic centres form an essential link in the activation of pituitary adrenocorticotropic (A.C.T.H.) secretion following conditions of stress as well as administration of adrenaline. Upon nervous stimulation or contact with circulatory adrenaline, a humoral substance appears to be secreted by cells of the anterior hypothalamus which stimulates A.C.T.H. secretion; and George Thorn says that through this neurohumoral system the adrenal cortex may be activated to secrete 11·17-oxysteroids by a number of non-specific stresses and emotional factors. In 1948, in the Heberden oration, Philip Hench drew attention to the reversibility of rheumatoid arthritis, a reversibility which may occur spontaneously, therapeutically, or accidentally. He argued that the disease is possibly a biochemical disturbance of an unknown nature which is transiently corrected by some biological change. He restated his belief that rheumatoid arthritis is not necessarily a relentless chronic progressive disease. In 1949, with Kendall, Slocumb, and Polley, he demonstrated the dramatic effect of 17-hydroxy-11 dehydro-corticosterone (Compound E), later to be known as 'Cortisone.' This was a great advance in therapeutic research, extended by the work of Thorn on the use of A.C.T.H. These hormones, however, do not seem to alter the fundamental cause of the inflammatory changes which characterise certain of the rheumatic diseases.

Clinical experience, sometimes in contrast to statistical survey, has suggested that stress does precede the onset of rheumatoid arthritis, and often exacerbates the disease when this is established. Whether the response of the adrenal cortex to stress is merely a trigger mechanism setting off a train of events, already prepared in the body, or whether some permanent imbalance between the various corticosteroids becomes the dominant factor in the causation of arthritis, is not known. A possible and partial explanation was offered in 1946 by Prof. Hans Selye when he produced arthritis in animals by the administration of deoxycortone acetate.

In the Heberden oration on the Rheumatic Diseases as Diseases of Adaptation delivered to the Heberden Society on Friday and Saturday of last week, Professor Selye described the theory he terms "the general adaptation syndrome," and discussed his experimental work on animals and its application to clinical medicine. The diseases of adaptation he attributes to a breakdown of the hormonal adaptive mechanism. The organism reacts by means of a common hormonic mechanism, in which the adrenal cortex is primarily concerned, to a variety of stressor agents—traumatic stimuli such as heat, cold, X rays, infection, and emotional stress. Exposure to stressor agents will cause a triad of disturbances, thymicolymphatic involution, gastro-intestinal ulcers, and adrenocortical hypertrophy. He described how stress may be followed by an "alarm" reaction, a stage of resistance and a stage of exhaustion. Both damage and defence reactions take place. These, he said, are those mediated by either glucocorticoids or by glucocorticoids plus an *x factor* which liberates minerocorticoids. He emphasised the importance of the glucocorticoid and minerocorticoid balance in health and disease. Dependent on the severity and duration of the harmful stimuli, on sodium intake, and other factors, lesions resembling nephrosclerosis, periarteritis nodosa, and the "collagen" diseases are produced. Diseases such as peptic ulcer, hypertension, and "allergy" are determined by a disturbance in this adaptive mechanism. Finally he pointed out that, in his animal-experiments, deoxycortone caused a variety of lesions simulating rheumatic and other diseases according to the "conditioning factors" and the "target organ"; the therapeutic success of starvation in rheumatism, and the effect of pregnancy and jaundice are he believes, due to their acting as stressor agents which liberate A.C.T.H. endogenously.

Professor Selye remarked that the purpose of a theory in medicine is to act as a guide. Whatever the ultimate fate of the theory he has so fascinatingly developed, it may well point the way to the solution of at least some of the medical and social problems of stress.

RENAL TUBERCULOSIS IN CHILDHOOD

Tuberculosis of the kidneys is not a common manifestation of the disease in children as seen in the pædiatric clinics. Müller describes, in a monograph,[1] 56 examples found among 10,000 tuberculous children seen in the clinic of Wangen-im-Allgän, during 1928–46, and points out that, though uncommon, the condition is part of a generalised tuberculosis. It is discovered in the pædiatric clinic more often than in the urological department, and is prone to manifest itself differently in the two clinics: in only 10 cases did it appear in his series as a renal lesion, the rest of the patients being brought for endothoracic or skeletal tuberculosis. As a result of his experience, he believes that miliary tuberculosis can heal—a fact which he considers is insufficiently recognised. The primary foci are commoner in the lung than in the alimentary tract and the source of the infection must generally be sought in the family. Severe open pulmonary tuberculosis and severe open renal tuberculosis appear to be mutually exclusive. The development of renal tuberculosis in childhood may be slow, and Müller quotes two instances in which

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[1] Müller, R. W. *Über die Nierentuberkulose im Kindesalter.* Stuttgart: Thieme. 1948. Pp. 49. D.M. 6.30.

6–6½ years elapsed between the first demonstration of tubercle bacilli in the urine and the appearance of bladder symptoms. He emphasises the importance of routine urine analysis, and tuberculin tests, in diagnosis, but finds blood-sedimentation rates of no special significance. Tubercle bacilluria is by no means the rule in this disease. The indication for removal of the kidney depends in his view on the presence of extrarenal foci, but the prognosis of the disease is in any case bad and results of the operation have not been encouraging.

JOINT CONSULTATION

MANY hospitals have already arranged for joint consultation between management and staff; but the extent to which this arrangement is used, and the composition of the consultative committee, varies from one hospital to another. Such committees are now to be set up in all but the smallest hospitals; and their constitution and function (described by Mr. Dalton on p. 1086) are to be standardised.

In some respects the new scheme differs from those adopted in industry. Thus in industry the national approach has been largely discarded in favour of a more subtle one that is believed to evoke a better spirit of coöperation. In industry, again, it is now usually accepted that management and staff should be equally represented; and the Ministry of Health's suggestion that the management side should perhaps have fewer representatives (recommendations being reached "by agreement between the two sides") may prove too optimistic since in committees of this sort the two sides are not always unanimous and a show of hands is sometimes needed. The General Whitley Council, in drawing up the model constitution, seems to have been undecided as to the side on which senior officers should be represented. The machinery for producing the material on which the committee is to deliberate has not been described: nor that for the dissemination of information about the committee's findings. One is left wondering why five divisions of staff were selected for representation instead of the customary six; and no provision seems to have been made for the automatic resignation of delegates who neglect to attend meetings. However, these possible defects are less important than they would be in industry: for in hospital interests are less sharply opposed. We have every hope that the scheme will prove of real value.

SEX EDUCATION IN THE CINEMA

IN the last few weeks two American sex-education films have been exhibited in London, both of them fictional and designed to emphasise the dangers of ignorance, and both with the sponsorship of a number of social-hygiene organisations. Despite the soundness of the general idea, neither picture was particularly successful in doing what it attempted, and the main justification for showing them is that nothing better is available. American taste in presentation, and in sugaring the documentary pill, is badly out of key with the English audience; the antics of bobby-soxers in trouble strike very few sympathetic notes in our experience; and animated diagrams of the uterus and fallopian tubes, introduced with music, have little recognisable connection with the problems of conduct involved. The main criticism is not that made by the Public Morality Council when *Should Parents Tell?* was shown, but the risk that a useful kind of hygiene teaching may be made ridiculous through bad management. The suggestion in both these films that elementary physiological knowledge—rather than an adult attitude—is the main aim of sex education is sufficiently misleading in itself to be harmful.

A better idea of the kind of film which might be valuable is given by the series of short Canadian pictures, designed to illustrate various kinds of immaturity and personality defect, which were recently televised. The semi-fictional documentary could undoubtedly be used in sex education, both for adults and adolescents, but in a matter where cultural attitudes differ so widely films made in America are heavily handicapped from the outset. Documentaries with human interest are perhaps the one type of film which English studios handle superlatively well; and our own attitude to sex education lacks most of the emotive overtones so prominent in the American mind. If we can imagine a collaboration between the narration of Wilfred Pickles or the Radio Doctor, the script-writing of Mrs. Nesta Pain, and the production of *The Blue Lamp*, we can certainly envisage social-hygiene films which would be neither over-inhibited nor sensational, nor unintentionally funny. A high-level collaboration of this kind, adequately financed, would be worth any number of animated physiological models, and is certainly badly needed. It is an undertaking which might commend itself to one of the larger public foundations.

SOCIAL CLUB THERAPY

THE difficulty of every emotionally or mentally ill patient is to fit into society; but if he is ever to learn how to do this, he must have some society to fit into. For over ten years Runwell Mental Hospital has provided inpatients with a social club which they manage themselves, men and women together, and which gives them the chance of sharing many activities—such as indoor and outdoor games, social gatherings, and dramatic and other forms of entertainment. Many mental hospitals nowadays also sponsor outpatient clubs, where discharged patients can meet and gradually regain their social ease. Carrying the principle further, the Institute of Social Psychiatry, has established over the last ten years, about a dozen clubs for various kinds of psychiatric and asocial patients. The institute also founded the Social Psychotherapy Centre and Day Hospital, now a part of the National Health Service. This centre, which held its first visiting day on June 6, has a turnover of about 500 patients in the year, and carries a staff of some eight or nine part-time physicians, a psychologist, an occupational therapist, and psychiatric social workers. Patients are treated individually, in groups, or by occupational therapy, according to their needs, and they also become members of an appropriate social club. Thus a shy patient, whose heart fails at the thought of strange company, is offered a club where all the members are shy—a prospect which relieves his anxiety at once. The clubs vary in membership from 25 to about 70, and patients are encouraged to bring their wives or husbands to the gatherings. It is found that in the give-and-take of social intercourse at the clubs patients often learn to resolve their conflicts, find new outlets, or take the responsibility which they have been shunning or unconsciously desiring. At the same time they may be attending the centre, for individual or group psychotherapy. This treatment is in the main analytical; but the approach is liberal, for some of the staff are Freudians, some Jungians, while Dr. Joshua Bierer, the medical director, is an Adlerian. Since good results are claimed for all three methods, it seems that something more—or other—goes to the successful treatment of these patients than a particular theory of the inner causes of their illness. Among the group sessions held, one course perhaps deserves special notice. This is an instruction group in biophysiology, mainly for patients with anxiety states, in which they are taught the physical mechanisms which lie behind such things as tachycardia, an overactive gut, trembling fits, breathlessness, and sweating—symptoms which can be terribly alarming to those who believe them always to be the expressions of dangerous physical illness.

Child-guidance sessions are also held, and children with behaviour difficulties come daily for play therapy.

Since the principle followed with every case is to attack the difficulty from as many directions as possible, the parents are invited to join one of the clubs, in the belief that if they can better their own relations to society they will prove better society for the child; and so it is apt to turn out. The centre is in a pleasant house in Hampstead, and is open all day.

TERRAMYCIN

SUBSEQUENT work on the antibiotic terramycin, produced by *Streptomyces rimosus*, is justifying the hopes of its discoverers, Finlay and his colleagues,[1] of New York. It is a crystalline compound which forms salts with both acids and bases; these are stable at room-temperature and may be kept without loss of potency for at least a year. Pharmacological tests and limited clinical trials by Herrell et al.[2] at the Mayo Clinic have confirmed that the new antibiotic has a wide bacterial spectrum in vitro and in vivo, being effective against gram-positive and gram-negative organisms and some rickettsiæ and viruses. In many respects terramycin is comparable in its range of activity to 'Aureomycin,' and like aureomycin and chloramphenicol it is effective by mouth. When given in doses of 500–750 mg. six-hourly (i.e., 2–3 g. daily) it can be detected in active concentrations in the blood, cerebrospinal fluid, pleural cavity, bile, urine, and fæces. It also passes the placental barrier, and so can be given in pregnancy for the treatment of mother and fœtus. Terramycin is relatively non-toxic, and according to Herrell et al. the diarrhœa, nausea, and vomiting that sometimes occur when it is taken on an empty stomach can be overcome by giving it in a capsule with milk. The only other side-effect observed is glossitis, which has also been described with other antibiotics taken by mouth. With ordinary dosage the terramycin excreted in the fæces may produce concentrations as high as 2·5 mg. per ml., which will have much the same effect on the bacterial flora as the oral administration of aureomycin; clostridia, streptococci, and coliform organisms disappear and the fæces become odourless. Considerably higher concentrations are attained in the urine with terramycin than with aureomycin after comparable dosage by mouth.

Among the organisms sensitive to terramycin are pneumococci, *Staph. aureus*, hæmolytic and non-hæmolytic streptococci, *Strep. fæcalis*, gonococci, *Hæmophilus influenzæ*, *H. pertussis*, *Br. abortus*, *suis*, *and melitensis*, *Klebsiella pneumoniæ* (Friedländer's bacillus), *Bact. coli*, *Ps. pyocyanea*, *Pasteurella tularensis*, spirochætes, the rickettsiæ of typhus, Rocky Mountain spotted fever, Q fever, and rickettsial-pox, and the viruses of primary atypical pneumonia, lymphogranuloma venereum, and influenza. The preliminary clinical trials published by Herrell et al.,[2] King et al.,[3] and Hendricks et al.[4] in the United States show that the conditions responding satisfactorily to terramycin include pneumococcal pneumonia; urinary tract infections due to *Bact. coli*, *Ps. pyocyanea*, and streptococci; bacteræmia due to susceptible organisms; lung abscesses; follicular tonsillitis; and erythema multiforme. Hendricks and his colleagues have tried it in syphilis, gonorrhœa, and granuloma inguinale. After two doses of 1–2 g., with 6 hours between, the cure-rate claimed in gonorrhœa is 80–100%. It is too soon for any opinion on the ultimate value of terramycin in syphilis, but it will cause the spirochæte to disappear from the local lesion in 24–48 hours and a negative serological test is obtained a month after treatment. Only 2 patients with granuloma inguinale were treated; but in both of these the lesions had cleared by the third day.

Further clinical trials with terramycin are under way or in course of publication. It appears to be a most useful antibiotic with a wide range of activity, though owing to the dollar situation it may be some time before much is obtainable in this country.

LOOKING AT YOUNG CRIMINALS

CRIME is so troublesome for everybody that it deserves to be studied from as many standpoints and by as many good minds as possible. Sir Leo Page's book[1] on the young lag has a unique value of its own, for it contains case-histories of general interest, and a good deal of constructive comment on legal and penal methods. It is, moreover, a picture of the author, a humane, intelligent, and experienced man in contact with convicted criminals and attempting, with some success, to understand and help them. He has no special training in psychology, but is quite willing to profit from any insights it provides, so long as they do not conflict with "common sense." He specifically repudiates retribution as an improper and untenable theory of punishment. He is willing to learn, but unwilling to be bullied by experts. His attempts to make contact with delinquents, even when their attitude makes him indignant, are both painstaking and genuinely humane. Sexual offences leave him bewildered and disgusted. What the psychiatrist can get from this book is a picture of the best type of magistrate or prison governor that he will ever have to convince of the soundness of the interpretation he advances—a man who has his own ideas of the causation of crime in phenomena like irreligion, lack of discipline, and shortage of boys' clubs, and who makes serious efforts to verify them by observation. Sir Leo Page's viewpoint, quite apart from the respect commanded by his experience, is one which has to be kept constantly in mind.

If we contrast it with the method used by Mr. D. H. Stott in his recent survey[2]—based on a lower age-group—Sir Leo's method of approaching crime becomes easier to evaluate, and the criticisms of it which most psychologists would make become clearer. Sir Leo finds it impossible, in a case which is "as plain as a pikestaff," to swallow psychological suggestions of a greater underlying complexity. It is obvious, and a matter of common knowledge, that prostitutes rob their clients because they like money and want to have more of it—what more is there to be said? It is equally obvious that irreligion causes crime. This is a viewpoint which commands great sympathy, particularly when ill-judged theorising is rife in medical reports; but it is one which a fuller knowledge of the evidence might very well alter. To such arguments, Stott's investigation provides excellent and critical answers, which Page would almost certainly accept. The latter's picture of the aimless, affectless, and cultureless youth is an accurately observed study of what the sociologist calls asociality. More is already known, through reputable and dispassionate investigation, about these matters than he suggests. That is no criticism of his position. He is the receptive but critical audience to whom social sciences have got to prove their case, and they are likely to derive a good deal of benefit in doing so. If the pikestaff is less plain than it seems, we must demonstrate it in intelligible and convincing terms.

AT the close of the Third World Health Assembly, in Geneva on May 27, Rajkumari Amrit Kaur (India), the president, spoke of the Assembly's "heart-rending" task in cutting out necessary programmes, because of lack of money. W.H.O., she said, should be made better known to the peoples of each nation, for "it is on the peoples' pennies rather than on governmental donations that 'we will thrive.'"

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1. Finlay, A. C., et al. *Science*, 1950, 111, 85.
2. Herrell, W. E., et al. *Proc. Mayo Clin.* 1950, 25, 183. Herrell, W. E., Heilman, F. R. *Ibid*, 24, 157.
3. King, E. Q., et al. *J. Amer. med. Ass*, 1950, 143, 1.
4. Hendricks, F. D., et al. *Ibid*, p. 4.

1. The Young Lag. By Sir LEO PAGE, of the Inner Temple and South Eastern circuit, barrister-at-law. London: Faber. 1950. Pp. 320. 18s.
2. Delinquency and Human Nature. Carnegie Foundation. 1950. See *Lancet*, May 20, p. 963

Special Articles

BRITISH PSYCHOLOGICAL SOCIETY

Teaching of Psychology

THE medical section of the British Psychological Society met in London on May 24, under the chairmanship of Dr. H. V. DICKS, to discuss the Teaching of Psychology to Medical Students.

Dr. A. E. CLARK-KENNEDY, speaking as a general physician and dean of the London Hospital Medical School, said that this subject raised the whole question of how medicine should be taught to undergraduate students. It was useless to go on tinkering with the present system; rather, it was time to face complete reconstruction.

The object of the preclinical training was to give the student an idea of the nature of the normal, or (as Dr. Clark-Kennedy preferred to say) the average, man or woman. But how often did it succeed? The ordinary student, befuddled with anatomical fact and overwhelmed by physiological detail, hypnotised by the bogy of an examination which he must pass before he could start work in the wards, might gain a fair idea of the human body as a physicochemical machine, but he usually missed the fundamental concept of it as the product of the plan laid down at its conception and the environment in which it had developed. Moreover, the mind seemed to be omitted altogether from preclinical teaching.

> "We must teach, I think, that the development of the body conditions the development of the mind under the stimulus of education and experience, and that the development of the mind in this way to some extent affects the future development and maintenance of the body on which it depends. True that the *psychosomatic nature of mankind* may be difficult to understand, but is it more difficult than many of the physicochemical concepts which the student is asked to swallow? I doubt it. It is certainly much more important. It should be in his mind from the beginning."

Dr. Clark-Kennedy did not think it would ever be possible, under the existing system, to bridge the gap between the preclinical and clinical subjects by introductory courses or other devices of that kind. The preclinical system—in historical perspective, recent—was already out of date. It was right that the student should learn anatomy and dissect the whole body. He must also know his physiology, though some of the detail now taught could be cut out and the student could manage with less chemistry. But it was wrong that the student should spend his first three years, as at present, ignoring the mind. Moreover, though medicine must draw freely on science, why pretend that it could ever be a branch of applied science like mechanical engineering or commercial chemistry? The unbalanced scientific training provided by the universities was inadequate for a man destined to spend his life in medicine.

Propounding what he called "a most outrageous heresy," Dr. Clark-Kennedy said he was convinced that preclinical and clinical subjects should be taught together. The student should start to work in the wards a little in his first preclinical year, and the proportion of his time spent in the wards should then be progressively increased, while that spent in the laboratory should be correspondingly reduced. But the student should still do some laboratory work in his last clinical year. It would be said that this practice was followed in France, where it did not work; but it was logically right and must be made to work. If at 18 the student was old enough to go into battle, he was old enough to go into the wards.

> "I shall be told that you *cannot* teach any clinical medicine until a student has studied anatomy and physiology. Nonsense! I would like my students in the wards before they have been taught any anatomy or physiology. I see no difficulty in teaching them about mind and body, pain and fever, pulse and temperature, heredity and environment, fear and anxiety, repressions and instinct. Moreover, if they were taught medicine and science simultaneously, how much more exciting would their anatomy and physiology become."

Administrative difficulties must be overcome. At present students were crowded in a relatively small number of hospitals; the field of medical education could be spread much wider.

Psychology was learnt by contact with human nature and mankind; yet during his first three years the medical student led a life more divorced from the humanities and human nature than any other student's. The teaching of psychological medicine to the undergraduate student should be carried out, as far as possible, by general physicians and psychologists grounded in organic disease. The trouble was that the general physician was often content with dividing his cases into organic and functional, disclaiming any particular responsibility for the latter. "In consequence the student gains the idea that 'to be functional' is something peculiar, neither somatic nor psychic, merely discreditable. In fact, through the misuse of the word 'functional,' which has taken on a slang meaning, the whole picture of disease is bedeviled in the student's mind." But Dr. Clark-Kennedy thought this position would slowly change, as it had in the case of physiology.

Many students and doctors had a natural dislike of inquiring into the intimate affairs of other people's lives, while others lacked the tact required. Moreover, the type of mind which would make a good scientist or surgeon, or even a good physician where an organic problem was concerned, might be peculiarly unsuccessful at this aspect of medical practice; and this deficiency could only be remedied to a limited extent. At present there was too much concentration on inpatients, where the problem was usually one of diagnosis and treatment of an organic condition, and too little on outpatients, who provided a cross-section of disease with which the general practitioner had to deal. This aspect of medicine could only be taught in the outpatient department; but the teaching of psychological medicine would always be difficult. The key to both the teaching of psychology and the satisfactory organisation of the student's education lay in the reintegration of medicine. "We must break down the artificial distinctions which we ourselves have set up between health and ill health, body and mind, heredity and environment by teaching the preclinical and clinical subjects simultaneously."

STUDENT AND TEACHER

Prof. D. R. MACCALMAN (Leeds) remarked that while most medical schools gave some prominence to the teaching of psychiatry, some had not so far thought it necessary or desirable to include normal psychology in the curriculum. Yet if physiology was the logical predecessor to pathology, surely psychology was a necessary foundation to the teaching of psychopathology. He believed that any subject could be fitted into the medical course, provided it was shown to be important enough. Here the psychologists had themselves to blame. They should show that psychology was a scientific discipline, concerned with the measurement and comparison of measurable and comparable quantities.

In the preclinical years students relied greatly on intelligence and memory, for such subjects as physics and anatomy demanded little else. From the very beginning of their clinical studies they would be faced with people who were far from being rational in their behaviour; and to understand human nature, they needed qualities of character other than reason and intellect. In addition to open disparagement of psychology and psychiatry, the student came under the influence of theories and methods which underlay the hospital management of patients and the general philosophy of medical practice. As Colman had pointed out, patients were given advice, suggestions, encouragement, reassurance, or anything else which established the physician as an authoritative father-figure and the patient as the obedient and compliant child-suppliant. The problem with this method of psychotherapy was not its use by psychiatrists, who only saw the psychiatric patients, but its distressingly wide application by the general body of physicians.

The teaching of psychotherapy, Professor MacCalman declared, should begin in the first year at the medical school. From the very beginning the medical student should be taught that he himself was a human being, the success of whose work would largely depend on his reactions to the attitudes and emotional needs of his patients. The teacher must adapt himself to the student's immaturity. Much more use should be made of the tutorial system, and the teaching of small groups. In medical schools there was too much of what Adolf Meyer called "the adoration of personalities," and too little recognition of negative transference. Too many teachers played the authoritative father-figure, and demanded of the student the rôle of child-suppliant. Instead, the student required a teacher who would allow him to talk about his difficulties in learning, who would tolerate his ignorance, and who would correct his mistakes without malice or sarcasm. The teaching of psychology to medical students was the first step towards providing them with a knowledge of themselves and their fellow men which would illuminate and enrich their clinical skill as doctors.

THE STUDENT'S INTERESTS

Dr. A. D. **Harris**, of the Medical Research Council's applied psychology research unit, described the findings from the records of medical students who consented to be interviewed in an investigation into selection methods. Among 400 such students, the number of intending psychologists or psychiatrists was 44 (11%)—a proportion exceeded only by those who had not yet decided what they intended to do after qualifying (32%), and by those who wanted to be surgeons (24%). They were slightly more numerous than the general practitioners, and considerably more numerous than the adherents of general medicine or any other specialty. These figures agreed approximately with those for a provincial medical school given by a peripatetic correspondent in The Lancet.[1] Surgery held pride of place probably because of its obvious power to stimulate the imagination; the same factor might be recognised in the growing interest in psychology.

Of the 44 who wanted to be psychologists, 31 were interested in abnormal psychology, psychiatry, psychoanalysis, or psychological medicine; and 13 in general, experimental, or social psychology. Their reading-matter ranged from a systematic exploration of the *Encyclopædia Britannica* to an interest in the *Greyhound News*. An analysis of the authors read by the 22 ($5^1/_2$% of the total) who had read books on psychology showed that though an interest in psychology was fairly common among medical students, it was not always directed into the most profitable channels. On the basis of the first medical examination and a standard intelligence test, the students who wanted to specialise in psychology were not found to differ significantly from their fellows; but this group contained more of the highly intelligent and of the stupider students than would have been expected in a random sample. Interview records did not suggest that they were distinguishable from other medical students.

These considerations cast doubt on two objections sometimes raised to the teaching of psychology to medical students: (1) that such teaching was unfavourably received, and (2) that it might be unsettling or even dangerous to their mental stability. If students' preferences were to be considered, psychology had as good a claim as any other subject, except surgery, in the clinical period—and a far better claim than, say, botany in the preclinical years. As to the second objection, it would be as reasonable to argue that because some students were unduly worried about their physical health, there should be less instruction concerning the human body and its ailments.

Dr. Harris thought that the teaching of psychology to medical students should have a practical bias; the student should realise that the reasons for recognising a psychiatric emergency were of exactly the same kind as the reasons for recognising acute otitis media or a perforated appendix. What was taught should be verifiable, and so far as possible generally agreed. The application of these criteria might greatly reduce the amount which medical students could beneficially be taught. "If so," Dr. Harris concluded, "it seems to me that, whatever the state of demand, psychologists should be chary of accepting a more prominent rôle in medical teaching. It would be a mistake to suggest that psychologists are standing outside the medical schools waiting for an opportunity to make available a large body of fundamental teaching, until we are convinced that this is really the case."

Dr. **Emanuel Miller** said that in an investigation among third-year and fourth-year students he had obtained rather different results to Dr. Harris's. Asked whether they thought that psychology ought to be included in the medical curriculum, 35% answered No. Of those who answered Yes, 88% wanted the course in the preclinical years. He had found that a number had written "no" in answer to this question larger than they had written it in answer to other questions; some had written "no, no" and some had even written "never, never." This suggested that the negative replies were not entirely due to opposition to the idea of adding another subject to an overcrowded curriculum. Only 7% of the students had read any books of psychology.

A CONTINUING COURSE

Dr. Miller suggested that psychology could not be introduced into the medical curriculum by a mechanical addition of new subject-matter which lay outside an established tradition. A favourable mental climate could be produced in medical schools and hospitals only by the coöperation of physician and psychiatrist; both must make sacrifices for a common end—making medicine a branch of scientific humanism. The attitude of *non est vivere sed valere vita* could only be grounded in psychology. In a large measure psychology might prove to the young doctor more basically important than psychiatry, because he would be confronted by at least hypothetically normal patients. For all practical purposes the mental processes, outside of neurosis and psychosis, were within a normal statistical range. Throughout, the accent should be on the total person, so that when the student arrived at mental disorders he would see them as disturbances of persons and not as diseases. Nor should there be failure to teach the lesson of psychological constitution rooted in inheritance and blossoming in psychological types.

Though few students had much knowledge of life beyond the innuendoes of the Light Programme, an appreciable number knew something of social relations; and the elements of social psychology could and should be imparted to them, so that when they entered the wards and the outpatient department they would see sick people as social units. Since the mass teaching of psychology had certain grave disadvantages, students who attended lectures might be invited to special study groups.

Psychology should be taught with no other purpose than to illustrate its relevance in the departments of medicine which needed its fertilising influence; and it should be conveyed with a view to the student's being examined at the end of the period of instruction. If given in one block of lectures, the instruction would appear isolated from the body of medicine. The rudiments could be introduced in the physiology course; by the time students had completed their anatomy and physiology courses, they would have had perhaps five lectures, which would provide them with a basic vocabulary and basic concepts. When he entered the wards, the student could be supplied with lectures from which he would apply to special subjects the knowledge already gained. Problems of personality structure, interpersonal relations, and social psychology could be discussed at various periods of the clinical course, so that they were relevant to the various medical subjects. In pædiatrics the psychologist would give a short course on child development; and the gynæcologist might spare a few lectures for psychology of sexual development. The student would come to realise that psychology no more left the life of the hospital than did the expert on morbid anatomy and the applied physiologist. Above all, psychology should be taught with an eye to scientific method.

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[1] *Lancet*, 1949, i, 796.

Preferably the teaching should be done by a physician in psychiatry who knew his colleagues' prejudices and apprehensions, and understood the climate of the hospital and the mentality of the "normal patient." But some aspects of psychiatry, particularly scientific method, would best be conveyed by a trained general psychologist.

HARVARD AND MELBOURNE

Dr. D. W. **McElwain** (Melbourne) supported two points emphasised by the Harvard Commission on the Place of Psychology in an Ideal University.

The first was that all teaching of psychology in a university should be centralised. Should the teaching of all applied or specialised courses in psychology be conducted from the school of psychology which was primarily responsible for the training of psychologists, or was there a valid case for the present practice whereby special courses were conducted in the professional schools by teachers within these schools, who commonly were not psychologists? This issue arose, not only with the teaching of psychology in medical schools, but also with educational psychology in teacher-training and with industrial psychology in management courses. The teacher identified with a particular professional school was often cut off from the main stream of the subject which he presented to his students. The Harvard report recommended that "every psychologist in the university should be attached to the psychology department"; but, accepting this principle, was the teacher of psychopathology—a psychiatrist usually—a psychologist within this meaning? In the University of Melbourne the teaching of psychopathology was a function of the psychology department. The senior lecturer in psychopathology was qualified both in psychiatry and psychology. He was a full-time officer of the psychology department, responsible for the teaching of this subject, not only for the medical school, but also for the psychology department and for the department of social studies, which trained various social workers. This arrangement had been effective.

The second point emphasised in the Harvard recommendations was that any course in applied or specialised psychology should be preceded by a course in general psychology. The particular schools of medicine, theology, and the rest usually asked for short intensive courses of lectures which would make clear the psychological theory of the problems of the school concerned. Such courses were worse than a waste of time. The general course which preceded any special course must be adequate in level attained and in breadth. This was not possible without an introduction to the methods of psychological inquiry—which meant a suitable amount of practical work. The general course should have about 150–200 "student-contact" hours.

Dr. McElwain then outlined a scheme for psychological teaching consisting of the following courses:

Course	*No. of hours*
(*a*) General psychology I (introductory)	150
(*b*) General psychology II (a more advanced theoretical course)	250
(c) Psychopathology I (introductory)	200
(*d*) Psychopathology II (advanced)	250

The medical undergraduate would take course (*a*) in one of his preclinical years and course (*c*) in one of his clinical years. This would be supplemented with training in elementary psychotherapy in the clinical schools—which, as a training in therapeutics, would be no direct concern of the psychology department. Students for the diploma of psychological medicine would take courses (*b*) and (*d*), together with their advanced work in psychiatry, neurology, &c. The psychology student would take courses (*a*), (*b*), and (*d*) as components of his honours degree; and the psychiatric social worker would also have these courses.

In the University of Melbourne this scheme was almost fulfilled. The psychology department conducted for medical undergraduates courses in general and abnormal psychology; but both were in the clinical years and were at present shorter than was desirable. The D.P.M. candidates were required to take courses (*a*) and (*d*), and most also took course (*b*) (so completing a B.SC. degree); and the social workers completed a full B.A. degree (with psychology as a major subject) as a prerequisite to the granting of diploma status. The psychologist, psychiatrist, and psychiatric social worker attended courses together; and in the general psychology course the medical student was also brought into contact with the students in orthoptics and tutor nurses. "We hope that these people who are to work together later will not only know a fair amount about each other's work, but will also know each other personally, having trained in the same classes." Dr. McElwain added that the attitude of clinical students towards psychology was eased by their having been "dosed" with general psychology, and that an increasing number of students were taking an honours degree in psychology and physiology before taking the course in medicine.

FURTHER OPINIONS

Dr. W. R. **Bion** said that he thought from the point of view of the general practitioner it would be helpful if he were taught to be suspicious whenever a patient or his family seemed to be denying him the minimum conditions necessary for adequate treatment of his case. The general practitioner, considering his case in this kind of way, would then be led to consider whether he ought to call in a psychiatrist or not. Such an approach in a teaching hospital would cover practically the whole of psychiatry.

Prof. H. E. **Field** (New Zealand) thought the key defect was that psychological phenomena were regarded as less real than physical ones. Associated was the notion that common sense was enough. On that ground there was a good case for the careful introduction of psychology in the early stages of the medical student's training. Furthermore, the introduction of psychology would not only affect his attitude to psychology but would give him a healthy scepticism in regard to science.

Dr. **Joyce Partridge** said that she had been told by men and women students that they were most anxious to be taught about functional cases and did not find they were so taught. Their complaint was not against the general physicians but against the psychiatrists who had beds in the hospitals and who sent out cases labelled as being "only functional."

Dr. **John Rickman** was doubtful whether medical students were the right people among whom to carry out "consumer surveys" on the demand for psychological training; the proper time to inquire into the adequacy of the medical course was in the first few years after the young doctor had gone into practice. When the apprenticeship system was in vogue, the student went into the homes of the patients, but that system did not provide sufficient scientific basis. Dr. Rickman believed, however, that it was only very partly true that doctors learned best in hospitals. If man was to be studied in his social environment, that study could not be carried out satisfactorily when he had been removed to hospital. The hospital was the best place to study "parts of the machine" but not "the whole person."

The CHAIRMAN, closing the discussion, recalled the Collings report. He had a strong feeling that it reflected some sort of morale problem among general practitioners, arising from their inadequate training for the psychological aspects of their daily work. What was possible in Australia—as described by Dr. McElwain—should be possible in this country. He thought that the approach should be first from the clinical side in the wards of a general hospital. Students should be taken to the bedside to hear a skilled psychologist taking life-histories: they would there see resistances and tensions arising and being dealt with. Early in the clinical training it should be possible to introduce the psychiatric social worker; if she was introduced at a later stage the idea was pooh-poohed on the grounds that she was a laywoman. Medical teachers should be taught psychology lest the students, outstripping them, became frustrated, and so, in general practice, found themselves having more Collings reports written about them.

GENERAL MEDICAL COUNCIL

SESSION MAY 23–27

(Concluded from p. 1047)

More Disciplinary Cases

Alummootil Paul Abraham, registered as of 265, Eccles New Road, Salford, M.B. Madras (1944), was charged with having canvassed patients of Dr. W. G. R. Wilson in a practice at Salford to which Dr. Wilson had been appointed in November, 1948, in succession to the late Dr. L. D. Stephen. In particular Dr. Abraham was charged with having canvassed Mrs. J. E. Shepherd, with endeavouring to procure Mr. James Johnson to put his medical card and the medical cards of his family into his possession, and similarly in respect of Mrs. Lavinia Spruce, Mrs. Lucy Heywood, Mr. Harold Hurst, Mrs. Emily Glencross, Mrs. May Redmond, and Mrs. Emma Byrne, and with canvassing Mr. James Dixon and Mrs. Eva Burrow.

Mr. N. Leigh Taylor, of Messrs. Hempsons, solicitors, appeared for the complainants, the Medical Defence Union, and Mr. B. H. Gerrard, instructed by Goulty and Goodfellow, solicitors, appeared for Dr. Abraham.

Mr. Taylor said that Dr. Abraham had acted as locum tenens for Dr. Stephen in a working-class practice in Salford. When Dr. Stephen died, Dr. Wilson applied successfully for the vacancy. Dr. Abraham also applied but failed; he appealed and again failed. All the people in the charge had been patients of Dr. Stephen. Dr. Abraham ceased to be locum tenens in 1949, and in that year set up in practice on his own, about three-quarters of a mile from the surgery formerly occupied by Dr. Stephen and now occupied by Dr. Wilson.

Mr. Taylor said that he would produce witnesses to testify on four of the charges, and Dr. Wilson would explain why the other persons who had made statutory declarations were not present. It was ruled that at this stage Mr. Taylor should not refer to the cases in respect of which there were only statutory declarations.

Outlining the cases in which there was supporting oral evidence, Mr. Taylor said that Mr. Johnson would say that Dr. Abraham paid various calls to inquire how the family were getting on, and later told Mr. Johnson that he was setting up in practice and expected their cards. Dr. Abraham, in his reply, referred to a particular visit to Mr. Johnson's house and said the reason was that Mr. Johnson's son-in-law had called him; Mr. Johnson would say the son-in-law had called Dr. Wilson. Dr. Abraham said that the other visits were in connection with watch-mending.

Dr. Abraham, continued Mr. Taylor, had met Mrs. Glencross when she was shopping, offered her a lift, said he was starting in practice, and asked her for her cards. Dr. Abraham denied offering her a lift, said he had never been to her house since he was a locum tenens, and agreed that he saw her once in the street, when she asked him what he was doing, but again he denied canvassing.

Mr. Dixon had been told by Dr. Abraham that he was getting new premises and would let him know when he got them. In December, 1948, Dr. Abraham called on him and gave him a list of names of householders and asked him to sign in the appropriate place and get the others to do the same; Dr. Abraham told Mr. Dixon another doctor was trying to get the practice and he wanted as many names as he could to send to the council. The vacancy, commented Mr. Taylor, was not advertised until after that time. Dr. Abraham denied ever attempting to get Mr. Dixon to transfer to his list.

Mrs. Eva Burrow was a patient of Dr. Stephen's who had been attended by Dr. Abraham. Dr. Abraham had stopped her in the street and told her he was setting up in practice in Eccles New Road and would be pleased to see her or her children at any time. Dr. Abraham stated that there was an occasion when he was standing outside his surgery when Mrs. Burrow asked him if it was his surgery, but he did not canvass.

Dr. Wilson, examined by Mr. Taylor, told how he had come into Dr. Stephen's practice and had not seen Dr. Abraham when he took over. Dr. Wilson gave the medical and other reasons why the remainder of the persons who had made statutory declarations which were the subject of charges were unable to be present.

Cross-examined, Dr. Wilson agreed that Salford was a highly populated area with many doctors and was not an area closed to doctors. He denied that the reason he did not go to see Dr. Abraham was because Dr. Abraham was coloured. Dr. Wilson said he asked Violet Bartlett whether Dr. Abraham had canvassed her. Mr. Gerrard: "Did you say: 'I'm going to have Dr. Abraham sent back to India where he belongs?'" Witness: "Rubbish." He did not say to Mary Tench that there should be a white doctor for white men and black for black. Dr. Wilson further denied that he told Margaret Rowbotham that he would "get this nigger black run out" or that he had better qualifications than Dr. Abraham. He agreed that a Mrs. Dodd, who phoned him, was very angry with him and reported him to the secretary of the Salford Executive Council. Witness agreed that over 99% of the people in Salford had registered under the National Health Service. Mr. Gerrard: "Did you lose one of the cases referred to in the counts?" Dr. Wilson: "No."

In re-examination, Mr. Taylor read a letter from the chairman of the local medical committee sent to doctors in the area stating that, as membership of the scheme in the area was about 100%, an increase in the numbers of patients on the list of one doctor could only come from another doctor. The letter went on to refer to the traffic in patients having developed to an enormous extent and warned against canvassing.

Evidence was then given by four of the persons mentioned in the charge. Mr. James Johnson said that he had been attended by Dr. Abraham when Dr. Abraham was acting as locum. After Dr. Wilson had arrived, Dr. Abraham saw witness at his house. He called when witness's daughter was ill, when Dr. Wilson had been asked to come. "I asked him what he was going to do now," said Mr. Johnson; "he shrugged his shoulders." Witness's son had done watch-repairing for Dr. Abraham.

Mrs. Emily Glencross said her husband and child had been treated by Dr. Abraham when he was locum. When Dr. Wilson took over they were automatically transferred to his list. She met Dr. Abraham when out shopping about March, when he offered her a lift. He said he was going to open a place in Eccles New Road. A week or so after, Dr. Abraham called at the house and asked if he could have their cards. She told him she had seen Dr. Wilson and was satisfied, and he went out.

Mrs. Eva Burrow said Dr. Abraham had looked after her as a locum. In January or February, 1949, he met her in the road near his new surgery, which was being prepared, and told her he was opening the premises soon and would be pleased to see her or the children any time they liked to call.

Mr. James Dixon gave evidence of Dr. Abraham calling on him and his housekeeper. Cross-examined, witness said Dr. Abraham did not ask for their cards.

At the conclusion of this evidence, Mr. Taylor asked permission to read the statutory declarations in support of the other charges. Mr. Gerrard submitted that the council could admit statutory declarations at their discretion, provided the evidence justified it; he suggested that there had not been a case from the four witnesses who had been heard to warrant the inclusion of the statutory declarations. After deliberation in camera, the president announced that the council had decided not to admit the statutory declarations.

Mr. Gorrard then submitted that there was no case to answer. Of the four witnesses called, Mr. Dixon, Mr. Johnson, and Mrs. Burrow had said nothing detrimental, and Mrs. Glencross, who had made an allegation, when asked if she had seen Dr. Abraham since the day she had seen him in the street, said she had not.

Mr. Taylor said that Mrs. Glencross's evidence alone was sufficient to convict if the council so wished.

After consideration in camera, the President announced that the council had found the facts alleged against Dr. Abraham not proved to their satisfaction.

ADULTERY ADMITTED

Eric Allan Peter Sutherland-Rawlings, registered as of 1, Burwood Place, London, W.2, M.R.C.S. (1928), appeared before the council on the following charge of infamous conduct in a professional respect:

(1) You committed adultery with Gwyneth Lyons, of which adultery you were found guilty by the decree and Admiralty Division . . . in the case of Sutherland-Rawlings, in which you were th stood in professional relationship with the at all material times.

Mr. Gerald Howard, K.C., M.P., and Mr. Magregor, instructed by the council's solicitors, stated the case, and Mr. C. R. Havers, K.C., and Mr. Ormerod, instructed by Brown, Baker, and Baker, appeared for Dr. Sutherland-Rawlings. The fact that the alleged adultery took place was not disputed.

Mr. Howard said that a sheet from Dr. Sutherland-Rawlings's account book would be produced which was headed "Miss G. Lyons, consultation, 1 gn."; that was settled in March, 1948, and it appeared that from Dec. 31, 1947, Miss Lyons was a patient. In 1949 Mrs. Sutherland-Rawlings made a discovery as a result of which she was granted a decree nisi, the doctor filing no answer; the decree was made absolute on Dec. 17, 1949. Documents indicated that for months Dr. Sutherland-Rawlings was giving treatment to Miss Lyons. These included a copy of a laboratory report headed "Miss G. Lyons," letters from another doctor regarding Miss Lyons, and a letter from a specialist.

Mrs. Jane Sutherland-Rawlings said that she assisted her former husband in his practice, doing the secretarial work and keeping the books. She identified the page from the ledger and copies of the letters. Cross-examined, she said she took the page from the ledger because she already knew that Miss Lyons was a patient and she wanted it in black and white. She agreed that she continued opening her husband's correspondence after her solicitors had given an assurance that she would not do so. She denied that she wanted to ruin her husband. Mrs. Sutherland-Rawlings agreed that her husband kept a "surgery book" and that she copied the entries from this to the "day book," from which the ledger was made up and the accounts sent out by her.

Miss Dorothy Lyons, called by Mr. Havers, said she was the sister of Miss Gwyneth Lyons. She and her sister first met the doctor at the house of a friend, and Dr. Sutherland-Rawlings subsequently frequently visited their flat. At the end of December, 1947, her sister thought she was pregnant and went to see Dr. Sutherland-Rawlings; her sister did have a doctor of her own. Mr. Howard: "She was consulting him (Sutherland-Rawlings) as a doctor in order to see him at all?"—"I suppose so, yes."

Dr. Sutherland-Rawlings in the witness-box said that his late wife had looked after the business side of his practice. He met Miss Lyons at a party, where he was introduced to her and her sister. Afterwards he paid visits to their flat and intimacy took place between him and Miss Gwyneth Lyons on several occasions in 1947. At the beginning of December, 1947, they agreed not to see each other for a trial period of a month, but on Dec. 31 she came to his surgery. He did not know she was coming; he did not want her to come; he had not been told she had an appointment. He pointed out to her that it was very unwise of her to come to the surgery and it put him in a dilemma. She insisted on making the subsequent visits. He made the entry of this and subsequent visits in the surgery book because the visit was entered by the receptionist and had to be accounted for in the other book and “feed up.” Miss Lyons insisted that she should have a test and he gave her a container to obtain the specimen. Miss Lyons had never come to his surgery before Dec. 31, 1947, or after Feb. 2, 1948, and he never rendered her professional service. It was never his intention that she should pay; he paid the bill himself. After he made a settlement with his wife he went to live with Miss Lyons as man and wife, and it was then that she said she had something wrong with her knee and he told her she should see the specialist, and he told her of the other doctor whom she went to see. Cross-examined, Dr. Sutherland-Rawlings said he did not send Miss Lyons to another doctor when she came to see him, because he did not want to bring the matter out. He did not give her any advice as a doctor. Asked by Mr. Howard whether he would have done any more than he did had Miss Lyons been a complete stranger, Dr. Sutherland-Rawlings replied that he would have examined her.

Mrs. Gwyneth Sutherland-Rawlings, formerly Miss Lyons, corroborated the doctor's evidence. She said that a friend at work, who suggested it, made the appointment for her to see Dr. Sutherland-Rawlings on Dec. 31.

Mr. Howard, cross-examining: "Was one of the reasons for going to Dr. Sutherland-Rawlings to ask him as a doctor whether you were pregnant?"—"No." "Did you ever ask Dr. Sutherland-Rawlings as a doctor whether he could find out if you were pregnant?"—"No."

"What you are really saying is that the real object of your visits was to see him as your lover, not as a doctor?"—"Yes."

Evidence was also given by other witnesses.

At the end of the proceedings in the case, the President announced that the council had found that the facts alleged against Dr. Sutherland-Rawlings in head 2 of the charge had not been proved to their satisfaction; the case was therefore ended.

ADULTERY DISPUTED

Reginald Frank Stubbs, registered as of Sannomiya, Hale Road, Hale, Cheshire, M.B. Manc. (1928), appeared on the charge that:

(1) You committed adultery with Freda Rose Mitchell, a married woman, of which adultery you were found guilty by the decree of the Probate, Divorce, and Admiralty Division . . . in the case of Mitchell v. Mitchell and Stubbs in which you were the co-respondent. (2) You stood in professional relationship with the said Freda Ros Mitchell at all material times."

Dr. Stubbs was represented by Mr. N. Richards, instructed by Messrs. Le Brasseur and Oakley, on behalf of the Medical Protection Society, and Mr. Howard, K.C., M.P., with Mr. R. J. Lowry, instructed by the council's solicitors, appeared to state the case. For Dr. Stubbs it was contended that he did not commit the adultery set out in the charge, and that he did not stand in professional relationship to the woman at all material times.

Mr. Howard said that Mrs. Stubbs had a schoolgirl friend who became Mrs. Mitchell. After these two friends married, the one becoming Mrs. Stubbs, the other Mrs. Mitchell, they lived close together at Hale. It appeared that Dr. Stubbs first saw Mrs. Mitchell professionally in 1936 and from that year he was a frequent visitor to the Mitchells' house. Evidence would be given of his professional attendance on Mrs. Mitchell from 1936 to 1947.

Mr. Howard explained that when divorce proceedings were taken, by Mr. Mitchell, evidence was given by two inquiry agents. The commissioner did not accept their evidence as proof that adultery had taken place at a hotel and dismissed the petition. The Court of Appeal, however, reversed the commissioner's finding and granted a decree nisi, which was made absolute on Aug. 10, 1949. Dr. Stubbs at no time made any defence to the proceedings.

Evidence was given by Mr. J. F. Mitchell. In cross-examination he was asked: "From the start of your marriage your wife was openly visiting Mr. and Mrs. Stubbs?"—"Yes." "Is it right to say that long before he treated her professionally he knew her socially?"—"Yes."

Dr. Stubbs in the witness-box said that he first met Mrs. Mitchell at a party before she was married and before he had married a second time. He treated her for a cut finger in 1936 and for influenza in 1946. He sold his practice in 1948 and left Cheshire on Feb. 22, 1948. Questioned about what happened at a hotel in Richmond, he denied that adultery took place. Mrs. Mitchell and he did not defend the divorce proceedings because it would have brought them back to the intolerable conditions from which they wanted to escape.

Mrs. Freda Rose Stubbs, formerly Mrs. Mitchell, said she first met Dr. Stubbs at a party about 1928; she was not a schoolgirl friend of Mrs. Stubbs. Between 1934 and 1939 she frequently met Dr. and Mrs. Stubbs socially. She corroborated Dr. Stubbs's evidence about the hotel visit and the divorce. Cross-examined, she agreed that in so far as she had a doctor before the war, it was Dr. Stubbs, and similarly after the war.

Mr. Richards in his closing address said it was true the Court of Appeal had granted a decree, but it could do so on circumstantial evidence. The court said that the inference to be drawn from the facts was such that when the suit was not defended it might be inferred that adultery took place. That did not mean that the parties could not come to the council and say that although they did not defend the suit they did not commit adultery. If the council found that the adultery alleged in the first head of the charge was not proved, they were not concerned with the second, but if they found the first count proved, they had to consider whether Dr. Stubbs was in professional relationship at all material times. Mr. Richards submitted that attendance on Mrs. Mitchell as a medical man was purely incidental. This was not a case of a man meeting a woman for the first time because she was a patient. All the way through they continued to meet socially.

After hearing Mr. Howard in reply and deliberating in camera, the president announced that the council had found the facts alleged against Dr. Stubbs in head one of the charge (the adultery in respect of which the divorce was granted) not proved to their satisfaction.

SEXUAL PERVERSION

A practitioner appeared before the council charged with having been convicted of an offence arising from sexual perversion, for which he had been sentenced to twelve months' imprisonment. The case was heard in camera, and at the end the President announced in public that the council had not seen fit to direct the Registrar to erase the practitioner's name from the register.

COÖPERATION BETWEEN HOSPITAL, GENERAL-PRACTITIONER, AND LOCAL-AUTHORITY SERVICES

THE Central Health Services Council has appointed a committee to study means of promoting coöperation between the hospital, general-practitioner, and local authority services. It will consider existing forms of coöperation between (i) regional hospital boards, hospital management committees, and boards of governors; and (ii) local authorities; and (iii) executive councils; and report whether it is possible to formulate any general principles on which coöperation might be promoted between these authorities. The members of the committee are:

F. MESSER, C.B.E.; M.P. (chairman); Sir HENRY COHEN, F.R.C.P. (vice-chairman); Sir ERNEST ROCK CARLING, F.R.C.P.; Sir ALLEN DALEY, F.R.C.P.; F. HALL, C.B.E., M.D; Captain S. H. HAMPSON, M.B.E., M.C., LL.B.; the Hon. ARTHUR HOWARD, C.V.O., M.P.; W. V. HOWELLS, M.B.; K. I. JULIAN, C.B.E.; Prof. HILDA LLOYD, F.R.C.O.G.; R. A. MICKELWRIGHT, F.H.A.; Sir CECIL OAKES, C.B.E.; Councillor WILLIAM ONIONS; Prof. R. H. PARRY, F.R.C.P.; W. G. PATTERSON, M.D.; E. W. SCORER, O.B.E.; A. TALBOT ROGERS, M.B.; Alderman W. E. YORKE, C.B.E.

The joint secretaries are Mr. E. J. S. Clarke and Mr. J. T. Woodlock, of the Ministry of Health.

Reconstruction

JOINT CONSULTATION IN HOSPITALS

TOM E. DALTON

THE joint consultative committees which are now to be set up in hospitals with the approval of the General Whitley Council and of the Ministry of Health will make further demands on those concerned with the efficient running of hospitals.

In industry joint consultative committees have not always achieved their purpose; and even in those branches where some measure of success has been recorded they have sometimes produced strained relations between workers and management. The setting up of such a committee in a hospital will not automatically produce harmonious relations. Furthermore, joint consultation is not an end in itself, but merely a means whereby workers can get a better grasp of the difficulties of management, and the management a better grasp of the contribution that workers can make.

Hospital administrators can learn some useful lessons from industry. In the past thirty years many erstwhile theories have been discarded. Thus, economic considerations are no longer regarded as the principal activating force; and tradition has proved a stronger factor than reason in influencing the way a worker does his job. Moreover, it has been increasingly recognised that workers are—very naturally—sensitive about anything that impinges on their self-respect. They desire an outlet for their grievances, and a chance to put forward their ideas and theories and to ask the why and wherefore of processes and policies determined by their managers. Joint consultation can help to satisfy these needs, and to make workers aware that they are an important part of the concern.

In 1918 the Ministry of Labour—well in advance of its time—published the following list of functions ("not meant to be exhaustive") suggested as suitable for discussion by works committees: (1) issue and revision of works rules; (2) questions of discipline and conduct as between management and work-people: (3) terms of engagement of work-people; (4) technical library, and lectures on the technical and social aspects of the industry; (5) the training of apprentices; and (6) suggestions for improving the methods and organisation of works, and the testing of suggestions.

With time and experience, the list of functions has been expanded. In industry, however, the traditional distrust between employed and employer remains; there is little enough common ground. The worker still regards the making of profit as a form of exploitation of his services; so there is conflict on policy. In hospitals, on the other hand, there is a very powerful emotional impulse which, if properly used, can provide common ground; the alleviation of suffering arouses in most minds a sympathy that can transcend all other motives.

PROPOSED ORGANISATION

The committees now to be set up will not discuss rates of pay or total hours of work. Special machinery exists for dealing with such matters; and to permit discussion of them would be to undermine the authority of such bodies as the joint industrial councils and the Whitley councils.

The committee's functions are to be as follows:

1. To promote the closest coöperation and provide a recognised means of consultation between the management committee or board of governors, its senior officers, and staff.
2. To give the staffs a wider interest in, and a greater responsibility for, the conditions under which their work is performed; to give the maximum assistance in promoting the welfare of the patients and efficient administration in the hospitals controlled by the committee or board; to make suggestions for the improvement of the general arrangements for the comfort of the staff, their recreation, entertainment and dietary.
3. To prevent friction and misunderstanding.
4. Subject to the proviso that no recommendations of the *hospital staffs committee shall conflict with, or override,* any decision of the general council or the appropriate functional council, to deal with such matters as: *(a)* the distribution of working hours; *(b)* holiday arrangements; and *(c)* questions of physical welfare (cloakroom arrangements, heating *ventilation, &c.).*
5. To consider any hospital rules affecting staff, apart from any that may be prescribed nationally or regionally.

Members are to be elected from the following grades of staff: administrative and clerical; nursing and midwifery; technical and professional other than nurses and midwives; domestic, farm, and garden; and artisan.

n a circular to hospital authorities (R.H.B. [50] 47) Ministry of Health declares that "it is contemplated t consultative committees will be set up in all hospitals ept where the small number of staff makes such a nmittee inappropriate." Committees, it is pointed out, uld be set up for individual hospitals rather than ups, since the whole purpose of the consultative chinery is to enable local problems to be discussed. en in a small hospital the management committee ould not oppose the setting up of a committee if the ff clearly desires its establishment; and where a mmittee is not appropriate or desired, arrangements ould be made for informal consultation between anagement and staff on matters which would be vered by a committee. There is no need, adds the cular, for the two sides of the committee to be evenly lanced in numbers; "and, indeed, it is perhaps eferable that the management side representatives ould be fewer in number than the representatives on e staff side." Since the committee's recommendations e decided by agreement between the two sides—and ot by a vote of the whole committee—this does not ffect decisions.

THE CHAIRMAN

On the chairman will depend the ability of each of these committees to develop a common purpose through steady development of joint responsibility and attention to sound administrative principles. He must be a Solomon in wisdom and a Job in patience. In particular, he must be prepared to recognise that delegates from the staff side have a better grasp of hospital problems than may be supposed. He must be able to grasp a point being made by a hesitant, and perhaps incoherent, delegate, and to present it in a form understandable to all. With a mediocre chairman such a delegate may get no encouragement, or no chance to make his contribution; and the committee will be thereby the poorer.

Joint consultation has nothing to do with workers' control, with which it is often confused. In any project there can be only one management; if the workers are in control, then they are the management, and are faced with the same problem as their predecessors—that of obtaining the willing coöperation of everyone in their organisation. It is this willing coöperation that joint consultation seeks to achieve.

Medicine and the Law

The Nurses' Elections and the Returning Officer

THE difficulty which arose lately over the election to he General Nursing Council for England and Wales aises questions of the powers and responsibilities of a returning officer. It will be recalled that, under the 1949 Act, the new constitution of the Council is to include 14 elected members who will respectively represent each of the 14 areas into which the Minister has for this purpose divided the country;

> "and each of these nurses shall, on the date of the election, be engaged in the area for which he '[the Interpretation Act, of course, provides that "he" includes "she"]' is elected, in nursing or in other work for which the employment of a registered nurse is requisite or for which a registered nurse is commonly employed."

So runs the statute, and presumably no rules purporting to be made under the statute could vary the words "engaged in the area" by narrowing their sense to "exclusively engaged in the area"; nor could a returning officer take it upon himself as a matter of administrative practice arbitrarily to insert an important adverb into the text of the statute so as to alter the meaning. Certain nominations, however, for election to the General Nursing Council were rejected by the returning officer for the ostensible reason that the candidates were not exclusively "engaged in the area" concerned. The Ministry of Health was invited to give an authoritative interpretation of the material phrase; *it declined* on the plea that it is for the courts and not for the Minister to give a ruling of this kind. How the point should be referred to the courts, or who will pay for the privilege of clarifying the law, the Ministry's reply did *not* explain. Meanwhile it became known that in certain other cases seemingly parallel to those of the rejected candidates no disqualification had been pronounced.

Some analogy may be found in the position of returning officers at parliamentary or local-government elections. In a Berwick-on-Tweed case in 1946 (Watson *v.* Ayton) the mayor, acting as returning officer at a local-government election, rejected as invalid the nomination of a candidate described as a "schoolmaster." The mayor assumed that the schoolmaster was the paid employee of the Northumberland county council and therefore, under section 59 (2) of the Local Government Act, 1933, *ineligible.* The court held that the mayor had no sure evidence of the candidate's official activities and could not decide the issue of disqualification from such information as appeared on the face of the nomination paper. The Committee on Electoral Law Reform, many of whose recommendations were carried out in the Representation of the People Act, 1948 (now largely consolidated in the Act of 1949) expressed the view that the ruling in the Berwick-on-Tweed case should be incorporated in the statute law. Accordingly Rule 9 (2) of the Third Schedule to the Act of 1948, reproduced as Rule 13 (2) of the Parliamentary Elections Rules in the Second Schedule to the Act of 1949 and there declared to be applicable to local-government elections, states that the returning officer is entitled to hold a nomination paper invalid *only* on one of the two following grounds:

> "(*a*) that the particulars of the candidate or the persons subscribing the paper are not as required by law, and
> "(*b*) that the paper is not subscribed as so required."

The nomination paper at a parliamentary election must, under the statute, state the full names, place of residence, and description of the candidate; the description must not refer to his political activities (i.e., he must not be described, for instance, as "the Labour candidate") and, if it is unduly long, the returning officer may (in consultation, if possible, with the candidate, his agent or sponsors) shorten it or substitute another. The material fact is that the returning officer is concerned only with the nomination paper, not with the nomination as distinct from the nomination paper. He cannot enter into the question of the candidate's qualification. The recent legislation appears to be reconcilable with the judgment of Mr. Justice Wright in Harford *v.* Lynskey in 1899: "If the nomination paper is, on the face of it, a mere abuse of the right of nomination or an obvious unreality, as for instance if it purported to nominate . . . a deceased sovereign, there can be no doubt that it ought to be rejected and no petition could be maintained in respect of its rejection."

If these principles are applicable to the General Nursing Council elections, the recent action of the returning officer seems questionable, though no-one will be anxious to initiate litigation with the idea of having the election declared void because a valid nomination was wrongly rejected. The returning officer acts in a sense judicially: provided that his action is not vitiated by bad faith or partiality (which nobody suggests) he personally is unchallengeable. If it really is his duty to decide whether a candidate is or is not "engaged in the area" in nursing or similar work, and if he decides differently in what appear to be similar cases, there may be no remedy. But it is never a satisfactory situation if the law is made to appear either uncertain or unequal in its application—or both.

In England Now

A Running Commentary by Peripatetic Correspondents

NEVER before this Danish spring have I noticed how pungent yet how pleasant is the scent of the balsam poplar. The two great trees that stand before my window, which for weary weeks were bleak and dead, their roots set in the hard earth with never a blade of grass on it, swiftly clothed themselves in their lovely shimmering leaves, and now bees hum in their topmost branches; in the morning sun the scent is like hot beeswax.

Spring comes to this northern city unbelievably swiftly. Seven or eight weeks behind southern England, then one morning the sun shone and suddenly the woods by the sea were carpeted with anemones, cherries were in dazzling blossom, and men trundled great stone pots filled with tulips and wallflowers and forget-me-nots out into the city squares. Pavements that last week were cold and grey and empty, swept by bitter winds off the Baltic, are now hidden by hundreds of little tables beneath striped awnings; the table-cloths are clipped on and the ends crack merrily in the breeze, for there is always a wind in Copenhagen. The sun shines warmly on the green copper domes and spires, glinting from the golden balls that surmount them; the Townhall carillon plays merrily and ships hoot with joy. People have changed from bundles of woollies and enveloping leather jackets to straw hats and light coloured clothes, and everywhere the flags are flying.

The flag of Denmark is so lovely that the Danes fly it on all occasions—birthdays and weddings, holidays and festivals, or just any day when they feel particularly happy. On Liberation Day, May 4, Copenhagen was hidden by its brave red fluttering flags, and my little English car added to the gaiety of the nations with a Union Jack tied on with string to the wing mirror. Outside the city, too, pennants and full-size flags flew from the tall staff before almost every cottage and farm. Liberation Day was a holiday and the King's Guard marched about the streets all day long in their tall fur hats and their gay blue trousers, the band playing lustily and children running and leaping beside them. In the midst of the rejoicing crowds however one would come quietly on a little clearing on the kerbstone or in one of the great squares, where a wreath and a few bunches of garden flowers lay on the pavement to tell where a Resistance member had died. At night there were torchlight processions and fireworks, and very lovely these looked reflected in the long lakes that were once the city moats. These waters now sport rowing-boats and little anchored rafts where swans are sitting on their high nests. One pair of swans has built an untidy affair of packing straw and cigarette paper right against the water's edge; here no fireworks were lit and by day an awning is put up to shield the pen from the sun; at peak hours a policeman stands guard over her and all Copenhagen awaits the coming of the cygnets.

The storks have arrived and stand proudly on their cartwheel nests on the farm buildings. They seem to be resting after their long flight northwards, standing quietly looking down at the life below, when suddenly without warning the male bird lifts up his long beak and lays it along his back, letting out the startling clapping sound that is his love-song. The owners of a pair of nesting starlings think themselves indeed fortunate; for to the Danes these garrulous birds, so familiar to us, are welcome harbingers of spring. The exiled Englishman looks on them with a certain fondness too, for may they not have wintered in Trafalgar Square?

* * *

We have had almost four years of rhesus-testing, but the ever-possible happened for the first time this week. A woman at the antenatal clinic, pregnant for the second time, presented as part of her previous obstetric history the small white card we give first attenders for them to carry always in their handbags. This bears their name, address, blood-group (ABO and rhesus factor), and, in the case of rhesus-negative women, the rhesus blood-group of the husband if he is rhesus-positive. This woman was of the last category, and our obstetrician raised his eyebrows when he noticed an alteration in our last-line entry: "Husband—Positive." A broad pen-line all but obliterated the last word, and beneath, in determined block capitals, the word "NEGATIVE" defiant. This was no laboratory-correction, obviously, then a new card would have been issued and an panying letter of apology and explanation would have been remembered. Almost before our query, "Who did this?" was out of his mouth explanation followed: "My husband was *simply fur* when he saw *that*! He changed it *there and then. He* in the Navy, and *his* blood-test was *always NEGATIV*

* * *

I hadn't long been in the isolation hospital w a painful complication of mumps before I was introdu to a strange circular relic of the Bronze Age, the bedp If it had been unearthed in the deeper deposits of Chaldean excavations it would doubtless enjoy a tinguished place in the British Museum. I perch myself perilously on this curiously unstable article and very soon realised, with growing dismay, that I was not sitting *on* it but sinking *into* it. Yes, *it had to be accepted*. I was sucked and jammed into this wretched copper coracle. For 20 minutes, with rapidly diminishing strength and dignity, I wrestled to effect a separation. Finally I intimated to a passing orderly that I needed assistance.

In a little while the nurse came. Then the sister came. *And last of all the matron came. They all examined the* situation with a nice mixture of delicacy and practical determination. The student nurse, hot from her physics class, timorously suggested that if only the vacuum could be broken the problem would be solved. She was firmly put in her place. The sister, who had met her Waterloo, looked to the matron. The matron, who had not achieved her exalted position for nothing, said in a commanding voice: "Hold me tight, doctor!" I thereupon threw my arms around her while the sister and nurse worked arduously below. I supported them with many a merry jest and dear encouragement. I felt *I* must put on a courageous front, for much was at stake. In a moment I was free—free as the wren's tongue, and far more lyrical. But the incident has left its mark.

* * *

The *recent animal stories in* the press, particularly that of the bus-driver who found a lion as his only passenger, prompt me to set down a personal anecdote.

It was in the interval between the third and fourth Bechuanaland campaigns, at Impala, the capital of Hotsetotseland. I had been to the *salon of* Dentine ("She was only a settler's daughter but she's lost her Native Reserve") Blatherspoon and was *sleeping off* our conversation in the long grass, which *in those parts* sometimes reaches a height of three inches. All around, herds of voodoo, gnu, urdu, and pushtu were grazing. Suddenly a hippopotamus, playing tig with a Coal Black *Ma'amba, landed with all four feet on* my stomach. Fortunately I had glanced up a moment before and was able to put my abdominal muscles into Defence Position No. 3 in the nick of time, so that he rebounded into the veldt. You would have enjoyed the look of dismay on his face, for, deceived by my grey flannel trousers, he had expected to sink up to the nostrils in the grey, green, greasy Limpopo river.

But the point of the story is this. Some 36 hours later I passed a fine specimen of the emerald-eyed tapeworm (*T. saphira*) and it showed slight but *definite bruising on one side of its head.*

* * *

There's one thing about a Devon man, you can never accuse him of unnecessary hyperbole. This one was huge, with a round red face and blue eyes, and a gentle soothing voice. I was asking him if there had been any history of nervous breakdown in his family. He gave this considerable thought. "Well, no," he said "unless you count my uncle Jarlie . . . he were a bit contrary come the end . . . took seven men to 'old 'im down, I'm told . . . proper contrary 'e were."

* * *

One of the regional hospital boards is, I see, advertising for LOCUM TENENTES. *I hope there will be no* squabbling over games of King of the Castle. Or does the secretary mean LOCA TENENTES or LOCUM SERIATIM TENENTES—or what?

Letters to the Editor

ANOMALIES OF SALARY

IR,—Your leading article of May 20, and the letter n Mr. Stanley Mayne a week later, touch on several omalies of salary within the profession. We would tance still another in which the anomaly is due to the vice of a single Treasury committee—the University ants Committee—but is accentuated by competing partments.

Mr. Mayne points out that Sir Will Spens does not deal h salaried medical officers: this is understandable. ing outside the terms of reference of both Spens mmittees. But in one respect he did go beyond ese bounds. The report on consultant and specialist muneration suggested that whole-time clinical prosors and their staffs should be eligible for the consultant ecialists' merit awards. This was outside his terms reference.

It is implied that no competent clinical scientist would interested in giving his whole time to the study of his bject unless his post were financially competitive with e National Health Service. This may have been ue in 1920–21, when clinical units were initiated, but is not so in 1950. We need scientists trained in ientific method and techniques who have taken not nly the membership or fellowship of the Royal College f Physicians or Surgeons, but also the honours science chools of their university. These honours schools, ith postgraduate research, alone give the basic training eeded by the scientist to apply modern research echnique to problems of clinical medicine.

The suggestion of the second Spens Committee was, urprisingly, accepted by the University Grants Committee, by the Ministry of Health, and by the Treasury. n consequence, whole-time university staffs in the linical years are eligible for two salaries—one from the J.G.C., through the university and school for their eaching, research, and care of patients, and the other, lso for care of patients, payable for special merit, from he National Health Service through the university and school. This principle of dual remuneration is entirely new in British finance.

The reason given for the principle of dual remuneration is not valid. In any case it is foreign to the true spirit of university life. But since it has been accepted by the Treasury it needs re-examination in the light of present-day social problems, and of its repercussions upon other university faculties and other branches of the profession in this country and the Dominions and Colonies. We are well aware that, despite the increase in salary in other university faculties, there are some serious anomalies, among both the distinguished and the undistinguished, in favour of medically qualified scientists.

The real *gravamen* of our letter is, however, that within the faculties of medicine of the universities of this country the U.G.C. has set up different salary-scales for preclinical and clinical workers of the same grade. It would be generally agreed that the clinician whose name is on the bed-ticket, who takes the final decision on treatment following advice given by his paraclinical and preclinical colleagues, and who is responsible for his case day and night, is entitled to more remuneration than his paraclinical and preclinical colleagues. This is properly represented by the 10–12·5% difference in scales in the professorial grades. But in the lowest grade a medically qualified scientist begins as assistant lecturer at £600 per annum in the preclinical grade or at £900 per annum in the clinical grade—a difference of 50%. This is a matter of moment to the young man who, at the beginning of his career, is likely soon to face problems of family or housing.

In 1947–48 the Conference of Non-Clinical Medically Qualified Professors presented evidence that of the total vacant non-clinical posts (including at that time pathology and bacteriology), 40% remained vacant, and for 30% there was only one applicant. There is evidence that in 1950 the position is not much different: the good work of the Goodenough report has been undone by the U.G.C. and the National Health Service conditions—that is, by the Treasury. Not only is there financial encouragement to the young medical scientist to enter a clinical department rather than a non-clinical, but there is also Government-supported demand from the Medical Research Council, the Ministry of Supply, and in many cases the Services, all of which bodies are outbidding the preclinical departments of the universities for the new recruits among the honours graduates in science with medical qualifications. Moreover, the requirements of Government departments appear to be growing.

If the intention of the Government and the University Grants Committee is to staff the preclinical departments with personnel lacking medical training and qualifications, then the policy is understandable. It may be that they wish the training of the doctor and medical scientist to be effected in these years by only the second best; this again will happen on this policy.

It is not really in the best interests of the profession, the universities, or the National Health Service that an anomaly of salary should exist which tends to attract the young man on the threshold of his career away from the preclinical university departments.

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St. Mary's Hospital Medical School,
London, W.2.

A. ST.G. HUGGETT.

Department of Physiology,
Royal Free Hospital Medical School,
London, W.C.1.

ESTHER M. KILLICK.

TOWARDS SAFETY IN BOXING

SIR,—Your annotation of May 27 on cerebral injuries during boxing is appropriate for a medical journal, especially as a good proportion of doctors have at one time or another represented their university and hospital in boxing competitions. The thirty-six cases of intracranial hæmorrhage reported by Jokl immediately bring home the danger beyond dispute. The practical considerations advanced in your article equally clearly show the difficulty, or impossibility, of avoiding this danger by medical anticipation.

Nevertheless, an " attitude of mind " on the part of referees and spectators, as well as contestants and their team-mates or their professional equivalents, will do much. Thus recently when a team of men belonging to the Amateur Boxing Association met Services' representatives, the referee stopped several contests at a stage when such intervention would formerly have been regarded as premature, badly judged, and " soft." I remember a contest in which a patient was " out on his feet " after rising from a count of 8 seconds, and his experienced and anxious second jumped into the ring to stop the fight. The referee ordered him out (it was an O.T.C. event) and the time bell just saved the situation. Even so this lad had *retrograde amnesia* for the whole contest of three rounds and for some minutes before it began.

Serious injury may occur like a bolt from the blue where the recipient is perfectly fit and strong and fresh; but this is very rare. In most cases such injury is inflicted on a man who is already severely affected physiologically, if not pathologically, and who is at that time unable to offer any real defence. I would strongly support any measures or interpretation of rules that would minimise the incidence of serious damage during boxing, and in addition the encouragement of an " attitude of mind " that will permit the referee to stop a contest before a man is dangerously incapacitated, without there being any sense of loss of honour or absence of " guts." This should be true for all contests, but is particularly important where circumstances have permitted opponents of unequal skill and strength to face one another in a contest which is almost inevitably lost before it begins.

London, W.1. S. L. SIMPSON.

THE FLOW OF LYMPH

SIR,—This subject, which was discussed in your leading article of March 11, seems to have been somewhat neglected; and I should like to add some observations of mine.

The blood is—except in the region of the digestive tract—the only source of lymph, and it is without exception the only outlet for lymph. Thus the velocity of the lymph-stream must be adapted to the local and general rate of lymph production. Since the production of lymph depends greatly on the local state of blood capillaries, local is more important than general adaptation. Where the permeability of blood capillaries is greatly increased, the inflow of fluid to the tissues increases correspondingly. When simultaneously the outflow of lymph is checked—as by inactivity of a broken limb—œdema results. In itself this œdema is not dangerous, except when it involves the lungs. Pulmonary œdema may be fatal; but the body has a means of protection against this danger.

Pulmonary œdema develops rapidly, because lymph flows through the lungs very rapidly.

I have seen a dog, on the third day after phosgene poisoning, which was definitely recovering and in good condition. This animal was killed instantly by the intravenous injection of a 25% solution of magnesium sulphate. The animal fell immediately after the injection, and from its nose started to run a stream of clear plasma. In the few seconds between the arrest of respiration and of the heart action more than 100 ml. of plasma was shed from the nostrils; and much remained in the lungs, forming profound œdema. Before the injection this animal clearly had no pulmonary œdema, but its lungs had not recovered completely from the phosgene poisoning and were still predisposed to œdema; and this was precipitated by the arrest of respiration, which stopped the normal lymph outflow from the lungs.

I have also observed the velocity of lymph-flow in the lungs of rabbits.[1]

In these experiments an indian-ink suspension was injected through the chest wall directly into the lungs and the animal killed immediately by bleeding; death occurred a few minutes after the injection of indian ink. Post-mortem examination showed no trace of indian ink in the lungs; *it had been washed out within a few minutes by the lymph-stream* (which was accelerated by the laboured respiratory movements preceding death). But when, immediately after injection of indian ink, an artificial pneumothorax was established, the indian ink remained in the lungs as long as the pneumothorax was sustained—in my experiments for three days. The ink was found post mortem as a blotch over the whole cross-section of the lobe except in the hilar region, where the lymph-vessels were compressed by the retracted lung. Arrest or checking of outflow of lymph-containing toxic products from the lung seems to be an explanation of the detoxicating action of pneumothorax in pulmonary tuberculosis.

It seems therefore justifiable to assume that the flow of lymph through the lungs is very rapid and is mainly sustained and regulated by the respiratory movements. Whenever fluid begins to accumulate in the lungs, and thus the danger of pulmonary œdema develops, changes in expiration can be observed.

In dogs poisoned with phosgene these changes were in three phases: at first expiration became prolonged; then laboured; and finally "groaning." In this last phase expiration begins with a closed glottis, which opens suddenly giving rise to a groaning sound. In each of these phases expiration is prolonged and the air-pressure in the lungs increased. This increase is especially great in the third phase, and thus the outflow of fluid from the lungs must then be consi increased.

I later observed "groaning" expiration c in cases where the *permeability* of lung cap and consequently the flow of fluid from the blood the lungs, was increased—e.g., in a case of int with petrol vapour, in extensive pneumonias, and pulmonary congestion due to heart-failure.

The dilution of blood which takes place during period of remission after the phosgene poisoning indirect proof of the escape of fluid from the blood the lungs.

The escaping fluid is plasma; this coagulates on damaged lung, covering it with a layer of fibrin[2] changed to serum, which is forced out through the l vessels back into the blood-stream. Consequently occurs after phosgene poisoning an intravenous auto-in of serum.

In experiments on dogs I have shown[3] that intraven injection of the animal's own serum causes dilution of bl just like that during the period of remission after t phosgene poisoning. After a single injection of serum, have noticed a decrease in the red blood-cell count to 8 of the original value 7 hours after the injection. When t injection was twice repeated, the dilution of blood took pl more rapidly, reaching the same level $4^1/_2$ hours after the fi and 2 hours after the second injection.

It seems that the changes in expiration described abov which counteract accumulation of fluid in the lun may be an important clinical sign in cases where the is danger of pulmonary œdema. This danger mig thus be recognised earlier and averted more promptly.

Ely, Cambridgeshire. H. Z. E. SCHEURING.

DEATH OF A MIND

SIR,—As a labouring man I am not-expected to r the professional periodicals, but circumstances compel me long ago to follow your pages. I read with more tha ordinary interest the article of May 27 on the Deat of a Mind. I disagreed with this title. There is n death to the mind—to the brain, yes. The writer show wonderful insight into mental phenomena. The stor had a gripping interest for me.

Caversham, Reading. MCKINLAY HARGREAVES.

A URETHRAL SYRINGE

SIR,—In your issue of April 8, Mr. Riches describes a urethral syringe consisting of a glass nozzle and a rubbe bulb. He states this is suitable "for aspiration o irrigation of an indwelling catheter," and "after an form of closed prostatectomy this syringe can be use for aspiration of the catheter in case of blockage." Th Canny Ryall syringe is condemned as "unsuitable fo irrigation of a catheter because the nozzle does not giv an airtight fit." Exactly the same objection would seen to apply to the Riches syringe; only the danger-poin *here does not lie between the nozzle and* the cathete but between the rubber bulb and the nozzle. Who is t say that after a few boilings an air leak will not develo at this point and may not be detected until too late It is not the leak that matters but the fact that th air may be reinjected into the bladder. Aspiration o air into the bulb is, of course, more likely to occur shoul there be a temporary blockage of the catheter.

My experience of opaque syringes and other opaqu instruments for aspirating the bladder is particularl painful. Many years ago I was using a Bigelow evacuator to clear away clot. There was a leak betwee the catheter and the rubber bulb sufficient to allow large quantities of air to enter the apparatus, the result of which was amply demonstrated at the early autopsy

At the Newcastle General Hospital it was our custon to use all-glass syringes of about 2 oz. capacity (of the o Clinic type) for all bladder irrigations and aspira- after punch prostatectomy. Any air leak was ced at once. There was a period during the late war n these syringes were unobtainable and we had to on all-metal syringes for the purpose. Four patients one after the other from reinjection of air before real fault was discovered. Thereafter opaque nges of any type were *forbidden*, and such stocks re possessed were destroyed. That was the end of employment of the urological equivalent of the cle pump.

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[1] Scheuring, H. *Polsk. Gaz. lek.* 1931, 10, 709.

[2] Winternitz. Pathology of War Gas Poisoning. 1920.

[3] Scheuring, H. Patologia zatrucia fosgenem. Jerusalem, 1944.

et us hope that the day is not far distant when every book of urology will give prominence to a solemn ning never to use an opaque syringe for bladder ge.

pe Town, South Africa. W. E. M. Wardill.

PERFORATION AND HÆMATEMESIS

IR,—In his article of Feb. 11, Mr. Ives emphasised rarity of hæmatemesis and perforation occurring ether. In the cases cited by him there is a certain se of time between those two incidents. In the owing case perforation and hæmatemesis occurred ultaneously.

stonemason, aged 44, was admitted to hospital one after- n with a two-year history of pain in the epigastrium made se by food, which caused vomiting. The history was ical of gastric ulcer.

he next morning, at 7 A.M., he started vomiting blood, l immediately afterwards began to have intense abdominal n. His pulse was very rapid and of small volume; his domen was very rigid, and he had all the signs of peritonitis. His condition being too poor for surgical intervention and a table blood-donor being unobtainable, conservative treat- nt was started. He was given morphine and atropine d an intravenous glucose-saline drip. Continuous suction s applied to his stomach.

The hæmatemesis did not recur. His general condition proved a little, but never sufficiently to allow a laparotomy. e next day he began to hiccup, and he died 36 hours after perforation and hæmorrhage.

Moka Hospital, Mauritius M. Shun Shin.

N.O.T.B. ASSOCIATION

Sir,—Medical practitioners who are taking part in the pplementary ophthalmic service or are interested in hthalmic practice may like to know something about e N.O.T.B. Association, which was formed in January, 49, to carry on the work of the old National Ophthalmic reatment Board.

All ophthalmic medical practitioners whose names are on e central professional list, and all dispensing opticians ho are members of the Guild of British Dispensing pticians, are eligible for membership; the present medical embership is 662. The association is administered by a mmittee composed of 4 ophthalmic medical practitioners ppointed by the Ophthalmic Group Committee of the British edical Association, 4 ophthalmic medical-practitioner mem- ers of the N.O.T.B. Association elected by the medical embership, and 7 dispensing members appointed by the uild of British Dispensing Opticians. It has a medical ecretary and secretary, the day-to-day work being carried out y four subcommittees. Three medical members appointed y the committee represent the association officially on the phthalmic Group Committee.

The objects of the association are: (1) to facilitate a edical eye examination for the general public; (2) to reserve the liaison between ophthalmic medical practi- ioners and dispensing opticians; (3) to encourage the evelopment of adequately equipped and staffed eye entres throughout the country for the convenience of he general public in areas where the permanent eye ervice is not in operation; (4) to act, if called on, in an dvisory capacity in any difficulty which may arise etween members of the association; and (5) to deal ith any queries which may be raised, and to provide eneral information.

The committee invites all those who are eligible, to support these objects by joining the association. The annual subscription is £1 1s.

Tavistock House North,
Tavistock Square,
London, W.C.1.

M. H. Atkins
Secretary.

SULPHONES IN LEPROSY

Sir,—In connection with your leading article of Jan. 28, I should like to mention briefly my experience at this hospital.

Four cases of lepromatous type have been on sulphone treatment for the last two years; they have had a 25% solution in arachis oil 3–5 ml. subcutaneously twice a week.

Another four cases of similar type have had 'Sulphetrone' as a 50% aqueous solution in normal saline 3–7 ml. subcutaneously biweekly.

A further three cases of similar type have had 'Promocitin,' six tablets per day for eight months.

In each of these three groups the clinical response has been good, but the bacteriological response poor.

Government Pentland Hospital,
Vellore, South India.

P. V. Karamchandani.

TRAINING FOR GENERAL PRACTICE

Sir,—The B.M.A. report on the *Training of the General Practitioner*[1] includes among the family doctor's duties "health education and preventive medicine." This led me to hope for proposals for incorporating a modicum of instruction on these subjects in the three-year training to be undertaken between qualification and entry into practice. I was not really surprised to find no further reference; the customary lip-service had been paid.

Professor Neale, in his letter of May 27, suggests that, for an all-round postgraduate course for general practitioners, the D.P.H. course—containing instruction in the epidemiologies of the home, the factory, the school, and even the hospital—cannot be bettered. In principle this is true; but the D.P.H. is a statutory requirement for those specialising in public health, and it should be recognised as a specialist qualification. However, it is most important that general practitioners should have a course of study in the principles and practice of preventive medicine and health education; this should certainly be provided in the three-year preparatory training after qualification.

London, N.W.8. P. A. Tyser.

SUBSTITUTES FOR CURARE

Sir,—In your leading article last week the statement was made that "it is not yet clear that C10 possesses any advantages over the natural drug."

It has been shown[2] that C10 is in fact superior to *d*-tubocurarine hydrochloride, since in equipotent doses (as judged by degree of muscular relaxation) the former drug leaves the patient with a significantly greater vital capacity than does the latter. Moreover, C10 appears to be free from side-reactions, whereas most workers have had the common experience of bronchospasm and histamine release as concomitant effects of the action of *d*-tubocurarine hydrochloride. To my knowledge the evidence produced in support of these conclusions has not been challenged.

Since that report appeared C10, in association with thiopentone, has been used routinely at the Maudsley Hospital for modifying electrically induced convulsions. Between February, 1949, and February, 1950, 973 treatments were given to a total of 125 patients. The only untoward effect was undue cyanosis in 2 cases, due to faulty technique in the management of the patient while natural breathing was being re-established after the fit. Both patients made uneventful recoveries. One of these was given 20 mg. of C5—the only occasion in the series when an antidote was thought necessary. The absence of side-effects, and of any evidence pointing to idiosyncrasy, in such a large series, clearly establishes C10 as the drug of choice for this work.

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[1] See *Lancet*, May 27, pp. 1001, 1008.
[2] Davies, D. L., Lewis, A. *Ibid*, 1949, i, 775.

That C10 should act for a shorter time than *d*-tubocurarine hydrochloride is an advantage to the psychiatrist, since the maximum paresis is obtained in the fourth minute, when the fit is induced. No single instance of delayed recovery was noted in the series here described.

Altogether it seems that for the psychiatrist C10 has a proved superiority over *d*-tubocurarine hydrochloride.

Institute of Psychiatry,
University of London.

D. L. DAVIES.

EPIDEMIOLOGY OF POLIOMYELITIS

SIR,—Dr. Cavendish Fuller's comments (May 13) on my letter of March 25, are rather sweeping. He asserts, without giving any references, that epidemic disease cannot be spread by fæcal pollution of the permanent way. A moment's reflection on the countless thousands of miles of railroad in constant daily use on this tightly packed island, carrying passengers a small proportion of whom are bound to be excreting typhoid bacilli, dysenteric organisms, or the virus of poliomyelitis, is sufficient to cause the epidemiologist to consider this mode of spread.

The Railway Executive, in a recent statement, makes these observations:

> "Although many investigations have been made, no country in the world has so far found any better solution for its railway coaches. The chemical closet and similar devices used in aircraft, etc., are not suitable as they stand because (*a*) there is not sufficient capacity, (*b*) they bring inside the vehicle problems of æsthetics, smell, contamination, and possible misuse which are at present entirely absent. Any system inside the coach involves special means of disposal and this is distasteful work for which it is likely to be difficult to obtain staff. As intimated above, the problem will continue to be examined with a view to seeking a solution and the research department will take a leading part in these investigations, but there is no alternative for the time being to the continuance of the previous practice so far as the new coaching stock is concerned."

M. B. MCCANN
Worksop. Medical Officer of Health.

ALBUMIN-ACTIVE ANTISERA IN RHESUS TYPING

SIR,—Dr. E. M. Stirk's paper (May 13) on the use of albumin-agglutinating antisera calls for criticism on a number of points, some of which have already been dealt with by Dr. Richardson-Jones (May 20) and Dr. Malone (June 3). Everyone will agree that all patients who are to receive transfusions should be Rh typed, but the general policy and detailed proposals of Dr. Stirk are probably not the best way of achieving this end. The main problem appears to be that of supplying sufficient reliable testing serum to the smaller hospitals where only relatively few transfusions are carried out. Larger hospitals and those laboratories which serve several hospitals will perform enough Rh tests for their pathologists and technicians to be able to obtain experience and to produce reliable results with almost any of the proved methods of Rh testing, including the use of albumin-agglutinating antisera in precipitin tubes, and perhaps even by the capillary-tube technique. There is little doubt that the most reliable method of all is the use of a saline agglutinating antiserum in precipitin tubes; and every effort should therefore be made—and in most regions it is being made—to supply small and occasional users with such antisera. But on the whole when a transfusion can be planned some days in advance, it is always best for both the testing of the patient's blood and the matching of the blood for transfusion to be done at the regional transfusion centre.

Certainly it is important that all possible use be made of albumin-agglutinating antisera—i when any patient is found to have a usable serum sort, the quantity of blood drawn should depend on condition and not solely on the day-to-day needs of laboratory. All serum which is to be used for Rh t should have its antibody contents determined by specialist laboratory. While it may be true that an and anti-E are somewhat less common in those which do not agglutinate any cells suspended in al than in those which do give such agglutination, attempt to base the supposed antibody content of a se on this criterion is a retrograde step. Up to 1944 it perhaps necessary to guess the antibody content serum and to use several antisera for each test in one of the sera was wrongly classified. Such a meth is at the present time unjustifiable. It is indeed surpris that Dr. Stirk always obtained agreement between different sera. They must by chance all have been p anti-D or all anti-C + anti-D. The latter supposit seems more probable, since according to Mollis Mourant, and Race[1] the total frequency of D-negat persons in England is 16·8%, of whom 16·0% are negat both with anti-D and anti-C, agreeing somewhat m closely with Dr. Stirk's figure of 14%. It is most import that transfusion recipients who are negative to anti but positive to anti-C should be classed as Rh-negati It is also a possible source of error to use anti-Rh testi sera containing anti-A or anti-B agglutinin. This another reason why all Rh testing sera should be iss from specialist laboratories since only such a laborat is likely to have facilities for carrying out and check the necessary absorptions.

Blood Group Reference Laboratory,
c/o Lister Institute, London, S.W.1.

A. E. MOURA

PERFORATED PEPTIC ULCER

SIR,—In their article of May 13 Mr. Truscott a Mr. Withycombe give their reasons for rejecting co servative treatment for perforated peptic ulcer exce in special circumstances. On comparing the five fa cases in their series with the series described by M Hermon Taylor,[2] I am struck by the relatively lon period between the time of perforation and the time admission to hospital in their series. Mr. Hermo Taylor describes twenty-eight cases in which (with th exception of one patient whose ulcer had been perforate for 24 hours, and who was unfit for any type of trea ment) the average time between perforation and admissio to hospital was 3 05 hours, and the longest time 8 hour By contrast with this, in the five cases described Mr. Truscott and Mr. Withycombe the average time perforation was 11·2 hours, the shortest being 7 hou and the others ranging from 10 to 15 hours.

It would seem, therefore, that operation is advisab in cases where perforation has been present for 9–10 hou or more; and it is probable that if this rule had b followed in the series reported by Truscott and With combe the fatalities in cases treated conservatively wou have numbered one (instead of three) out of twenty, a their conclusions might have been quite differe Mr. Hermon Taylor stated in his article that "ca perforations will seal themselves if the stomach is k empty by *aspiration*." *This suggests* the value immediate aspiration carried out by the general prac tioner if the patient cannot be got to a hospital with a few hours of the onset of symptoms.

It appears that both methods have their danger conservative treatment is dangerous when more dra treatment is required, and operative treatment dangerous when the patient is unfit (usually because some other disease) to stand it. Therefore whicher

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1. Mollison, P. L., Mourant, A. E., Race, R. R. Medical Rese Council Memo. no. 19 1948, p. 14.
2. Taylor, H. *Lancet*, 1946, ii, 141.

of treatment is preferred for general use, the surgeon t use his judgment to choose the method of treatment :h is safest for each patient.

ndon Hospital Medical
College, E.1.
ALEC P. BARCLAY.

WATER AS A NUTRIENT

IR,—Wholesome water, with or without its traces of eral ingredients in solution, is the protective food excellence. But any attempt to make it the vehicle other substances which current knowledge regards necessary in our diet, such as calcium, fluorine, and ine, should be considered very critically. If the nan requirements of these trace ingredients are ictly known, and if it can be said with certainty it the average mixed diet is deficient in one or more these elements, and if the only, or even the best, way making good these deficiencies is by introducing them ı the public water-supplies, then it would be "cutting one's nose to spite one's face" to refrain from doing ; but these are very big ifs. Is the suggestion to nvert water into what would amount to a diluted edicine simply another phase of the modern complex r faking, in some way or other, nearly every article food we consume? One does not need to be specially nical to detect the ulterior motive behind most of the louring, bleaching, pasteurising, sterilising, polishing, id fortifying that is applied to much of the food we onsume today. So every proposal to fortify food or ater with minerals, vitamins, &c., should be judged rictly on its merits after due study and research.

The elements whose presence in water constitute it nutrient [1] are fluorine, iodine, and calcium.

Present knowledge suggests that water containing more than one part per million of fluorine is liable to cause luorosis or mottled teeth in children, while dental caries follows the consumption of water containing appreciably less than this amount. If water were the only source of fluorine, it would seem that here, at any rate, we have the very knowledge we want of the knife-edge *optimum* amount of fluorine to add to or remove from various supplies, and the action that Murray and Wilson [2] recommend in adjusting supplies to contain 0·5 p.p.m. fluorine would be justified. But does this take account of the very unequal amounts of water consumed by different people; of the fact that fluorine might be concentrated in some cooking processes and entirely removed in others; and of the fact that water is not the sole source of fluorine (fluorine has been recorded in baking-powders, butter, and other foods, and probably occurs in many fruits and vegetables, as eaten, from the use of insecticides containing the element)?

Is fluorine deficiency the only or even the main cause of dental caries? They may be associated but yet not necessarily be cause and effect. It would be interesting to know what percentage of the population does not suffer from fluorine deficiency. After all, we have evolved in our environment as it is; *and would it* be any less reasonable to try to establish, say, a deficiency of argon in the atmosphere we breathe than a deficiency of fluorine or anything else in the very mixed diet that we can eat if we choose wisely?

If our present dietary deficiencies are due to an obsession for consuming manufactured, pre-packed articles whenever possible, is it the proper corrective to superimpose yet another artificial process—viz., fluorising—on our water-supply, which we already sometimes aluminate and almost *universally* chloraminate, or has the time come to call a halt to these artificial means and to start the reverse process of getting back a little nearer to nature?

Iodine is another element only required in trace amounts by the human body, the average daily requirement for adults being estimated at 0 05 mg. Most people obtain all they require from water, sea fish, and vegetables, but the use of iodised table salt and the inoculation of water-supplies with small amounts of iodides are already fairly widely practised. Only if the success of these measures can be proved is their further adoption justified.

The deficiency of calcium in many diets, of which there seems to be no doubt, is surprising in view of the prevalence and cheapness of the element. In considering public water-supplies as the channel for introducing extra calcium into the diet, a number of considerations must be borne in mind. In the first place, natural water-supplies vary enormously in their calcium content, soft supplies from the Welsh hills containing no more than 20 p.p.m., whereas supplies derived from lowland rivers may contain up to 160 p.p.m. and supplies from miscellaneous wells up to 350 p.p.m. Taking the daily requirement of calcium as 1000 mg. (a low estimate probably) this would be supplied by 1½ pints of milk, or 5 oz. of cheese, or 6 oz. of vegetables. To replace 1½ pints of milk one would require, of soft water, of hardness 5, as much as 88 pints, assuming the hardness was due to calcium salts and not to magnesium. Of hard water, say, hardness 20, one would require 22 pints. If some of the hardness were due to magnesium salts, a bigger volume still would be required to supply the needed amount of calcium.

It is not to be supposed, of course, that there is any intention of taking the whole of one's calcium requirement in one's water-supply. Nevertheless, it is obvious that, by comparison with other substances, particularly dairy products and vegetables, the calcium one derives from average water is negligible, and even from very hard water almost negligible unless one consumes relatively enormous amounts. Moreover, in cooking, much of this calcium might go out of solution, forming a deposit on cooking utensils and becoming unavailable.

F. C. BULLOCK
Health Department, Leicester. Public Analyst.

USE OF POLYESTER RESINS IN MEDICINE

SIR,—Some omissions from the article by Dr. Scales (April 29) may give your readers an erroneous impression—especially as his use of references in some parts of his paper shows that he is well aware of the custom of referring to earlier work in relevant fields. Writing on Reproduction of Bones he does not mention the articles on Plastic Bone Models in the *British Medical Journal* (Feb. 25, 1950, p. 482), and on Plastics Aid in Medicine in *British Plastics* (November, 1949), in which attention was drawn to the pioneer work done in this field by my company's laboratories, based on Blaine's original work which goes back quite a few years.

Whilst one could perhaps make no claim to originality in reproducing bones in plastic material (except perhaps that to my knowledge no-one produced a complete, articulated, all-plastic skeleton before Blaine's development work in this connection) it would appear a matter of scientific accuracy (which, after all, is what your readers are looking for, both at present and in future) and courtesy to make some relevant references.

Educational & Scientific Plastics Ltd.,
392A, London Road,
Croydon, Surrey.
T. W. FAZAKERLEY
Managing Director.

*** We have shown this letter to Dr. Scales, who writes: "The article to which your correspondent refers makes no claim to originality in bone-casting. It simply states a method that was developed at Stanmore, and which, as far as I know, has not been previously described. Considerable doubt seems to exist as to who carried out the 'pioneer' work in this field. Following the article in the *British Medical Journal* of Feb. 25, there appeared in that journal (March 25, p. 731) a letter by Dr. R. A. Broderick, which should be read by

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1. Leading article, *Lancet*, 1945, ii. 17.
2. Murray, M. M., Wilson, D. C. *Ibid.* p. 23.

those interested. There is no reference in *British Plastics* of November, 1949, to any work by Dr. Blaine. No doubt the reference is to an article which appeared in *British Plastics* in December, 1949, in which the writer states (p. 638): 'These models have always been produced in some artificial material such as plaster-of-paris and gelatin.' If Dr. Blaine is concerned with scientific advancement, surely his methods of bone-casting, which may be of interest and use to many people, should be published. Mr. Fazakerley should not complain if no reference is made to methods which have not been published."—ED. L.

ULCERATIVE COLITIS

SIR,—In his letter last week, Dr. L. Rau quotes me as holding the opinion that for all practical purposes the psychological aspects of ulcerative colitis can be ignored. I must disclaim any such opinion. On the contrary, I have for many years believed and taught that psychological factors play an important, if not the most important, part in ætiology, and that psychotherapy, in selected cases, is a valuable adjunct to treatment.

Birmingham. T. L. HARDY.

A.C.T.H. AND LYMPHOSARCOMA-CELL LEUKÆMIA

SIR,—Your leading article of Jan. 28 mentions that Pearson, Eliel, and Talbot, in a symposium held at the New York Academy of Medicine on Jan. 13, describe "diminution in the size of the spleen and lymph-glands in chronic lymphatic leukæmia, lymphosarcoma, and Hodgkin's disease, and a remission in five cases of acute leukæmia" after application of adrenocorticotropic hormone (A.C.T.H.).

Unaware of the findings of these workers, my colleague, Dr. Hassan Darman, reported to the Turkish Medical Association of Istanbul, on Feb. 21, the following observation:

A young man, aged 26, had suffered for 11 months from increasing weakness and debility, coupled with violent pains in the region of wrists and ankles, with concurrent swelling of the lymph-nodes of the neck, axilla, and groin. For 2 months the patient had shown manifestations of diabetes insipidus—excessive thirst and excretion of 4–5 litres of urine per diem.

The affected glands were swollen to the size of walnuts or hazelnuts. Near the junction of the 5th rib and the sternum was found a walnut-sized tumour, obviously separate from the bone. Insteps and ankles were extraordinarily painful, and both legs were almost completely paralysed—apparently through pressure of enlarged lymph-nodes upon the main nerve-trunks in the pelvis.

Blood examination: red cells 1,700,000 per c.mm.; Hb 40%; white cells 3600 per c.mm., of which 93% were atypical lymphocytes (lymphosarcoma cells). The sternal-puncture smear consisted almost entirely of the same cells; normoblasts 17%. Examination of an inguinal lymph-gland, which showed many mitotic cells, led to the pathological diagnosis of lymphosarcoma. X-ray examination revealed decalcification and osteolytic foci in several bones of the foot. The sella turcica was about normal size; but it seemed that the diabetes insipidus was most probably caused by a proliferation of osseous tumour tissue, encroaching upon the hypophysis.

Clinical diagnosis: universal lymphosarcomatosis with leukæmic blood picture.

In order to combat the diabetes insipidus, this extremely ill man was treated with 'Postuitrin,' a locally produced extract of the posterior lobe—at first 80–110 international units (8–11 ml.) per diem, later 3 ml. per diem. On the 5th day of treatment the patient felt better; the pains in joints and bones had decreased. Blood examination now showed 34% polymorphonuclears and 66% lymphocytes. On the 14th day the glands had become much smaller and the pains had ceased completely.

Thereupon Dr. Darman used another posterior-lobe extract —'Infundin' (Wellcome)—and within a few days the state of the patient had again greatly deteriorated. Blood examination: 86% lymphocytes with only a few polymorphonuclears. Consequently we returned to treatment with the produced extract, and once again the state of the improved.

He has taken this preparation continuously since 1949. His state is very satisfactory; he has develope enormous appetite and is clearly acquiring layers of the abdomen. He has the air, no longer of a suffering but of one who is convalescent. His lymph-glands disappeared almost completely. Although formerly nearly completely in both legs, he is regaining control muscles, notably the iliopsoas and the quadriceps. picture: red cells 2,500,000 per c.mm, reticulocytes Hb 59%, white cells 7200 per c.mm. (polymorphon 37%; lymphocytes, which resemble normal, 63%). bone-marrow contains numerous normoblasts, myel and metamyelocytes and gives the impression of very regeneration.

A further biopsy, carried out when the size of the l glands had much decreased, showed only few mitotic there were strands of connective-tissue with few cells, also still agglomerations of pathological cells.

We were especially impressed by the fact that locally produced extract—but not infundin—sho itself beneficial; and bearing in mind the fact[1] A.C.T.H. applied to rabbits and mice greatly red the thymus and lymph-glands, we concluded that local extract must contain A.C.T.H. Nothing is kn about any beneficial influence of posterior-lobe horm on lymphatic tissues, whereas it has been repeat observed that basophil anterior-lobe cells, in nests strands, can intrude deeply into the posterior l Thus we are convinced that A.C.T.H. has a dama influence not only on normal lymphocytes but als lymphosarcoma cells.

The cortical steroid hormone which under the influ of A.C.T.H. acts upon the lymphocytic apparatus w not seem to be identical with deoxycortone either or combined with vitamin C. For, according to Profe Frada (Feb. 18, p. 329), even large doses had onl "moderate, transient, and inconstant effect u leukæmia." On the other hand Law and Spe found in mice with spontaneous lymphoid leukæ a decrease of the immature lymphocytes after inject adrenal cortical extract, and a regression of infiltrated thymus and lymph-nodes and to a les extent of the spleen.

The preparation employed by Dr. Darman, *appli to two healthy people, led to lymphopenia* after 3 hour this resembles the effect of highly purified A.C.T.H.[3]

2nd Medical Clinic,
University of Istanbul. E. FRANK.

Public Health

The Glasgow Smallpox Outbreak

BETWEEN March 26 and April 1, there were 21 ca of smallpox in the Glasgow area,[4] the original case be in an Asiatic seaman who landed at Tilbury on March

The outbreak has been discussed by Dr. Stuart Laidl the medical officer of health, and Dr. W. A. Horne, senior deputy.[5] They refer to the difficulty of differ tiating clinically between varicella in an adult and var modified by previous vaccination, especially in Asiat "it is imperative to regard an eruption in an Asi showing any varioloid feature whatever as 'adminis tive smallpox' and to carry out timely vaccinatio all contacts." The outbreak provided a sad remin of the vital necessity to protect hospital nursing st by adequate vaccination before recruitment and at reg intervals thereafter. Furthermore: "The value infant vaccination has been established, and the 30- increase in the number of infants vaccinated during outbreak indicates both the serious position result

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1. Dougherty, T. F., White, A. *Amer. J. Anat.* 1945, 77, 81.
2. Law, L. W., Speirs, R. *Proc. Soc. exp. Biol., N.Y.* 1947, 66,
3. Hills, A. G., Forsham, P. H., Finch, C. A. *Blood*, 1948, 3, 75
4. See *Lancet*, April 1, p. 638; *Ibid*, April 8, p. 685; *Ibid*, April p. 728; *Ibid*, April 22, p. 789.
5. Laidlaw, S. I. A., Horne, W. A. *Med. Offr*, May 13, p. 157.

the repeal of compulsory vaccination and the ıgness of parents to have their children vaccinated ıe presence of danger." All the fatal cases were in ıccinated or unsuccessfully vaccinated people; and, ersely, those patients survived who had been essfully vaccinated, even though only in infancy. lly: "It is of fundamental importance to sustain fficient public-health service of knowledgeable and rienced medical officers, a service still available threatened with extinction due to failure to recognise entive medicine as an indispensable element in an grated National Health Service. Nothing that has ırred in this outbreak has lessened our conviction ; the control of infection in an area is best served the co-ordination of fever and tuberculosis hospitals one group under the direct control of the medical er of health."

Births, Marriages, and Fertility in 1948

n 1948, the birth-rate in England and Wales fell from high figure reached in 1947, but it was higher than the immediate pre-war years; and the stillbirth-rate s again the lowest recorded up to that time. The rriage-rate was maintained at a comparatively high el, but the number of divorces was 27% lower than in previous year. These facts emerge from a report by Registrar-General[1] which includes the following ures.

Population.—The national population (inclusive of Armed rces and merchant seamen at home and abroad) was ,502,000, compared with 43,050,000 in 1947—an increase 452,000.

Births.—There were 775,306 live births in 1948, which presented a birth-rate of 17·8 per 1000 total population. his was a decrease of 2·7 per 1000 from the previous year's ıte. The 1947 rate of 20·5 per 1000 was the highest since 21; and despite the fall, the 1948 rate was still much igher than that of the immediate pre-war years, the average ıte for the years 1936–40 being 14·7 per 1000.

There were 41,574 illegitimate live births, compared with 6,603, 53,919, and 63,420 in the years 1947, 1946, and 1945. hown as proportions of the total numbers of live births, hese figures represent 5·4, 5·3, 6·6, and 9·3%.

Stillbirths numbered 18,399, representing a rate of 23·2 per 000 live and still births, compared with 21,795 and a rate of 4·1 per 1000 in 1947. The rate in 1948 was the best ever recorded in this country up to that time; the provisional rate for 1949 was 22·6.

Fertility.—Of the legitimate maternities during the year, 44·1% were to mothers with no surviving previous children, 30·7% to mothers with one surviving previous child, and 13·3% to mothers with two. There were 9687 maternities resulting in multiple births, of which 2 were quadruplets and 88 triplets. All the quadruplets were born alive. Of about 112,000 confinements which took place within 11½ months of marriage, some 62,000 occurred within 8½ months; and of these, about 42,000 occurred within 6½ months.

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[1] The Registrar-General's Statistical Review, 1948. Tables. Part II, Civil. H.M. Stationery Office. Pp. 157. 4s.

Infectious Diseases in England and Wales

Disease	Week ended May			
	6	13	20	27*
Diphtheria	41	43	51	60
Dysentery	341	444	391	457
Encephalitis:				
Infective	2	3	—	4
Postinfectious	—	—	2	—
Food-poisoning	56	54	103	79
Measles, excluding rubella	6319	7280	8828	9354
Meningococcal infection	34	37	37	40
Ophthalmia neonatorum	29	31	56	50
Paratyphoid fever	7	11	13	5
Pneumonia, primary or influenzal	534	502	594	489
Poliomyelitis:				
Paralytic	20	15	15	34
Non-paralytic	5	7	10	16
Puerperal pyrexia and fever	87	80	70	82
Scarlet fever	1267	1323	1177	1295
Smallpox	3	—	—	—
Typhoid fever	3	6	7	6
Whooping-cough	3229	3472	3237	2966

* Not including late returns.

Obituary

MORRIS BENJAMIN BRODY

M.D. SHEFF., D.P.M.

Dr. M. B. Brody, who recently died in Sheffield, was one of the most capable and promising among the younger generation of British psychiatrists.

Born in Sheffield in 1912, he graduated M.B. with honours at Sheffield University in 1934, and after holding house-appointments at the Sheffield Royal Infirmary and the Miller Hospital, Greenwich, he decided to specialise in psychiatry. He held appointments at St. Lawrence Hospital, Caterham, and at the West Riding Mental Hospital before he moved to Runwell Hospital, where during the next nine years he established his reputation as an excellent all-round clinician and a successful research-worker. He took the D.P.M. in 1937 and his M.D. degree in 1941. For several years he was honorary secretary of the clinical psychiatry subcommittee of the Royal Medico-Psychological Association and a member of the council of the psychiatric section of the Royal Society of Medicine. From 1946 to 1949 he was deputy medical superintendent at Graylingwell Hospital, Chichester, and last year he was appointed director of research at the same hospital.

Dr. Brody founded the East Ham child-guidance clinic and started the social psychotherapy centre at Graylingwell Hospital. Of his contributions to psychiatric research, his studies on the measurement of dementia and on intelligence tests in the psychoses have gained him a well-deserved reputation far beyond this country; but his lively and original mind did not permit of narrow specialisation. In 1946 he published, in this journal, together with T. C. Hall, his invention of an automatic pneumo-encephalographic apparatus. In psychotherapy he experimented with a short-term method of his own. In his approach to psychiatric problems he was nonconformist and he never tired of questioning and challenging accepted authority. As a teacher he was stimulating and provocative; as a colleague he was loyal and generous. One of the few friends who knew of the shadow of ill health which threatened Dr. Brody writes: "in his professional and private life he radiated vitality and cheerfulness, and even when he was aware that he was doomed he continued with his work undeterred and completed an exhaustive review on mental testing in psychiatry which bears witness to his profound knowledge."

Dr. Brody leaves a widow and two children.

EDMUND CECIL SALT

B.A., M.B. CAMB.

Dr. E. C. Salt, who died at Burton-on-Trent on May 17, at the age of 78, was the son of the Rev. T. S. Salt, vicar of Curbar, Derbyshire. From Repton School he went to Cambridge, where he graduated B.A. in 1893 and M.B. four years later. As a student at the London Hospital one of his contemporaries was McAdam Eccles, who became his intimate friend.

After qualification Salt served as house-surgeon and resident receiving-room officer at the London Hospital, and as assistant house-surgeon at the Poplar Hospital. In 1900 he returned to his native town of Burton-on-Trent, where his great-grandfather had been a founder of the brewing industry. There he entered partnership with the late Dr. Bridgman and he continued in the same practice, with Dr. W. P. Lowe and later with Dr. E. G. Frewer, until he retired in 1943.

Dr. Salt's whole interest centred in his large and busy practice. An ideal family doctor, kindly and cheerful, he never spared himself, and he endeared himself to a host of patients. A good general surgeon, his work at the Burton Infirmary, where he was appointed surgeon in 1902, was of a high order. His only recreation was golf, but he got little time for it except during his annual holiday, which he always spent in Scotland at his beloved Machrihanish.

He is survived by a widow and two married daughters.

Notes and News

CONVALESCENT HOMES

THE new edition of the King's Fund's invaluable directory[1] has *lost the original loose-leaf form, and is now a compact* and tidy volume bound in red and gold. It will be re-issued every spring, and so kept well up to date. Only homes willing to admit patients living in the London area are recorded, and those which lie outside the four Metropolitan hospital regions are grouped together in part II of the directory. Nearly all the homes which have remained outside the National Health Service, before being accepted for the directory, were visited by one or more members of the King's Fund convalescent homes committee. All the homes included are for patients for whom convalescence or a recuperative holiday has been recommended by a doctor. None of them is commercially managed.

HOSPITAL COSTS IN NEW ZEALAND

THE rising cost of hospital maintenance is reflected in the New Zealand Department of Health's account of expenditure by hospital boards in 1948.[2] In the years 1946, 1947, and 1948 the cost per occupied bed in general hospitals, by classes, was as follows:

Hospital (class)	*Cost per occupied bed (£)*		
	1946	*1947*	*1948*
I	421·8	460·7	556·6
II	424·9	447·7	503·2
III	364·4	442·2	516·9
IV	418·8	466·4	526·0

Class I hospitals have a daily average of over 200 occupied beds; class II, of 100–200 occupied beds; class III, of 40–100 occupied beds; and class IV, of 20–40 occupied beds.

In 1948 the average cost per occupied bed in hospitals with 10–20 beds occupied each day was £624·9; and in hospitals with 10 or less occupied beds, £631·0. For all general hospitals the average was £540·9. (The corresponding figures for special hospitals were as follows: infectious diseases, £569·6; tuberculosis, £343·0; and maternity, £559·5.) Of a total of 10,652 beds in general hospitals, an average of 8022 were occupied each day.

INSTITUTE OF PSYCHO-ANALYSIS

THE present building of this institute is too small for its teaching and clinical activities and its lease is near its end. Accordingly a new building has recently been purchased; but this cannot be ready for occupation for about a year, so any expansion of the work of the institute is not, at the moment, possible.

SIGHT-TESTING BY OPTICIANS

THE committee set up, under the chairmanship of Mr. William Penman, to investigate average times taken by opticians in connection with sight-testing and with *fitting* and supplying glasses under the Supplementary Ophthalmic Services, has now completed the first part[3] of its report. This shows that the average time taken by ophthalmic opticians to test sight is 36·16 minutes—an estimate which allows for such factors as writing letters to general practitioners, filling up forms, and losses due to broken appointments. Letters are written to general practitioners in about one-twelfth of the completed tests. "There is no evidence of widespread overwork. The two men who did most testing during the sample week made 69 and 56 tests respectively, the number of minutes actually occupied in sight-testing being 2162 and 1470 respectively." The average time per ophthalmic optician during the sample week was only 815 minutes; but "it has to be remembered that, whether a whole-time or a part-time ophthalmic *optician*, very few of the sample are engaged in sight testing alone in the Supplementary Ophthalmic Services. (The fitting and supplying of glasses is also their function.)"

"MEDICINE IN 1850"

AN illustrated catalogue is now ready of the exh (described in our issue of June 3) which is on show at Wellcome Historical Medical Museum, 28, Portman London, W.1, daily, except Sundays, from 10 A.M. to 5 The catalogue is published for the trustees of the mu by Geoffrey Cumberlege, Oxford University Press (pp. 64, and can be obtained through booksellers or from the publi but not by post from the museum.

THE PLAGUE IN LONDON

IN *Physician Extraordinary* Miss Shirley Murrell intro Sir Gilbert Blane to many who had never heard of him be In *Farewell Sweet Life*[1] she has given her imagination rein; at any rate the picture of Nat. Hodges, phys which she presents differs considerably from that given in *Dictionary of National Biography*. It is doubtful wh her variations have added interest to the doings of her h for anyone who—like the real Nathaniel Hodges, M.D. could choose a fire-engine as a suitable present for the Col of Physicians is surely a character ready made. The is set against the grim background of London in the d of the Plague.

MEDICAL POSTS IN SYRIA

EARLIER this year we announced[2] that the medical facul of the Syrian University, Damascus, had vacancies for Briti assistant professors of anæsthetics, anatomy, physiolog biochemistry, and histology and pathology. The physiolo and anatomy posts have now been filled, but there are possibl further vacancies for assistant professors of parasitology and bacteriology. Inquiries should be addressed to the Midd East Secretariat, Foreign Office, London, S.W.1.

TOOLS OF OUR ANCESTORS

IN a new book[3] on prehistoric tools, Mr. Kenneth P. Oakley adopts a conservative attitude about artefacts: he does n accept either Benjamin Harrison's eoliths or Reid M rostrocarinates, both of Tertiary age, as human handi Such stones, he says, "can be matched exactly by stones chipp by natural agencies"; but that is hardly a serious ans to the arguments elaborated by Reid Moir.[4] The old artefacts recognised as such by Mr. Oakley are the Oldow pebble tools found with a lower jaw of human type in an ear Quarternary deposit in East Africa. From that poi onwards he traces clearly the history of tool-making in stone, wood, and bone and correlates it with the successions of cultures. He shows that in early Palæolithic times in Europe there were two parallel cultures, of which one was charac-terised by Abbevillian and, later, Acheulian core-tools and the other by Clactonian and, later, Mousterian flake tools. The Abbevillian stone implements are regarded as derived from the Oldowan, and the Clactonian from the tools found asso-ciated with *Pithecanthropus pekinensis* in China. Most of the *later cultures derived from these* two main lines are described together with their interactions with one another, and thei relations with other human activities, such as hunting and ar Methods of making some of the tools are also indicated. A final diagram showing in parallel the cultures of Europe, As and Africa, suggests that the origin of them all is to be sought in Africa. A fascinating book.

University of Cambridge

On May 27 the following degrees were conferred:

M.D.—R. N. R. Grant, Vivien U. Lutwyche.
M.Chir.—H. E. Lockhart-Mummery.*
M.B., B.Chir.—Margaret M. Bates.

* By proxy.

Royal College of Physicians of Ireland

On June 2, the following were admitted to the fellowship:

M. L. Abrahamson, R. G. Cross, F. F. Kane, Simon Sevitt.

The following were admitted to the membership:

Dhirubhai Vallabhji Doshi, A. A. McG. McConnell, Ravind Vasant Rele, C. M. Sheridan.

North-East Metropolitan Region

The annual general meeting of the ophthalmologists i this regional area will take place at 6 P.M. on Thursday, June 22, in room 1301, 13, Portland Place, London, W.1.

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1. Directory of Convalescent Homes Serving Greater London. London: King Edward's Hospital Fund. 1950. Pp. 183. 7s. 6d.
2. New Zealand Department of Health: Appendix to the Annual Report for the Year ended 31st March, 1948, containing hospital and relief statistics.
3. Ministry of Health and Department of Health for Scotland. Report of the working party on the average time taken to test sight by op [illegible] average time taken by ophthalmic [illegible] opticians in fitting and supplying [illegible] ementary Ophthalmic Services of [illegible] o. Part 1: Report on the Average Time [illegible] Ophthalmic Opticians. H.M. Stationery Office. Pp. 39. 1s. 3d.

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1. London: Hodder & Stoughton. 1950. Pp. 319. 10s. 6d.
2. *Lancet*, Feb. 25, p. 378.
3. Man the Tool-Maker. London. British Museum. 1949. Pp. 98. 2s. 6d.
4. Moir, J. R. The Antiquity of Man in East Anglia. Cambridge, 1927. The Earliest Men. London, 1939.

nal University of Ireland

senate has decided to confer the honorary degree of on Sir Alexander Fleming, F.R.S.

dnought Seamen's Hospital, Greenwich

Stephen Power will demonstrate surgical cases at this tal at 3 P.M. on Thursday, June 29. The demonstration n to any doctor who cares to attend.

lwick Lecture

Tuesday, June 20, at 2.30 P.M., at the Royal Sanitary tute, 90, Buckingham Palace Road, London, S.W.1, Gordon M. Fair, dean of the Graduate School of neering of Harvard University, is to lecture on the neer in Public Health.

John's Hospital Dermatological Society

of. H. A. Harris will deliver the Prosser White oration is society at 1, Wimpole Street, London, W.1, on Thurs- June 22, at 4.30 P.M. A dinner will be held the same ing, and tickets (17*s.* 6*d.*) may be had from the hon. etary, *Dr. J. E. Schneider-Green, St. John's Hospital,* isle Street, W.C.2.

tish Cardiac Society

he 28th annual general meeting of this society was held the Westminster Hospital Medical School on May 25, ler the chairmanship of Sir Arnold Stott. At the morning sion, when there was a discussion on the use of anti- gulants with special reference to cardiac infarction and ipheral vascular disease, the opening speakers were Dr. Gilchrist, Sir James Learmonth, Dr. R. G. Macfarlane, d Dr. K. Shirley Smith. The short communications given the afternoon included papers on œsophageal lead electro- rdiography, tomographic and electrokymographic investi- tions of the heart, and the effect of drugs upon the venous d right ventricular pressures.

rvey of Growth

The Ministry of Health and Education are conducting, in njunction with the British Pædiatric Association, a survey the growth of infants and young children, with a view to mposing reliable growth charts. This survey, which began 1949, is being made in selected child-welfare centres; and e field work is being supervised, on behalf of the Ministry f Health, by Dr. Ethel Cassie. Data are being collected under e headings of growth, type of feeding, medical history, and ocial circumstances. In the first place about 20,000 babies, ll entering the survey below the age of two months, will be ncluded; the investigation will continue for at least three ears.

Extra Rations for Invalids

The Minister of Food announces changes in the arrangements for supplying extra rations to those suffering from diabetes and active tuberculosis. These changes, made with the agreement of the Rationing (Special Diets) Advisory Com- mittee of the Medical Research Council, are as follow:

Diabetes.—In addition to the ordinary rations of butter and margarine, diabetics may now obtain each week either (*a*) two extra rations of butter and one extra ration of margarine, or (*b*) two extra rations of margarine and one extra ration of butter. (Margarine may still be taken in place of all, or part, of the butter entitlement.) At [illegible] and margarine combined ent[illegible] They will continue to be [illegible] rations and the special cheese ration of 12 oz.

Active Tuberculosis.—People suffering from active tuberculosis will in future be entitled to obtain each week one extra ration of butter or margarine instead of the following extra allowances: 3 oz. butter or margarine, 1 oz. cooking fat, and 1 oz. bacon. The extra allowances of cooking fat and bacon were granted at a time when the ordinary rations of these two foods were 1 oz. and 2 oz. respectively. The present rations of cooking fat and bacon are 2 oz. and 4 oz.

Canned Milk and Proprietary Infant Milk Foods.—Since these are no longer controlled, the special arrangements for making supplies available to certain infants and invalids have lapsed.

Dried Banana Flakes.—Patients suffering from steatorrhœa, cœliac disease, or tropical sprue will in future be able to obtain dried banana flakes as well as dried bananas.

Priority Milk and Eggs.—Now that milk-supplies are unrestricted and eggs more plentiful, medical certificates are not needed to enable invalids to obtain priority supplies. In some cases, however, authority for foods other than milk is granted against a milk code-number.

Award for Research on Infertility

The American Society for the Study of Sterility offers an annual award of $1000, known as the Ortho award. The competition is open to those in clinical practice as well as those whose work is restricted to research in the basic sciences. Essays submitted for the 1951 contest must be received not later than March 1. Further particulars may be had from the society, 20, Magnolia Terrace, Springfield, Mass.

Church of England Hospital Chaplains' Fellowship

The annual conference of this fellowship, held in London on May 24 and 25, expressed opposition to both "mercy-killing" and euthanasia. On leucotomy it was felt that knowledge was still insufficient for moral judgment. The conference agreed that normally it was desirable for any dying patient who was a practising Christian to be told of his approaching death.

Research Board for the Correlation of Medical Science and Physical Education

On Tuesday, June 20, at 2.30 P.M., a meeting of this board will be held at Apothecaries' Hall, Black Friars Lane, London, E.C.4, when it is hoped that Mr. George Tomlinson (Minister of Education), Lord Webb-Johnson, and Miss L. E. Charlesworth will discuss medical science and physical education from the educational, medical, and international points of view respectively.

Sickness Benefit

The first report of the Ministry of National Insurance, covering the period from Nov. 17, 1944, when the Ministry was created, to July 4, 1949, shows that during 1948–49—the first year of operation of the new National Insurance scheme—some 39 million sickness-benefit payments were made. New claims totalled 7 million—an average of 140,000 a week. The number of people receiving sickness benefit was at one time 1,100,000; but by midsummer, 1949, the number had dropped to 800,000.

West London Medico-Chirurgical Society

Proposing the health of this society, at its annual dinner held at the Royal College of Surgeons on June 2, Sir Cecil Wakeley, P.R.C.S., spoke of the West London Hospital's 95 years' history of "triumph upon triumph." In their discussions doctors were apt to overdo the subject of the moment; but the society did more than bring the general practitioner and the consultant together, and he saw great value in its dinner meetings to which members could bring their wives. He was glad that it should make use of the college for its annual dinner: "what we want in every branch of medicine is cooperation." Mr. V. B. Green-Armytage, replying as president, said that the society had been founded in 1884 for the mutual benefit of practitioners and consultants and had reached its zenith with a membership of 608. Today, possibly because of the effect of the National Health Service on general practice, the number was only 258: the practitioner, he feared, had no longer any inclination to go out to dinner. All doctors were from the same mould (though it had been said that some were mouldier than others), and he was thankful that new hope had dawned for the G.P. in the B.M.A. report on training for general practice. Meanwhile the society's monthly meetings continued to be successful and a record audience had attended the Cavendish lecture by Lord Mountevans. Dr. W. S. C. Copeman, proposing the Guests, recalled a previous Cavendish lecture by Lord Dawson, which had led directly to the Dawson report of 1920. Pigeon-holed till 1947, this report had been brought out in the form of the National Health Service, for which the society could therefore take any credit obtainable. Lord Mountevans, Sir Neil Cantlie, and Prof. Hans Selye responded. Lord Mountevans began and ended with Robert Louis Stevenson ("the sailor's poet"), touching meanwhile on Cheatle forceps, asparagus, and other congenial topics. General Cantlie expressed his regret that young doctors should imagine that 18 months' Army service would be clinically a waste of time: in peace-time the R.A.M.C. looked after 400,000 people, 5000 children were born in Army families' hospitals each year, and 7000 operations were performed in Army hospitals, which were now open to civilians. Professor Selye, as the last speaker, diverted attention to the more local (but occasionally urgent) problem of getting decomposable pathological specimens across the customs barrier between the United States and Canada.

Medical Week at Verona

An international medical week is to be held at Verona from July 20 to 30. Further particulars may be had from Prof. Luigi Barchi, Pescheria Vecchia 6, Verona, Italy.

Last month Dr. Macdonald Critchley, as a visiting professor in neurology to the University of Istambul, gave a series of lectures in Turkey. He also delivered lectures in Athens and in Ankara under the auspices of the British Council.

France, Italy, Austria, Denmark, and Syria are being represented at a British Council course on British Health Services Today which is being held in Cardiff during the first fortnight of June.

Appointments

BAILEY, BERYL, M.B. Lpool: temporary asst. M.O. in maternity and child welfare, Birmingham.
COLLINS, E. G., M.B. Edin., F.R.C.S.E.: senior ear, nose, and throat surgeon, Aberdeen general and special hospitals.
CORALL, J. M., M.B. Aberd., D.M.R.: consultant radiologist, Medway and Gravesend and Mid-Kent hospitals groups.
JOHNSON, S. J., M.B. Lond., D.M.R.D.: consultant radiologist, Canterbury and Isle of Thanet hospital groups.
KIRBY, N. G., M.B. Birm.: surgical officer (B1), Stoke Mandeville Hospital, Bucks.
LENDON, N. C., M.A., M.B. Camb., D.P.H.: M.O. (B1), Queen Alexandra Hospital, Cosham, Hants.
LINACRE, J. L., M.B., M.SC. Sheff., D.A.: consultant anæsthetist, Eastbourne hospitals group.
NELSON, D. H., M.R.C.S., D.M.R.D.: consultant radiologist, South-East Kent hospitals group.
RAINER, E. H., L.R.C.P.E., F.R.C.S.E.: consultant ear, nose, and throat surgeon, Dartford and Sidcup and Swanley hospitals groups.
REID, J. L., B.M. Oxfd, F.R.C.S., D.L.O.: consultant ear, nose, and throat surgeon, Canterbury, Isle of Thanet, and South-East Kent hospitals groups.
SMITHAM, J. H., M.B. Lond., D.M.R.E., F.F.R.: consultant radiologist, Lewisham hospitals group.
TERRY, S. W. W., M.B. Madras, D.T.M. & H., D.P.H.: asst. M.O.H. and school M.O., Bristol.
THORNTON, MAIRE, M.B. N.U.I.: temporary asst. M.O. in maternity and child welfare, Birmingham.

Births, Marriages, and Deaths

BIRTHS

CATHRO.—On May 28, the wife of Dr. A. J. M. Cathro—a son.
CHRISTIE.—On May 24, in London, the wife of Dr. H. D. Christie—a daughter.
COIGLEY.—On May 23, at Kinrara, Kuala Lumpur, the wife of Captain M. H. F. Coigley, R.A.M.C.—a daughter.
COTES.—On May 31, in London, the wife of Dr. John Cotes—a son.
FOSTER-CARTER.—On May 25, in London, the wife of Dr. A. F. Foster-Carter—a daughter.
HAMILTON.—On May 22, in London, the wife of Dr. Henry C. Hamilton—a daughter.
HANLEY.—On May 25, in London, the wife of Dr. Thomas Hanley—a son.
HEARN.—On May 29, in Birmingham, the wife of Dr. G. W. Hearn—a daughter.
LOVELL.—On May 29, in London, the wife of Dr. R. R. H. Lovell—a daughter.
MACDOUGALL.—On May 28, at Teddington, the wife of Dr. George Macdougall—a daughter.
OSWALD.—On May 26, in London, the wife of Dr. Neville Oswald—a daughter.
REID.—On May 26, at Henley-on-Thames, the wife of Dr. R. O. D. Reid—a daughter.
WOLFSON.—On May 26, in Birmingham, the wife of Dr. L. J. Wolfson—a daughter.
WOODS.—On May 30, in London, the wife of Dr. Arnold Woods—a son.

MARRIAGES

LACY—MILLAR.—On May 20, at Bolton, Peter Broadhead Lacy, M.B., to Winifred Joan Millar, M.B.

DEATHS

BELFRAGE.—On May 31, at Penn, Bucks, Sydney Henning Belfrage, M.D. Lond., aged 78.
CARVER.—On May 30, Alfred Edward Arthur Carver, M.A., M.D. Camb., D.P.M., D.P.H.
GUY.—On May 28, in Edinburgh, William Guy, F.R.C.S.E., F.D.S.R.C.S., F.R.S.E., LL.D. Penn., aged 90.
HOLMES.—On May 26, at St. Annes-on-Sea, Francis Bernard Greame Holmes.
LEWIS.—On May 26, Harold Warburton Lewis, M.B. Lond.
MACKENZIE.—On June 3, at Chalfont St. Giles, Donald Francis Mackenzie, D.S.O., M.B. Edin., colonel, late R.A.M.C. retd, aged 69.
PORTER.—On June 4, at Faversham, Kent, Herdman Porter, M.B. Edin., aged 74.
POTTS.—On May 25, at Great Yarmouth, Horace Potts, M.R.C.S., aged 79.

Diary of the Week

JUNE 11 TO 17

Monday, 12th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. Desmond Curran: Toxic Confusional Psychoses.

Tuesday, 13th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. E. R. Cullinan: Diseases of the Liver. (5 lecture.)
INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5 P.M. Dr. E. J. Moynahan: Collagen.
INSTITUTE OF NEUROLOGY, National Hospital, Queen S W.C.1
5 P.M. Dr. Marcel David (Paris): Technique et une métho reparage des structures souscorticales. (Film.)
INSTITUTE OF OPHTHALMOLOGY, Judd Street, W.C.1
5.30 P.M. Sir Stewart Duke-Elder: Glaucoma.
NATIONAL HEART HOSPITAL
5 P.M. (1, Wimpole Street, W.1.) Dr. Paul Wood: Conge Heart-disease. (St. Cyres lecture.)
PADDINGTON MEDICAL SOCIETY
8.45 P.M. (St. Mary's Hospital, W.2.) Dr. W. D. W. Brook Hypertension.
MIDDLESEX COUNTY MEDICAL SOCIETY
3 P.M. (North Middlesex Hospital, Edmonton.) Clinical a pathological demonstrations. Mr. Hedley Hall: Revie of 1000 Laminectomies for Prolapsed Intervertebr Disc.
EDINBURGH POST-GRADUATE BOARD FOR MEDICINE
5 P.M. (University New Buildings, Teviot Place.) Dr. J. Scadding: Bronchial Obstruction.

Wednesday, 14th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Prof. Leon Stone (Yale University): Developme of Normal and Reversed Vision in Transplanted Eyes.
UNIVERSITY COLLEGE, Gower Street, W.C.1
5 P.M. Prof. Sewall Wright, SC.D. (Chicago): *Genetical Structur of Populations.* (Galton lecture.)
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. H. Haber: Histology.

Thursday, 15th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. Emanuel Miller: Some relations of Child Psychia to Pædiatrics.
ROYAL COLLEGE OF SURGEONS
5 P.M. Dr. S. A. Henry: Cutaneous Cancer in relation t Occupation. (Hunterian lecture.)
INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. *Professor Stone:* Experimental Studies on the Eye Based upon Regeneration of the Neural retina and th Lens.
ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Mallinson: Psychiatry lecture-*demonstration.*
ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, *Portland* Place, W.1.
7.30 P.M. Dr. Frank Hawking: Filariasis.
HONYMAN GILLESPIE LECTURE
5 P.M. (University New Buildings, Teviot Place, Edinburgh Mr. Bruce Dick: Bronchial Adenoma.

Friday, 16th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. F. H. Young: Use of Collapse Therapy in the Tr ment of Pulmonary Tuberculosis. (First lecture.)
MEDICAL RESEARCH COUNCIL
5.15 P.M. (London School of Hygiene, Keppel Street, W.C. Prof. A. C. Burton, PH.D. (University of Western Ontario Clothing and Heat Exchanges in the *Human Body.*
MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. Anthony Feiling: Clinical neurological dem stration.
CONFERENCE ON INFERTILITY
10 A.M. (House of the Zoological Society, Regent's P London, N.W.) Mr. Kenneth Walker: Diagnosis Treatment of Male Infertility. Dr. R. G. Harrison, A. G. Oettlé: Pathological Changes in the Rat Te following Ischæmia.
2 P.M. Mr. A. S. Parkes, F.R.S.: Storage of Mammalian Sp tozoa at [illegible] Dr. C. A. Joël: Compar Studies [illegible] nd Testis Biopsies. Mr. Polge: [illegible] in Fowl.

Saturday, 17th

CONFERENCE ON FERTILITY
10 A.M. Mr. Samuel Siegler, F.R.C.S.: *Reflections upon* S Aspects of Fertility, and Film on Sterility. Mr. I. Rowlands, PH.D.: *Breeding of Dogs.* Dr. Marga Hadley Jackson: Significance of Round-cell Infiltrat as Seen in Endometrial Biopsy Sections.
2 P.M. Dr. Claude Béclère: Hysterosalpingography in Diagnosis and Treatment of Sterility. Mr. A. Walt PH.D.: Activity of Spermatozoa in vitro. Dr. Het Solomons: Some Conclusions about Infertility.
BIOCHEMICAL SOCIETY
11 A.M. (School of Biochemistry, Cambridge.) Short paper

WEAR AND TEAR *

LORD MORAN
M.C., M.D. Lond., F.R.C.P.
ONSULTING PHYSICIAN TO ST. MARY'S HOSPITAL, LONDON

I HAVE chosen "Wear and Tear" as my title, because want to be at liberty to dip into the underworld of edicine where aberrations of the mind are found. In ngland, medical students are sometimes poorly schooled these matters, and I am under the impression that ysicians, broadly speaking, are obsessed with the ientific approach to medicine. We have forgotten the reek saying that a doctor has opportunities of studying uman nature which are given to no-one else, wherefore philosopher ought to begin his life as a doctor, and a octor should end his life by becoming a philosopher.

I must begin by a search for physical evidence of wear nd tear; and I have to admit at the outset that the tresses and strains of everyday life on individual organs re difficult to assess, because we have only a vague nowledge of their functional reserves. Just where we might expect the fret of life to leave its mark—on the irculation—we find little that is tangible. James Mackenzie said that he had never seen a strained heart, and Thomas Lewis affirmed that the circulatory organs were built to stand the strains which they themselves create. While Abrahams, working with a competent radiologist, found that the heart of the athlete appears to be smaller, not bigger, than the average for his height and build.

The response of elastic tissue is another story. The signs of wear and tear are obvious, for any distensible organ when subject to prolonged strain loses its elasticity. The lungs of a patient with chronic bronchitis become emphysematous, the blood-vessels suffer in hypertension, the bladder in chronic urinary distension does not escape.

If we include in a record of wear and tear changes in the suprarenal gland in response to alarm stimuli which are transient and in the nature of physiological responses, it seems reasonable to refer to the effect of emotion in inhibiting the peristaltic movements and secretion of the gastro-intestinal tract. Thirty years ago, when I was working in Bickel's laboratory in Berlin, there was a dog by my bench with a Pavlov stomach. It was eating some meat contentedly so that I could see the gastric juice flowing freely. Then the door opened and a cat was brought in. The dog leaped forward until restrained by his chain; the secretion of gastric juice ceased. Since that time many observers have recorded the effect of emotion on peristalsis and on secretion. For my part, when I look back on those thirty turbulent years, and on the inhibitions I must have suffered, I find myself asking, is there no scar left, no structural trace of those agitated interruptions? But I must end my search for objective evidence by reminding you that the onset of diabetes and of hyperthyroidism may be associated with an emotional disturbance.

THE MIND IN WAR

Even an untutored eye can detect the imprint of pain and hard usage on a friend's face, and yet my search for physical signs of wear and tear has not been very productive. But when I turn away from the body and ask what is the effect of prolonged stress on the mind, I can quote a classical experiment which is pat to my purpose. The severity of the strain to which a battalion was subjected in France in the first world war was, I think, greater than anything the infantry experienced during the last war. For in the winter of 1914 the men were standing in waterlogged trenches, shelled by the Germans, without ammunition to reply, while later the long-drawn-out ordeal of trench warfare was punctuated by massacres, such as the battle of the Somme.

I became interested in the manner in which the men responded to this stress in the following manner. I was medical officer to the 1st Royal Fusiliers in France. One day in 1914, at Armentières, when we were waiting to go up to the trenches to relieve a battalion, word was brought to me that there was a sergeant in his billet who was not well. I asked him what was wrong. He said "nothing—he was all right." He was a morose fellow and I could get nothing out of him. I examined him carefully but found nothing. He did not appear to be ill. I told him he could stay in his billet until the battalion came out of the trenches. But when we had gone, he blew his head off. This man was not afraid to die, but he had found he could not face war and was uncertain what he might do, and had taken the matter into his own hands before he did something dreadful that might bring disgrace on himself and on the regiment. I had a feeling that I had been responsible for this fellow's end, that he should have been sent down the line sick. I began to ask: what was happening in men's minds? How were they wearing? For four years I tried to find answers to those questions, which are of everlasting consequence in war.

From the autumn of 1914 until the spring of 1917 I was with the 1st Royal Fusiliers, a fine battalion of a famous regiment, and I have recorded, the results of my long vigil in a short chapter of *The Anatomy of Courage*, that I called The Birth of Fear. In retrospect I am delighted by the poverty of my description of the signs of wear and tear in that battalion. During the battle of the Somme there were no sick, none would ask for an easy ticket to the rear. But if little was found I do not think much was missed. I was with one of the companies during the Somme battle, went with the men on raids, and lived with them. In short, what I have said in their praise I saw with my own eyes. What was found on the debit side?

Once, I remember, a subaltern developed a facial tic. Yet he did his job, and as the months went by without anything happening my doubts were gradually lulled to rest. But after the Somme there seemed to be a change in him. He began to get irritable at some little thing, sometimes even at nothing, and then one day he was found in an epileptic fit. And I remember another young officer, a gay, carefree boy, but one night I shared a dugout with him and was roused from my sleep by his shouts and yells. I went to wake him from his dreams: then, with my hand on his shoulder I stopped. He would not wish to share his secret with anyone. A week later he was killed.

The absence of obvious signs of wear and tear in this battalion during that time is in striking contrast to my experience in the autumn of 1917 when I was sent to Boulogne to find out how the wastage from mustard gas could be checked. With James Mackintosh I published in the *Quarterly Journal of Medicine* an analysis of a consecutive series of 1500 mustard-gas casualties admitted to No. 7 Stationary Hospital between Jan. 1 and Oct. 31, 1918. There was a mortality of 2%; on the other hand, we found that 87% of the men could march half a mile to a convalescent camp in their equipment within a month of gassing. In them the organic lesions were negligible or absent, it was the mind that had suffered hurt.

> "Gas, after July 1917, partly usurped the rôle of high explosive shell in bringing to a head a natural unfitness for war, or less frequently a fitness sapped by exceptional stress of experience in the field. In many cases where the signs of gassing cleared up in a few days, we had to deal with a

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* Based on an address to the American College of Physicians on April 17.

condition of mild gas shock, comparable to the slighter cases of shell shock which reach a Casualty Clearing Station after an action. This condition, with its accompanying functional nervous disorders, was an expression of trench fatigue."

There were 113,000 casualties from mustard gas, and, if our investigations were a fair sample, nearly a quarter exhibited a functional nervous disorder which reacted promptly to suitable treatment. We found every kind of manifestation of hysteria, from hemiplegia to hysterical aphonia. (In our series there were 108 cases of hysterical aphonia.) What was the explanation of the disparity between the behaviour of these misfits in war and of the men of the Royal Fusiliers? The men in that battalion were in a sense picked men. They had joined the Army in time of peace partly from a sense of adventure, rather than spend their lives in an office; they were not security-minded. And they were fortified too by a regimental spirit, an esprit-de-corps, to which I testify in my little book, which is their epitaph. The majority of the men who left the front line in 1917 "gassed" were frankly frightened. They were the military rubbish, which is found in every democracy. Incidentally, in the Royal Air Force in the last war it was found that in two-thirds of the pilots who broke down there was evidence of a flaw which was inborn: the way a man is made matters more than the risks he runs.

THE NATURE OF NERVOUS FATIGUE IN WAR

Watching for the signs of wear and tear through all those months, it was perhaps inevitable that one came to ask—could nothing be done to fortify these men to meet strain; and what was the nature of this nervous fatigue and how was it caused? In the Royal Air Force the mental strain of flying, Symonds has said, is precisely in proportion to the danger. Where the danger was greatest, as in Bomber Command, there the number of pilots who broke down was also greatest. It is not however quite accurate to say that the strain is in proportion to the danger, for if a man's threshold to fear is high, he may go through hazards with impunity; while if he is easily frightened, he may break down when the danger is of no consequence. The Greeks knew this, for Aristotle said that fear is the normal response to the instinct of self-preservation to danger and that it only becomes morbid when it is out of proportion to the degree of the danger. It would be more just to say that the fear of flying is a measure of the strain. Put differently, it is the long-drawn-out control of a persistent state of fear which ends in a pilot's defeat. In the history of the English Army, the threshold of fear has been gradually falling. Five centuries ago Shakespeare said of our men at Agincourt, "If these English had any apprehension they would run away." The strength of those yokel soldiers lay in their vacant minds; they did not stop to measure their chances of survival. And then the centuries passed, and, as these men became civilised and more open to impressions, their threshold to fear fell, until Thomas Hardy wrote of the soldier of our time: "More life may trickle out of a man through thought than through a gaping wound."

It is not true of course that all men with a high threshold of fear have vacant minds. I remember after the last war receiving an invitation to lecture to the Staff College of the Royal Air Force. I found about 140 pilots gathered in a hall, the pick of the survivors of the war; every man seemed to possess the decorations which the discriminating value, and I recall a sense of incongruity that I, an elderly apothecary, should have to admonish these men on morale. I invited them to answer a *questionnaire*, to put on paper in the order of their importance the qualities which in their experience make a good pilot in war. Their assessment is, I believe, worth recording on account of their unique authority in this particular field.

1. Calmness: in their jargon, the man who does not flap.
2. Determination: the man who does not give up easily.
3. Dependability: the pilot who can be relied on to do a thorough job.
4. Discipline: willingness to carry out orders.
5. Keenness.
6. Aggressiveness: the hallmark of the "ace" pilot.
7. Confidence.
8. Decisiveness: the ability to make up the mind quickly.
9. Initiative: resource, the ability to cope with new conditions.
10. Coöperation: working harmoniously with a crew.
11. Influence: respect.
12. Sense of humour: ability to laugh at oneself.
13. Appearance and bearing. Smartness.
14. Power of self-expression.
15. A good mixer.
16. Breadth of outlook. Wide interests.

Every command represented there gave their vote for the personal attributes which bring success in air operations, while at the bottom of the list, huddled together, are the qualities which we have come to associate with worldly advancement—further confirmation, if it were needed, that success in war and success in peace are not necessarily due to the same qualities. A sense of humour comes out poorly, though the Day Fighters supported it. The Night Fighter was the strongest advocate of the value of confidence. In brief these men were not security-minded, and their attitude to life seemed to raise their threshold to fear.

While the threshold to fear has steadily fallen through the centuries, sapped by the spread of education and the stirring of the imagination, there has been what Wilfred Trotter would have called a biological drift to stiffen the citizen for the ordeal by battle. Trotter, in some of his most persuasive and eloquent pages, records a growing tendency to accept selfishness as a test of sin, and consideration for others as a test of virtue. He affirms that throughout the incalculable ages of man's existence as a social animal, nature has been hinting to him in less and less ambiguous terms that altruism must become the ultimate sanction of his moral code, the supreme moral law. The historian may decide that the democracies, confronted by the menace of the fanaticism of Germany and Japan, were saved by altruism, which Trotter defined as the capacity to make the interests of another individual one's own. The physician is more concerned with finding a physical basis for those signs of wear and tear which I have described as the consequence of the secret battle between fear, or the instinct of self-preservation, on the one hand, and control, or will-power, or courage, or whatever you like to call it, on the other.

WHAT HAPPENS IN THE BODY AS THE RESULT OF THIS MENTAL CONFLICT

There is no sign of any lesion in the central nervous system. Is there any evidence connecting the suprarenal gland with this nervous fatigue? Some careful workers in England have been doubtful whether there is any proof as yet of the involvement of the adrenal gland. They argue that the reports that fatigue and stress were accompanied by increased loss of ketosteroids in the urine were backed by figures which are not outside the range of possible error of the method of estimation. They say again that parallel experiments by the Royal Air Force, during and since the war, have failed to confirm these figures; while to give a man Compound E does not help him to resist stress.

But apart from Pincus's highly suggestive work, if there is no direct proof, there is much circumstantial evidence supporting Selye's hypothesis. It provides an explanation for things which have been inexplicable. I all give a personal experience as an illustration. Once twice a year, when I have been aggressively attacked debate, I have experienced a sharp pain in the small my back lasting, perhaps, thirty seconds. I ascribed is pain to muscular spasm until one day I was having tooth stopped. I was not in pain and I was thinking other things with my eyes closed when suddenly I lt this familiar pain in my back. "What are you oing?" I asked, opening my eyes. And the dentist nswered that he was injecting adrenaline. Half an our later, when I had forgotten the incident, I had the ame pain again and found that he was again injecting drenaline.

Since my return from America, Dr. Peter Bishop has een kind enough to send me an account of a similar ersonal experience. He writes:

> "I had a curious experience two or three days ago in which I think you may be interested. I was driving home to Harpenden, where I live, and the roads were wet. Suddenly I ran into a skid which I controlled only within 100 yards, nearly having picked off a cyclist in the meantime. Once I was in control of the car again I sat back relaxed and relieved. I then began to realise that I was suffering from an acute pain which I eventually located bilaterally in the costophrenic angles. I suppose this must have been due to congestion of my adrenals as the result of Selye's alarm reaction, possibly induced, as you suggested, by release of adrenaline."

Again I need not remind those who are familiar with the behaviour of the eosinophils after alarm stimuli that the experienced physician who used to follow the course of pneumonia by taking daily blood-counts knew that the patient had turned the corner when the eosinophils reappeared in the blood.

Incidentally I find that the description of the behaviour of soldiers under stress, which I described in 1914—35 years ago—bears an interesting resemblance to the language in which Selye describes his adaptation syndrome. I spoke of the exhaustion of will-power: he speaks of the exhaustion of nervous energy reserve. I said that in a battle "somehow the horror of this business of war was not felt. Nature has the stop on: we must be half doped to come through it at all." Selye calls it—"the mental stupor of the shock stage."

Again, we speak now of the euphoric condition after an alarm stimulus, which we ascribe to the increased output of adrenal steroids. Thirty-five years ago I described a similar emotion when I heard my first shell. It came into the room of a farmhouse, in front of Armentières, when we were lying in reserve, two hundred yards from the Germans, and it killed three men and wounded five others. When I had got the wounded away I ate heartily and I remember being filled with compunction that I could be so callous. On that day, Dec. 20, 1914, I wrote in my diary—"And, in spite of the three dead men, I could not help feeling cheerful now that it was over. It was as if I had achieved something, though I had done nothing."

Nor can I claim to be the first to paint a clinical picture of the symptoms and signs that may follow alarums and *excursions*. Caesar said that he could make a man a coward by starving him for three days. That was a good many centuries before Selye found in rats that fasting is particularly effective in increasing their sensitivity to alarm stimuli.

We may then say that if the relationship of Selye's adaptation syndrome to any disease occurring in man has yet to be proved, he has demonstrated that delayed reactions to trauma may occur in the bodies of animals, clearly showing that those reactions are related to activity of the adrenal cortex. Though histological changes in the central nervous system and endocrine glands have never been demonstrated in man, it seems probable that there is in him a corresponding pituitary-adrenal response to alarm stimuli. But the effects are transient and ought to be regarded as physiological reactions rather than lesions. There is evidence of overactive autonomic response, and the disorder may be said to lie in the borderland between normal and abnormal vegetative function. Selye has then made an interesting contribution to scientific thought, and his concept has given an experimental background to psychosomatic medicine.

* * *

My final reflections are of a more general nature, underlining the danger of dogmatism in the field of science. I am thinking of a man of repute in the scientific hierarchy who scoffed contemptuously when told that a woman with rheumatoid arthritis had received miraculous relief from a visit to Lourdes. We can understand now how an intense psychological stimulus may have led to an increase of the adrenal steroids in the blood, so that within six hours this woman felt better and her joints became more mobile. Perhaps she was so elated by the improvement in her condition that she received another stimulus which continued the improvement, and she had probably left Lourdes before she relapsed. It was said of Frederick Taylor that at the end of his life he was so conscious of the possibility of error that he never ventured to make a diagnosis. Certainly as we grow older we come to see that all knowledge is provisional.

And on that note of caution I shall bring to an end these discursive remarks. For even if it is proved, as I believe it will be proved, that in man under stress there is a suprarenal reaction, it is doubtful whether this will lead to any helpful action in fortifying him to meet the strain. We may at the most be able to stiffen his resistance for a few hours, but he will have to pay for it later. Nor can man's behaviour under stress be explained away by any endocrine response. A man with Addison's disease living in adrenal poverty, will often behave with great courage, taking no thought of the fact that a slight infection might be fatal. The truth is we do not yet possess any physical explanation of man's behaviour when under stress.

INFLUENZA: A STUDY IN MICE *

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Over the past two years research in our laboratory has been focused on the factors governing susceptibility and resistance to experimental influenza. I try to give here a coherent picture of the pathogenesis and immunogenesis of influenza emerging from these studies.

The broader approach adopted involves inevitably much repetition, since the recently developed and improved techniques had to be applied to *all* the problems. As a result, many of our findings are not more than a restatement in quantitative terms of earlier observations. However, they help in viewing the integrant processes in their true context, and provide a background against which the novel facts and concepts can be assessed.

Some justification is needed perhaps for our choice of experimental animal. Although influenza is not a natural disease of the mouse, most human strains of virus can be adapted without difficulty to this host. Experimental infection with such strains closely parallels the human condition, the differences being quantitative rather than qualitative. Use of the mouse as a *model* therefore, allows extensive studies into the essential pathological and immunological processes, which could not be made readily in the natural host.

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INITIATION OF INFECTION

Influenza viruses are specifically adsorbed to certain cells, among others to those in which they can multiply. That part of the cell membrane with which the virus combines is called the *receptor*. The virus carries embedded in its surface an enzyme capable of acting on the receptor ("destroying it") and thus releasing the virus from the cell surface. These facts, firmly established on non-living cells, led to the somewhat hasty conclusion that (1) in the virus-cell combination it is the viral enzyme that combines with its substrate, and (2) destruction of the enzymic receptor is necessary for infection—indeed, it is *the* mechanism by which the virus forces its way into the future host-cell (Hirst 1942, 1943, 1948).

This hypothesis had to be discarded because it does not fit the facts. The virus-cell combination is not simply an enzyme-substrate interaction, because (1) enzymically inactive (heated) virus is still adsorbed by cells (Hirst 1942, Briody 1948), (2) cells containing modified substrate on which the enzyme cannot act still bind virus, and (3) cells without substrate combine with virus lacking enzyme action (Fazekas de St. Groth 1949). That the enzymic destruction of receptors is not essential for infection is evident from experiments where cells were as readily infected by virus whether or not their receptors contained destructible substrate (Fazekas de St. Groth and Graham 1949).

What, then, is the mechanism by which the virus enters a host-cell if the action of its enzyme is of no avail in this process? The experiments gave an unequivocal answer: virus, dead or alive, once adsorbed to the surface of living susceptible cells, is *ingested by the cell*. Whether or not the receptors involved contain substrate is irrelevant, as is the fact whether the viral enzyme was active or not during the process (Fazekas de St. Groth 1948c). This process by which the cell takes up virus was termed *viropexis* (by analogy to colloidopexis, the passive uptake by cells of adsorbed submicroscopical particles).

Hence the initiation of infection by influenza virus involves two major steps: (1) physical adsorption between two complementary surfaces of colloid dimensions (the virus particle and the cellular "receptor area")—something like an antigen-antibody combination—and (2) ingestion of the adsorbed virus by cell (viropexis)—something like phagocytosis.

COURSE OF DISEASE

Once inside a host-cell, the virus is beyond our re All we can do is to look for the net changes in the infec tissue and guess what has happened in individual cells. There is no shortage of such speculations; relevant facts are less abundant.

We tried to approach the problem from as many sides as possible, and the investigation consisted essentially in daily determinations in infected mice of the *virus* content of ground lung tissue and of bronchial washings; of soluble *complement-fixing antigen* (distinct from the virus, of smaller size and non-infective) in lungs and in the air-passages; of the number of available *receptors* in the respiratory tract; and of the amount of virus *inhibitor* contained in respiratory secretions. Further, the two types of specific *antibody* (one against the virus the other against the soluble complement-fixing antigen) were titrated in sera and in bronchial washings. The composite picture so obtained was correlated with the macroscopical *lesions* of the lungs, and the *histopathology* of the disease was followed. The whole of the process may be outlined as follows.

Practically all of the infective inoculum is taken up by cells, and no virus can be detected during the "lag period" by any known method. The soluble complement-fixing antigen appears then in the cells, followed closely by the liberation of infective virus into the air passages. (The soluble complement-fixing antigen is not released from the cells in significant amounts.)

Fresh cells are not infected at random; there is good evidence that the normal spread trends upwards—i.e., follows the physiological movement of the respiratory mucus. Straub (1940) and Taylor (1941) have observed already that an innocuous nasal inoculum—e.g., normal saline—given to mice infected a few days previously with sublethal doses of influenza virus will precipitate the disease, cause the virus content of the lungs to rise several hundredfold, and kill all the mice with complete pulmonary consolidation. We found that in sublethally infected mice the number of available receptors did not drop to the same extent as in lethal infections (Fazekas de St. Groth 1950a), and that less complement-fixing antigen was produced (Fazekas de St. Groth and Donnelley 1950a), all this pointing to a smaller number of cells being involved. The simplest explanation of these facts is to suppose that peripheral cells which escaped infection with the primary inoculum

TABLE I—DIAGNOSIS OF INFLUENZA IN MICE
(Challenging virus: Melbourne (A) strain)

Laboratory Tests (applicable over periods shown in parentheses)		Normal mice									Immune mice *								
		Challenged with ID_{50}																	
		10^5	10^4	10^3	10^2	10^1	10^0	10^{-1}	10^{-2}	10^{-3}	10^5	10^4	10^3	10^2	10^1	10^0	10^{-1}	10^{-2}	10^{-3}
Virus in lungs (1–7 days)	infectivity test	+	+	+	+	+	+	+	+	+	+	+	+	O	O	O	O	O	O
	hæmagglutinin test	+	+	+	+	+	+	+	+	O	+	O	O	O	O	O	O	O	O
Virus in bronchi (1–7 days)	infectivity test	+	+	+	+	+	+	+	+	+	+	+	O	O	O	O	O	O	O
	hæmagglutinin test	+	+	+	+	+	+	+	+	O	+	O	O	O	O	O	O	O	O
Complement-fixing antigen in lungs (1–7 days)		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	O	O	O
Number of available receptors (3–9 days) ..		+	+	+	+	+	+	+	O	O	⊥	O	O	O	O	O	O	O	O
Inhibitor in bronchial washings (1–5 days) ..		+	+	+	+	+	+	+	+	O	+	+	O	O	O	O	O	O	O
Antihæmagglutinin in serum (9–30 days) ..		+	+	+	+	+	+	+	+	O	+	O	O	O	O	O	O	O	O
Complement-fixing antibody in serum (9–30 days)		+	+	+	+	+	+	+	+	O	+	+	+	+	⊥	O	O	O	O

One mouse ID_{50} = $10^{1.7}$ egg ID_{50}. * Immunised with formol-inactivated Melbourne-virus vaccine.

+ = highly significant
⊥ = significant
O = insignificant
} difference from pre-infection level.

l not be exposed to virus infection at a later stage. e newly formed infective particles released from the re central cells will be carried by the sheet of respira-y mucus, known to adsorb influenza viruses (Fazekas St. Groth 1948a and b), and will infect still intact ls on their way out. This interpretation also explains o other regular findings: (1) the substrate in respira-ry secretions is "destroyed" as soon as the virus has ished its first growth-cycle, and (2) large amounts of rus are excreted via the trachea, even if there are illions of infectible cells in the peripheral ramifications the respiratory tree.

The severity of the disease is apparently governed by e number of virus particles that have been produced. nd thus depends on two main factors: the size of the fective inoculum, and the intrinsic multiplication-rate f the virus.

Unlike the growth of virus in eggs, infection of a ammalian host is something like a race. It is not erminated by the exhaustion of infectible cells but by he appearance of antibody. And here we are faced with an intricate problem. Detectable antibody appears n the circulation about the seventh day (between days 5 and 8). However, it is difficult not to suspect that antibody was *produced* from the third day. There is strong though indirect evidence for this assumption. In mice vaccinated with killed virus either by the peritoneal or the nasal route antibody appears regularly between days 3 and 5. If live virus is given by any extrarespiratory route, antibody again appears on day 3. If the same amount of live virus is given nasally (experimental infection), the serum titre starts to rise only on day 7. Yet the infected lungs become anticomplementary from day 3 onwards, and this is due to an antigen-antibody complex (Fazekas de St. Groth and Donnelley 1950b). At the same time a conspicuous plasma-cellular reaction is observable both in the regional lymph-nodes and in the peribronchial connective tissue (Bate 1950, Bate et al. 1950), a phenomenon increasingly accepted as the morphological manifestation of antibody production.

It may therefore be concluded tentatively that antibody production *does* start at the same time in an infected as in a vaccinated animal, but that in the first few days all the antibody is used up in the neutralisation of the still multiplying antigen. Only when there is an excess of antibody will one observe a rise in serum titre. The argument holds also the other way round: one cannot be sure that the multiplication of virus has ceased after the ninth day just because none is detectable by the routine techniques. Some still might be produced but masked by antibody. Indeed, McKee and Hale (1948) have shown by appropriate methods that this is so.

RECOGNITION OF INFECTION

The rich array of distinct and well-measurable changes, all of them potential diagnostic symptoms, makes the recognition of influenza in normal mice an easy task.

The classical method of assessing lung lesions seems to be inferior to practically all the procedures listed in table I; it is also less convenient because incompatible with the survival of the animal. Among those performed on respiratory washings the direct test for virus by the hæmagglutination technique and the somewhat more sensitive indirect test for viral enzyme activity by inhibitor titration are the most suitable for *early diagnosis*. Both can be performed in an hour and are far less costly than the delicate test for infectivity in eggs. Among those giving *retrospective diagnosis* the titration of serum antibodies is not surpassed in simplicity and specificity by any method—as methods of diagnosis, I hasten to emphasise, not of prognosis.

Less heartening is the second half of the table. In immune mice the presence of virus is masked already in the earliest stages by antibody, and antihæmagglutinin tests are more often than not inconclusive, since initial titres are high. The complement-fixation test, however, comes to our aid. As immunisation with killed vaccines does not elicit the production of complement-fixing antibody, we regard the presence of this antibody as the most reliable sign of past infection. Taken as such, it is about 10,000 times more sensitive than the test for lung lesions. From this discrepancy we have to conclude that the main difference between infection of normal and immune animals is not in the number of infected cells but in the extent to which the virus can multiply.

The irony of the situation is that our most sensitive indicator is also the least known. Eloquent in this respect is the fact that there are no less than three hypotheses, all equally acceptable and unconvincing, to explain the origin of the complement-fixing antigen. It might be materially related to the virus, either as a precursor or as a breakdown product, or it might simply be an abnormal metabolite of the parasitised cell.

TABLE II—CORRELATION OF ANTIBODY LEVELS WITH SPECIFIC RESISTANCE

(Abridged from Fazekas de St. Groth and Donnelley 1950c)

Vaccine	Route	Antibody in		Protection
		Serum	Bronchi	
Live	Nasal *	924	46·0	> 1,000,000
	Peritoneal	1120	2·8	1550
	Subcutaneous	232	1·0	186
Killed	Nasal	156	4·6	3160
	Peritoneal	564	2·2	380
	Subcutaneous	108	0·8	89
Nil	—	<5	<0·5	1

The Melbourne (A) strain was used both for vaccination and challenging.

* Experimental infection with one 50% infective dose of virus.

ANTIBODIES AND RESISTANCE

The fact of antibody combining with its antigen in vitro has led, not infrequently, to the use of serum titres as a measure of immunity—an unfounded assumption, especially in the case of pathogens which do not enter the blood-stream to establish infection.

To find out exactly what is the part of the serological response in resistance we used different types of vaccination, and determined the amount of antibody present in the serum *and* in bronchial washings. The ratio of the two titres is a measure of the *distribution of antibody* between the circulation and the site of possible infection. The answer was rather surprising.

Irrespective of the type of vaccine (live, formol-inactivated, or heat-inactivated), after extrarespiratory immunisation only $^{1}/_{250}$ of the antibody produced is present in the respiratory tract. After nasal vaccination, on the other hand, there is a highly significant shift in favour of the bronchi, the distribution ratio being 1 : 20.

These differences are also reflected in various degrees of resistance. Animals whose serological status was fully known, as regards both the amount and the distribution of antibody, were challenged with live influenza virus. The "protection values" show how many times bigger an infective dose had to be to cause standard symptoms than in untreated normal control animals (see table II).

These experiments, done on large numbers of mice and repeated with different strains of virus, allow of definite conclusions. No method of vaccination conveys any protection against infection with the heterologous type of virus; and it can be stated categorically that the degree of resistance to homologous challenge is not a

TABLE III—PATHOTOPIC POTENTIATION OF IMMUNITY
(Abridged from Fazekas de St. Groth and Donnelley 1950d)

Vaccination	Antibody in		Protection
	Serum	Bronchi	
A-type virus peritoneally ..	564	2·2	380
A-type virus peritoneally and B-type virus nasally	496	7·8	22,400
B-type virus nasally	<5	<0·5	2
Nil	<5	<0·5	1

A-type virus = Melbourne strain, inactivated by formaldehyde.
B-type virus = Lee strain, inactivated by formaldehyde.
All mice were challenged with dilutions of live Melbourne (A) virus.

direct function of the amount of antibody present in the serum, but shows a high positive correlation with the concentration of antibody free in the respiratory tract. In other words, only that fraction of antibody is *immunologically active*—i.e., capable of preventing infection—which meets and neutralises the virus before it can enter a susceptible cell. Specific resistance can be explained by the interaction of virus and antibody in the respiratory tract; *in the case of immunisation with inactive vaccines it seems unnecessary to postulate any further mechanism, whether extracellular or intracellular.*

ENHANCEMENT OF IMMUNITY

A higher degree of protection was achieved by nasal vaccination than by other methods, not because more antibody was produced (in fact, it was considerably less) *but because more of it was present in the immediate* environment of the susceptible cells. The next task was, obviously, to find out *how* this advantageous distribution originated. *It could have been brought* about either by local production of antibody or by *local accumulation of antibody produced* elsewhere. Instinctively we favoured the first view: however, the experiments showed that we were wrong.

Mice were immunised simultaneously with the two types of influenza virus: one of the antigens was given by the nasal route, the other peritoneally. If local production were the answer, bronchial washings should contain a large amount of antibody against the antigen administered nasally, and practically none against the one given peritoneally. The results were *not quite* as expected (table III).

It is clear that nasal administration of an unrelated vaccine, in itself incapable of affording even the slightest protection, increased the efficiency of peritoneal immunisation by 20–100 times. This increase in specific resistance can be attributed to the increase in specific antibody content of the respiratory tract. That is, a vaccine—besides acting as a specific antigenic stimulus—can also initiate a process which leads to the accumulation of unrelated circulating antibodies at the site of immunisation. The dramatic increase in specific resistance was brought about by a *shift in the distribution of specific antibody*—i.e., not by the reinforcement of antibody production but by the strategic use of antibody already present.

This experiment established a method which combines the advantages of the two types of vaccination. Large amounts of antibody are produced—as after peritoneal administration, but without the unfavourable distribution—and high concentrations are reached where antibody is needed—as after nasal vaccination, but without requiring impractically big doses of antigen. The phenomenon was termed *pathotopic potentiation of immunity*, since it involved the administration of an "adjuvant" at the site of future infection. Obviously, it has no relation whatsoever to the enhancement antibody response by the local application of adjuv admixed to a vaccine (Ramon's principle, commo known as Freund's).

In further experiments we furnished what we b is conclusive evidence that *pathotopic potentiation* effective after all commonly used types of influenz vaccines given by any extrarespiratory route. What i *more, it can enhance passive immunity resulting from* the intravenous injection of specific antiserum (Fazek de St. Groth and Graham 1950).

The essential mechanism seems to be a local increa in tissue or capillary permeability induced by the very mild inflammatory reaction to vaccination. Widely different substances—e.g., influenza-virus preparations, live vaccinia virus, the metaperiodate-ion, and compounds with anti-vitamin-K action—which had this one trait in common proved equally effective as *pathotopic adjuvants*, whereas others lacking this property were inactive (Fazekas de St. Groth and Donnelley 1950e).

As inflammation disappears the elevated permeability declines, and with it the potentiating effect. Antibody distribution and specific resistance returned to the level found in the control mice by the end of a month (Fazekas de St. Groth 1950b).

CONCLUSIONS

What does all this mean to the epidemiologist and the physician concerned with *human disease?* Strictly speaking, nothing. Results of animal experiments have little immediate effect on medical routine. They are meant rather to provide food for thinking, and to shape the mental attitude towards problems yet *unsolved. And there is a fair number of these in* epidem influenza.

As regards diagnosis, the disappearance of inhibitor *from the respiratory secretions* of infected animals promises a simple and sensitive presumptive test. Among those applicable in convalescence and suitable to large-scale work on vaccinated groups the titration of complement-fixing antibodies is given high preference. This view, persistently advocated by Hoyle and Fairbrother (1947), is not only supported by work on mice. Study of an epidemic in a population with no *basic immunity* (Isaacs et al. 1950) also showed clearly *the superiority of the complement-fixation test over the* hæmagglutination technique.

The *generally used serological* tests do not measure resistance, which seems to be determined by the amount of antibody in the respiratory tract. The use of serum titres as a synonym for immunity is misleading, and can well explain why there are numerous contradictions and confusing results. Convenience is not an excuse for inaccuracy; and, if an indirect test is to be sub*stituted for a direct one*, we *must insist* first on the demonstration of a strict correlation between the two phenomena.

We have reliable tests for antigens and antibodies, but we cannot predict what the next epidemic strain is going to be like. The complete failure of the latest American wholesale vaccination campaign is a strong warning against complacency. Yet, whatever our future vaccines be, we should aim at making the most of what we have. *Pathotopic potentiation* of immunity might be useful in this respect, since with this method it is possible to "store" antibody in the circulation, and, in case of emergency, to "turn it on" in the respiratory tract.

In the absence of drugs with antiviral effect, combating an epidemic rests on the production of better vaccines. Knowing, however, that *nasal secretions* of even subclinical cases contain enormous amounts of virus, perhaps the handkerchief is not such an obsolete weapon it might have seemed among the more modern uipment of preventive medicine.

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CIRCULATORY CHANGES IN THE FOOT AFTER LUMBAR SYMPATHECTOMY

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Lewis and Landis (1929) were the first to draw attention to the fact that vascular tone returned to human blood-vessels after sympathetic denervation. They studied the circulation in the hand after cervico-dorsal sympathectomy and noted that on the day after operation the hand was hot and the digital arteries were pulsating vigorously. On the second day the arteries pulsated strongly but the skin had become pale, and by the fourth day the pulsations had subsided.

The return of tone following sympathectomy in man has already been proved by objective methods in the fingers (Freeman et al. 1934, Doupe 1943, Grayson 1948), in the hands (Barcroft and Walker 1949), in the forearms (Grant and Pearson 1938, Wilkins and Eichna 1941, Grayson 1948), and in the feet (Hoobler et al. 1949).

We describe here what we believe to be the first attempt to record the blood-flow changes daily for six days and from one to three months after sympathectomy in a large number of feet.

EXPERIMENTAL

The investigations were made in the department of vascular surgery at the Postgraduate Medical School. The temperature of the ward where the tests were done was fairly constant at 19–20°C. The final test was done under similar conditions in a quiet room in a clinical laboratory.

In most cases the foot was kept under the bed-clothes till the beginning of the test. The patient usually lay flat without pillows to avoid venous congestion of the leg. Flexible wire thermo-junctions (Grant 1935a) were strapped with sticking-plaster to the skin proximal to the base of the nails of the first and third toes of each foot, and the skin-temperature was recorded. The thermo-junction wires were then gently withdrawn from under the sticking-plaster on the toes so that the plethysmographs could be put on for determining the blood-flow. Each plethysmograph was fitted as follows:

A rubber diaphragm with a cuff was selected to fit the leg just above the ankle neatly but not tightly. To prevent leakage of air under the cuff it was lightly bound to the ankles with a couple of turns of non-vulcanised rubber, avoiding venous congestion. A board was put across the foot of the bed and the plethysmograph placed on it. The foot was inserted into the plethysomgraph so that the heel rested on a felt pad. The diaphragm was clamped to the plethysmograph. A collecting cuff was put on about $^{1}/_{2}$ in. proximal to the diaphragm. The tubing from the plethysmograph was connected to the recording apparatus, and the tubing from the collecting cuff to a reservoir of compressed air. The plethysmographs were filled with air (Barcroft and Walker 1949).

After both feet had been fitted up in this way about 10–12 flows were recorded in each foot at intervals of about a minute. Both plethysmographs were then calibrated and removed. The thermo-junctions were

EFFECT OF LUMBAR SYMPATHECTOMY ON BLOOD-FLOW THROUGH FOOT AND ON SKIN-TEMPERATURE OF TOES

Case no.	Sex	Age	Diagnosis	Foot	Foot blood-flow (ml. per 100 c.cm. of foot per min.)											Toe-temperature (°C)				
					Before operation			Op.	After operation							Before operation		After operation		
					During reflex vasodilatation	2 days	1 day		1 day	2 days	3 days	4 days	5 days	6 days	1–3 mos	2 days	1 day	1 day	6 days	1–3 mos.
Normal arteries:																				
1 (fig. 2)	F	19	Hyperhidrosis	Rt	16·5	1·2	1·0	18·0	21·0	20·0	12·0	7·0	6·8	7·6	6·6	25·6	24·5	30·4	32·0	33·0
				Lt	13·2	2·0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7·0	7·8	9·0	5·5	25·3	26·0	30·0	32·3	31·7
2	F	13	Hyperhidrosis	Rt	—	1·3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9·2	12·2	9·0	6·6	24·0	23·5	33·3	31·0	31·5
				Lt	—	2·4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9·4	13·4	8·0	6·0	24·0	23·5	32·0	31·5	32·0
3	F	40	Deep venous thrombosis	Lt	12·0	4·0*	4·0	—	12·8	14·5	22·0	16·0	13·0	13·0	2·8	—	29·5	35·0	33·5	32·0
4	F	34	Deep venous thrombosis	Lt	—	1·6	1·7	—	28·0	22·0	14·5	14·6	10·6	4·4	1·9	22·0	23·2	35·4	33·7	32·3
			Average (fig. 5) ..	—	**13·9**	**2·1**	**2·1**	**16·5**	**18·4**	**20·0**	**14·9**	**10·5**	**10·6**	**8·5**	**4·9**	**24·2**	**25·0**	**32·7**	**32·3**	**32·1**
Abnormal arteries:																				
5 (fig. 3)	F	20	Acrocyanosis	Rt	16·3	—	2·8	9·4	17·0	—	12·0	5·4	—	7·8	5·5‡	—	—	—	—	29·8‡
6	F	52	Pernio and varicose veins	Lt	—	1·1	0·9	11·2	15·1	—	6·9	—	—	4·9	5·5‡	—	—	—	—	30·2‡
				Rt	1·0	—	0·8	—	13·0	—	—	5·0	3·5	3·6	3·9	21·0	22·3	32·5	30·7	31·5
7	M	45	Popliteal aneurysm	Lt	3·0	—	1·0	—	15·0	—	—	3·2	1·8	3·0	4·2	22·5	21·5	32·0	30·0	31·5
8	F	62	Pernio and ulceration ..	Rt	—	—	0·8	—	16·3	11·6	—	7·8	6·4	6·0	5·3	—	27·3	35·0	31·7	29·0
				Rt	8·8	1·3	1·1	—	11·9	14·2	11·6	5·6	3·2	3·2	0·8	—	20·0	30·5	31·2	18·5
9	M	52	Arteriosclerosis	Lt	8·0	1·0	3·2	—	16·0	16·0	10·6	6·0	5·2	5·2	1·6	—	20·0	32·0	30·5	20·5
				Rt	1·8	1·4	3·1	—	9·7	5·4	—	2·5	2·8	4·0	3·9	27·0	29·0	32·5	30·5	31·25
10 (fig. 4)	M	59	Arteriosclerosis	Lt	6·4	3·3	2·8	—	8·7	5·9	—	2·0	2·1	2·5	2·9	30·3	29·3	32·5	28·7	30·5
				Rt	5·8	1·1	2·2	1·1	3·2	5·9	5·0	2·1	3·8	3·7	3·2	—	23·5	29·2	—	31·0
11	M	54	Arteriosclerosis	Lt	4·5	1·5	1·8	3·5	9·4	7·1	5·0	3·6	4·9	4·4†	4·3	—	23·2	30·0	—	30·0
12	M	49	Arteriosclerosis	Rt	4·4	2·0	1·6	—	5·6	11·0	8·3	5·8	5·0	4·0†	3·3	—	26·5	32·8	30·3	29·5
				Rt	5·0	1·9	2·1	—	9·0	7·3	—	2·8	8·4	3·6	5·9	22·0	26·0	32·0	28·3	33·0
			Average (fig. 5) ..	—	**6·4**	**2·3**	**1·8**	**6·3**	**11·5**	**9·7**	**8·7**	**4·3**	**4·3**	**4·3**	**3·9**	**24·6**	**24·4**	**31·9**	**30·6**	**29·0**

* Foot blood-flow not measured; the figure is that for the other preoperative test.
† The figures are the averages of the foot blood-flows recorded on the fifth and seventh days.
‡ Nine months after sympathectomy.

The thermo-electric skin-temperature meter used for the toe-temperatures on and before the nineteenth postoperative day in case 5 differed from that used on all the other occasions; so the readings may have been too high. For this reason these readings, though shown in fig. 3, are omitted from the table and from the averages.

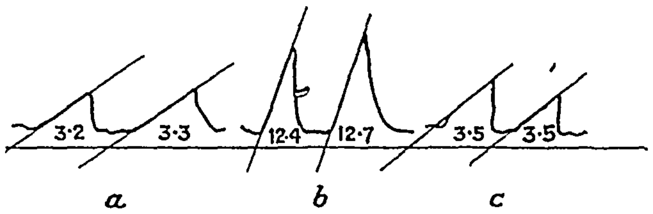

Fig. 1—Plethysmographic tracings of the blood-flow in the foot: *a*, two days before sympathectomy; *b*, first postoperative day; *c*, fourth postoperative day.

gently inserted under the plaster on the toes once again, and a second set of skin-temperatures was recorded.

The patient's temperature and the temperature of the ward were noted. The rate of the blood-flow in each foot was calculated and averaged. The toe-temperatures were similarly averaged.

Before operation foot blood-flows and toe-temperatures were measured twice, on different days. On one of these days, after the resting flows had been obtained, one of the patient's arms was immersed in water at 45°C and he was covered with blankets. The blood-flow in the foot was then measured over three-quarters of an hour during reflex vasodilatation.

In a few patients the foot blood-flows were recorded within a few hours of operation, no assistance being necessary for carrying out the test. In most cases the flow was measured daily from the first to the sixth day after operation and often a few more times in the first fortnight. All except one of the patients returned from one to three months after operation, and the final blood-flows and toe-temperatures were measured after the patients had rested for half an hour.

CLINICAL MATERIAL

The investigations were done on 21 limbs before and after sympathectomy. The accompanying table shows that these have been divided into two main groups: (1) 6 limbs with healthy arteries (hyperhidrosis 4, deep venous thrombosis 2); and (2) 13 limbs with various degrees of arterial abnormality (acrocyanosis 2, c and varicose veins 2, popliteal aneurism 1, and ulceration 2, diffuse obliterative arteritis or art sclerosis 6).

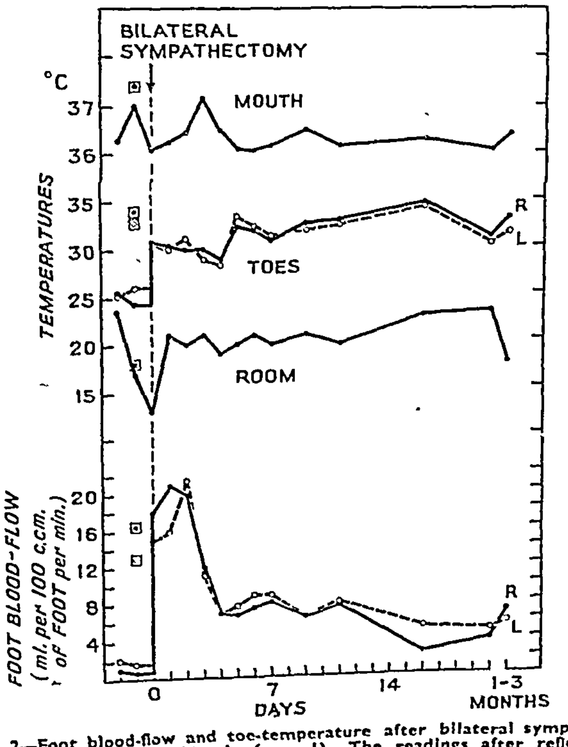

Fig. 2—Foot blood-flow and toe-temperature after bilateral sympathectomy for hyperhidrosis (case 1). The readings after reflex vasodilatation are shown in squares.

The blood-flow in the feet of one patient with ulcers and varicose veins behaved atypically and case is described in an accompanying paper (Lynn and Martin 1950).

RESULTS

Fig. 1 shows a typical tracing of the foot blood-flow. Figs. 2–4 show the results obtained in cases 1, 5, and Fig. 2 illustrates the effect of sympathectomy on the foot blood-flow and toe-temperature in a case of hyperhidrosis in which the arteries were normal. Before operation the blood-flow in the feet was about 1 or 2 ml. per 100 c.cm. of foot per minute. Reflex heating (results enclosed in small squares) increased the blood-flow in the right and left feet to 16·5 and 13·2 ml. respectively. As would be expected, the blood-flow records made a few hours after the sympathectomy showed considerable hyperæmia in both feet (right 18 ml., left 15 ml.). However, the flow continued to increase, reaching a maximum on the first day in the right foot (21 ml.) and in the second in the left (21·4 ml.). After this the blood-flow decreased abruptly to 7 ml. in both feet on the fifth day. No further remarkable changes took place, but it should be noted that the blood-flow remained about four times the preoperative level up to the time of the final test from one to three months after operation.

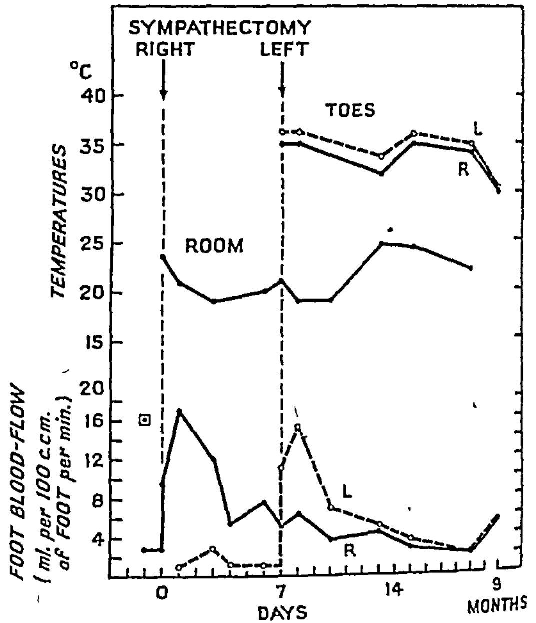

Fig. 3—Foot blood-flow and toe-temperature after bilateral sympathectomy for acrocyanosis (case 5). The reading after reflex vasodilatation is shown in a square.

Fig. 2 also shows the effect of the sympathectomy on the toe-temperature. Before operation the skin-temperature was about equal in both feet at 25–26°C. After operation it rose abruptly and remained up, and from one to three months after operation it was 33°C on the right side and 31·2°C on the left.

When the effects of the sympathectomy on the foot blood-flow are compared with those on the toe-temperature, the striking fact is that the foot blood-flow soon declined from its initial rapid postoperative rate, yet the final toe-temperatures were higher than those during the first few days after operation. The table shows that similar vascular changes took place after sympathectomy in the other feet with normal arteries.

Figs. 3 and 4 are the charts from two cases with arterial disease. Case 5 (fig. 3) had mild acrocyanosis.

mpathectomy was done in two stages, with an interval seven days. Apart from this the blood-flow and the mperature changes, generally speaking, were similar those recorded in fig. 2 in the patient with *normal* teries. As might be expected, the maximum foot ood-flows in the feet with slightly diseased arteries g. 3) were *not* quite so large as those in the patient erated on for hyperhidrosis (fig. 2). Note that nine onths after operation the blood-flow was more than uble the preoperative rate and the toes were very arm.

Fig. 4 shows the effects of sympathectomy on the rculation in the feet of a patient with severe obstructive teriosclerosis. The postoperative increase in foot lood-flow is small, although from one to three months ter it was still about double its preoperative level. The stained elevation of the temperature of the toes is ery striking. Similar changes were observed in the lood-flow in the other feet with abnormal arteries (see able). The table also shows that the average temerature of the toes was above 30°C in 7 of the 11 feet ith diseased arteries tested from one to three months fter operation.

The foot blood-flow and the temperature changes btained before and after sympathectomy in limbs with ormal arteries have been averaged and are shown in fig. 5. Here we see also the average of all the results recorded in the limbs with diseased arteries. The points shown in the average curves are (1) the immediate postoperative increase in foot blood-flow; (2) the maximum on the first or second day; (3) the rapid decline after the first few days: and (4) from one to three months later foot blood-flows about double the preoperative level. In limbs with both normal and abnormal arteries, on the other hand, as fig. 5 shows, the average temperature of the toes was much increased by sympathectomy and remained elevated throughout the investigation.

DISCUSSION

Changes in Blood-flow in Foot

The results just described confirm the clinical observations of Lewis and Landis (1929), who noticed considerable hyperæmia after sympathectomy, followed by a rapid return of tone. In particular they stated that the vigorous pulsations in the digital arteries had subsided on the fourth day—an observation which agrees very well with rapid decrease in the foot blood-flow as measured with the plethysmograph (fig. 5).

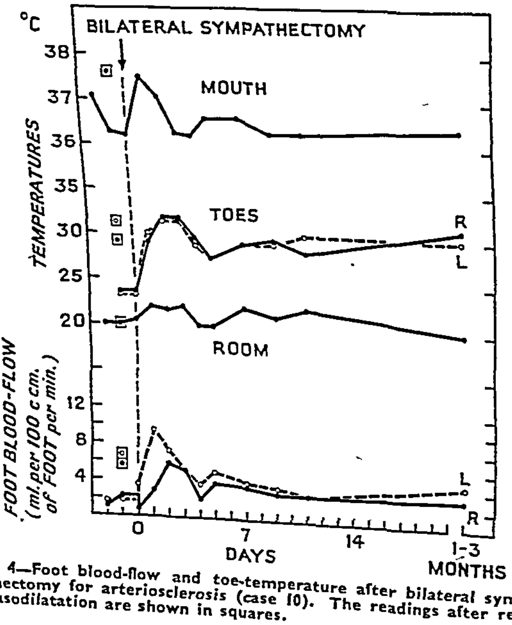

Fig. 4—Foot blood-flow and toe-temperature after bilateral sympathectomy for arteriosclerosis (case 10). The readings after reflex vasodilatation are shown in squares.

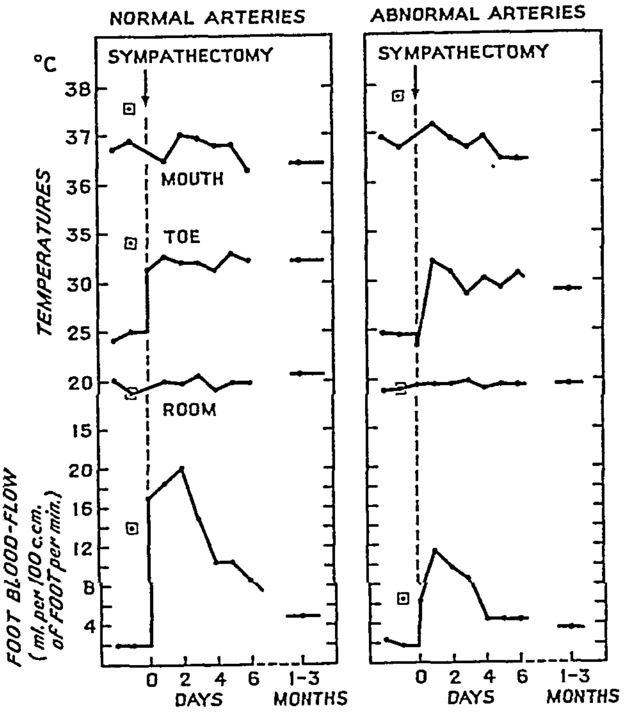

Fig. 5—Averaged foot blood-flows and toe-temperatures in 6 limbs with normal arteries and 13 limbs with abnormal arteries. The readings after reflex vasodilatation are shown in squares.

The most obvious explanation of the increase in the rate of the blood-flow in the feet after sympathetic denervation is a vasodilatation due to release of the vessels from central vasoconstrictor tone. Another possible explanation considered was the action of metabolites released by the trauma of the operation. This, however, was discounted by the fact that, when the limbs were sympathectomised one at a time, the hyperæmia developed only in the sympathectomised foot (fig. 3). Several similar observations were made by Barcroft and Walker (1949) on the blood-flow in the hands after unilateral sympathectomy.

It is curious that the blood-flow in the feet does not usually reach its maximum till the first or second day after section of the sympathetic fibres. This delayed hyperæmic peak was also seen after sympathectomy in some hands (Barcroft and Walker 1949). At present this cannot be explained. It will be seen that preoperative reflex vasodilatation also does not cause maximal hyperæmia.

Another interesting point is that the average maximum foot blood-flow in sympathectomised feet was only about half the maximum blood-flow that Barcroft and Walker (1949) found in sympathectomised hands (feet with normal vessels, maximum average 22·4 ml.; hands, maximum average 46 ml.). This may be because the foot contains a much greater bulk of relatively avascular tissue in proportion to the skin than does the hand.

Rapid Partial Recovery of Tone

The recovery of tone in the vessels of the foot was very rapid between the third and sixth day (figs. 2–5 and table). In this respect the arteries of the foot and hand behave very much alike—blood-flow in the sympathectomised hand had declined to a quarter of its maximum postoperative value by the end of the first week (Barcroft and Walker 1949). The reason for this recovery of tone is not understood. It would be beyond the scope of this article to discuss in detail the theories advanced by various workers to explain it. Cannon (1937) believes *that it is due to an intrinsic property of the smooth* muscle of the arterial wall. One can say with certainty, however, that it is not due to the re-establishment of central nervous tone through some slightly damaged pathway. This follows from the fact that tone returned in the usual characteristic way to the vessels in 4 feet and 11 hands proved by postoperative reflex vasodilatation tests to have been completely sympathectomised. Moreover the phenomenon is very well known in animal experiments in which there can be no question of the completeness of the sympathectomy—e.g., Grant (1935b) found that the arteries of the rabbit's ear recovered their tone about twenty-four hours after all the sympathetica fibres had been cut.

Temperature of Toes

It will be remembered that the temperature of the toes remained high throughout the postoperative period. Lynn and Burt (1949) observed high toe-temperatures as long as four years after sympathectomy. The permanent elevation of the temperature of the toes, yet very considerable subsidence in the blood-flow in the foot, so striking a feature of this investigation, has already been briefly reported by Hoobler et al. (1949). Further work is necessary on the circulatory changes in the toes following sympathectomy. As regards its action on the circulation, the beneficial effects of sympathectomy may be considered from two angles. (1) In acute emergencies, it will tend to produce a large vasodilatation lasting for a few days. (2) In chronic cases, the benefits will probably mainly be due to isolation and protection of the sympathectomised vessels from strong central stimulation excited by cold, &c.; under such circumstances the circulation in a normally ennervated foot may become very small indeed and that through a sympathectomised one is likely to be many times greater.

SUMMARY

The blood-flow in the feet and the temperature of the toes of 19 limbs were determined twice before, daily for the first six days after, and from one to three months after, lumbar sympathectomy.

The average blood-flow in 6 feet with normal arteries (2·1 ml. per 100 c.cm. per minute before operation) was much increased after sympathectomy, reaching a maximum on the second day (20·0 ml.). By the sixth day vascular tone had partially recovered (8·5 ml.), and still more so from one to three months after operation (4·9 ml.). But, the toes in these cases remained permanently warm after operation (preoperative average 24·2°C; from one to three months 32·2°C.).

The blood-flow in 13 feet with abnormal arteries also increased postoperatively and returned to about double the normal. The toes also remained warm.

We are most grateful to Mr. Peter Martin, F.R.C.S.E., for his interest and encouragement, and for permission to carry out these investigations on his patients. The expenses were partly defrayed by a grant from the Medical Research Council to one of us (H. B.).

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LACK OF RETURN OF VASCULAR TON IN THE FEET AFTER SYMPATHECTOM

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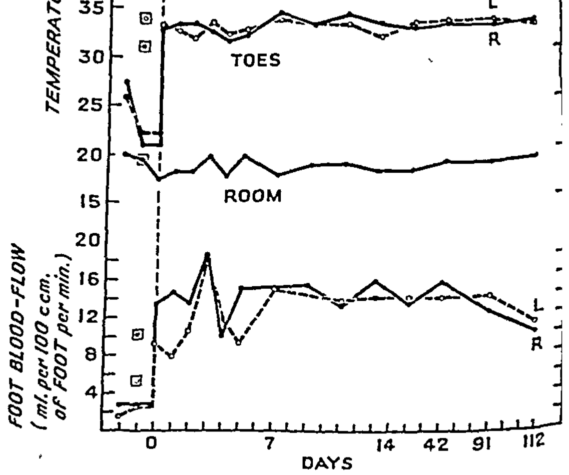
LUMBAR sympathectomy is usually performed abolish, or at least diminish, vasomotor tone in the lo extremities and so to increase the blood-flow thro the part. However, Lynn and Barcroft (1950) h shown that after a transient hyperæmia the foot blo flow returns in four to seven days to just above its operative level. The following case is thought to be interest because vascular tone had not returned at end of four months and because the patient complai of the excessive warmth of his feet, particularly at nig

CASE-RECORD

A chef, aged 32, was admitted with seven years' hist of recurrent ulceration of both lower legs following "de sores" which developed in the Middle East in 1942. ulcers healed and recurred at intervals despite excision skin grafting on one occasion. Incompetent varicose ve had been excised without benefit. The patient also co plained of excessive sweating and vasospastic attacks in feet.

On examination bilateral testicular atrophy was fou which the patient stated had been present as long as he co remember. The penis was of normal length, and the pati admitted potence. The distribution of hair and fat slightly feminine. There were ulcers over both me malleoli, with extensive surrounding varicose staining slight eczema. The ulcer on the left ankle was in the mid of a skin graft. The feet were excessively moist and the t cool and slightly cyanosed. All the peripheral pulses w present and full in both limbs. The long saphenous syste in both legs were incompetent. The blood picture was norm and urine analysis negative. 18·7 mg. of 17-ketosteroi



Temperatures and foot blood-flow. The readings after ref vasodilatation are shown in squares.

s excreted in the urine in twenty-four hours (0·87 mg. per 0 ml.). Tests for pituitary hormones showed an excessively h secretion of follicle-stimulating hormone (24, 48, 72 + 96 ouse units in the 24-hour specimen of urine). Radiography the long bones showed no evidence of delayed epiphyseal ion.

Operation.—After bilateral lumbar sympathectomy, multiple ation of the varicose veins, and biopsy of the right testicle, e patient was discharged ambulant, with the ulcers almost aled.

Biopsy Specimen.—The portion of the right testis showed rtually nothing but interstitial cells, only an occasional ubule being found, devoid of spermatic elements. There as no evidence of disorderly growth.

Follow-up.—A month after discharge the patient complained hat his feet were so hot that the rest of his body felt cold. t night his feet burned and tingled so much that he kept hem outside the bed-clothes for relief, and even then the discomfort disturbed his sleep. Examination of his feet howed the superficial veins to be turgescent and the skin f the toes and feet to be abnormally hot to the touch as well s flushing excessively when the patient stood up. About our months after the sympathectomies this "erythermalgic-ike" discomfort had diminished somewhat but was still sufficient to be of real discomfort to him. He reported that the feet were more comfortable if supported by elastic bandages, which he wore almost constantly during the day.

Plethysmographic studies and skin-temperature readings are shown in the accompanying figure. Before operation the foot blood-flows were about 2·5 ml. per 100 c.cm. of foot per minute, and after sympathectomy there was an immediate increase to a maximum of about 18 ml. on the third day, and then, instead of a return to a little above the preoperative level, a sustained hyperæmia, although declining slightly, up to the end of almost four months. Even the skin-temperature readings were somewhat higher than the average after lumbar sympathectomy.

DISCUSSION

The explanation of this anomalous behaviour after lumbar sympathectomy is as unknown as the mechanism of spontaneous return of vascular tone which is the rule (Lynn and Barcroft 1950). Rogers (1935) described a case similar to this in which the patient remarked about his feet that "they feel as if I am walking on hot plates." Rogers offers no explanation for this unpleasant side-effect of flushed feet. Leriche (1946) reports three such cases in which the feet became pathologically hot after lumbar sympathectomy. He states that the feet were burning hot to the touch as well as subjectively, that they were more bearable when the patient lay down, and were relieved by a cold bath. He believes that the condition is due to total abolition of vasoconstrictor tone in the vessels and likens the clinical state to "la causalgie de Weir Mitchell." Simmons (1950) has observed the condition clinically and finds that it tends to diminish in severity after six months.

No-one who has reported this condition has verified the hyperæmia by blood-flow measurements in the affected feet; hence one cannot be certain that their cases are strictly comparable, particularly in view of the fact that many patients complain of undue warmth of the foot after unilateral lumbar sympathectomy. Whether the endocrine imbalance in the present case is of significance is a matter for speculation only. Perhaps after several months or a year some degree of tone may be regained, and this may be suggested by the slight fall in foot blood-flows in this patient at the last reading. This may explain also the slight subjective improvement; or perhaps the patient is merely becoming accustomed to his persisting hyperæmia. However, it remains an unpleasant, unexplained, and unpredictable complication of lumbar sympathectomy for which there is no specific treatment.

SUMMARY

A patient with bilateral testicular atrophy and chronic ulcers of the legs developed an "erythermalgic-like" state after lumbar sympathectomy, owing to failure of return of vasomotor tone to the feet, as measured by the venous-occlusion plethysmograph.

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SODIUM THIOPENTONE AS THE SOLE ANÆSTHETIC FOR TONSILLECTOMY IN ADULTS

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EARLY success with the use of sodium thiopentone as the sole anæsthetic for tonsillectomy in adults (Griffiths and James 1945) led me to think that it had several advantages over methods in more common use. Further experience has justified this belief, and a second series of 220 consecutive cases is presented here in the hope that the method will be employed more widely.

The first series (Griffiths and James 1945) consisted of 133 successful cases in Service personnel. We used a 5% solution of sodium thiopentone in a dosage varying from 13 ml. (0·65 g.) to 70 ml. (3·5 g.). The patient was placed in the Rose position and a Davis gag was inserted, after which a flow of 2 litres of oxygen per minute was administered through the anæsthetic tube on the tongue-piece. We commended the method on the grounds of simplicity, ease of administration, and absence of post-operative complications, but warned against its use by those not skilled in the administration of sodium thiopentone.

Whyte (1946), Fox and Shane (1947), Robertson (1947), and Dickie (1948) all use sodium thiopentone as the main anæsthetic for tonsillectomy; but they add other drugs to it, which is unnecessary. Fisher and Woodley (1949) said that they published their results because they considered that much of the criticism of the method is quite unwarranted. Their technique is almost identical with that of Griffiths and James, except that they spray the nose and throat with 10% cocaine or 2% tetracaine hydrochloride before the administration of sodium thiopentone. The number of their successful cases amounts to 738, but they recommend that the method should not be used for children under the age of 15 years.

METHOD OF ADMINISTRATION

Premedication.—'Omnopon' gr. $^1/_3$ and scopolamine gr. $^1/_{150}$ hypodermically one hour before operation were given as a routine for all patients between the ages of 18 and 60. Below 18 and above 60 half this dose was given.

Induction and Maintenance.—A solution of 5% sodium thiopentone is used in a 20 ml. syringe, and induction takes place in the anæsthetic room. As soon as deep and level anæsthesia is reached, the needle is withdrawn and the patient is transferred to the theatre and put into the Rose position. The needle is then re-inserted and anæsthesia is maintained at the required level by further small and repeated doses of the drug. Usually between 4 and 8 ml. (0·2–0·4 g.) of the solution is required to induce anæsthesia, according to the age and build of the patient. It is injected fairly rapidly and often brings on a short period of apnœa. This need cause no alarm, for it soon passes, and is indeed encouraged as being a valuable gauge of the probable total dose required. Generally between 10 and 15 ml. (0·5–0·75 g.) is necessary to get the patient deep enough for transfer to the theatre, and after this small quantities, varying between 2 ml. and 4 ml., are added as necessary to keep the patient so deep that there is no movement of the pharyngeal muscles. The anæsthetist must ask the surgeon periodically to report on the colour of the patient and whether or not there are pharyngeal movements.

As soon as the jaw is sufficiently relaxed, a standard Boyle-Davis gag is inserted, and a tube delivering roughly 2 litres of oxygen per minute is connected to the tongue-piece. It has been found advisable to administer oxygen, so as to correct the slight cyanosis which may occur if respiration becomes unduly depressed.

The surgeon then performs a dissection of the tonsils, taking particular care that his assistant keeps the pharynx scrupulously clear of blood. This is especially necessary because the laryngeal reflexes are never entirely absent, and the inspiration of blood may cause severe spasm.

Postoperative Care.—The operation having been completed, and all bleeding-points secured, an airway is placed in position as the Boyle-Davis gag is removed. The patient is them immediately turned on his side and a pillow is placed under his occiput in order that any blood or secretions may run out and so be kept from the larynx. In this position he is returned to the ward and left unmoved until consciousness has returned sufficiently for him to eject the airway.

The pharynx and larynx are not sprayed with any local anæsthetic, for it is thought this would increase the liability to inhale foreign substances.

THE PRESENT SERIES

Age and Dosage.—In the 220 cases now recorded, the average age was 28·8 years; the oldest patient was 68 and the youngest 14. There was no selection. The average dose of sodium thiopentone was 28·3 ml. (1·41 g.). The minimum was 13 ml. (0·65 g.) for a girl of 17. The maximum of 50 ml. (2·5 g.) was required in 3 males, aged 16, 35, and 38.

Recovery.—Most patients recovered consciousness within 20–30 minutes of returning to bed, after which they usually fell into a sleep lasting up to 3, or even 4, hours. Postoperative sedative was rarely required, but when needed was given as morphine gr. $^1/_4$ or $^1/_6$ hypodermically. Restlessness was seldom seen, and was easily controlled with morphine. Vomiting was very uncommon, and the general condition of patients was much better than after the anæsthetics more usually employed.

ADVANTAGES

From the surgeon's point of view there are several advantages. He has a motionless pharynx in which to work, and he has more room than when an endotracheal tube is used. He does not have to inhale noxious vapours, and there is less bleeding than with the more usual anæsthetics. It enables him to work more expeditiously, for the time of induction is so much reduced that three adult dissections can be done in one hour.

The method is not suitable for children, and, though simple and safe, it should be employed only by those with considerable experience of sodium thiopentone.

My sincere thanks are due to Mr. C. B. Andreae, F.R.C.S., for his long forbearance and his help in the production of this paper.

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A CORD-BLOOD SURVEY OF DI IMMUNITY

COMPARISON OF TWO POPULATIONS

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IT is now generally recognised that the most importa factor to be considered in the immunisation of ver young babies against diphtheria is the amount of anti toxin derived from the maternal circulation and st present at the time of the first injection of prophylacti too much antitoxin may neutralise and so render ine the injected antigen.

My colleagues and I (Barr, Glenny, and Randall 194 found that babies lose their maternally conferred ant toxin at a steady logarithmic rate, and that the approx mate titre remaining at any given age can be calculate from the cord-blood value. We have shown (195 that babies can be successfully immunised by tw injections, each of 0·5 ml. of A.P.T., provided that the passive antitoxic titre has fallen below 0·04 unit per m at the time of the first injection of prophylactic. W also calculated that over 80% of a population of 2 babies born in south-east London would be effectivel immunised if they received their first dose of A.P. at the age of 3 months, the maternally conferred antitox in these babies having fallen below 0·04 unit per ml. a that age. We suggested that antitoxin estimations on limited sample of cord-blood specimens obtained fro different districts would provide a good general pictu of the immunity state of the newborn, so that methods o immunisation could be devised which would be the m satisfactory for the majority of babies.

ANTITOXIC TITRES OF CORD-BLOOD SAMPLES

Between July, 1949, and January, 1950, random specimens of cord-blood from different districts have been investigated at these laboratories, 100 samples being used from each district, to determine whether the conclusions of Barr et al. (1950) are of general application. In the course of this work it has been found that the percentage of samples with no detectable antitoxin obtained from any one district may not give any indication of the antitoxic values of the remainder, and that the Schick test, whether done on mothers after delivery or on the babies at a given age, such as 3 months, would not provide useful information about when to start immunisation of the babies. These points can be well illustrated by considering the results obtained from some districts, of which Coventry has been chosen here as an example to compare with Southwark, the figures for which have already been published (Barr et al. 1949). Results of antitoxin tests for these two districts are given in table I.

Tests were made by the guineapig intracutaneous method, the lowest value for which tests on human sera can be made with certainty being 0·001 unit per ml. All values in this particular investigation were tested at about 100% differences, because the large scatter rendered closer testing unnecessary; in the determination of means of logs each value was taken as the mean of the logarithmic limits within which it lay.

It will be seen from table I that there were twice as many samples with no detectable antitoxin from Coventry as there were from Southwark, and statistical comparison of the numbers with and without detectable antitoxin from these two districts shows that the differences are highly significant ($\chi^2 = 10{\cdot}219$, $n = 1$, $P = 0{\cdot}002$). A comparison of the general scatter of values shows that, although there are more samples between 0·001 and 0·01 unit per ml. in the Coventry series, the main peak of both distributions occurs at 0·2–0·5 unit, the peaking in value being more pronounced in the Southwark es. The highest value recorded was 5–10 units oventry, and six samples from Southwark and seven Coventry contained over 1 unit per ml. A comparison he means of the logs of values over 0·001 unit per gives a value of $t \doteq 1{\cdot}586$, $n = 135$, and $P = 0{\cdot}116$. is, though the difference between the numbers of ples with and without detectable antitoxin is highly ificant, the numbers containing over 1 unit per ml. almost identical and the difference between the ans of the logs of values of those with detectable itoxin is not significant. In these particular distributions, therefore, the proportion of samples with no ectable antitoxin gives no indication of the mean lue or of the scatter of the remaining samples.

Any investigation of the immunity state of very young bies should be made by antitoxin titrations on blood mples. Making titrations at 10% differences (Barr al. 1949) showed that the antitoxic titre of cord-ood was usually appreciably higher than that of the other's blood taken during labour, the ratio varying om 1·00–2·23, with an average figure of 1·57. We und that the best straight line representing the logarithmic rate of loss of maternally conferred antitoxin in babies cut the axis at a point 36·9% below the cord-blood value. Owing to individual differences in the ratio of titres, cord-blood : mother's blood, a better way to investigate the immunity state of the newborn would be the titration of blood samples from the babies, but this is impossible on a large scale. On the other hand, the differences between the ratio of titres are of the same order as the error of the antitoxin titrations made at 100% differences. Thus in practice very good agreement is usually obtained between the amount of antitoxin found by titration of a blood sample from a baby at any given time after birth and the amount expected to be still present at this time as calculated from the cord-blood value. It therefore seems that the best and most practical method of investigating the immunity state of young babies is the titration of cord-blood; from the values so obtained the amount of antitoxin still present at later ages can be calculated with fair accuracy by the formula $\log A_w = \log A_c - 0{\cdot}20 - 0{\cdot}065\,w$, where A_w is the antitoxic titre of a baby w weeks old and A_c is the cord-blood value (Barr et al. 1949).

ABLE I—DISTRIBUTION OF DIPHTHERIA ANTITOXIC LEVELS IN RANDOM CORD-BLOOD SAMPLES FROM SOUTHWARK (GUY'S HOSPITAL) and COVENTRY

Antitoxic value (units per ml.)	No. of cord-blood samples	
	Southwark	Coventry
nder 0·001	21	42
ver 0·001 under 0·002 ..	2	2
„ 0·002 „ 0·004 ..	0	4
„ 0·004 „ 0·01 ..	3	4
„ 0·01 „ 0·02 ..	5	4
„ 0·02 „ 0·04 ..	6	6
„ 0·04 „ 0·1 ..	11	7
„ 0·1 „ 0·2 ..	15	8
„ 0·2 „ 0·5 ..	17	11
„ 0·5 „ 1 ..	14	5
„ 1 „ 2 ..	3	5
„ 2 „ 5 ..	3	1
„ 5 „ 10 ..	0	1
Total	100	100
Median (unit per ml.) ..	0·110	0·00632

AGE AT WHICH BABIES REACH THE SCHICK-POSITIVE STATE

The results of titrations of cord-blood samples from Southwark and Coventry have now been used to estimate the approximate Schick-positive rates and the numbers of babies whose antitoxin values would have fallen below 0·04 unit per ml. at various ages and so could profitably receive a first dose of 0·5 ml. of A.P.T.

In estimating the numbers of babies expected to be Schick-positive at any given age, the Schick level has been taken as being between 0·002 and 0·004 unit of antitoxin per ml. This level would be generally accepted as suitable in adults, though some with antitoxic values of 0·004 unit or more might give positive Schick reactions, and others with 0·002 unit or less might be Schick-negative. It seems, however, that the reliability of the Schick test in relation to circulating antitoxin has not been investigated in babies, and so failure to react to the Schick dose may be due either to the neutralisation of the dose by passive maternal antitoxin or to the relative insensitivity of very young babies' skin to the toxin. Until Schick reactions and antitoxic levels are compared in babies, it is impossible to draw accurate conclusions as to the meaning of the Schick-negative state in the very young. In most cases where discrepancies have been encountered in the Schick reactions of mothers and their babies when tested within a few days of delivery, the babies have not shown any reaction while their mothers have reacted; this has been most usual when the reactions of the mothers were not very obvious (Wright and Clark 1944). Owing to this uncertainty in the interpretation of Schick reactions in young babies the assumption is being made here that babies whose antitoxic values are below 0·004 unit would be Schick-positive, and those with values above 0·004 unit would be Schick-negative. The term "Schick-positive" therefore refers to babies with less than 0·004 unit of passive antitoxin per ml. The number estimated as Schick-positive at birth has, however, been given as those for whom the *cord-blood* values were below 0·004 unit per ml. In view of the higher titre of cord-blood, it is probable that this figure gives too low an estimate, and that some of the babies with cord-blood values between 0·004 and 0·01 unit per ml. should be included. The numbers of such babies in these particular populations are very small, however, there being only three at Southwark and four at Coventry. Calculations of values for the age of 1 month and later were made from the formula given above.

The results of these calculations, given in table II, show that 23% of the Southwark babies and 48% of the Coventry babies were born with antitoxic values below the Schick level. If the Schick test were delayed until the babies were 3 months old, 38% and 63% respectively would be expected to be Schick-positive. From the point of view of interference of antitoxin with active immunisation, however, the Schick level is of no practical importance. This is evident from the second and third lines of figures in table II, which show that those babies whose titres are below 0·04 unit per ml.

TABLE II—CALCULATED PERCENTAGE SCHICK-POSITIVE RATES AND CALCULATED PERCENTAGE OF BABIES WHO COULD RECEIVE THEIR FIRST DOSE, 0·5 ML. OF A.P.T., AT VARIOUS AGES

Age (months)	Percentage with titres below 0·004 unit/ml. (Schick-positive)	
	Southwark	Coventry
0	23	48
3	38	63
..	Percentage with titres below 0·04 unit/ml. (ready to start immunisation)	
0	37	62
1	54	72
2	64	78
3	82	89
4	91	92
6	99	99
8	100	100

at birth, and who can profitably receive their first injection of prophylactic in the first few weeks of life, become Schick-positive only at the age of 3 months. Calculation shows that about 3 months elapse between the times at which the maternally conferred antitoxin falls from the level at which immunisation can be started (below 0·04 unit/ml.) to the Schick level (below 0·004 unit/ml.). *Thus information based on Schick testing is* always obtained 3 months in arrears if it is to be applied to the age at which immunisation can be started.

Statistical analysis of portions of the table reveals the following facts concerning the two populations:

(1) The differences between the Schick rates at birth are highly significant ($\chi^2 = 13{\cdot}647$, $n = 1$, $P = <0{\cdot}001$).

(2) The differences between the Schick rates at 3 months are highly significant ($\chi^2 = 12{\cdot}501$, $n = 1$, $P = <0{\cdot}001$).

(3) The difference between the numbers of babies who can be satisfactorily immunised at the age of 3 months is not significant ($\chi^2 = 1{\cdot}976$, $n = 1$, $P = 0{\cdot}17$).

These points seem to show that Schick testing of babies *at various ages would provide information* which is only of academic interest, and if unsupported by antitoxin titrations might lead to erroneous conclusions in the comparison of populations.

AGE AT WHICH TO START IMMUNISATION

Other points of interest shown in table II are that all babies from both populations could be satisfactorily immunised starting at the age of 8 months, as is now officially recommended; on the other hand, over 80% would be effectively immunised if they received their first dose when 3 months old, and at the age of 8 months a large proportion of the babies would have lost nearly all their maternally conferred antitoxin and would thus be unprotected. In referring to successful immunisation the criteria we recommended (Barr et al. 1950) have been accepted; we obtained in babies, at least 2 months after the second injection, normally distributed log antitoxic values with a small scatter round a mean value of 0·2 unit. We suggested, however, that all babies, except those born of potentially immune mothers further immunised during pregnancy, could be successfully immunised by three injections of prophylactic given at the age of 3, 6, and 18 months. This suggestion could be applied to the two populations at Southwark and Coventry discussed here.

DISADVANTAGE OF IMMUNISATION OF EXPECTANT MOTHERS

It seems unfortunate that the immunisation of expectant mothers, to confer passive immunity on their offspring, should recently have been advocated by Bradley (1949). The scatter of values of cord-blood antitoxin is far greater after immunisation, and, as we have shown (Barr et al. 1950), may range from under 0·001 to 120 units per ml. Such high values would not be detected by the Schick test, which was used by Bradley in his work. It is clear that immunisation during pregnancy, by widening the scatter of antitoxic values in the babies, would make it very difficult to formulate a scheme for immunising babies which would be suitable for the majority.

SUMMARY

The immunity state of the newborn in various districts in the British Isles is being investigated by carrying out antitoxin titrations on 100 cord-blood samples from each.

The results from two districts are compared here. In one district the number of babies born without detectable antitoxin was double that in the other. In both districts, however, over 80% of the babies would have been effectively immunised if they had received their first injection of 0·5 ml. of A.P.T. at the age of 3 months instead of waiting until 8 months, as is now officially recommended.

These figures were obtained by calculation cord-blood values, and represent the numbers of in whom the titre of maternally conferred would have fallen below 0·04 unit per ml. This level is reached about 3 months before the babies be expected to become Schick-positive.

It has been found that the number of babies in *samples with values below the Schick level of* at birth does not give a reliable indication of antitoxic values present in other babies.

Active immunisation of expectant mothers, to give increased passive immunity to the babies, be deprecated. Maternal immunisation would the antitoxic level in most, but not all, the babies, it would also increase the scatter of these levels, making it impossible to decide when to begin primary course of immunisation in the babies with a reasonable hope of a good response in the ma of them.

I wish to thank Dr. J. F. Galpine, medical superintend of the Isolation Hospital, Coventry, for his interest coöperation in supplying cord-blood samples, and Mr. H Duval, *consultant obstetrician and gynæcologist*, for perm *ting and facilitating their collection from a maternity* u in his charge.

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PRIMARY ATYPICAL PNEUMONIA WIT HEPATITIS AND NEPHRITIS

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The following case is reported because the association of atypical pneumonia with hepatitis and nephritis appears to be unusual. Reimann (1947) refers to the occasional occurrence of hepatitis in atypical pneumonia, but two other probable examples were seen in this practice in the same month as the case to be described.

A previously healthy schoolmaster, in the early forties, developed a sudden pyrexia one evening after having had a cold for a few days. Next morning he had a temperature of 103·4°F, pulse-rate 88, and slightly increased respiratory excursion though not rate; fine crepitations were audible at the base of the left lung.

Treatment.—The patient was put on full doses of sulphadiazine and, when in the evening his temperature rose to 104·8°F, on procaine penicillin 600,000 units daily. On the second day a patch of bronchial breathing appeared at the left base. On the fourth day severe vomiting and jaundice of an obstructive type appeared. The sulphadiazine was stopped. On the seventh day, the temperature, which had fallen by lysis to 98–100°F, rose suddenly to 103°F, and fine crepitations were heard all over the right lower lobe. The jaundice meanwhile had persistently deepened and anorexia was complete. On the tenth day the patient was still running a remittent fever up to 103°F, and penicillin was stopped. On the eleventh day a heavy cloud of albumin was noted in the urine and a wet film showed a few red cells and a moderate number of cellular and granular casts.

The patient's condition remained static for a week, with a remittent fever up to 101°F, pulse-rate persistently below 8 minimal and varying pulmonary signs, deep jaundice, and continuing presence of albumin, cells, and casts in the urine. At the end of this week Dr. Ernest Bulmer was called in consultation and kindly arranged a supply of 'Aureomycin,' treatment with which was begun on the eighteenth day of the disease. During the previous twenty-four hours there had been slight signs of spontaneous improvement in that the amount of bile pigment and albumin in the urine decreased and the patient felt better; nevertheless within twenty-four hours of the start of aureomycin therapy the patient's *temperature dropped to normal and did not rise again*, and ll other aspects the patient rapidly improved. By the nty-fourth day the urine was free from bile pigment and ımin, but a few casts were noted until the thirtieth day. reafter convalèscence was rapid.

nvestigations.—On the fourth day radiography of the lungs wed a congested appearance of both lung fields. On the enth day a blood-count showed hæmoglobin 108% and te cells 5000 per c.mm. (differential count normal). On twelfth and nineteenth days agglutinations for *Leptospira rohæmorrhagiæ* and *L. canicola* were negative. On the hteenth day agglutinations for typhoid and paratyphoid ups, composite salmonella, *Brucella abortus*, and proteus re negative. On the same day blood and urine were tured and after thirteen days' incubation were sterile. the sixtieth day cold agglutination did not occur. A nplement-fixation test was negative at $^1/_8$ dilution for the ttacosis-lymphogranuloma group of viruses.

ly thanks are due to Dr. Ernest Bulmer for his assistance l-advice.

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Medical Societies

CIETY OF MEDICAL OFFICERS OF HEALTH

Poliomyelitis

THE fever hospital medical services group of the ciety of Medical Officers of Health held a two-day mposium on Poliomyelitis in London on May 19 and , under the chairmanship of Dr. E. G. BENN, president the group.

EPIDEMIOLOGICAL ASPECTS

Dr. W. H. BRADLEY pointed out that the disease had ddenly become pre-eminent in the field of communicable seases in this country. The first real epidemic in Great ritain occurred in 1947 when the attack-rate in England ıd Wales was 18 per 100,000 living—four and a half mes as great as the 1938 high figure and comparable ith the rate in the U.S.A. in 1916 and 1946. In 1947 e number of deaths was about three times as great as 1938; but the case-fatality was only 9%, compared ith 16% in 1938. The age-distribution showed the pward trend characteristic of recent epidemics in vilised countries; 55% of the deaths registered were persons over 15 years of age. The geographical stribution showed a departure from the former rural reponderance, and there was evidence of spread into e rural areas from the cities. The epidemic began in number of widely separated places at about the same me, but not necessarily simultaneously. In these aces some warning of the impending autumnal epidemic as given by a higher incidence than usual at the ginning of the year. There was some evidence of ncentric spread from these centres in the early stages, ut this was soon lost in the general spread.

In 1948 there was a "hangover" from 1947, and a milar effect appeared in the present year after the 1949 pidemic, which was second only to that of 1947. The pidemic of 1949 began a little later than that of 1947 ut lasted longer. In 1947 the peak weekly figure of 08 cases was reached in the 36th week of the year; in 949 the peak figure (463) was in the 43rd week. The hole country was involved in both epidemics; it was ot the general rule that areas lightly attacked in 1947 ere heavily attacked in 1949.

Useful information about the epidemiology of poliomyelitis was provided by the Jersey outbreak in 1948. he island escaped in 1947 despite many visitors from reat Britain. The outbreak suggested a harbinger case, he survival of infection in the area, and a subsequent utbreak.

Dr. Bradley said that in this country Dr. A. H. Gale, r. J. K. Martin, and Dr. D. H. Geffen, and in Australia r. B. P. McCloskey, had been instrumental in discovering the association of poliomyelitis with immunising injections. Prof. Bradford Hill had conducted a statistical inquiry for the Ministry of Health, and had found an undoubted association between recent inoculation and paralysis affecting the injected limb; the finding was most evident with A.P.T.-pertussis vaccine, and less so with A.P.T.; the figures for pertussis vaccine alone were inadequate for drawing conclusions. The risk of poliomyelitis after injections had not yet been determined, but some idea could be obtained from a report that among 1453 cases of poliomyelitis in the age-group 0–4 years there were 26 cases of recent inoculations, not all of which could be regarded as responsible. The task of obtaining reliable information was formidable and required controlled investigation.

Dr. Bradley also reported 12 examples in one year of cross-infection with poliomyelitis in hospitals which, with one exception, were general hospitals. Direct spread merited greater attention. Off-season immunisation might be desirable for nurses in fever hospitals, and subcutaneous injections might be safer than intramuscular; but immunisation should not be discouraged.

ASSOCIATION WITH INOCULATION

Dr. B. P. MCCLOSKEY (Melbourne) reported that during the routine investigation of poliomyelitis in Victoria attention was directed to cases following inoculation. It was concluded that during 1949 recent inoculation with pertussis vaccine, either alone or in combination, was associated with the onset of paralytic poliomyelitis; that the mean interval between such an inoculation and the onset of poliomyelitis corresponded with the presumed incubation period of poliomyelitis; and further that during the 1949 epidemic the actual number of cases of paralytic poliomyelitis was increased by the administration of these inoculations. The severity of paralysis in patients with a history of recent inoculation of pertussis vaccine, either alone or in combination, was significantly greater than in those with no such history. The evidence that recent inoculation with diphtheria prophylactic was associated with the onset of paralytic poliomyelitis was much less conclusive, but could not be dismissed as fortuitous.

The difference from the findings in Great Britain, where the evidence against diphtheria immunisation was strong and that against pertussis vaccine weak, might be explained by the fact that in Australia diphtheria prophylactics were given subcutaneously and with little local reaction, whereas pertussis was given intramuscularly and was commonly followed by reaction; in Great Britain A.P.T. was the common prophylactic and was given intramuscularly.

BULBAR POLIOMYELITIS

Dr. W. HOWLETT KELLEHER observed that though "bulbar" poliomyelitis strictly implied only medullary involvement, the term commonly included involvement of the brain-stem. In polioencephalitis, spasticity and other symptoms had been attributed to damage to the brain-stem; but some of these symptoms might be due to cerebral hypoxia. The incidence and severity of bulbar lesions varied between different epidemics. In 1947 the proportion of cases was higher but the severity was less than in 1949—a bad year. The Minnesota Research Commission classified "bulbar" poliomyelitis into: (1) the cranial-nuclei group; (2) the respiratory-centre group; (3) the circulatory-centre group; and (4) the encephalitic group. Combinations occurred, and the first group could be subdivided into upper and lower subgroups. Palsies involving the upper cranial nerves (5th, 7th, and 8th) were common and mild, and in 1947 gave rise to little anxiety. Involvement of the lower cranial nerves, particularly damage to the 10th nucleus, was associated with the dangerous features of bulbar poliomyelitis, and was prominent in the bulbar forms in

1949. Neurogenic dysfunction of the pharyngolaryngeal area, with large pools of secretions and interference with the airway, gave rise to grave anxiety though treatment was now more promising than formerly.

Involvement of the respiratory centre was difficult to recognise clinically although histological evidence of involvement was common. Some of the symptoms had been ascribed to hypoxia. Circulatory-centre involvement was not recognised in any of Dr. Kelleher's cases. Encephalitic symptoms were exceedingly common, but here again hypoxia might be responsible. The whole problem of bulbar poliomyelitis seemed to be bound up with defects of oxygen concentration. By contrast with poliomyelitis, laryngeal diphtheria necessitating tracheotomy did not seem to cause postanoxic cerebral damage. Factors which added to anoxia were pooling of pharyngeal secretion, reflex laryngeal spasm from the aspiration of small quantities of secretion, abductor paralysis of the larynx, pulmonary atelectasis, pneumonia, and pulmonary œdema. The first three might cause rapid asphyxia.

Drugs, antisera, and antibiotics were not effective against poliomyelitis. Curare had been used to relax muscles in spasm; and this seemed a rational procedure. Hot compresses alleviated tightness of respiratory muscles. Attempted correction of the fluid balance was not without dangers of over-hydration. Intravenous glucose had been used for cerebral dehydration. Nasal feeding must be used with the greatest caution, for collapse and death had followed feeds. Oxygen therapy was clearly indicated in selected cases, but the airway must be free. A free airway might be secured by postural drainage, intermittent or continuous pharyngeal aspiration, or intratracheal aspiration. In the supine position as much as 45° tilt might be needed for drainage; in the prone position the angle was less. Tracheotomy should be, not an emergency operation, but carefully planned. To those who favoured it there were many indications for its early performance; indeed some claimed that it was indispensable before treatment in a respirator, to ensure a clear airway. Tracheotomy was sometimes carried out with a bronchoscope or endotracheal tube in place. A high tracheotomy allowed subsequent nursing in a respirator. The Stille and the Moynahan collarless respirators had advantages in this type of case. Positive-pressure oxygen therapy was required if there was suspicion of pulmonary œdema. The respiratory-centre and circulatory-centre groups responded poorly to these measures.

RESPIRATORS

Dr. W. **Ritchie Russell** (Oxford) observed that life in a respirator was highly precarious; yet decisions had to be made on inexact criteria, and so these were often deferred until severe anoxia had developed. The usual criteria were the extent of the chest movements, the patient's colour, and the sound and strength of the cough; and Dr. Kelleher determined how many numbers the patient could say in one breath. All these standards were crude. Correct speeds and pressures in the respirator were difficult to determine; over-ventilation developed insidiously and might be as disastrous as under-ventilation. An easy method of recording tidal air and vital capacity was urgently needed, not only for deciding on the necessity for the respirator, but for determining its efficacy. In the study undertaken by his team a recording spirometer was used. For research purposes the alveolar carbon dioxide must also be studied. When breathing became difficult the patient's anxiety influenced a decision as to whether a respirator should be used. He suggested that at this stage a strong sedative or anæsthetic might be administered. The difficulty was to decide which was safe; any sedative which gave rise to vomiting was dangerous and might cause death. For postural drainage in the respirator the prone position, with frequent changes of posture, was worth furth because a good tidal air could be obtained in this pos Support for the patient and a better neck-seal required. Other improvements in respirator d suggested by Dr. Ritchie Russell were accurate and rate of control of the motor, temperature control, quick method of tilting, an alarm system to indic failure of pressure, and adequate ports for nursing and setting up intravenous transfusion and blood-press recording apparatus. With every respirator it desirable to have a lung inflator or, better, a suck-bl machine which would maintain respiration adequat when the patient was temporarily removed from th respirator. Inquiry was also needed as to the best meth for weaning the patient from the respirator.

Dr. R. B. **Bourdillon** urged investigation int better measurement of the patient's breathing. Carbo dioxide meters were best; special spirometers or, failing them, spirometers from B.M.R. machines were valuabl It was possible to measure breathing roughly by usin an anæsthetist's bag and elephant tubing. He demo strated a simple improvised bellows for providing a roug idea of a fading vital capacity; for tidal air a similar bu smaller bellows could be used. Tidal air should neve exceed 600 ml., and preferably it should not exceed 500 ml Among the dangers of over-ventilation was cerebra anoxæmia from constriction of the cerebral vessels.

TREATMENT IN THE POST-ACUTE STAGE

Dr. C. D. S. **Agassiz** (Carshalton) remarked that case were now accepted for physiotherapy as soon as possibl after the painful phase. He was impressed by the bette condition of those who had received hot packs and by th unsatisfactory "tightness" of those immobilised i splints or plaster casts.

The child was nursed flat in bed with a firm mattre or bed-board and with a foot board. A simple restraine was necessary to prevent the child sitting up. In th prevention of deformities attention must be directed n only to paralysis but to tightness, which interfered wit the functions of the underlying muscles. Failing hot packs, the affected limbs were sprayed alternately with hot and cold water until the skin was flushed; the patient then lay in a bath of warm water for 10-15 minutes; he was dried, and physiotherapy was begun. Passive movement was restricted by "tightness," which was gradually overcome by regular stretching, short of producing pain. The physiotherapist instructed the child in muscle movement; and when his feet could be brought to a right-angle he was made to stand, with support. Re-education in walking then began. Elbow crutches were preferred to arm crutches. With lengthy re-education a patient with complete flaccid paralysis of both lower limbs could walk with sticks. Callipers were a last resort. Instruction to parents and attendance at aftercare clinics were essential.

Mr. R. H. **Metcalfe** (Carshalton) supported Sister Elizabeth Kenny's ideas on pathology and therapy. Poliomyelitis was not the localised disease it was once thought to be. It involved not only nerves but also nerve end-plates, muscles, fascia, and skin, which become tight and needed to be stretched. Splinting was to be condemned and was probably responsible for short limbs. Moist heat and stretching relieved tightness. He emphasised the importance of enthusiasm and optimism among patients and staff.

Mr. A. **Rocyn Jones** held that the orthopædic surgeon must collaborate with the physician from the beginning. As soon as patients were fit their muscles must be trained for an occupation. Occupational therapy had two advantages: it encouraged muscles which were recovering, and it directed the patient's attention away from his disability. In both physiotherapy and occupational therapy fatigue in recovering muscles must be led, and patients must be handled gently. Two s of occupational therapy were particularly suitable oliomyelitis—modelling and weaving. At the end ½–2 years the permanent disability could be assessed a decision made as to whether any operation or iance could help. If possible, callipers should be ded. The basic operation was arthrodesis; tendon splantation was disappointing. In the rehabilitation hildren leaving hospital, ordinary schools, if practic-, were better than schools for physically defectives. phasis should be on the patient's capacity, not his apacity, so as to overcome the feeling of inferiority. training-schools young patients (aged 16–21) should grouped together, not mixed with adults disabled industry.

FURTHER COMMENTS

The **President** was surprised at the evidence of cross-ection. He thought it of interest that inoculation liomyelitis should occur after immunisation against phtheria and whooping-cough, whose toxins affected e nervous system. The grouping of cases of polio-yelitis in big centres would help to overcome the fficulties of nursing and equipment. He also had perience of distress with nasal feeding, and he preferred introduce the tube into the stomach.

Dr. G. **Breen** compared the geographical incidence f poliomyelitis in London in 1947 and 1949. In 1947 he disease started in London and was heaviest in the South-East. In 1949 the incidence was greatest in the prosperous North-West and lightest in the East and South-East, some poor areas remaining free. Thus the distribution was the reverse of 1947; there were examples of more than one overt case per family; in institutions multiple cases were common: and the age-distribution reverted to a younger group, possibly because of inoculation. Complaints that some batches of combined A.P.T. and pertussis prophylactic were causing severe reactions and might determine the onset of inoculation poliomyelitis influenced the replacement of A.P.T. by P.T.A.B., which could be used subcutaneously. Dr. **Kelleher** found no correlation between the degree of reaction and local paralysis in an experience extending over nine years.

Dr. J. F. **Warin** (Oxford) was alarmed at the effect a few cases of local poliomyelitis were having on the whole diphtheria immunisation campaign; a sense of proportion must be preserved. Dr. G. E. **Harries** (Cardiff) expressed the view that modification of the immunisation campaign might be desirable during poliomyelitis epidemics.

Dr. A. **Joe** (Edinburgh) said there was very little poliomyelitis in Scotland in 1949. Notification was unreliable; only about one-third of the cases were of true poliomyelitis; there was too great readiness to accept a diagnosis of non-paralytic poliomyelitis. Other infections of the central nervous system, including canicola fever, were sometimes called poliomyelitis. He mentioned a ward outbreak in which paralyses were localised by injections of penicillin.

Dr. J. F. **Galpine** (Coventry) thought that syringe infection had not yet been excluded as a cause of poliomyelitis after inoculation.

Dr. W. **Gunn** said that tracheotomy was indicated if there was excessive pharyngeal secretion, and intubation if there was not. Curare could be used for rigidity of the chest.

Dr. H. **Stanley Banks** described a case of neurogenic dilatation of the stomach heralded by sudden vomiting and distension. Dr. **Ritchie Russell** said that acute dilatation in the acute stages was not uncommon; the cause was uncertain, but the respirator could contribute by sucking in air. Dr. **Kelleher** had found acute dilatation not only in the acute stage but also later—sometimes much later. Treatment consisted in passing a stomach tube, washing out the stomach, and prohibiting oral feeding. Other causes of death were bronchopneumonia, atelectasis, chronic urinary infections with renal concretions, and failure of the respirator because of either mechanical or nursing deficiencies. Dr. J. S. **Anderson** had also seen a long-standing case die of acute dilatation of the stomach.

Dr. M. **Mitman** (Dartford) emphasised the importance of muscle spasm and cerebral anoxia in the symptomatology of bulbar poliomyelitis, and agreed on the desirability of some method of measuring respiration. Differences between pharyngeal paralysis in diphtheria and in bulbar poliomyelitis might be ascribed to the presence of spasm in the latter. Cerebral damage attributed to infectious agents and their toxins might be the result of cerebral hypoxia: he suggested that the convulsions of whooping-cough were the result of such oxygen deficiency caused by a paroxysm of coughing which emptied the lungs of residual air. He strongly supported the plea for investigation into the use of the prone position in treatment. Kenny's treatment had first been condemned as no improvement over orthodox methods; then accepted as of value while her "osteopathic" pathology was dismissed; and now even this was accepted. Professor A. **Topping** said that Sister Kenny deserved credit for her influence in changing orthopædic opinion.

Reviews of Books

Physiology in Diseases of the Heart and Lungs

M. D. **Altschule**, assistant professor of medicine, Harvard Medical School. Cambridge, Mass.: Harvard University Press. London: Oxford University Press. 1949. Pp. 368. 40*s*.

Because their approach to each subject is different, there is often a hiatus between physiology and clinical medicine. But in this study of the heart and lungs, Dr. Altschule has succeeded in drawing the two together.

His first and longest chapter treats of chronic cardiac decompensation; its features are analysed and the methods of investigation are assessed. The cardiac output, peripheral circulation, lung volume, blood gases, œdema, and renal and hepatic functions are considered in detail, with long bibliographies appended. The view that acute pulmonary œdema is due to failure of the left ventricle is not regarded as acceptable from a physiological standpoint, and the possibility of a neurogenic factor is discussed. In a chapter dealing with cardiac tamponade the early development of ascites (ascites præcox), usually well in advance of œdema of the legs, is attributed to severe liver damage resulting from raised venous pressure; but cases of constrictive pericarditis, in which the venous pressure may be raised for years, do not often show gross hepatic changes. The help given by cardiac catheterisation has added greatly to the value of the studies in congenital heart lesions and in valvular disease; these have been related particularly to the possibilities of surgical treatment. Shorter sections on lung fibrosis, emphysema, and inflammation deal with alterations in lung volume, cardiac function, and blood gases, but according to the author the data do not suffice for anything like a complete analysis.

Throughout the book deliberate suppression of theory has made the argument in parts a little heavy and lacking in force, especially as the reader may feel that Dr. Altschule himself might have a good deal more to add. The fact remains that the novelty of approach and conception makes this work most valuable to the student of heart and lung diseases.

Morbus Cæruleus

An Analysis of 114 Cases of Congenital Heart Disease with Cyanosis. Editor: E. **Mannheimer**. Basle: Karger. 1949. Pp. 332. Sw. fr. 40.

The international character of medicine is well illustrated in this work, which is produced by a group of doctors from Stockholm, dedicated to two Americans, written in English, and published in Switzerland. The study is based on 114 patients suffering from congenital cyanotic heart-disease, and it includes a considerable amount of original work, particularly in relation to the circulation and heart tolerance tests. The section by Eek on embryology is comprehensive and the descriptions good, giving prominence to the second or back torsion of the bulbis cordis, which if increased will produce the components of the tetralogy of Fallot. A grouping of the 114 cases shows that 61 were examples of this condition. The clinical features have been carefully scrutinised, and the investigations, which have become much more exact and exacting as a result of the possible surgical implications, have been carried out in detail; the results in different types of heart lesions have been tabulated and described. The chapter on radiology and cardioangiography is particularly well illustrated and the X-ray reproductions are excellent. Surgical treatment has followed the Blalock-Taussig principle, using chiefly the anastomosis between subclavian and pulmonary arteries. Of the 21 patients operated on, 8 died; but the results were good in the survivors. A footnote comments on the usual experience of a high mortality only in the early cases: this is borne out by survival after 12 of 14 subsequent operations. The advantages of experienced team-work are once again shown.

The Surgical Treatment of Facial Injuries

VARAZTAD HOVHANNES KAZANJIAN, M.D., D.M.D., professor emeritus of plastic surgery, Harvard University; JOHN MARQUIS CONVERSE, M.D., associate professor of clinical surgery, New York University. Baltimore: Williams & Wilkins. London: Baillière, Tindall, and Cox. 1949. Pp. 574. 76*s.* 6*d.*

Dr. Kazanjian and Dr. Converse (both well known in this country as well as in the U.S.A.) have combined to produce a fine book on the treatment of facial injuries. An opening chapter on the comparative anatomy of the skull and face is interesting though not fully pertinent: chapters on the histology and pathology of wound healing, and the early treatment of facial injuries are more valuable, and from the long section on fractures of the mandible, maxilla, nose, and zygoma, many useful and practical points can be learnt. But the repair of soft tissues inevitably occupies most of the book, and all the methods in common use are described—local flaps, free grafts, and grafts from a distance—with diagrams and photographs illustrating special problems. Deformities of the nose and of the jaws are well handled. Temporomandibular ankylosis, facial paralysis, ear deformities, and burns of the face have a chapter each, with final chapters on the use of prostheses and the management of anæsthesia. The book could be studied with advantage by all concerned with this type of work.

Clinical Management of Varicose Veins

DAVID WOOLFOLK BARROW, M.D. London: Cassell. 1949. Pp. 155. 25*s.*

Dr. Barrow, of Lexington, Kentucky, says of his small book that "this monograph is the result of personal observations of 2500 patients": and certainly the text reveals continued, fresh, and thoughtful experience. Moreover, though his references are few, many of his quotations show wide reading.

He limits his account of anatomy to that of the saphenous and communicating veins. More about the deep veins and the alternative anastomotic channels through the gluteal and pelvic vessels would be helpful; and though he gives the embryology and variations of the short saphenous vein, he omits detailed landmarks to help those exposing the saphenous veins at the ankle and above and below the knee. The appearance of varicose veins early in pregnancy, before the uterus can cause mechanical obstruction, may be explained by the fact that flow from the internal iliac veins is increased by thirty-two times the normal amount and they thus become large enough to obstruct the discharge from the external iliac vein. Barrow reports the finding of Beecher that the pressure in the normal internal saphenous vein at the ankle when walking is 20–75 cm. of water, but that when the vein becomes varicose the pressure rises to 95 cm. Even so, œdema does not necessarily develop, because the deep veins, if competent, draw off the blood. When the deep and perforating veins are incompetent, œdema of the foot, ankle, and leg follow—a significant diagnostic point. In treating varicose veins of the long saphenous system Barrow gets good results from its ligation and stripping, followed by postoperative injections given ad infinitum. He emphasises that precise diagnosis is essential, for 32 % of his patients had already had an ineffective operation for their varicose veins.

This is a splendid book. The forthright opinions are supported by the author's statistics and those of other experts. The principles of his practice are in accord with the best in Britain, and can be adopted in every surgical clinic.

Thorpe's Dictionary of Applied Chemistry (4th ed. Vol. IX. Oils, fatty—Pituitary body. London: Longmans, Green. 1949. Pp. 671. 80*s.*).—This volume opens with an authoritative treatise on the natural fats, by Professor Hilditch, and ends with a brief account of the hormones of the pituitary gland; and in between are many subjects of interest to the doctor and biologist, including vitamin P, pantothenic acid, penicillin, patulin, and opium. Several articles deal with physical matters of importance to both the physiologist and biochemist—such as osmotic pressure, oxidation-reduction potentials, and pH. Oxidising enzymes, photosynthesis in plants, pest control, photography, and petroleum are perhaps not too strange as bedfellows; while perfumes, synthetic, and onion lend fragrance to a volume which is in every way up to the standard of its predecessors.

Introduction to Neuropathology (New York and London: McGraw-Hill. 1950. Pp. 494. 85*s.*).—Dr. S. P. Hicks and Dr. S. Warren, of Harvard, have produced a good textbook of elementary neuropathology, of the sort that medical students like. There are plenty of excellent photomicrographs; there is not too much text; pedantic details are omitted; the typescript is large and clear; and the paper is thick and shiny. Throughout there is a pleasant link between clinical neurology and pathology, achieved by brief references to what has happened to the patient. The chapter on cerebral tumours, which takes up a quarter of the book, is particularly lucid, though it is a pity that the text must have been completed before Kernohan's simplified classification of the gliomas was published. The older nomenclature is used, but the illustrations prevent any confusion. As so often with well-presented American texts, the only deterrent to purchasers is the price.

Clinical Radiation Therapy (2nd ed. London: Henry Kimpton. 1950. Pp. 902. £5 5*s.*).—Prof. Ernst A. Pohle, as editor of this textbook, now musters a company of 20 expert contributors. Ovid O. Mayer, writing on diseases of the blood and blood-forming organs, includes a description of the use of radioactive phosphorus in the treatment of the leukæmias, and Gordon Richards gives a thoroughly useful account of radiation therapy in diseases of the respiratory system and breast. The techniques described are modern, and the diagrams show exactly how they are applied, with dosage in terms of röntgens received at the tumour. The section which deals with the breast brings together much important information, both clinical and technical. It is surprising, however, to find no chapter dealing with radiation treatment of diseases of the mouth and pharynx: this method of treating these important cancers is mentioned only in the section on the use of low-intensity radium needles. On the other hand, a complete section is devoted to radiation treatment of diseases of the gastro-intestinal tract, various techniques for the irradiation of cancer of the stomach, including the use of radon gold seeds, being described, with a table showing the number of millicuries to deliver to masses of various diameters, dosage being specified in terms of skin erythema dosage. Treatment of diseases of female genital organs occupies a long and elaborate section in which methods of treating cancer of the cervix in most of the important centres are reviewed, but the descriptions are not always completely accurate. Tumours of the genito-urinary tract, and diseases of the nervous system, eye, ear, connective tissue, skin, and glands of internal secretion, all receive due notice. Though the clinical accounts of diseases are usually good, many conditions are included for which radiotherapy is of doubtful value, and space which might have been used to discuss some of the newer developments is still given to old techniques.

THE LANCET

LONDON: SATURDAY, JUNE 17, 1950

Drugs in Parkinsonism

The symptomatic relief obtainable with drugs of the belladonna group in most cases of parkinsonism has been recognised for many years; for, according to Mendel,[1] the value of hyoscine in this condition was noted by Gnauck in 1882. Atropine, hyoscyamine, preparations of stramonium, extract of Bulgarian belladonna in white wine, and sundry proprietary preparations of the solanaceous alkaloids were introduced later. In general, the effects of all these drugs are similar, but their relative efficacy seems to vary from patient to patient. To get the best results with any of them the dosage must be pushed to the limit of tolerance, where side-effects begin to appear. In patients with sialorrhœa the usual reduction in salivation is desirable, but in other cases dryness of the mouth is often troublesome. Paralysis of visual accommodation is also common, and drowsiness, dizziness, and even hallucinations may occur. For each patient it has to be decided whether the benefit obtained is enough to offset these disadvantages.

In the last few years many other drugs, most of them synthetic, have been tried in parkinsonism. Curare, which mainly acts at the myoneural junctions, will reduce or even remove the rigidity and tremor, and apparently somewhat before it paralyses voluntary movement.[2] However, owing to the difficulty of separating these two effects and the inconvenient necessity for injecting the drug, it is not used in parkinsonism. The synthetic relaxant mephenesin ('Myanesin'), though it will also paralyse voluntary muscle, has a different mode of action, mainly exerted on the interneurones of the spinal cord and brain-stem.[3] It has little effect on the higher centres. When given intravenously in parkinsonism it can reduce the rigidity and tremor without affecting voluntary power [4] and with no atropine-like effects on salivation or accommodation. It may cause giddiness, but this is usually not severe, and the vomiting that has been reported is uncommon. As with curare, however, intravenous injection is tiresome, and the relief so obtained is transitory; administration by mouth produces less consistent though longer-lasting results. More serious disadvantages of mephenesin are that an overdose may cause respiratory paralysis for which there seems to be no effective antidote, and that intravenous injection may cause intravascular hæmolysis. None the less, the work done on mephenesin has established that it is possible to relieve the symptoms of parkinsonism without producing atropine-like side-effects.

The remaining substances to be considered do not attain that ideal, but they have much less effect on salivation and accommodation than the solanaceous drugs. Each has been introduced to clinical medicine as the most therapeutically active member of a series of related compounds, and all possess, to a greater or lesser extent, anti-histamine and local anæsthetic properties. (All the substances that are effective in parkinsonism, including atropine and mephenesin, are local anæsthetics, but the fact seems to be of no particular significance.) They are all of undoubted value in parkinsonism, yet each has its individual peculiarities. With 'Parpanit' [5]—a compound closely related to the synthetic antispasmodics 'Trasentin' and 'Dolantin'—the common side-effects are giddiness and a feeling of lightness of the limbs. 'Diparcol' [6] may produce depression and paræsthesiæ. With 'Benadryl' [7] drowsiness is common, and paræsthesiæ and dizziness occasionally occur. 'Artane,' a clinical trial of which was lately reported by Ellenbogen [8] in these columns, has sometimes caused mental confusion and headache. Of these four drugs, diparcol is perhaps the most liable to cause side-effects; but some patients seem to do better with it than with any other treatment. Parpanit, which also produces a high incidence of side-effects, is more often successful, though the improvement may not last long. For best results with either of these substances the dosage must be carefully adjusted to suit the patient. The drowsiness from benadryl can be avoided by giving amphetamine sulphate at the same time. Artane is probably freest from undesirable effects, and, as with benadryl, there is less need to find the exact dosage for each patient. Any of these drugs may be given at the same time as the patient's usual solanaceous medication. As Dr. J. Phillips and two colleagues say in their letter on another page, stopping stramonium sometimes leads to unpleasant withdrawal symptoms. When a change of drug is being made it is usually wise to give new and old together for a time and make the replacement gradual. At the Highlands Hospital in North London artane has given good results in 28 out of 35 postencephalitic cases, with remarkable freedom from side-effects, but Dr. Phillips mentions the "prohibitive" cost of the drug and its present scarcity.

The improvement obtainable with any of the drugs now used in parkinsonism is limited. On the whole, rigidity (as it affects ease of movement) is more readily relieved than tremor; and speed of movement is not likely to be much altered. Even in the most satisfactory cases the signs of the disease remain, and indeed the improvement is often wholly subjective. At best, the patient is not restored to complete normality of behaviour. But, apart from the efficacy of the drug prescribed, there are other important factors affecting the outcome. As KINNIER WILSON[9] pointed out, every activity is more of an effort for the patient with parkinsonism than for his healthy fellow, and the temptation not to make the effort is constantly with him. Thus he may—and often does—fail to perform many actions of which he is physically capable. For this reason, a drug which only slightly facilitates the patient's movements may yield dramatic results by giving him new confidence and enthusiasm. On the other hand, when the patient's activity has long been severely restricted, his musculature will be weak, his posture bowed, and his joints stiff, and no drug can then produce much immediate improvement. In such cases reablement by graduated physiotherapy may be of great benefit. Better still, the physiotherapist should be called on to prevent physical deterioration developing; and helping the patient to retain his physical powers will ensure that neglect and despair are not allowed to determine his future.

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[2] Schlesinger, E. B. *Bull. N.Y. Acad. Med.* 1946, 22, 520.

[3] Henneman, E., Kaplan, A., Unna, K. *J. Pharmacol.* 1949, 97, 331. Berger, F. M. *Ibid*, 96, 243.

[4] Stephen, C. R., Chandy, J. *J. Canad. med. Ass.* 1947, 57, 463.

[5] Dunham, W. F., Edwards, C. H. *Lancet*, 1948, ii, 724.

[6] Sigwald, J., Bovet, D., Dumont, G. *Rev. Neurol.* 1946, 78, 581.

[7] Ryan, G. M. S., Wood, J. S. *Lancet*, 1949, i, 258.

[8] Ellenbogen, B. K. *Ibid*, June 3, p. 1034.

Cerebral Aneurysms: Congenital or Acquired?

PATHOLOGISTS have long been puzzled by the frequency of non-inflammatory aneurysms on the circle of Willis and its main branches. In 1890 NEWTON PITT[10] reported the finding of 23 cases in 9000 necropsies, an incidence of 0·25%. OSLER[11] noted 12 cases in 800 necropsies (1·5%), and most writers quote figures between these extreme values. In the general population, therefore, something like 1 person in 200 has one of these cerebral aneurysms. As regards cause, the most obvious non-inflammatory lesion leading to weakness of a vessel wall is atheroma, and several writers emphasise the importance of atheroma in the genesis of cerebral aneurysms. TURNBULL,[12] however, in a study of 30 such aneurysms, found atheroma absent or slight in 21 of the cases, of which 17 showed little or no cardiovascular hypertrophy. He therefore suggested that there is an additional factor, probably an inherent weakness due to a congenital abnormality in the structure of the arteries at their points of junction. This suggestion seemed to be strongly supported by FORBUS[13] when he demonstrated small gaps in the musculature of the media at the points of bifurcation of the cerebral vessels in a case of multiple aneurysms of the circle of Willis.

Atheroma in a congenitally weak vessel was a satisfactory solution until GLYNN[14] pointed out that these muscular defects in the media can be found in the cerebral vessels at necropsy in about 80% of cases without cerebral aneurysms. Moreover, in each case where the defects were found they were present in about 80% of the 15 different branches examined. Thus, on the average, four cases out of five show defects in 12 out of the 15 main bifurcations in their cerebral arteries. GLYNN justly contended that a theory which ascribes major significance in the ætiology of a condition occurring in 0·5% of the population to a factor present in about 80% of th population must surely be overlooking some mo significant factor. Since freshly removed cerebr vessels with natural and artificial muscular defect but with intact internal elastic membranes coul withstand inflationary pressures of 600 mm. Hg, h concluded that the maintenance of form in the vessels is not a function of their muscle but depend on the integrity of their elastic tissue; in his vie aneurysms arose on a basis of elastic degeneratio and congenital muscular defects played no part i the ætiology.

CARMICHAEL[15] has now tried to reconcile the tw views. Thirteen aneurysms which he studied in detai all showed evidence of considerable degenerativ disease in the intima, and the age-incidence in 26 published cases also favoured the degeneration hypothesis. On the other hand, the virtually constan relation of the aneurysms to the arterial bifurcations, where developmental defects occur, seems t warrant the view that developmental deficiency is th one essential basic lesion. CARMICHAEL therefor suggests that a breach in both layers is necessary, th muscular breach being usually a congenital defect whereas the elastic breach is the result of atheromatous degeneration. But the original difficulty still remains of reconciling the frequency of the defects with the rarity of the aneurysms, and CARMICHAEL offers several interesting suggestions to account for it. First, two independent lesions—congenital defect in the media and elastic degeneration in the intima—must coincide. Secondly, the defects in many cases are too small. Thirdly, atheromatous degeneration is often preceded by elastic hyperplasia, and there is also considerable variation in the time-relationship between elastic degeneration and fibrohyaline thickening in atheromatous plaques. It is presumably only in those cases with precocious elastic degeneration that the intima is sufficiently weakened to allow aneurysm formation These three reasons may well account for part of the discrepancy between the incidence of aneurysms and defects; but are they really adequate ? To take them in turn, the coincidence of two common occurrences will itself be quite common. Atheroma is not only an extremely common degeneration in people over 30, when the great majority of aneurysms occur, but it also shows a special predilection for vascular bifurcations and the mouths of branches, apart from any underlying medial defect.[14 15] Coincidence of the two lesions must therefore be extremely common and in later life almost as frequent as the defects themselves. The size of the defect might well be important, but CARMICHAEL himself admits that probably one defect in four is large enough to be effective; this means that, in four people out of five, 3 of the 15 bifurcations examined by GLYNN would present adequate defects. The third suggestion—that the fibrohyaline thickening associated with atheroma compensates in many cases for the elastic weakening —is probably valid and may account for the relative rarity of these aneurysms.

Medial defects of the kind described by FORBUS are by no means confined to the cerebral vessels, for he observed them both in the coronary and mesenteric vessels in 2 out of 9 specimens in each case. Atheroma also by no means rare in these other vessels, and ; non-inflammatory aneurysms are very seldom ind in them. The striking difference in the incidence aneurysms between the cerebral and other vessels obably depends on the different distribution of ir elastic tissue, which is mainly adventitial in most scular arteries and almost entirely intimal in the ebral vessels. In the intima the elastic tissue is rticularly liable to degenerative changes, whereas in adventitia it remains virtually unaffected. Thus Carmichael maintains, aneurysms may well m only when there has been a previous breach in th the muscle and elastic layers, but the evidence licates that the muscular defects do not predispose elastic degeneration.[14] There is no such definite idence with regard to the reverse situation, and the al effects of loss of elastic tissue may well lead to rophy of the underlying muscle. Moreover, it is clear m inflation experiments that the elastic layer alone is pable of maintaining the form and integrity of the ssel wall. The essential factor in aneurysm forma- n must therefore be a breach in the elastic tissue, and this sense the congenital medial defect is relegated secondary importance. The medial defect may be sential for the development of this type of aneurysm, it since it is almost ubiquitous in the cerebral teries it can only be regarded as a secondary, even essential, factor. Hence the rarity with which ese defects lead to aneurysms in non-cerebral teries.

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[9] Wilson, S. A. K. Modern Problems in Neurology. London, 1928.

[10] Pitt, G. N. *Brit. med. J.* 1890, i, 827.

[11] Osler, W. Principles and Practice of Medicine, 7th ed. London, 1909; p. 982.

[12] Turnbull, H. M. *Quart. med. J.* 1914–15, 8, 201.

[13] Forbus, W. D. *Bull. Johns Hopk. Hosp.* 1930, 47, 239.

[14] Glynn, L. E. *J. Path. Bact.* 1940, 51, 213.

[15] Carmichael, R *Ibid*, 1950, 62, 1.

Anti-histamine Drugs in Colds

In his third Dunham lecture at Harvard last year, r. C. H. Andrewes, f.r.s.,[1] remarked that "even ie most eminent men of science almost invariably se all sense of critical judgment when colds and pecially their own colds are concerned, and the atistical methods they use in their daily work are ll forgotten." For those who seek to appraise a emedy objectively, the way is hard. In the first lace, it is often difficult for the patient—and just bout as difficult for the doctor—to tell whether the ymptoms are really those of a common cold, articularly at the onset. Then immunity varies, s also does the natural course of the disease; and ince the disorder is slight, and normally does not ring the patient to a doctor at all, attempts at omplete follow-up will often be thwarted. Further- iore, the patient—and his physician—may be ifluenced psychologically by the remedy under trial. Diehl[2] found that 35% of patients with colds who eceived lactose reported good results.)

These impediments may account in part for the elay in the publication of controlled studies of anti- istamine drugs in this disease. The first, encourag- ig, report appeared in 1947[3]; and thereafter this roup rapidly won public favour, particularly in the .S.A. Last year, however, workers at the National nstitute of Medical Research[4] described a small, ut carefully controlled, investigation indicating that t least one drug in the group is valueless against he cold; and now this conclusion is reinforced by two arger studies made in the U.S.A.

One of these was undertaken at Cleveland, where Prof. J. H. Dingle and his associates[5] have been continuing their war-time work on acute respiratory disease. Their investigation was made in two ways. First, they have under continuous observation a population of families whose natural illnesses are reviewed clinically and in the laboratory; and because a number of these families began to take anti-histamine drugs for colds, all were asked to note the drug used. Thus complete records were obtained of dosage and clinical effects in those individuals who took these substances, and in those who did not (who acted as controls). Altogether 87 treated and 289 control illnesses (75% in each group were classed as colds) were observed in 203 people. The drugs used were a mixed bag, but thonzylamine hydrochloride and chlorprophenpyridamine maleate were employed in 55 and 13 of the illnesses. Taking full account of whether dosage was rated as adequate, those who took the anti-histamines fared no better than those who did not; and this was true also of 32 subjects who had two or more colds at least one of which was treated with an anti-histamine substance. In the second investigation the treated members of a group of volunteers who received an intranasal inoculum of secretion from a case of common cold were given pyrathiazine hydrochloride or thonzylamine hydrochloride, 50 mg. four times a day, administration being started before the inoculation and continued for five days. The treated were no better off than the controls in the incidence, severity, symptoms or duration of colds.

The second report, by Hoagland and his colleagues,[6] concerns 190 patients in the U.S. Army. These were divided into five groups according to whether they received tripelennamine hydrochloride orally, the same drug by nebuliser, chlorothen citrate orally, or one of two inert substances. Of the patients who were given an anti-histamine drug orally (50 mg. five times daily), 16% reported cure within twenty-four hours, while among those receiving placebos by mouth or nebuliser the percentage was 27; and the percentage was much the same as this for those receiving tripelennamine hydrochloride (0·5%) by nebuliser. The results were little different when those who began treatment within twenty-four hours of the onset were considered separately. The one advantage which some of the treated group seemed to gain was decrease of the irritating serous nasal discharge in the initial phase—an effect that is probably bound up with an allergic response to the cold virus.[7]

Self-medication with the anti-histamine compounds has its dangers;[8] and in the U.S.A. warnings have been issued[9] and their control has been mooted.[10] The Medical Research Council is investigating fully their place in the common cold.[11] Meanwhile, the public should know that probably the best that these drugs can offer—and even this not always—is a little easement for a few hours while the cold is getting under way.

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2. Diehl, H. S. *J. Amer. med. Ass.* 1933, 101, 2042.
3. Brewster, J. M. *U.S Nav. med. Bull.* 1947, 47, 810.
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6. Hoagland, R. J., Deitz, E. N., Myers, P. W., Cosand, H.C. *J. Amer. med Ass.* 1950, 143, 157.
7. See *Lancet*, 1949, i, 489.
8. Leading article, *Ibid*, Jan. 7, p. 28.
9. *Ibid*, 1949, ii, 1114.
10. *Ibid*, March 18, p. 524.
11. *Ibid*, April 1, p. 650.

Annotations

TREATMENT OF OFFENDERS

THE Home Secretary's Advisory Council on the Treatment of Offenders has been considering the borderland between sanity and insanity, and what should be done with offenders who inhabit this borderland. Their conclusions are published on p. 1123. In brief, they are in favour of a special penal institution for the mentally abnormal criminals who are not insane. Those guilty of less serious crime, who are willing to undergo treatment, should be dealt with by probation and outpatient psychiatric treatment under Section 4 of the Criminal Justice Act. In 1939 Norwood East and Hubert[1] advised that the minimum period of imprisonment in which psychotherapy could be of any help was four months (i.e., a six-month sentence with the usual two months' remission) and Prison Commission experience confirms this. Since the maximum period of psychiatric detention should not be longer than the maximum legal sentence for the particular crime, no crime meriting less than six months should be rewarded by treatment in the special penal institution. Though quarter sessions and assize courts should pronounce sentence to the institution, the power of admission would in fact rest with the psychiatrists of the Prison Commission. No court would be permitted to pronounce such a sentence without a report from the commission on the prisoner's mental state, and the commission would have the right to reject in advance any candidate on the grounds of unsuitability. Further, the commission would have power to transfer appropriate prisoners from ordinary prisons to the new institution.

Wisely, the council makes no attempt to define the psychiatric clinical types who would be collected. There can, however, be little doubt that many would be psychopaths of the most difficult kind. How far physical and psychological therapy is able to assist such people is something we can only find out by trying. The council's proposals are well designed to collect all whom the Prison Commission desire to be drawn into the net, and to exclude the unsuitable. Though such an institution will have more in common with a hospital than a prison, it must clearly be run on maximum security lines. If it is too pleasant, and if release is often quicker than from an ordinary prison, we shall get every defending counsel with a hopeless case trying to prove his client a psychopath. Danish experience[2] suggests that the only hope for the criminal psychopath is the indeterminate sentence—that unless the psychopath is forced to try to change himself, as a condition of release, he does not do so. On this, the council hedge; though treatment may require a longer time than the maximum legal sentence for the particular offence, they feel that they would not carry public opinion with them in proposing more than the existing maximum.

Only experience can show whether the absence of this provision is as fatal to success as the Danes maintain. The proposals for the collection of psychopaths are an advance on Danish law. It remains to be seen whether we need more than an institution to achieve the Danish 50% recovery-rate.

There is one further practical point. If the Prison Commission is to provide reports of any value before sentence, the accused must be remanded in custody. At present, some accused persons are reported on to higher courts, with regard to their suitability for Borstal or corrective training, by prison medical officers and governors who have never had an opportunity of seeing them.

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1. East, W. N., Hubert, W. H. de B. The Psychological Treatment of Crime. London, 1939.
2. Taylor, S. *Lancet*, 1949, i, 32.

VIBRIO FETUS AS CAUSE OF HUMAN ABORTI

BECAUSE of the attention given to *Brucella abo* as a cause of human infection one is apt to forget t this is only one of the many organisms known to prod infective abortion in cattle; nearly forty years M'Fadyean and Stockman[1] drew up a list of th which might be found. Among these was the *Vib fetus ovis*, which has hitherto been looked on as pat genic to cattle and sheep, though the infection of th animals is widespread in only Europe and the U.S Evidence is now accumulating that the infection can transmitted to pregnant women and that its abortifaci action is in many respects similar to that in anim Whether men can also be infected is uncertain, but a c of ankylosing arthritis in Paris suggests that pregnan is not essential for infection. This case is cited Vinzent and colleagues in their vivid account[2] of th further cases seen since the first description of t human disease[3] in 1947.

The infection affects women in the later months pregnancy and takes the form of an acute septicæm The diagnosis is made by blood-culture, the m satisfactory culture medium being citrated meat pepto broth containing 1% gelatin, since morphological the organism resembles *V. choleræ*. After an invasi period of about 24 hours, a severe illness develops wi intense headache, remittant fever, and a fleeting pne monia; nevertheless, the patient's general conditi remains good. There is a well-marked secondary anæm and a moderate leucocytosis with about 80% polymorph After an illness lasting up to 4 weeks the sympton disappear, usually with spontaneous expulsion of th uterine contents. Oddly enough, it may be possible t obtain a viable infant; the explanation may be tha the infection is mainly a "placentitis," and the histo logical findings certainly substantiate this view. Th placenta, whether human or in animals, is characterise by a patchy necrosis associated with an infective throm bosis of the arteries supplying the affected cotyledons and the infection clears up rapidly once the placenta i expelled. Normal conception is possible subsequently The pathogenicity of the infection, judged by fatality rates, may not be high, but it can produce an alarming illness while it lasts. Serological changes persist for less than a year after the infection and are specific to the particular strains of *V. fetus*, so agglutination reactions should be performed with multiple strains.[4] In future it may be worth while to include *V. fetus* in the routine series of serological tests applied to patients with obscure fever. As regards treatment, clinical improvement seems to follow a dosage of 400,000 units of penicillin daily together with one of the more active sulphonamides. *V. fetus* is fairly sensitive in vitro to both penicillin and streptomycin. German veterinary surgeons have claimed good results in cattle with neoarsphenamine, and this drug might well be tried in human cases.

How human infection occurs is unknown but it is reasonable to suppose that the bovine organisms might be spread by dairy products. Cattle can certainly be infected by mouth. All attempts to culture the organism in milk have been unsuccessful and no-one knows how long a previously infected cow may remain contagious. It is somewhat remarkable that of the three French cases described by Vinzent et al.[2] one was in the wife of a doctor and one in a midwife. So far, no human cases have been reported in Great Britain, but this may be because they have not been looked for. There

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1. M'Fadyean, J., Stockman, S. Report of the Departmental Committee on Epizootic Abortion. Board of Agriculture and Fisheries. London, 1913.
2. Vinzent, R., Delarue, J., Hebert, H. *Ann. Méd.* 1950, 51, 23.
3. Vinzent, R., Dumas, J., Picard, N. *Bull. Acad. nat. Méd.* 1947, 131, 90.
4. According to its most recent list (1948), the National Collection of Type Cultures maintains 3 strains of *V. fetus*.

are still some severe septicæmias that defy all attempts at exact diagnosis. And it might be profitable to find out whether *V. fetus* infection takes any part in the causation of that 25% of all abortions which are said to be unexplained.

MEDICAL PATENTS

AMONG doctors the habit is to share knowledge freely: what is learnt by one is made known to all. Desire to preserve this open communication and to avoid harmful monopolies underlies the precept that no medical man should take out a patent in respect of a medical invention. In abstract this is a sound, and even a noble, idea; but in the context of a warmly competitive world market it has proved increasingly detrimental to those whom it is meant to protect—the public. Accordingly, in their annual report[1] the council of the British Medical Association recommend that, subject to certain conditions, a doctor should be allowed to patent an invention.

Patentable discoveries derive from the work not of clinicians but of research-workers, who nowadays are associated with chemists, physicists, engineers, and others. A special committee which the council appointed, with Dr. Robert Forbes as chairman, notes that "there immediately arises the possibility of a moral obligation upon the non-medical specialist to avoid patenting where formerly he would have patented, and it may be incumbent upon the medical profession to make concessions in departing from the custom that formerly prevailed." There are further, and perhaps weightier, arguments for a change of attitude. Where an invention is not protected by a patent, a manufacturer would normally refuse to handle it, lest others took the opportunity of profiting freely by his development of the discovery. More important still, observance of the no-patenting rule may tell hard on the whole country, particularly where a "central" patent is vacated: the British consumer now pays royalties to American firms for penicillin manufactured in this country.

Some years ago the British Medical Association proposed that doctors should be enabled to dedicate patents to the public. There are precedents for such usage. The Dicks patented their scarlet-fever toxin and antitoxin, but delegated their rights to a special committee. The patent for Sir Frederick Banting's process for preparing insulin was taken out in the name of the University of Toronto, but the British rights were vested in the Medical Research Council. The way to delegation in the public interest has now been opened by the Development of Inventions Act, 1948, under which the National Research Development Corporation was set up as an independent body to which medical patents might be assigned. As regards reward to the inventor, none would be paid by the Corporation to anyone who is another man's servant—for instance, a Crown servant, who in any event would be precluded by his contract from deriving any benefit from his invention (though he might receive an award from the Departmental Awards Committee). The relationship between the corporation and a sole worker not employed by an organisation who wished to assign a patent and claim an award would be one of buyer and seller; but, says the B.M.A. report, "in the case of a medical man the Corporation would not take any action that would conflict with a policy laid down by the profession as a whole." When the association's Representative Body meets next month it will be asked to approve the conclusion that "in the opinion of the Association there is no longer any objection to the patenting of inventions for which members of the medical profession are responsible, provided such patents are assigned to the National Development Corporation with a view to their administration in the best interests of the public as a whole." This seems a realistic solution.

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[1] *Brit. med. J.* suppl. June 10, p. 276.

THE THYROID AND LACTATION

THE lactation-stimulating (galactopoietic) effect of thyroid-active preparations seems to have been first suggested in 1896 by an experiment of Hertoghe,[1] who increased the milk yield of a cow by feeding it dried thyroid gland. This effect of dried thyroid was later independently rediscovered and extended to thyroxine by Graham,[2] and soon the results of Folley and White[3] in lactating cows clearly demonstrated the considerable galactopoiesis produced by injections of crystalline thyroxine. Interest in the possible applications of this discovery in dairy farming remained lukewarm for some years, mainly because of the belief that the effectiveness of thyroxine by mouth was so low that it would be uneconomic to give it to milking cows except by injection, which would obviously be impracticable. And dried thyroid gland, though fully active by mouth in cows, was not plentiful or cheap enough to be a practical alternative. At the beginning of the late war, however, Ludwig and von Mutzenbecher[4] discovered that a thyroid-active protein effective by mouth could be prepared by the iodination of casein. Improved methods of cheap large-scale production were soon devised, so that extensive researches could be begun on the various uses of this artificial thyroid-active protein in agriculture, mainly for increasing the milk yield of cattle, but to a less extent for stimulating egg-production in hens and accelerating growth in young pigs.[5]

Lately the wheel has come full circle, bringing synthetic thyroxine back into the picture. A new synthesis of *l*-thyroxine has been worked out[6] which seems capable of large-scale development so as to supply the synthetic hormone in considerable amounts at relatively low cost. Following this, Bailey, Bartlett, and Folley[7] have shown that *l*-thyroxine by mouth is a good deal more active in stimulating lactation in milking cows than has hitherto been believed. The optimum oral dose of the synthetic hormone for this purpose (about ten times that by the subcutaneous route) is such that, in view of its relatively low cost of production by the new method, it is likely to be at least as cheap to use as iodocasein, and in practice it has some important advantages. Thus, the crystalline *l*-thyroxine is virtually tasteless, whereas iodocasein preparations are often so unpalatable that a significant proportion of cows will refuse to eat rations containing them. Perhaps its most valuable feature is that, being a pure crystalline substance, it does not need to be standardised by bio-assay, a troublesome and unsatisfactory procedure which has proved difficult from the very outset of the experiments with iodocasein in this country. Provided the long-term experiments now in progress under the auspices of the Agricultural Research Council show that the repeated administration of thyroid preparations in successive lactations does no harm to the health or reproductive abilities of the cattle, synthetic thyroxine is likely to be chosen for general use.

The thyroid treatment of hypogalactia in women also dates back to Hertoghe, but the modern clinical investigations can be said to have started with the work of Robinson,[8] who reported successful though variable results in hypogalactia by feeding either dried thyroid gland or thyroxine. The value of thyroid treatment has recently been demonstrated in France by Romani et al.[9], who confirmed the effectiveness of crystalline thyroxine by mouth in women, and by Roche et al.[10] with iodocasein. These successful results will no doubt be followed up, but in view of the advantages of synthetic thyroxine enumerated by Bailey et al. there does not seem to be much point in further studies with iodinated casein or even dried thyroid gland. Robinson [11] implied that in the cases she investigated the hypogalactia was due to under-production of thyroxine stemming from a latent iodine deficiency becoming manifest under the stress of lactation. On this basis she treated hypogalactia with Lugol's iodine solution, but her favourable results have not been confirmed [12]; in any case, what is known about the relation of the thyroid gland to lactation [13] lends little support to the iodine-deficiency view.

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[1] Hertoghe, E. *Bull. Acad. Méd. Belg.* 1896, ser. 4, 10, 381. See Robertson, J. D. *Lancet*, 1946, i, 978.
[2] Graham, W. R. jun. *J. Nutrit.* 1934, 7, 407; *Biochem. J.* 1934, 28, 1368.
[3] Folley, S. J., White, P. *Proc. roy. Soc.* B. 1936, 120, 346.
[4] Ludwig, V., von Mutzenbecher, P. *Hoppe-Seyl. Z.* 1939, 258, 195.
[5] See Reineke, E. P. *Vit. & Horm.* 1946, 4, 207. Young, F. G. *Brit. med. Bull.* 1947, 5, 155.
[6] Chalmers, J. R., Dickson, G. T., Elks, J., Hems, B. A. *J. chem. Soc.* 1949, p. 3424.
[7] Bailey, G. L., Bartlett, S., Folley, S. J. *Nature, Lond.* 1949, 163, 800.
[8] Robinson, M. *Lancet*, 1947, ii, 385.

THE BIRTHDAY HONOURS

With eight new knighthoods the list of doctors in the Birthday Honours is longer than it seemed at first sight, and it contains many notable names. Mr. Arthur Porritt, who as chairman of the Empire Games Federation is appointed K.C.M.G., is well known as an athlete, a surgeon, and a soldier, and very well liked in all capacities. As K.B.E. the heads of the medical departments of the Royal Navy and the Royal Air Force, Vice-Admiral Greeson and Air Marshal Livingston, are joined with Prof. Hamilton Fairley, F.R.S., one of the most respected figures in tropical medicine, who served the Services so faithfully during the war. Of the four knights bachelor, one, Dr. W. S. Newton, belongs, like Professor Fairley, to Australia, where he is physician to the Alfred Hospital, Melbourne. Dr. A. N. Drury, F.R.S., whose administrative talents were discovered only by the war, has proved himself a most happy choice for the directorship of the Lister Institute in its time of growing activity. Prof. Geoffrey Jefferson F.R.S., besides the specialised knowledge that has earned him his new facilities for neurological surgery at Manchester, has a strength and wisdom that give him wide influence. And finally Professor Spence, of Newcastle and the University Grants Committee, has a flow of ideas—always arresting and often strangely right—which makes him one of the most valuable members of our profession. The other appointments to orders are for equally various services—important and often unobtrusive—which it is good to see occasionally recognised in a formal way.

SERVICE DOCTORS' PAY

To explain the Army's difficulties in finding enough doctors one need go no further than the Government's statement on defence,[14] which says: "a high level of recruitment cannot be expected unless Service conditions compete in attractiveness with those of civilian life." Professionally the conditions are far more attractive than is often supposed. As General Cantlie told the West London Medico-Chirurgical Society the other day, the Army in peace-time is responsible for the medical care of 400,000 men, women, and children. Its hospitals now admit civilians when they have room, and last year 7000 operations were performed in them, not to mention 5000 deliveries of soldiers' wives in Army family hospitals. The service offers opportunities not only of working, but also of training, in a specialty, and of 90 officers studying at Millbank since the war no fewer than 74 have obtained higher diplomas. Professionally, indeed, the prospects in a Service career are probably better than ever before; and, now that the post-war revulsion of feeling against military life is diminishing, the Army would no doubt enlist many young doctors, provided it could also offer them adequate pay. But that is just what it cannot do.

So long as the Treasury refuses to let Service remuneration "compete in attractiveness" with that of civilian doctors, the Army is forced to rely more on compulsion than attraction. As the establishment of regular and short-service R.A.M.C. officers is 37% below strength,[15] it depends for general-duty officers on conscription, which applies to doctors up to the age of thirty. This, however, is only a partial and temporary solution of the problem, for an increasing proportion of newly qualified doctors have already performed their National Service, and in 1952, Lord Webb-Johnson says, there will be a shortage of about 500 medical officers in the Army alone.[16] If that seems a distant difficulty, the lack of specialists, on the other hand, is very present and pressing. The Army has only about two-thirds of the number it requires, and, since conscription of doctors up to thirty years of age does little to bring in experienced specialists, it has been obliged to advertise for civilians to fill the more serious gaps. Meanwhile it has continued—for doctors and dentists only—the war-time ban on the retirement of officers.

This situation is thoroughly unsatisfactory. For well over a year the British Medical Association has been making representations,[17] and at one time it seemed almost certain that action would be taken; but the discussions held with the Defence departments in January and April proved fruitless because the Chancellor of the Exchequer is frankly less concerned with the efficiency of the Government services than with maintaining the wage-freeze. As in the case of Civil Service doctors, what is really needed is not a concession here or there by the Treasury, but an unprejudiced examination of the facts, in the light of which the Government can decide its policy. When a similar situation arose in the R.A.M.C. after the war of 1914–18, a Cabinet committee was eventually set up, in 1925, to inquire into medical remuneration in the Services; and such an investigation should be made again now. Unfortunately in 1925 this procedure was not adopted until the B.M.A., alleging breach of faith by the Government, announced that it would no longer publish in its journal any reference to the terms and conditions of service in the R.A.M.C. Doubtless having this precedent in mind, the B.M.A. has formally stated that it will accept no more advertisements for civilian specialists for the Army at higher rates of pay than those of the corresponding regular officers.[15]

Though the practice of reinforcing the Army medical services by employing civilian specialists is not in itself unreasonable, and though the payment of rather higher rates for such temporary appointments can also be defended, the combination of underpayment in the service, a ban on retirement, and the importation of civilians at considerably higher remuneration seems to us intolerable. The ban on retirement puts this affair in a different category from that of the Civil Service doctors; and though, as an independent journal, we are, for reasons stated,[18] averse from refusing advertisements for Government appointments, we shall feel obliged to refuse those of the Army unless the ban is lifted in the near future or a proper inquiry is instituted.

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[9] Romani, J. D., Plocq, G., Recht, P. *Rev. Sci. méd., Paris,* 1949, 2, 16.

[10] Roche, J., Giraud, P., Lelong, M., Liardet, J., Coignet, J. *Bull. Acad. Méd., Paris,* 1950, 134, 190.

[11] Robinson, M. *Brit. med. J.* 1947, ii, 126.

[12] Nicholson, D. P. *Ibid,* 1948, i, 1029. Dean, R. F. A. *Lancet,* 1950, i, 762.

[13] Folley, S. J., Malpress, F. The Hormones, edited by G. Pincus and K. V. Thimann. New York, 1948; chap. xvi.

[14] Statement on Defence. Cmd. 7895. 1950. H.M. Stationery Office.

[15] *Brit. med. J.* May 20, p. 1184.

[16] See *Lancet,* April 22, p. 777.

[17] *Brit. med. J.* May 20, suppl. p. 223.

[18] *Lancet,* May 20, p. 959.

Special Articles

TREATMENT OF OFFENDERS

REPORT TO THE HOME SECRETARY BY THE ADVISORY COUNCIL ON THE TREATMENT OF OFFENDERS *

THE Council has been considering whether any practical steps can be taken to provide both the courts and the administration with better means of treatment for offenders who, although not certifiable as insane or mentally defective, show abnormal mental characteristics. We have taken evidence from the Prison Commissioners, the Board of Control, and from Dr. Denis Carroll who has had considerable experience of the treatment of persons who have displayed deviation from normal standards of behaviour.

THE LAW

Under the present law an adult offender who is mentally abnormal may be dealt with: (1) under the Mental Deficiency Acts if he is certifiable under these Acts; (2) by being found by a jury to be guilty but insane or insane on arraignment; (3) by being certified as insane after conviction; and, (4) when section 24 of the Criminal Justice Act came into force, by a court of summary jurisdiction making a reception order on evidence that he is certifiably insane. In a number of cases, however, where there is an element of mental abnormality which falls short of certifiable insanity or mental deficiency, the courts have difficulty in deciding how the offender should be dealt with. On the one hand, they are reluctant to commit such an offender to prison with the stigma of criminality and with no reasonable hope of preventing him from repeating the offence and they may desire that he should have mental treatment: on the other hand, they may think detention essential to protect the public and they may consider it necessary to reflect in their judgment public reprobation of the offence. If the circumstances are such that the offender ought to be detained, all the court can do is to commit him to prison and ask the Governor to make a report to the Prison Commissioners on the question whether the offender is suitable for special treatment for his mental state; but after this has been done, the court can take no further action. The evidence before the Council showed that there is no possibility of effecting a substantial improvement in the prisoner's mental state by available psychotherapeutic measures unless he can be detained for a period of at least four months (that is, a sentence of six months); and the Prison Commissioners, after some years' experience, do not now select any prisoners for psychotherapy unless the sentence is at least six months. Where the offence is not a grave one, the courts may be unable or may not think it justifiable to impose a sentence of imprisonment sufficiently long to give reasonable chance of effecting an improvement by psychotherapy: and the only course then open to them is either to bind the offender over, or, if he cannot safely be released, to sentence him to a period of imprisonment which in the particular case is too short for psychotherapy.

The new provisions in the Criminal Justice Act will give the courts wider powers to place offenders on probation, with the condition that they submit themselves for treatment, and while these powers will go far to remove difficulties in the less serious cases they will not enable courts to deal with the offender with abnormal mental characteristics who in the public interest must be treated in custody.

PROPOSED NEW INSTITUTION

The proposal which has been discussed by the Council is that there should be established a new institution other than a prison or a place with penal associations, but something between a prison and a mental hospital, for the reception, observation, and treatment of convicted offenders with abnormal mental characteristics, who are not certifiable as insane or mentally defective. We suggest that the law should be amended to enable a court to make an order for treatment under detention in this institution, the order being quite distinct from a sentence of imprisonment or Borstal detention. Thus, it would be publicly and clearly pronounced that, in the judgment of the court, the circumstances were not of such a nature as to justify the imposition of an ordinary sentence, while at the same time the public would know that the offender was being removed to detention for a period.

The proposal that there should be a special type of institution for these cases is not new. In their Report on the Psychological Treatment of Crime (1939) Sir Norwood East and the late Dr. W. H. de B. Hubert recorded their emphatic conclusion that experience of the necessarily limited facilities for psychotherapy in prisons pointed to the need for a special penal institution for the care, study, and treatment of selected groups of offenders. Its functions would be: (1) as a clinic and hospital where cases could be investigated and, if necessary, treated by psychotherapy and other means, and their disposal decided upon; (2) as an institution where selected offenders could live under special conditions of training and treatment (for example, offenders who proved unsuitable for and unmodified by the influences of the modern prison system); (3) as a colony for the type of offender who had proved quite unable to adapt himself to ordinary social conditions but for whom reformative measures, however specialised, seemed useless, and the severity and hardship of ordinary prison life inappropriate; (4) as an observation and treatment centre for Borstal lads who, because of mental abnormality, appeared unsuitable for or had failed to respond to ordinary Borstal training, and for various reasons were considered unfit for early licence. Dr. East and Dr. Hubert envisaged it as a specialised institution within the prison system; convicted prisoners would be sent there from other prisons under the ordinary powers in the Prison Acts. The report also stressed the importance of careful definition and expert supervision of admission, to prevent the institution being flooded with unsuitable cases.

We understand that the recommendation in the East-Hubert report for a special type of institution has been accepted by the Home Office and the Prison Commissioners (although it has not yet been possible to find or to build suitable premises); but in our view an institution entirely within the penal system will not meet the difficulties which courts experience in dealing with the cases under consideration. The reluctance of a court to stigmatise as a criminal a person who is abnormal is not likely to be removed by the knowledge that the Prison Commissioners might send him eventually to a special type of prison, and we think the East-Hubert proposal as it stands will not remove the sense of frustration at present felt by courts. We have carefully examined how far powers could be given to the courts without the risk of unsuitable cases being sent for special treatment.

We realise that any change in the law relating to an offender's responsibility for his criminal acts would be most contentious. The McNaughten rules have been used by the courts for many years and any attempt to modify them would raise the whole question of the

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* The present members of the council are: Mr. Justice BIRKETT, Sir FRANK NEWSAM, Mr. GEORGE BENSON, Mr. A. F. STAPLETON COTTON, Sir LAURENCE DUNNE, Mrs. WALTER ELLIOT, Mrs. J. W. FIELD, Miss MARGERY FRY, Mr. A. HAWKE, Lady INSKIP, Mrs. CREECH JONES, Mr. J. LEES-JONES, Dr. W. S. MACDONALD, Dr. E. MILLER, Rev. E. SHIRVELL PRICE, Mr. L. RADZINOWICZ, LL.D., the BISHOP OF READING, Alderman R. G. ROBINSON, and Captain H. STUDDY.

medical and the legal view of insanity. It is most important to prevent any impression that persons can commit with impunity offences reprobated by the community. Psychiatry is a young science and evidence from psychiatrists is often brought by the defence in the hope of avoiding the rigour of the law. We think the medical profession would agree with the view that the standard of psychiatric evidence brought before courts is not uniformly high, and it is clear that any change in the law to enable a court, when it has decided that the evidence is consistent with a lesser degree of criminal responsibility, to order treatment in detention would require the most careful consideration. With the development of psychiatric facilities under the regional hospital boards of the National Health Service and the growth of experience in the Prison Medical Service, we think that courts would be able to rely on sound independent medical advice, and we think it important that provision should be made for courts to call for this advice at public expense. Our recommendation is that the court should be empowered, if it thinks fit, after hearing independent medical evidence and any medical evidence brought by the defence, to order detention and treatment in the special institution. A provision similar to that contained in section 4(7) of the Criminal Justice Act, 1948, as to the admissibility of written evidence should be made.

The length of the period which might be so ordered would require careful consideration. On the one hand it must be sufficient to offer reasonable hope of improvement (the time required must largely depend on medical advice and it would not necessarily correspond with the seriousness of the offence) but it must not be of such a length as would be unreasonable having regard to the nature of the offence and the history of the offender; on the other hand, the court would have regard to the protection of the public and the public's view of the iniquity of the offence.

USE OF PROPOSED NEW POWERS

We considered whether the new powers we propose for the courts should be exercisable in such a way as to provide for a longer period of remedial treatment in detention than the maximum period of imprisonment provided by law for the offence with which the court was dealing. There is, we think, no doubt that there are offenders whose chances of eventual reformation have been ruined by numerous short terms of imprisonment when no attempt could be made either by specialised or general training to improve their outlook; and it would in some such cases be in the interests of both the offender and the public if he were required to undergo detention for a period longer than that prescribed by law for offenders who can be regarded as fully responsible for their criminal acts. We think, however, that our main recommendation about treatment in detention in a special institution represents a substantially new conception in the treatment of offenders and that if the Secretary of State saw fit to approve it, it would be more readily accepted by Parliament and public opinion if the new powers of the courts were kept within the existing periods of imprisonment prescribed by law for the particular offence. If the experiment were confined to the more serious type of offence for which a long period of imprisonment would in any case be imposed it would limit the strain on the new institution in its early stages, and in the light of its progress and public opinion after a period, it could be considered whether the new powers should be extended. We suggest therefore that the maximum period of detention and treatment which might be ordered by the court should in no case exceed the maximum period of imprisonment provided by law for the offence for which the person was before the court. We think that the new powers should be confined to courts of Quarter Sessions and Assize and that the discretion should rest in the court and not in th jury.

There would be likely to be some difficulty about th rôle of courts of summary jurisdiction in dealing with this class of offender; for an order for special treatmen in detention would only be imposed after the most carefu consideration of the medical evidence, and this would no always be available for the proceedings before Justices We think it desirable that the Justices should b empowered, when the offence was one with which it wa appropriate to deal, summarily to convict and commit t Quarter Sessions either for sentence or for an order fo special treatment in detention.

The type of institution which we envisage is substantially that proposed in the East-Hubert report, bu with the difference that it should not be regarded as specialised prison within the penal system. In our view it should be removed as far as possible from the prison atmosphere. In addition to the persons who would b committed to it by order of the court, we think the Prison Commissioners should have power to transfer t it ordinary convicted prisoners or Borstal inmates who in the Commissioners' view, were in need of or would benefit from the special and general treatment availabl in it. Conversely, the Home Secretary or the Priso Commissioners should have powers to transfer from the special institution to prison or Borstal persons who wer found to be unsuitable for treatment, and there should b power in the Secretary of State in such cases if it appears to be necessary, in the interests of justice, to recommend remission of part of the period of remedial treatment on the Prison Commissioners' recommendation. Treatment in the special institution should be confined to persons sentenced to prison or to Borstal or persons who, but for the new powers which we propose, would be so sentenced. Young offenders who are seriously maladjusted and require a long period of psychiatric treatment would be treated in a special type of approved school, and not in the special institution. Similarly, it would not be appropriate to send to this institution offenders who could be dealt with under arrangements which will in time be made by the mental-health service. Thus, in the less serious cases where the offender is willing to undergo treatment, he might be dealt with by probation and special treatment under section 4 of the Criminal Justice Act; if he were not a serious menace, but in the court's view required treatment and were willing to go voluntarily, the court could make an order for treatment in a mental-health institution under the mental-health service. This may take time until the mental-health services are developed. The special institution which we propose would be able to concentrate on the more serious cases.

We think that a court should be required, before making an order for special treatment in detention, to take into consideration a special report by the Prison Commissioners as to the offender's suitability for treatment, as is done at present in Borstal cases under section 20(7) of the Criminal Justice Act, 1948. We also think that it should be a requirement that before such an order is made the Prison Commissioners must have signified to the court their willingness to accept the offender in the institution. A similar requirement applies to the committal of mental defectives to the State institution at Rampton, and we are informed that the Board of Control would find it quite impossible to administer the Rampton Institute if the courts had unfettered discretion to send people to it.

We considered whether the classes of person who might be made the subject of a special order could be defined but came to the conclusion that it would be impracticable. We think it is important, however, that some general information as to the possibilities and limitations of psychiatric treatment should be sent to courts, and that if our recommendations are accepted, a working party hould be appointed to prepare notes of general principles or the guidance of the courts.

SUMMARY OF RECOMMENDATIONS

Our recommendations can be summarised as follows :

1. A special institution should be provided by the Home Office or Prison Commissioners for the detention, observation, and treatment of offenders who, although not certifiable under the Lunacy or Mental Deficiency Acts, show abnormal mental characteristics.

2. The Home Secretary or Prison Commissioners should have power to transfer convicted persons from prison or Borstal to the special institution when they are satisfied that they are in need of the special treatment available in it. Conversely the Home Secretary or the Commissioners should have power to transfer from the special institution to prison or Borstal persons found to be unsuitable for treatment ; and the Home Secretary should have power to remit part of the period of detention ordered by the court.

3. Courts of Quarter Sessions and Assize should be given power to order a period of treatment in the special institution : the power should be in the court and not the jury. Where the offence can be dealt with summarily, the court of summary jurisdiction should be enabled to proceed to a conviction and to commit to Quarter Sessions if the Justices are not satisfied with the evidence before them that any of the methods of treatment which they can order are suitable.

4. The new power to order treatment in a special institution should only be exercisable where : (*a*) there has been a conviction for an offence for which the offender is liable to a sentence of imprisonment ; (*b*) the court is satisfied that having regard to the medical evidence the offender is in need of special treatment for his mental state ; and (*c*) the court is satisfied that having regard to the nature of the offence and the need to protect the public it is desirable that he should be detained. The court should have discretion to fix such maximum period of treatment as it thinks proper, having regard to the evidence as to the time required to cure or give a maximum benefit to the mental state, and to the nature of the offence, and the protection of the public.

5. The period of special detention should not be longer than the maximum sentence prescribed by law for the particular offence.

6. The Secretary of State or the Prison Commissioners should have discretion to release the prisoner when they are satisfied that he has obtained the maximum benefit from the treatment. It appears doubtful whether the Home Secretary's present powers to recommend remission of sentences would be wide enough for this purpose, and special statutory provision might be necessary.

7. It is not possible to define the categories of persons who should be subject to a special order. The court should have discretion to order detention in the special institution in any case in which it is satisfied that the mental condition of the offender as shown by the medical evidence and the offence are such as to make him suitable for detention in the special institution, but not such as to justify certification under the Lunacy Acts or Mental Deficiency Acts. The court should have power to call for independent medical advice (which might be from the Prison Medical Service or from other persons) at public expense, and the defence should continue to have the right to call medical evidence. The court should be required to consider a report from the Prison Commissioners as to the suitability of the offender for treatment (as is provided in section 20(7) of the Criminal Justice Act, 1948, in Borstal cases) ; and it should be a requirement that before a special order is made, the Prison Commissioners must have signified to the court their willingness to accept the offender in the institution.

8. A working party should be appointed to prepare notes on the possibilities and limitations of psychiatric treatment, for the guidance of courts in the exercise of the new powers which would be conferred on them.

We think it would be beneficial to find out from certain European countries whether they have institutions similar to that we suggest, and what their law and practice is regarding offenders having abnormal mental characteristics. It would be profitable later if members of the Council could have the opportunity of visiting foreign institutions. The experience of foreign countries might be valuable when it comes to considering the details of the legislation and administration required. If the project is accepted in principle we think the Magistrates' Association should be asked for their observations upon it.

KING EDWARD'S HOSPITAL FUND FOR LONDON

The Duke of **GLOUCESTER** presided at the annual meeting of the general council of King Edward's Hospital Fund for London, held on June 5 at St. James's Palace. He said that the change-over from the traditional patterns to an entirely new and revolutionary system of hospital care had been accomplished smoothly and without serious dislocation of existing services. Indeed, there had already been improvements in some directions, notably in the staffing of hospitals.

> " Such a statement must, of course, be qualified at once. There is the cost of the service as a whole. The Fund has long foreseen a steep increase in cost. It has been conscious that a limit would have to be laid down, and that when that point was reached, a new situation would arise : it would then be necessary to take stock, and decide how the total sum can be handled so as to provide the flexibility needed. This is the situation that confronts the hospitals today. We at the King's Fund see no really satisfactory solution that does not involve a break with the established methods of controlling public moneys. Will the regional boards be given definite round sums on an annual basis which they can pass on to the hospital management committees, and will the hospital management committees be given freedom to deal with these round sums as they think fit ?
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> " As regards the accountancy of the hospitals, we believe that a departmental system of accounts is overdue, and that it is urgent in everybody's interest that the old system should be replaced by one better adapted to the needs of today. The Minister of Health has on the recommendation of the Central Health Services Council asked the Fund, together with the Nuffield Trust, to conduct a costing investigation in a number of hospitals. This we are glad to do, for we believe that once the advantages of a departmental system are realised the whole scene will be transformed. It will then become possible to allocate money to hospitals rationally, and efficient administration will replace the hit-and-miss methods of today.
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> " The new situation created by the standstill on expenditure sharpens the problems of hospital administration. There are divergencies of standpoint between the Ministry and the regional boards, between the regional boards and the hospital management committees, between the administrative and financial sides in the hospitals, and between the medical and lay approach to hospital administration. It is obviously important that these friendly differences should not harden into friction, and that the right solutions should be found by discussion rather than the wrong solutions by force of circumstance."

The Fund had embarked on the establishment of a staff college for hospital administrators.

Sir **EDWARD PEACOCK**, the treasurer, in presenting the accounts for 1949, said that the Fund's ordinary income stood at £262,000. Subscriptions and donations, which dropped on the nationalisation of hospitals, had increased slightly, and a number of important institutions which had dropped out in 1949 had renewed their subscriptions. Legacies received during 1949 amounted to over £258,000. In 1949 £150,000 had been received from the Nuffield Trust for the Special Areas. A further instalment of £100,000 received in January this year brought the total so far from this source to £1,250,000. The total receipts for 1949 came to £671,432.

The disbursements during the year were exceptionally large. £250,000 was appropriated for homes for the aged sick, and another £209,860 went in grants to hospitals and convalescent homes. The special services, including various properties purchased, absorbed £77,562. Expenses of administration and of the Emergency Bed Service brought the total outgoings to £573,551. "The Fund is going strong," Sir Edward said, "and in my opinion is perhaps doing the best work in its history."

Sir ERNEST POOLEY, chairman of the management committee, in presenting the draft annual report, referred to the present situation of the hospitals vis-à-vis the principles of control being applied by the Treasury and by the Ministry of Health. In his view the only really satisfactory solution would be to break with traditional methods, the essential thing being that the responsible hospital authorities should know where they stood and should not have to return money saved at the end of the period for which it had been budgeted. This undoubtedly had the effect of encouraging expenditure rather than economy.

The Fund had recently prepared a *Manual for Hospital Visitors*, containing a list of questions for visitors. This was, in his opinion, a remarkably useful piece of work.

As regards homes for the aged sick, there had been a great deal of delay and trouble in finding the right type of buildings and still more in getting permission to adapt them, as well as difficulties about licences and restrictive covenants; but the Fund was going forward and hoped before long to be able to report definite progress. The Fund had been doing a unique work for convalescent homes, never done before, by issuing a compendium of these homes, by real visiting and trying to get their finances in order, and by making grants to bring them up to date. The new directory of convalescent homes was now available.

The division of hospital facilities, which was an important new feature of the Fund's work, was feeling its way. As regards hospital catering, a less ambitious training scheme had had to be accepted than had been proposed, because it was not at present possible to erect a large new building at St. Pancras Hospital. The Fund was going forward by way of modernising the old kitchens, and a grant of £11,000 had been made for this to University College Hospital. The school for medical records officers was going ahead.

ANNUAL REPORT

The Fund's annual report for 1949[1] remarks that there is little or no prospect of a renewed boom in hospital construction, such as continued here for fully half a century until 1939, and is still in full swing in the U.S.A.

> "There is no disposition to despair; on the contrary, it is coming to be accepted that too much emphasis on new buildings and on the latest stainless steel contrivances may easily become a snare and conceal a failure to grapple with the more important things. An old building if judiciously adapted may house better medicine, more gentle nursing and more comfort for the patient; and fortunately many of them, despite their forbidding appearance, embody the Nightingale 'pavilions' which have not yet been decisively out-moded."

The report observes that the success of the nationalised hospital service depends on first-class administration. "Means must be found of reconciling centralised policy and control over expenditure with the maximum freedom in the individual hospitals. This means that it will be necessary to secure a high degree of personal coöperation throughout the administration of the entire Health Service from top to bottom." If the new service is to work smoothly, the objectives, methods, and functions of the different parts of the machine must be understood by all who participate, much as in a modern army undertaking complicated operations. For these ends the methods evolved many years ago by the Local Government Board are largely meaningless; and so too is the institutional outlook, with which the hospital officer of days gone by approached his task. The Fund's hospital administrative staff college will provide: (1) refresher courses for those already holding posts in the hospital service; (2) longer courses for a limited number of younger men drawn, as far as possible, from within the service; (3) a continuous study of the problems and practice of hospital administration, with publication of the results from time to time; and (4) a common meeting ground for all engaged in the service.

One of the Fund's successful new activities is courses for ward sisters, which were started "to provide help and information, to increase the efficiency of ward management, and to encourage those who shrink from its responsibilities." "The ward sister's work does not enjoy the prestige it should as perhaps the most highly skilled of all branches of nursing." The Nursing Recruitment Service has noted "a substantial increase in the number of staffed beds available, and the outlook is bright." At the same time the demand for nurses remains unappeased; and the acceptance, by some of the hospitals which find it easiest to recruit nurses, of responsibility for the chronic sick and the tuberculous is welcomed; "student nurses will undertake these branches of nursing as part of the training offered by their chosen hospital." At first it was the more intelligent candidates who sought information. Now, however, as a result of the spread of general information about nursing, and of better recruitment methods on the part of hospitals, the more intelligent often have a clear idea where they want to train and make their application directly. More and more it is the "difficult cases" which seek advice. "It is much easier," says the report, "to guide a girl from an English public school to a suitable hospital than to find a Matron who will accept a girl from a Turkish household, whom she cannot interview, and whose parents require a number of conditions to be fulfilled before they will allow her to come." Though this type of application requires much detailed work, it often means a recruit saved for nursing; and during the year 147 non-British candidates were accepted for training after consulting the service.

BIRTHDAY HONOURS

THE list of honours published last week contains the names of the following members of the medical profession:

K.C.M.G.

ARTHUR ESPIE PORRITT, C.B.E., M.CH. Oxfd, LL.D., F.R.C.S.
Chairman of the Empire Games Federation; surgeon to H.M. the King; surgeon to St. Mary's Hospital, London.

K.B.E. (Military)

Surgeon Vice-Admiral CLARENCE EDWARD GREESON, C.B., M.D. Aberd., K.H.P.
Medical director-general of the Navy.

Air Marshal PHILIP CLERMONT LIVINGSTON, C.B., O.B.E., A.F.C., B.A. Camb., F.R.C.S., K.H.S., R.A.F.
Director-general, Royal Air Force Medical Service.

K.B.E. (Civil)

NEIL HAMILTON FAIRLEY, C.B.E., M.D., D.SC. Melb., F.R.C.P., F.R.S.
Wellcome professor of tropical medicine in the University of London at the London School of Hygiene and Tropical Medicine.

Knights Bachelor

ALAN NIGEL DRURY, C.B.E., M.D. Camb., F.R.S.
Director, Lister Institute of Preventive Medicine, London.

GEOFFREY JEFFERSON, C.B.E., M.S. Lond., M.CH. Dubl., LL.D. Glasg., F.R.C.P., F.R.C.S., F.R.S.
Professor of neurosurgery, University of Manchester.

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[1] King Edward's Hospital Fund for London: Fifty-third annual report, 1949. 10, Old Jewry, London, E.C.2.

Wilberforce Stephen Newton, M.D. Melb., F.R.A.C.P.
Physician to the Alfred Hospital, Melbourne; for public services in the State of Victoria.
James Calvert Spence, M.C., M.D., D.SC. Durh., F.R.C.P.
Professor of child health, University of Durham.

C.B. (Military)

Surgeon Rear-Admiral William John Colborne, F.R.C.S., K.H.S.
Major-General Thomas Menzies, O.B.E., M.B. Aberd., K.H.P., late R.A.M.C.

C.B. (Civil)

John Cecil Wilson Methven, M.R.C.S.
Deputy chairman, Prison Commission.
William Rees Thomas, M.D. Lond., F.R.C.P.
Medical senior commissioner, Board of Control.

C.M.G.

William Keverall McIntyre, M.C., M.D. Edin., F.R.C.O.G.
Gynæcologist, Queen Victoria Hospital and Launceston General Hospital, Launceston, Tasmania.
Richard Lionel Spittel, C.B.E., F.R.C.S.
Consulting surgeon, General Hospital, Colombo.
William John Vickers, M.R.C.S.
Director of medical services, Singapore.

C.V.O.

John Douglas McLaggan, M.B., F.R.C.S.
Aurist to H.M. the King and to H.M. Queen Mary; surgeon in charge of the ear, nose, and throat department, Royal Free Hospital, London.

C.B.E. (Military)

Air Commodore Abraham Briscoe, M.B. N.U.I., K.H.P., R.A.F.
Brigadier William Henry Blinman Bull, O.B.E., M.B. N.Z., F.R.C.S.E., K.H.S., R.N.Z.A.M.C.
Colonel Richard Murphy, M.B. Dubl., late R.A.M.C.

C.B.E. (Civil)

Arthur Joseph Amor, M.D. Lond., M.SC. Wales.
Principal medical officer, Imperial Chemical Industries, Ltd.
Hugh McIntyre Birch, M.R.C.S., F.R.A.C.P.
Superintendent of Mental Institutions, State of South Australia.
James Ralston Kennedy Paterson, M.C., M.D. Edin., F.F.R.
Director, Holt Radium Institute, Manchester.
Arthur Bushby Pearson, M.D. Edin., F.R.A.C.P.
Late director of pathology, Christchurch Hospital; examiner in the medical school at Otago University for many years.
Chau Sik-Nin, M.B.
For public services in Hong-Kong.

O.B.E. (Military)

Wing-Commander Lewis McKenzie Crooks, CH.M. Lpool, F.R.C.S., R.A.F.
Lieut.-Colonel John Mackenzie Matheson, M.D. Edin., F.R.C.S.E., R.A.M.C.
Surgeon Commander Ewen Hugh Murchison, M.B. Glasg., R.N.
Surgeon Commander George Desmond Wedd, M.B. Camb., R.N.

O.B.E. (Civil)

Henry Thomas Chapman, L.R.C.P.E.
Member, South Melbourne city council: chairman, Honorary Justices' Association, State of Victoria.
Henry Norman Davies, M.B. Edin.
Specialist medical officer, Tanganyika.
Alderman William Edward Moore Ede, M.D. Camb., J.P.
Chairman, Worcester youth employment committee.
Llewellyn Drysdale Innes Graham, M.B. Belf.
Medical officer, Royal Ulster Constabulary and the Ulster Special Constabulary.
Ludwig Guttmann, M.D. Freiburg, M.R.C.P.
Neurological surgeon in charge of the spinal injuries centre, Ministry of Pensions Hospital, Stoke Mandeville.
Daniel Lamont, M.B. Glasg., F.R.C.S.E.
Surgeon-consultant, Gilbert Bain Memorial Hospital, Lerwick, Shetland.
George Gibson Lyttle, M.B. Lond.
Principal medical officer coördinating civilian medical boards for recruiting, Northern Ireland district.
Patinharam Kunnath Thalathel Krishnan Nayar, M.B.
Medical officer, North Kedah, Federation of Malaya.
William Norman Awdry Paley, M.R.C.S.
For public services in Fiji.
Michael Joseph Petty, M.B. Camb., M.D. Buenos Aires, F.R.C.S.
Senior surgeon, British Hospital, Buenos Aires.

M.B.E. (Military)

Major Sidney Jayawardena.
Ceylon Medical Corps.

M.B.E. (Civil)

Gilbert Rashleigh Hull, M.R.C.S.
Admiralty surgeon and agent, London.
Marthinus Helperus Steyn, M.R.C.S.
Of the medical department, Morgenster mission, Southern Rhodesia.
Luther Reginald Wynter, M.D. Dalhousie.
District medical officer, Antigua, Leeward Islands.

THE NEED FOR REWRITING THE HISTORY OF MEDICINE

PROFESSOR SIGERIST'S ADDRESS

Introducing Prof. Henry E. Sigerist at a meeting on June 7 of the Royal Society of Medicine's section of history of medicine, Dr. Ashworth Underwood, president of the section, recalled that he built up the school at Leipzig before going to Johns Hopkins University as professor of medical history; and that he founded the *Bulletin of the History of Medicine* and edited it until he left America for Switzerland, where he is now engaged in preparing a six-volume history of medicine.

Prof. Sigerist said that he would not have given up his chair at Johns Hopkins had he not felt convinced of the need for the type of book which he was endeavouring to write—a comprehensive history of medicine, fully documented, and written rather differently from previous works on the subject. Until recently medical histories had centred around the physician and what he did, and on Western medicine; they had looked for predecessors and precursors. But the approach of the historian had now been extended, and medical history had to catch up with the other historical disciplines. There were still few centres for research: the institute at Leipzig was founded in 1905 and that at Baltimore in 1909.

When one set about the gigantic task of reconstructing the path of medicine one wanted to know what medicine was like at a given time. This raised the question: what is medicine? The conception of medicine as being the physician and what he did was too limited. Today there was a legal definition of a physician, but who was the physician in antiquity, who the dentist and who the nurse? Anyone could then treat—and charge a fee. Also much illness was treated by the patient himself. This might be according to scientific principles (as a mother repeating for her child what the doctor had prescribed on a similar occasion previously), or it might be conditioned by advertising, or it might be folk medicine. But it should not be left out.

Medical history should cover all the efforts of society to promote health, prevent sickness, treat illness, and rehabilitate the sick, so that it included not only the physician but statesmen and others.

One had to start by making a study of the health of the community at a given time. The incidence of disease was determined by geographic and economic considerations, and therefore one must begin with an analysis of the geography of the country. In Egypt, for instance, the flooding of a river determined the social organisation and the events in the land. It required social organisation

—that north and south should coöperate—and determined the pathology of disease. People of common race went to India and Greece, but in India they became vegetarians, whereas in Greece they remained beef-eaters. In Greece communities living in small valleys did not need to coöperate as in Egypt. The medical historian wanted to know how people lived—how they worked and how they rested. He wanted to know what they did to maintain and promote health—and all people did something to this end, consciously or unconsciously. Education was of importance. The historian needed to know also what was done in public health. Public health required State control; it must therefore be approached from two angles. First there was the medical. (But knowledge was not enough—we might know how to wipe out venereal disease and tuberculosis, yet we still had them for a number of reasons.) Secondly there were non-medical, non-scientific reasons which had to be understood. And the medical historian wanted to know what happened when health broke down.

There were two sources for the physician's action; one was experience, the other theory. Definite views on the origin of disease affected the approach to its cure; when, for instance, it was regarded as the punishment for sin, one tried to placate the deity: if it was regarded as a disturbance of the balance of the humours, one tried to restore the balance. Theories were also determined by experience. The Egyptians had their theory of *mitu*, for example, the canal theory of ætiology; Egypt had a system of canals and they knew what it meant when these were obstructed. Every theory, Prof. Sigerist pointed out, was correct once, until it was superseded by another. The medical historian must place himself in the position of a naïve observer. Concepts available at a certain time were limited, and if a person was far ahead of those concepts he had no influence—certain Alexandriates, for instance, had an idea of the anatomical concept of disease. If one saw theories as the product of their times, they no longer appeared fantastic.

Turning to the medical historicobiographical approach, Prof. Sigerist said that, in the event, medicine was made by individuals, and there had always been great doctors. History made a certain selection of who were great doctors. One found that many doctors who had been painted by famous artists were forgotten today: others were remembered as great scientists; some as great doctors. Among the latter Prof. Sigerist classed Sydenham, Boerhaave, and Osler, because they came nearest to the medical ideal of their time. Every age had its medical ideal, and the object of doctors' training was to bring them as close as possible to that ideal. The time and place at which a man lived also determined to what extent and how his genius developed.

Medical discoveries were usually not the work of one man alone, and Prof. Sigerist objected to the search for "fathers"—the father of surgery and so on. It was not fair to the mother and the midwife and the obstetrician. Harvey was one of the greatest medical scientists, but he had precursors. One had also to study how quickly great developments benefited the ordinary patient. It was equally important that one should have a high standard of general practitioners to apply the discovery of the great doctor. So the medical historian had to study the rank-and-file doctor and the other medical workers.

Medicine was not a pure science—it was a social science. There were always two groups involved—the medical workers in the broadest sense, and the public. The historian ought therefore to study the social environment, and consider the attitude which society took towards disease and the position which it gave to the physician. He should study the measures which society adopted to protect itself against abuse of the physician's power by codes of ethics and legislation.

The historian had to apply general methods of research to create a picture of the past. When he had done this, he had to communicate his knowledge, and this was why so much depended on the personality of the historian. The historian was the memory of society, and his work was related in many ways to that of the philosopher, who was its intellect. As a rule the medical historian was a physician who kept in touch with medical developments and who looked at medicine as a whole, not merely from the viewpoint of the physician but also from that of society.

Of the value of medical history, Prof. Sigerist remarked that he knew that without historical knowledge he would have found his practical work in public health much more difficult. History was the compass guiding to the future. In America he had been in the midst of the controversy over socialised medicine. One did not talk of "socialised" education or a "socialised" post-office, but medicine was called "socialised" apparently to scare people. He found that many were opposed to the development because they did not know the history of medicine.

The historian had a great responsibility. The biographer re-created the man—for instance, to younger men Osler was the man Harvey Cushing re-created in his book. History had its fakes like everything else, and the pseudohistorian was a menace. The medical historian must endeavour to approach his subject objectively. One who did not was like the scientist who faked his laboratory reports.

Prof. JOSEPH NEEDHAM, F.R.S., proposing a vote of thanks to Professor Sigerist, said that the importance of the social concept in approaching the history of medicine applied to the whole of the history of science. Prof. BENJAMIN FARRINGTON, seconding, said that Professor Sigerist had turned history outwards. He thought that at the present time there was too much intellectualism.

THE FOUNTAIN

IN 1893, to cope with an epidemic, an emergency fever hospital of 384 beds was built in Tooting. The sixteen wards were temporary structures of wood and corrugated iron, run up hastily for a transient need. They are still there after 57 years—all except three, which were destroyed by a flying bomb in 1944. The beds, however, are now closer together, and the occupants are no longer fever patients but mentally defective children. At the peak of overcrowding, during the war, the sixteen wards held 890 beds; and though the numbers are now down to 680, the loss of three wards means that overcrowding has not been greatly reduced.

This is the only mental-deficiency hospital in the National Health Service which caters specially for the care of children of all ages between a few weeks and sixteen years. The haphazard origin of its buildings has meant that it laboured under great difficulties; but it has always done good work, even when the old-fashioned view prevailed that there was nothing to be done with mental defectives except to look after them. It has always had a good school inside the hospital, and has been fortunate in attracting and keeping many kind and capable nurses whose life and interests came to be bound up with those of the children. In the last few years, however, Dr. L. T. Hilliard, the physician-superintendent, has been able to use a strong gift for improvisation to develop the unpromising buildings and to improve the prospects of both patients and staff; and this, he thinks, has been made possible by the flexibility of the National Health Service Act.

WIDER OPPORTUNITIES

The hospital comes under the South-West Metropolitan Regional Hospital Board, and is nowadays the chief of a group of three institutions. The Ellen Terry Home at Reigate is reserved for mentally defective children who are also blind. The South Side Home, on Streatham Common, is a hostel for the adult mentally defective workers who used to occupy a ward in the Fountain. They now live out, and travel to and from their work in the hospital's private motor-coach. Their hostel life is made as natural and unrestricted as possible: after years of life behind locked gates they are now allowed to go out shopping or to the cinema by themselves; and in these and other ways they are unobtrusively prepared for the chance of going out on licence. As Dr. Hilliard put it at the first annual meeting of the Fountain Group Hospital Management Committee, on May 24, "You don't learn to live in the community by being locked up in an institution." About three-quarters of all defectives, he added, are in the upper grades, and most of these can be fitted for life in the community.

The Fountain accepts children of the lowest grades, many of whom will always need care; but even among those who look hopelessly defective in the early months or years some will prove to be educable and will ultimately be able to live an ordinary life; and nowadays a fairly high proportion of the adult workers go out on licence—or even come off licence altogether. Of the 60 adults who have been away from the Fountain on licence for over two years, over half have been discharged from care under the Mental Deficiency Act.

The hospital school, or occupations centre, takes about 200 children, and nowadays accepts about 16 children living with their own families in the neighbourhood who have no local occupation centre within reach. The brighter children from the hospital attend a special school, held daily in the South Side hostel, travelling to and fro in the coach.

THE PARENTS

An energetic hospital management committee, under the chairmanship of Mrs. Eileen R. Hoare, has fostered many developments on the social side. Parents are now encouraged to take a close interest in the life of the hospital, to visit their children often, to take them out, on visiting days, for walks and bus rides or for tea without having to make an application in advance, and to have them home on leave for short periods. On alternate Sundays the coach takes parties of parents and children up to Epsom Downs. The parents have now formed themselves into a group—the Friends of the Fountain—and are taking a warm interest in the children's welfare. They contributed to the purchase of the famous coach, in which the children take a strong proprietary interest, and they are helping to equip, with swings and a sandpit, the playground which has been laid down on the site of the bombed wards. One part of the playground has been railed off for the use, by the children, of tricycles presented by the parents. This hospital was not evacuated during the war: the old shelters make very good tricycle-stores. There is also a hospital zoo, with a goat, some chickens, ducks, guinea-pigs, and a rabbit—a very popular corner of the grounds.

THE STAFF

The nurses' quarters were never greatly to the hospital's credit in the old days: dark dingy little rooms, ill furnished, were as much as the Fountain had to offer. Structurally the rooms are the same, but the paint is clean and light and the furniture new. The nurses' common-room, too, has been repainted and has a good wireless set. Trained staff can live out if they wish, and in any case they no longer occupy rooms on the wards as they used to do. The students now go into a preliminary training school for eight weeks on joining, and have a well-equipped lecture-room with an epidiascope, and an invalid-cookery room where some cookery really gets taught. All the nursing staff work a 96-hour fortnight.

Staff and patients alike have the benefit of the physiotherapy department when they need it, and lately a visiting chiropodist has been appointed to look after the feet of both patients and staff. A hairdresser now cuts the patients' hair—a duty which used to take up quite a lot of the nurses' time.

SPECIAL TREATMENT, TEACHING, AND RESEARCH

Many of the cases at the Fountain are of great medical interest. A neuropsychiatrist has joined the staff and will undertake specialised research. A visiting orthopædic surgeon has attended for many years to correct or relieve the disabilities of suitable patients, and the dental surgeon attends for two sessions weekly. An ear, nose, and throat surgeon, an ophthalmologist, and a neurologist also pay regular visits. More than 60 lectures and demonstrations on mental deficiency were given at the hospital to visiting classes last year. A social worker, lately added to the staff, will help with the visiting of patients on leave or licence.

To those who knew the hospital in the past and recognise the importance of its structural drawbacks, the advances made in the last few years are exceedingly impressive. They show what can be done by the use of good wits and a liberal spirit, even in the most adverse conditions. Moreover, the idea that all mentally defective people must of necessity be a dead weight on the community is thoroughly exploded at this lively place.

MEDICAL SUPERINTENDENTS

At the annual meeting of the Medical Superintendents' Society, in Newcastle upon Tyne on June 7–9, Dr. J. R. Murray, the retiring president, gave a spirited defence of medical administration of hospitals. Dr. Murray observed that the society would be called on to give evidence to a committee set up by the Central Health Services Council to examine the internal administration of hospitals; and he went on to suggest some fields in which the medical administrator could not, in his view, be suitably replaced by a layman. Among these was the admission and discharge of patients, and the allocation of beds: "it is quite as important for the well-being of the service that beds should be used intelligently and to the best advantage as that they should be occupied." As regards economy in drugs and other items, "circulars descending from the Ministry prompt hospital secretaries to an ill-informed and irritating concern about these matters"; whereas a medical administrator was better placed to discuss technical details and to maintain elasticity, while generating restraint and a corporate desire for economy with efficiency. Among the further duties which a medical administrator was better equipped to perform were the following: dealing with complaints by patients or inquiries by relatives; the building up of a satisfactory relationship with local practitioners; the solution of epidemiological problems; a decision on whether a death should be reported to the coroner; help in setting up new departments and integrating these with other departments; liaison with the matron; supervision of medical staff; advice on research projects; and protection of the staff's health. Dr. Murray declared: "We have allowed medical administration to be put upon the defensive. Instead of pointing out the manifest failures of lay administration . . . we have allowed ourselves to be hypnotised by the cobra-like gaze of the predatory laymen."

In England Now

A Running Commentary by Peripatetic Correspondents

Two Danish visitors, asked what had impressed them about England, replied simultaneously: "Your dirty food!" After that they went on to mention St. Paul's and the Abbey. We are supposed to be having a campaign for clean food just now; and it is generally agreed that one way of making it safer would be to get the nation to form the habit of washing the hands after using the toilet. With a little encouragement, we say, it should not be so difficult. With a little encouragement. Last week, accompanied by a friend, I visited the public lavatory in Leicester Square, and being a woman was required to pay 1*d.* before I could even get inside the place. When I came out of the toilet, I asked to wash my hands and was required to pay 3*d.* for the use of the towel. My friend also wanted to wash her hands, and I naturally said: "Share my towel." But the poor woman in charge shamefacedly explained that she was obliged to extract yet another 3*d.* and provide yet another towel. Hygiene at 8*d.* for two people comes expensive. I know that the public lavatories have to be maintained, but I suspect that the tariff falls unfairly. Men, I am told, are not always charged even 1*d.*; and most of them don't bother to wash. It looks to me as though the women pay for both. Quite apart from that, who cares to learn good habits and be fined for them?

* * *

Our dermatological club paid a four-day visit to Belgium a few weeks back. Some of us went by car and some by plane, and each arrived in Brussels pleased with their choice. The car-drivers had spent happy hours in Bruges la Morte or at the superb flower show which was being held in Ghent. Belgium is a great azalea-exporting country and there were huge banks of these lovely flowers in every shade. I chose the air passage and found it full of interest. The dreary London suburbs are soon exchanged for the tracery of water and sand, and flat green strips of the Thames estuary; strange desolate country, so little altered by civilisation that one half expected to see a Roman galley or a Jutish long-boat come round the next bend. Then a brief skim over the North Sea and below lies tidy Belgium, a flat chequer-board of rectangular fields. It seemed impossible that there could be so many variations in the green and brown of earth and growing crops. Here and there one saw a big country house, rather pompous and castellated in its formal garden, jutting out into a little moat of a lake. This building tradition, I believe, goes back through the centures to a prehistoric civilisation of lake dwellers, just as the great central archway of the Vosges farms derives from the ancestral caves.

We all forgathered at Brussels on a Saturday night. Life is comfortable there but very expensive by English standards. Morning coffee and roll, for example, costs 4*s.* Two or three of our more adventurous members went to a night-club with a floor show, and found that the only tipple was champagne at £8 a bottle. They assured us defensively that "The Cow on the Tiles" was well worth it.

On Sunday morning at 10 o'clock we started work with a visit to the University Hospital in the Rue Haute, where Professor Craps and his colleagues had collected an excellent show of cases and moulages, after which we made the acquaintance of our hosts at luncheon in the Institut Jules Bordet. This was followed by a meeting of the Belgian Dermatological Society. Sunday sessions are the rule there and our hosts remarked that only in England was life so leisured that weekday work could be interrupted by meetings. Fortunately the excellent dinner to which we were bidden that evening was also quite un-English. On the Monday we drove to Namur for a visit to the Military Hospital, where Dr. Dupont gave us an illuminating demonstration on the histopathology of the skin. No sooner was this over than he whisked us off to his own house, where his hospitable wife and children served us all with lunch—no mean feat with 20 hungry foreign guests. Next day was spent at the Hôpital Bavière at Liege. This is a big industrial centre with plenty of clinical material, and Professor Lapière has a fine department. Its lighting and general arrangements made us very envious, the more so as w were assured that it was to be replaced by somethin better in four years' time. More wonderful hospitality this time at the Restaurant Vieille France, whos panelled walls and perfect cuisine fully justified its name

Our last day was spent in Antwerp under the guidanc of Dr. Eyckmans at the Hôpital Ste. Elizabeth. This i a 13th-century foundation and still uses one of the ancien wards, an immensely high hall supported on a centr row of stone arches, and lit on both sides by tall windows. High up on one wall is a recess with an altar so that the sick, like Browning's Bishop, may "lie . . . and hear the blessed mutter of the Mass." The hospital is served by Augustinian nuns, whose white corded coifs look like Dürer etchings. How was it that the simple folk of those days had such an art in their fingers that when they folded a piece of linen round their heads it took on this sculptural perfection? Today we must go half-way round the world, to Bali and its sister islands, to find this same instinctive skill. The great ward breathed the tranquillity of another age and mode of thought. One felt one could be half in love with easeful death in that sunlit quiet, looked after by the white coifed sisters with their serene faces and the beauty that, as in Rembrandt's old women, comes from the heart and not the epidermis. "It is a beauty wrought out from within upon the flesh, the deposit, little cell by cell, of strange thoughts." The good sisters had not trafficked for strange webs with Eastern merchants nor been divers in deep seas, so their deposit is different from the Mona Lisa's! But what an intriguing subject for research, combining the psychosomatic, the microscopical, and the clinical approach. Perhaps in 50 years examination candidates will be asked: "Trace the development of Pater's cells in a nun, a woman minister, and a cabaret artist."

But at this point my fancies were interrupted by one more splendid lunch, with succulent steaks specially chosen by our host for his English guests. And so home again, full of memories, new friendships, and lasting gratitude for the warm welcome and boundless hospitality of our Belgian hosts.

* * *

Carrying my bag I brisked out of the station. The railway constable, as I passed him, put his hand to the peak of his helmet and made a curious sign, but I attached no importance to it. Presently I was tapped on the shoulder and turned to see a nondescript-looking fellow, in plain clothes and hatless, who assured me that he was a policeman and produced a document to prove it. I wondered how I might be of service to him. "Is that your bag?" he asked. "Of course," I replied, and scrutinised it hastily and closely to reassure myself. "Will you please tell me what it contains?" "So far as I remember," I replied, thinking aloud, "nothing except my night attire, shaving tackle, a couple of books, some sweets, and a spare pair of trousers." "Will you give me your name and address, please?" I gave them. "Now will you open the bag?" "Open it yourself," I said, "it isn't locked." He did so, found everything in order and apologised. He even called me sir. "You see, I've picked up two already this morning walking off with somebody else's property." We parted on the best of terms. But what I want to know is why, when one is absolutely innocent, one always feels so guilty when questioned by the police.

* * *

Rural Tap-water Stops Development of Tadpoles. Doctor Finds Possible Clue to Health Troubles of Local Population—see I.E.N. for June 3 (p. 1049). Ye gods and little fishes—guppies, to be precise. The third generation was coming along nicely in a tank in my surgery in London when a refill with fresh tap-water produced a sudden and comprehensive mortality. Previous replenishments (same tap, same amount) had only increased their joie-de-vivre. Ought I to tell the M.O.H. at once (*Doctor's Fish Save People of London*)?

* * *

A youngster, just admitted to the sanatorium, was being questioned about his family contacts. "Has your sister been to the Chest Clinic?" I asked. "Oh, yes, doctor," came the reply, "and they're going to give her those N.B.G. injections."

Letters to the Editor

ARTANE IN THE TREATMENT OF PARKINSONISM

SIR,—We have read with interest the paper by Dr. Ellenbogen in your issue of June 3; and we agree in the main with his conclusion that 'Artane' is "a powerful remedy possessing the advantages of belladonna alkaloids without their disadvantages."

We have in this hospital about 200 cases of post-encephalitic parkinsonism, the majority of which in the past have been treated with large doses of stramonium (up to 30 minims of the liquid extract, or its equivalent, t.i.d.). We were firmly convinced of the superiority of this form of therapy over any of the other standard treatments.

We have found no satisfactory objective test of the value of any drug in the treatment of parkinsonism: the rigidity, tremor, and oculogyric crises are grossly modified by variations in emotional tone and by suggestion. We have been compelled, therefore, to rely on an appreciation of the patients' over-all performance over a period of time, and not on clinical tests. We feel that the favourable results with artane in our group of patients are unlikely to be due to suggestion because, through the years, both patients and nursing staff have so frequently observed the failure of new remedies that they have become highly critical of any change in treatment.

In order to assess the value of artane, as of other drugs, we have first of all stopped administration of stramonium, either abruptly or gradually. This sometimes produces quite severe withdrawal symptoms, and patients have hitherto demanded vigorously that their stramonium be returned to them. When artane has been given, withdrawal symptoms have subsided rapidly and the patients have soon reported a feeling of well-being.

Altogether 35 patients have been under treatment with artane for periods varying between one and three months. Of this number, only 7 have failed to improve, and none has deteriorated. No side-effects have been noted except in 2 patients. who showed some temporary mild excitement whilst having 10 mg. thrice daily. In our experience the recommended dose is inadequate, at least in the more severe cases. We have found it expedient to start treatment with a dose of 5 mg. thrice daily, and to increase the dose gradually as long as the patient shows clinical improvement. Several cases have received 45 mg. daily, but there has been no evidence of improvement with doses in excess of this. The absence of side-effects with this large dosage is noteworthy.

The type of improvement noted by us was a well-marked decrease in the emotional hebetude so characteristic of the disease; the patients became more active and there was an increase in the play of facial expression. Rigidity and tremor were decreased, and patients found themselves able to use their hands and to walk much more easily. One patient's relatives stated that they had received their first letter from her for five years. We have observed no changes in the frequency or severity of oculogyric crises. We found (much to the patients' comfort) that the mydriatic effect of artane was much less than that of the solanaceous drugs, even in the large doses we have used. Sialorrhœa is less well controlled by artane than by atropine.

Completion of our observations has been held up by a failure in the supply of artane. At this stage we feel that only its prohibitive cost is likely to prevent it becoming the drug of choice in the treatment of post-encephalitic parkinsonism.

Our thanks are due to Dr. G. A. Borthwick, medical superintendent and director of the unit, for affording us facilities in this investigation.

Highlands Hospital,
London, N.21.

J. PHILLIPS.
E. MONTUSCHI
J. SHARKEY.

MULTIPLE-LEAD ELECTROCARDIOGRAMS

SIR,—I enjoyed reading the comprehensive article by Dr. Hill which appeared in your issues of May 27 and June 3.

There is one point I should like to mention regarding the diagnosis of bundle-branch block by means of the electrocardiogram. Dr. Hill rightly emphasises the importance of the precordial leads in differentiating the various types of bundle-branch block. However, it has been stated that there is a very useful rule for differentiating right from left bundle-branch block—namely, that the presence of an S wave in lead I of the standard limb leads, in the presence of wide QRS complexes, denotes that the block is of the right branch. With left bundle-branch block there will be no S wave in lead I. Though this fact does not in any way detract from the value of the precordial leads, I think it does enhance the usefulness of the standard limb leads and therefore will substantiate the diagnosis. I noticed that in all the illustrations of bundle-branch block in Dr. Hill's article this rule seems to apply. This includes the illustrations of the Wilson type of right branch block and a rare type (figs. 18a and 18b).

I should like to know whether this rule is still regarded as reliable and useful, or whether it has fallen into disrepute.

London, S.E.5.

CYRIL JOSEPHS.

SUBSTITUTES FOR CURARE

SIR,—Your leading article of June 3 is, unfortunately, a true reflection of the opinion of most anæsthetists in this country. In comparing the relative merits of various synthetic relaxant drugs, the usual undue emphasis has been placed on matters which would bear further consideration. There is some reason to think that mephenesin, as commercially obtainable, does produce intravascular hæmolysis. The same is perhaps true for many drugs which are given intravenously.

It has already been shown[1] that the evidence for hæmoglobinuria is decidedly less; since breakdown products of the drug may produce a positive reaction to the benzidine and guaiac tests, the proof of hæmoglobinuria seems to be lacking. In any event, there is little sign of any adverse effect on the patient. In this institution. mephenesin is used routinely by several anæsthetists to produce relaxation in infants and small children during abdominal operations. This has been my unbroken practice for three years, and the results justify the technique. We have already reported the successful use of mephenesin in the treatment of tetanus,[1 2] and further experience not only confirms the early impression but also shows that, despite large dosage of mephenesin continued for several days, it has no obvious adverse effect upon the organism.

It must be admitted that the relative values of 'Flaxedil' and decamethonium iodide are not yet assessed. Both these drugs have been widely employed to a considerable extent in this hospital; and at present the latter is preferred. With decamethonim iodide, it does seem that the duration of respiratory depression is shorter than that of abdominal relaxation, and that the total duration of action is shorter than that of flaxedil. It is quite true that one occasionally sees a fall in blood-pressure with this drug, but this responds immediately to the administration of ephedrine or 'Methedrine' intravenously. This disadvantage is offset by the rise in pulse-rate which so frequently

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1. Davison, M. H. A. *Lancet*, 1949, ii, 1110.
2. Davison, M. H. A., et al. *Brit. med. J.* 1949, i, 616.

accompanies the administration of flaxedil, and which may be a source of embarrassment should other adverse influences be in operation at the same time.

Concerning both mephenesin and decamethonium iodide, your leading article emphasises the absence of any reliable antidote. The action of mephenesin is such that no antidote is required; and the duration of respiratory depression with decamethonium iodide is so short that artificial respiration for more than 10 minutes is required only exceptionally. Thus, that antidotes are unnecessary is a strong point in favour of both these drugs.

Department of Anæsthesia,
Royal Victoria Infirmary,
Newcastle upon Tyne.
M. H. ARMSTRONG DAVISON.

SURGICAL TREATMENT OF CARDIAC ISCHÆMIA

SIR,—Little has been published in this country on the surgical treatment of cardiac ischæmia since O'Shaughnessy[1] described the operation of cardio-omentopexy. In America, however, there has been a steady stream of articles on the subject. No doubt much of the scepticism that is apparent here can be attributed to the difficulty of assessing the value of any surgical procedures in a condition whose course is notoriously unpredictable.

Recently four cases of cardiac ischæmia have been referred for surgical treatment by Dr. W. A. Bourne. All presented abnormal electrocardiographs and were suffering pronounced chest pain; and all other methods had failed to relieve them. The surgical treatment consisted of the insufflation of talc into the pericardial sac, with the intention of producing an increased blood-supply to the ischæmic myocardium.

The coronary arteries are end-arteries, so that the occlusion of their lumen produces either an area of ischæmia or an infarct. Local ischæmia leads to local anoxæmia, and the area may become a "trigger" for ventricular fibrillation. But if an adequate collateral circulation can be established the irritability of the anoxic zone may be diminished and the viability of the myocardium preserved, thus preventing it from degenerating into scar tissue.

With cardiac ischæmia intercoronary communications may develop spontaneously. Harrison and Wood[2] have described the changes found post mortem in the coronary tree of ischæmic hearts.

> Severe narrowing or occlusion—usually both—was constantly present. In 8 of the 15 hearts examined, the whole coronary tree was affected; while in the other 7, arterial narrowing was limited to either one vessel (usually on the left) or to part of one vessel. Infarction was found in 13 cases. Anastomotic vessels, just large enough to be visible after injection of the coronary tree and radiography, were noted in all cases; these were related to the distal parts of the occluded vessels and sufficed to permit retrograde filling of these vessels.

Beck[3] has shown experimentally that a heart that can tolerate obliteration of a coronary artery will, in the course of a few weeks, establish good communications between the coronary arteries. He emphasises that the important question is whether the patient can live long enough for such communications to develop.

The surgical approach to the problem of increasing the blood-supply to the ischæmic myocardium has developed along two main lines: the production of extracoronary communications, and the establishment of intercoronary anastomoses. As regards the first of these, grafting of tissues to the surface of the heart will produce arterial connections with the coronary tree. Many tissues have been used for this purpose—notably lung, mediastinal fat, omentum, stomach, and spleen. This method was adopted by O'Shaughnessy[4] in evolving the operation of cardio-omentopexy. Other workers, in America, have also pursued this line; but, while arterial communications have invariably been produced, doubt has arisen as to the adequacy of the anastomotic channels; as Burchell[5] says: "the possibility that the small vascular connections between a graft and the heart might develop to a functioning value cannot be denied but, in the experiments seemingly favourable to such a result, it has not occurred."

Aiming at a more widespread blood-bath to the myocardium, Beck[3] conceived the idea that the production of a bed of granulations on the heart surface would increase vascularity and distribute blood to every part of the heart. At first he used powdered beef-bone as an inflammatory agent. Later, in experimental work, he exposed the heart and abraded the epicardium with special burrs; three weeks later he again exposed the heart and ligated the descending ramus of the left coronary artery at its origin. Subsequently intercoronary anastomoses could be demonstrated, and in some cases infarcts were small or even absent.

In man the use of burrs is unnecessary; the inflammatory reaction can easily be evoked by other agents. The choice of agent is important, for it must not cause too severe a reaction nor must it lead to constrictive pericarditis. Schildt, Stanton, and Beck[6] found that croton oil, santal oil, formaldehyde, and acriflavine were strong irritants; sodium morrhuate and sodium ricinoleate produced a temporary reaction which disappeared in a few weeks; silica, sand, agar, cotton, and typhoid vaccine were not suitable. Asbestos (calcium and magnesium silicate) was regarded as the best of the substances investigated. These workers did not support the claims made by Thompson[7] for talc, nor those by Heinbecker and Barton[8] for lionite, aleuronat, and starch.

More recently Thompson[7] has again advocated the use of talc (hydrous magnesium silicate), because of its capacity to produce a well-marked foreign-body reaction. In the pericardial sac talc gives rise to hyperæmia of the myocardium, epicardium, and pericardium and results in an adhesive pericarditis. In the dog talc granulomas are characterised by a loose fibrous-tissue lesion, but in man the tissues react by forming pseudotubercles.[9] Thompson concludes from experimental work and clinical observation over nine years that the adhesive pericarditis produced by this method is not constrictive and does not limit its usefulness nor add any extra burden to the heart.

The operation of pericardial insufflation is simple and can be performed without shock to the patient.

> General anæsthesia is best, since it avoids the risk of an anginal attack during the operation. Each of the four patients mentioned below was given bromethol (0·08 g. per kg. body-weight) three-quarters of an hour before operation, and nitrous oxide, oxygen, and ether uring the operation; care was taken to ensure full oxygenation throughout.
>
> In these four cases the approach has been, not by division and removal of portions of rib or cartilage, but by an incision some 3 in. long along the lower border of the left costal margin. After opening the rectus sheath the muscle is retracted outwards and the loose plane of cleavage entered in an upward direction until the pericardial sac is reached. A small transverse incision is then made into the sac. All excess pericardial fluid is aspirated and, by means of an insufflator, 2 drachms of talc is introduced. The talc can be placed anywhere desired if a soft rubber tube is attached to the nozzle of the insufflator; this can be passed up behind the heart and well over the right border. In no case has any attempt been

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1. O'[illegible] Lancet, 1937, i, 185. O'Shaughnessy, L., S[illegible] Ibid, 1939, i, 617.
2. H[illegible] Brit. Heart J. 1949, 11, 205.
3. Be[illegible] 1943, 118, 788.
4. O'Shaughnessy, L. *Brit. J. Surg.* 1936, 23, 665.
5. Burchell, H. B. *Arch. intern. Med.* 1940, 65, 240.
6. Schildt, P., Stanton, E., Beck, C. S. *Ann. Surg.* 1913, 118, 34.
7. Thompson, S. A. *Amer. Practit.* 1948, 3, 81.
8. Heinbecker, P., Barton, W. A. *J. thorac. Surg.* 1910, 9, 431.
9. Lichtman, A. L., McDonald, J. R., Dixon, C. F., Mann, F. C. *Surg. Gynec. Obstet.* 1946, 83, 531.

made to inspect the surface of the heart for visible evidence of ischæmia or infarction, nor has the heart been palpated; and thus it has not been found necessary to introduce any local-anæsthetic solution into the sac during operation. The wound is closed without drainage.

In this brief communication no attempt is made to discuss the selection of cases for surgical treatment or to assess results. The four patients treated (three of them about a year ago) are quite convinced that the operation has definitely relieved their symptoms; but since no case has come to autopsy there is no direct evidence that an increased blood-supply has, in fact, been produced. Nevertheless, all four cases have been improved according to the criteria laid down by Thompson [7]—relief of anginal pain, increase in exercise tolerance, relief of incapacity, and increased ability to travel and deal with daily needs.

Royal Sussex County
Hospital, Brighton.

W. R. FORRESTER-WOOD.

ESTIMATION OF PROTHROMBIN-TIME

SIR,—We have observed in this laboratory that irregular results in measuring the prothrombin-time, using thromboplastin ('Difco'), were due to the fact that we had used soapless detergents for cleaning our glassware. Even if all laboratory glassware is cleaned by chemical means, results will still be irregular if the containers in which the blood is collected have been treated with such soapless detergents. It seems that this effect is not generally known, and I would like therefore to bring it to the notice of other laboratory workers.

Pathological Laboratory,
District Hospital, Pembury, Kent.

H. LEHMANN.

PROPHYLACTIC NEOSTIGMINE IN ELECTROCONVULSIVE TREATMENT

SIR,—In his letter of June 3, Dr. Silfverskiöld outlines his technique for using neostigmine as a prophylactic against curare depression of respiration following electroconvulsive therapy (E.C.T.). I see no advantage in the method he described over that which I have often used to offset the depressant effects of curare with a prophylactic dose of neostigmine.

It has been my practice to administer by rapid intravenous injection *d*-tubocurarine (2 mg. per stone body-weight, unless a small test dose shows excessive sensitivity), gr. 1/100 of atropine sulphate having been given subcutaneously 45 minutes before.

The syringe is then detached from the needle, which is left in the vein, and replaced by one containing thiopentone-sodium solution, altogether 0·2–0·3 g. being given slowly during the interval (usually 4–5 minutes) between the injection of the curare and the production of its full effects. At the appropriate time the thiopentone syringe is detached from the needle and replaced by one containing 1 mg. of neostigmine, which is immediately injected, the syringe withdrawn, and the electro-shock given without delay.

The method is based on the same principle as that underlying Dr. Silfverskiöld's technique—namely, the appreciable latent period before injected neostigmine exerts its anti-curare action. The modified convulsion has ceased before the neostigmine neutralises the curare. It is suggested that curare should always be followed by a thiopentone-sodium injection, since the effects of the former are rather terrifying in a conscious patient.

Recently, I have been less happy about the *routine* use of neostigmine before E.C.T., having several times noticed a rather pronounced slowing and weakening of the pulse after intravenous neostigmine. It seems possible that a vagotonic patient might suffer undue depression of the heart at a time when this organ is under great stress following a series of convulsions. However, Dr. Silfverskiöld appears to have had very little trouble with his 80 cases.

Park Prewett Hospital,
Basingstoke.

J. TODD.

ORIGIN OF PLACENTAL TROPHOBLAST

SIR,—I welcome Professor Mossman's letter of May 20 and the philippic by Prof. Emil Novak elsewhere,[1] as I find with relief that two such eminent leaders of the profession cannot produce anything more decisive than they have done. In fact neither of these criticisms disproves my hypothesis, any more than my own paper proves it.

I will deal with Professor Mossman's criticisms in turn.

1. It is granted that œstrogens and gonadotrophins are obtainable from a wide variety of sources. My argument, however, is that both follicle cells and trophoblast produce œstrogens, progesterone, and androgens. Why gonadotrophins have been introduced in this context I am unaware, as they are not produced by follicle cells, and my argument is that they are not produced by the trophoblast either.

2. The reason why trophoblast should not survive independently of the embryo if it were of fœtal origin is that it is unusual in nature for a part of an organism to continue to live for a material length of time when the organism itself has died. (Normal trophoblast is not a tumour.)

3. The origin of chorionepithelioma, as of most other tumours, is unknown, and I do not attempt to explain it. It is more rational, however, to believe that it occurs as a result of a change in cells of the individual himself—i.e., follicular cells, or their analogue in the male—than of a malignant change of cells belonging to an individual of another generation in the host.

4. The assumption that the ovarian reaction in mole and chorionepithelioma is evidence of secretion of gonadotrophins by the tumour is just as speculative as my theory that both are evidence of the action of the hormone; especially as Mossman explicitly states that the hormone cannot be extracted from the tumour.

5. Endometrial stroma does not form a new growth under the influence of gonadotrophin as granulosa cells apparently do. The analogy is thus inapt.

6. With reference to Ericulus, it is not essential to my argument that the follicle should have cavities or the ovum a corona radiata. All that is required is that follicle cells should be available when the blastocyst embeds in the endometrium, however they may have arrived there.

7. The fact that follicle cells and trophoblast have analogous functions is of course no more than suggestive that possibly they have the same origin. The introduction of mammary epithelium in a similar context is of course innocuous rhetoric.

8. The substance of this complaint is apparently that one must not venture new concepts as it will confuse students.

9. All stages of transition can be seen between the different cells of the epidermis.

10 & 11. I do not wish to labour the points of similarity in culture, nor the placenta of the hyracoidea. They are merely incidental illustrations of my main thesis.

12. Professor Mossman has evidently completely misunderstood my argument with respect to transplantation of tissue. The trophoblast is in a completely different relationship vis-à-vis the maternal tissues than the fœtal mesoderm is, for the trophoblast has a maternal circulation and the mesoderm a fœtal one. It is vascularisation by the host that causes the death of a transplant, as Medawar and others have shown.

The remaining arguments are merely statements as to how obvious it is that the prevalent conception is right, without giving specific instances. The fœtal origin of trophoblast may indeed be true, but if it is wrong it is because of misinterpretation of what I call the "isolated frame"—i.e., the histological section. A frame is one picture from a reel of film. The section is an "isolated frame" because the pictures preceding it and after it can never be obtained as the organism must be killed in the act of obtaining it. Thus the interpretation of processes must always be a matter of inference and not observation. Tissue culture under continuous observation does not suffer from these defects; but tissue culture supports me rather than Professor Mossman, as it is well known that both granulosa cells and trophoblast spread and grow luxuriantly in culture, yet the blastocyst, from whose outer wall the trophoblast is said to arise, always remains in culture a regular ordained sphere.

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[1] Obstet. Gynec. Survey, 1949, 4, 828.

I trust, Sir, that there will be no further correspondence on this subject, as it is a matter to be settled by experiment rather than by polemics. Over the last eighteen years I have grown accustomed to jibes of being an "armchair" scientist in this regard, and asked to produce evidence of my experiments. A vicious circle has arisen in that first opportunity to experiment has not been given by sceptical professors; then when the idea is published, rather than that it should die with me, I am blamed because there are no experiments. May I suggest to Professor Mossman, or any others sufficiently interested and lucky enough to have the opportunity, that the problem of the origin of the trophoblast might be settled in this way. Fawcett et al.[2] have developed the technique of transplanting mouse ova to the anterior chamber of the eye, where trophoblast grows luxuriantly. It should not be difficult to transplant each tissue concerned separately, and in various combinations, to decide which gives rise to trophoblast—i.e., granulosa cells alone, unfertilised ova with attached corona radiata, fertilised ova with all granulosa cells removed beyond all shadow of doubt (by hyaluronidase), and, if necessary, fertilised denuded ova to which granulosa cells have been added.

I regret to have wasted so much of Professor Mossman's time, of which he complains. I am aware of his erudition in this matter, and of my ignorance; but study of the progress of science in the past has often demonstrated that a lot of learning may be a dangerous thing.

ISRAEL GORDON
Acting Medical Officer of Health.

Ilford.

T.E.A.B. IN RHEUMATOID ARTHRITIS

SIR,—In your issue of June 3, Dr. Fløystrup appears to judge the efficacy of tetraethylammonium bromide (T.E.A.B.) by temperature changes. In the cases quoted by him, there is no indication as to the stage of the disease. It has been my experience that there is comparatively little clinical result except in the acute stages of the disease when severe "synovial" pain is present. Under these circumstances T.E.A.B. usually gives relief from pain without affecting the chronic course of the disease. Joint stiffness and swelling remain and need treatment by other methods.

St. John's Hospital,
London, S.W.11.

TREVOR H. HOWELL.

ORAL TREATMENT OF URINARY BILHARZIASIS

SIR,—Sugar-enteric-coated tablets of 'Nilodin' have proved relatively ineffective against urinary bilharziasis in young adult Africans in Southern Rhodesia.[3] Nilodin (B. W. & Co.) is a preparation of 'Miracil D' (1-diethylaminoethylamino-4-methylthioxanthone hydrochloride).

Four groups of young Africans infected with urinary bilharziasis have been treated with miracil D, miracil A, sugar-enteric-coated nilodin and plain nilodin, and an alternate-case method of treatment was used. The dose régime was 60 mg. per kg. body-weight, divided into six doses given morning and evening for three days.[4]

The patients treated were school-children, aged 6–18 years, living in a government native village outside Salisbury, and attending two schools in the village. They were treated at the end of the Rhodesian dry season, in an area where extensive copper-sulphating of streams had previously been carried out; and for many months they had been using bore-hole water exclusively, so that the possibility of recent infection was exceedingly remote. There was no selection of cases, and the laboratory staff engaged on the follow-up examinations knew neither the patients' names nor the drugs administered. The follow-up arrangements were similar to those already described elsewhere.[4] The results were as follows:

Drug	*No. of cases*	*Results*	
		Cures	*Failures*
Miracil D	40	37	3
Miracil A (Elberfeld)	28	13	15
Nilodin plain	68	62	6
Nilodin coated	68	28	40

These results need little discussion. Miracil D and plain uncoated nilodin are as effective as any known drug in the treatment of urinary bilharziasis, while miracil A is much less effective. It is impossible to escape the conclusion that sugar-enteric-coated nilodin tablets are poorly absorbed in the African gut, and that this faulty absorption is responsible for the poor therapeutic results.

I am indebted to Dr. R. M. Morris, secretary for health, Southern Rhodesia, for permission to publish this report. Thanks are due to the Medical Research Council for supplies of miracil A, and to Messrs. Burroughs Wellcome & Co. for the uncoated tablets of nilodin.

Research Laboratory,
Salisbury, Southern Rhodesia.

W. ALVES
Officer-in-charge.

THE G.P.'s EQUIPMENT

SIR,—As a profession we seem a little too fond of hackneyed words. Once it was "definitely"—and still is to some extent. Now no contribution to a medical journal is complete unless it is studded with that ugly word "integration," or embellished with various "patterns." But there is a more recent one than these, and it is the word "equipment" in its relation to the G.P. Everybody who is anybody thinks he is privileged to point out the G.P.'s deficiency in equipment as if it were some kind of malignant hypovitaminosis. Dr. Collings gave very high marks for equipment, all gleaming brightly no doubt in some smart little cabinet in the corner of the surgery. The addition of a Balkan frame or two in another corner would no doubt evoke, among the less sophisticated of our patients, much admiration.

An article by a Socialist doctor in a recent edition of an illustrated weekly, and having reference to the Collings report, showed a picture of what, in the absence of my glasses, I took to be a small heap of debris of some kind, but closer inspection revealed that it was the much-discussed G.P.'s equipment, complete down to a packet of safety-pins and a modicum of cotton-wool. Any G.P. without at least that must surely have missed his vocation.

As a student I cannot remember that great clinician, the late Prof. John Ryle, either in the wards or at out-patients, being equipped with anything except a stethoscope and a percussion-hammer, which were usually sticking out of the pockets of his long white coat. No doubt other instruments were available when needed. But unlike Dr. Collings, Dr. Ryle always deprecated what one may perhaps call the increasing "technification" of medicine.

Equipment surely includes more than the mere tools of our trade. It comprises those imponderable and abstract qualities referred to in the recent B.M.A. report on the G.P.: "inexhaustible tact, wisdom, patience, discretion, imperturbability." Osler recited all these qualities fifty years ago, as he who runs may read if he picks up *Æquanimitas*, but if we pay too much attention to all that is said about us today we shall fluctuate rapidly between a state of microcephaly and one of macrocephaly, neither of which conditions would help us or our patients.

There is one thing, however, which we should bear in mind, and that is that Socialist doctors and others of the same political faith are only too ready to bring up the failings of the G.P. as incontrovertible arguments (as they imagine) for a whole-time State medical service. Whatever we may have thought on this subject in the past, we must now all decide for once to sing the same song (and let it not be the sirens' song) and resist any such attempt *à outrance*; for there is little doubt that this issue will be raised before we are much older.

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[2] *Amer. J. Anat.* 1947, 81, 413.
[3] Alves, W. *Ann. trop. Med. Parasit.* 1950, 44, 31.
[4] Alves, W. *S. Afr. med. J.* 1949, 23, 428.

Brighton. G. L. DAVIES.

CONTINUOUS DRIP TREATMENT OF PEPTIC ULCER

SIR,—Recent correspondence on the subject of milk drips used for the alleviation of the pain of peptic ulcer, has shown that the improvement in symptoms is not likely to be due directly to an alteration in the pH.

Kinsella[1] believes that peptic-ulcer pain may be relieved by food in the following way: "The hyperæmia of digestion relieves the tension in the ulcer tissues by opening up the neighbouring capillary bed in the healthy stomach wall." Such a mechanism would explain the relief of ulcer pain by the continuous administration of milk. In my experience, pain from ulcers may be relieved by the act of retching without vomiting and also by distending the stomach; and it seems possible that here too the relief may be afforded by reduction in the turgidity of the inflamed tissues around the ulcer bed.

Bristol. J. M. NAISH.

FLUOROSCOPIC EXAMINATION OF THE CHEST

SIR,—May I, even at this late date, comment on your annotation of March 18?

While it is true that Dr. Ordway and I[2] reported in 1937 that in a study of 2500 fluoroscopic examinations of the chest 13% of the cases of tuberculosis were missed, that was not the whole story. All of the missed cases were minimal and none had physical signs. More important, I believe, was a further comment in our summary:

> "If one can assume that the X-ray examination reveals 100 per cent. of the lesions of pulmonary tuberculosis our results are: revealed by X-ray, 100 per cent.; revealed by fluoroscopy, 87 per cent.; revealed by physical examination, 36 per cent.; revealed by symptoms, 33 per cent."

Having observed the results of simultaneous fluoroscopy and röntgenography of many thousands of chests since 1927, I am inclined to believe that fluoroscopy, done well and searchingly, is nearly as revealing as a well-made röntgenogram.

Metropolitan Life Insurance Company,
1, Madison Avenue, New York, 10. H. H. FELLOWS.

SCORPION STINGS

SIR,—Last year McSorley and Perry[3] contributed to correspondence on the treatment of scorpion stings an account of a method which, they said, had long been used in parts of Africa. The method consisted in injecting emetine hydrochloride subcutaneously, either directly into the area of the sting or elsewhere on the affected limb; and they had found that the intense pain of the sting was immediately and permanently relieved.

We have since been studying the effect of emetine hydrochloride, and of other substances whose use has from time to time been advocated. Our experiments were made with albino rats and with dogs and guineapigs, into which was injected the minimum lethal dose of either crude or purified scorpion toxin prepared by one of us, mainly from *Buthus quinque-striatus*—the species most common in Egypt.

In no case did we observe any favourable effect when appropriate doses of emetine were injected; neither the pain nor the symptoms of intoxication seemed to be modified. The following drugs have also been tried: atropine sulphate; ergotamine tartrate; ergotoxine ethanesulphonate; histamine; and some anti-histamine drugs, including 'Anthisan,' 'Antistin,' 'Benadryl,' and 'Phenergan.' So far none of these has proved really effective. Atropine had no apparent effect in guineapigs and dogs, but in some rats it appeared to provide some benefit. The anti-histamine drugs have proved ineffective, except for phenergan, which eased the toxic symptoms somewhat, owing no doubt to its sedative action; this drug did not avert the animals' death. The only remedy which, under these experimental conditions, has been found to save the lives of animals is antiscorpion serum given in adequate amounts at the proper time.

Details of this work will be published later.

Vaccine and Serum Laboratory,
Agouza, Cairo.

M. ALY
M. A. M. ABUL-FADL
M. ROUSHDY.

A URETHRAL SYRINGE

SIR,—Like Mr. Wardill, who wrote last week, I dislike an opaque syringe. The syringe I described (April 8) has a clear glass nozzle, and any air entering it is readily seen in the wider expansion. When the rubber bulb becomes rough it is discarded, not because of air leaks but because sterilisation may then be less certain.

After modern prostatectomy operations bleeding should not be severe, and syringes of this type have been effectively used for more than a year to keep the catheter clear. They are easy to manipulate, and the accident which unfortunately happened in Mr. Wardill's case when using a Bigelow's evacuator has not been encountered. If more powerful suction is required than is given by this syringe, I use the glass bladder syringe which I described fourteen years ago.[1]

London, W.1. E. W. RICHES.

Obituary

ROBERT MENZIES GALLOWAY

M.D. EDIN., D.P.H.

Dr. R. M. Galloway, medical officer of health for Bolton, died on June 5, at the age of 51.

He was born in Birkenhead, and he graduated M.B. with honours from the University of Edinburgh after a distinguished academic career interrupted by service as a surgeon probationer in the first world war. Five postgraduate years in hospital appointments laid a solid foundation for his future career, and he took his D.P.H. in Manchester in 1923 and his M.D. with commendation two years later.

Possessed of a broad humanitarian outlook it was not surprising that Galloway should devote himself to public health. His apprenticeship in that service was by way of assistant posts in Bolton and with the Lancashire county council under two pioneers, the late Paget Moffat and Butterworth. In 1929 he became medical officer of health for Dewsbury, and at the beginning of 1932 he took up his present appointment at Bolton. In 1948 he was appointed lecturer in public health at Manchester University. A fellow of the Society of Medical Officers of Health, he had been president of the North West branch, and only last year as president of the county-borough group he met his fellow members in a delightful weekend at Windermere. His fondness for children and young people found expression in his work for the Bolton Lads' Club, of which he was a member of the committee and honorary medical adviser.

J. Y., V. T. T., and H. M. write: "As a sound doctor and an administrator of no mean ability and acumen, Galloway, apart from his worth as a man, was held in high esteem by his authority and his colleagues. The

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1. Kinsella, V. J. The Mechanism of Abdominal Pain. Sydney, 1948; p. 178.
2. Fellows, H. H., Ordway, W. H. Transactions of the 33rd annual meeting of the National Tuberculosis Association, 1937.
3. McSorley, J. G. A., Perry, W. L. M. *Lancet*, 1949, i, 889.

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1. *Brit. med. J.* 1936, i, 578.

influence of his education in Scotland, where he spent many of his early holidays, was reflected in a pawky yet kindly and whimsical humour. As a raconteur he was in great demand. His intimate knowledge and understanding of his fellow men could be expressed with equal fluency in the Lancashire dialect, broad Scots, Welsh, or even Irish. Of his four children his elder daughter is due to qualify soon at Edinburgh, while his elder son is in his second year at Cambridge. We know that it would have brought great joy and pride had he lived to see two of his children at least in the profession to which he had devoted his life."

ALFRED EDWARD ARTHUR CARVER

M.A., M.D. CAMB., D.P.M., D.P.H.

Dr. A. E. Carver, medical superintendent of Caldecote Hall, Nuneaton, died on May 30.

He was educated at Trent College, and Caius College, Cambridge, where he took the natural sciences tripos in 1905. Three years later he qualified from St. Bartholomew's Hospital, and he held house-appointments there and clinical assistantships at the Victoria Park Hospital and Royal Chest Hospital in London before he returned to the Midlands, where for a time he was tuberculosis officer at the Birmingham General Hospital. His practice in Birmingham was interrupted by the 1914–18 war during which he served with the R.A.M.C. in Salonika and later at Maghull Hospital. Here his interset in neurology was stimulated, and after demobilisation he became neurological specialist to the Ministry of Pensions in the West Midland region and physician in charge of the psychotherapeutic clinic at the Birmingham and Midland Hospital for Diseases of the Nervous System.

After his appointment to Caldecote Hall his interest naturally was more and more concentrated on problems of addiction and of alcoholism. In *Alcoholism in General Practice* (1936), in which he collaborated with Dr. T. C. Hunt and the late Sir William Willcox, his discussion of the treatment and aftercare of the alcoholic offered the practitioner wise and practical counsel. He emphasised that institutional treatment was the form of therapy most likely to be successful, provided the patient was willing to coöperate, a theme which he had already discussed in his first paper to the Society of Inebriety in 1926. This society (now known as the Society for the Study of Addiction) remained one of his chief interests. A member of council from 1934, he hardly ever missed a meeting, even during the war. A fellow member, describing him as an excellent lecturer with an attractive informal delivery, adds: "His approach to the problems of alcohol became increasingly psychological during his career. Those that differed from him have lost a worthy opponent."

During the late war Dr. Carver served as psychiatrist in the E.M.S., and in the early days of the blitz he suggested that an attempt should be made to condition civil defence workers against noise. He himself had some success in the application of this idea when he held "blitz concerts" in the capacious cellars of Caldecote Hall.

MORRIS YOUDELEVITZ YOUNG

C.I.E., M.B. GLASG.

Dr. M. Y. Young, medical adviser to the Anglo-Iranian Oil Company, who died on May 18, will long be remembered by the staff of the company as a counsellor and a friend.

He graduated M.B. at the University of Glasgow in 1906, and in the following year went to Persia as the first medical officer of the Anglo-Iranian Oil Company. In 1926 he transferred his headquarters to the London office as chief medical officer, and on his retirement in 1933 he was appointed medical adviser to the company.

After he retired, Young wished to work in a bacteriological laboratory and he settled down in the inoculation department of St. Mary's Hospital. Until this time he had never greatly concerned himself with the technical side of bacteriology, but by dint of his energy and application he became a skilled bacteriologist. During the second world war he worked with Dr. A. B. Porteous in the E.M.S. public-health laboratory at Ealing, where he remained until 1945, when he returned to St. Mary's Hospital as deputy director of the newly formed antibiotic unit. There he did valuable research work both in the ward and in the laboratory on the use of penicillin and on tests by which the treatment was controlled.

Sir Alexander Fleming, F.R.S., writes: "Young's long clinical experience made him especially fitted for this work, and, although he had become a laboratory worker, his real interest in life still lay in the treatment of the sick. He got an immense pleasure from the amazing results he obtained with penicillin in apparently hopeless cases and his enormous vitality and meticulous attention to detail contributed in no small measure to these successes.

"He had three outstanding characteristics. He had unfailing energy—having started a task he would work until its completion and would never acknowledge defeat, no matter how much effort or personal sacrifice it required. He was never influenced in any way by the importance or otherwise of the persons with whom he was in contact, and all received the same painstaking treatment and consideration at his hands. He never looked for personal reward. For 18 years he worked at St. Mary's Hospital and in the E.M.S. in an honorary capacity, and his unflagging devotion and keenness provided a wonderful example to the younger workers."

Dr. WILLIAM FREEMAN SNOW, president of the Union Internationale contre le Péril Vénérien, and chairman of the board of directors of the American Social Hygiene Association, died on June 12. Dr. Snow was born in 1874.

Diary of the Week

JUNE 18 TO 24

Monday, 19th

ROYAL COLLEGE OF PHYSICIANS, *Pall Mall East, S.W.1*
5 P.M. Dr. F. H. Young: Use of Collapse Therapy in the Treatment of Pulmonary Tuberculosis. (Second lecture.)

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Prof. F. M. Burnet, F.R.S.: Natural History of Surgical Infection. (Moynihan lecture.)

INSTITUTE OF OPHTHALMOLOGY, Judd Street, W.C.1
5.30 P.M. Dr. F. Stansfield: Anatomy of the Lacrimal Apparatus.

Tuesday, 20th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Prof. J. H. Dible: Degeneration, Necrosis, and Fibrosis in the Liver. (First Humphry Davy Rolleston lecture.)

INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5 P.M. Mr. A. K. Monro: Varicose Conditions of the Lower Limb.

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
4.30 P.M. Mr. V. E. Negus: Stenosis of the Larynx.

KENT PÆDIATRIC SOCIETY
2 P.M. Meeting at Broomhill Bank School for Educationally Subnormal Children, Rusthall, Tunbridge Wells.

EDINBURGH POST-GRADUATE BOARD FOR MEDICINE
5 P.M. (University New Buildings, Teviot Place.) Dr. Macdonald Critchley: Parietal Lobe.

Wednesday, 21st

BRITISH INSTITUTE OF RADIOLOGY, 32, Welbeck Street, W.1
8 P.M. Dr. Ross Golden (New York): *Clinical Problems in Small Intestinal Physiology.* (Mackenzie Davidson lecture.)

INSTITUTE OF OPHTHALMOLOGY
5 P.M. Dr. L. C. Thomson: Interpretation of the Spectral Sensitivity Curve.

Thursday, 22nd

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Professor Dible: Degeneration, *Necrosis*, and Fibrosis in the Liver. (Last Humphry Davy Rolleston lecture.)

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. P. H. MITCHINER: Dry Bones. (Erasmus Wilson demonstration.)

INSTITUTE OF NEURC[illegible]al, Queen Square, W.C.1
5 P.M. Prof. Th. [illegible] leningeal and *Radicular* Metastases [illegible] *especially* Pinealomata.

ST. GEORGE'S HOSPITAL, S.W.1
4.30 P.M. Dr. Anthony Feiling: Neurology demonstration.

MEDICO-LEGAL SOCIETY
8.15 P.M. (26, Portland Place, W.1.) Mr. William Latey, K.C.: Developments in the Law of Divorce and Nullity of Marriage.

Friday, 23rd

INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. Dr. J. Marshall: Causes of *Blindness*.

MAIDA VALE HOSPITAL MEDICAL SCHOOL, W.9
5 P.M. Dr. P. H. Sandifer: *Clinical neurological* demonstration.

News

University of Oxford

On June 3, the degree of D.M. was conferred on J. M. Rice-Oxley and J. R. O'Brien.

University of Birmingham

Dr. C. White has been appointed lecturer in physiology from Sept. 1. He is at present working in the department of physiology in the University of Pennsylvania.

Royal College of Surgeons of England

At a meeting of the council of the college held on Thursday, June 8, the following were coopted to the council for 1950–51 :

Dr. Guy Dain (general practice), Prof. A. M. Claye (gynæcology and obstetrics), Mr. V. E. Negus (otolaryngology), Mr. A. D. Marston (anæsthetics), Mr. J. H. Doggart (ophthalmology), Prof. R. V. Bradlaw (dental surgery), Prof. B. W. Windeyer (radiology).

Mr. R. V. Cooke was admitted as a member of the court of examiners, and the following examiners were appointed :

Fellowship.—Ophthalmology : Dr. S. P. Meadows. Anatomy : Prof. James Whillis, Mr. P. H. Mitchiner, Prof. Thomas Nicol, Mr. D. N. Matthews. Applied Physiology and Pathology : Prof. J. H. Dible, Prof. W. R. Spurrell, Prof. D. T. Harris, Prof. Theodore Crawford.

Diploma of L.R.C.P., M.R.C.S.—Elementary Biology : Mr. Alan Fisk, Mr. Frederick Segrove, Mr. A. G. Hamilton, Mr. C. C. Hentschel. Anatomy : Prof. D. V. Davies, Mr. R. J. Last, Prof. Thomas Nicol. Physiology : Prof. D. T. Harris, Dr. C. C. N. Vass. Midwifery : Mr. H. G. Kirwan-Taylor, Mr. Henry Evers, Dr. R. K. Bowes, Mr. D. M. Stern. Pathology : Dr. J. O. Oliver, Dr. H. A. Magnus, Prof. E. F. Finch, Mr. L. E. C. Norbury.

Diploma in Public Health.—Preliminary : Dr. Ian McCracken. Final : Dr. C. O.-S. B. Brooke.

Diploma in Tropical Medicine and Hygiene.—Colonel H. E. Shortt, Prof. Sydney Smith.

Diploma in Ophthalmology.—Prof. Arnold Sorsby, Mr. R. C. Davenport, Mr. A. B. Nutt, Mr. T. K. S. Lyle, Mr. A. G. Cross, Mr. A. McKie Reid, Dr. Eugene Wolff.

Diploma in Psychological Medicine.—Part I : Dr. Louis Minski.

Diploma in Laryngology and Otology.—Part I : Prof. F. C. Ormerod, Mr. G. H. Livingstone. Part II : Mr. John Henry Cobb.

Diploma in Medical Radiodiagnosis.—Part I : Mr. F. W. Spiers, D.Sc. Part II : Dr. Hugh Davies.

Diploma in Medical Radiotherapy.—Part I : Dr. Spiers. Part II : Mr. Ivor Glyn Williams.

Diploma in Anæsthetics.—Part I : Dr. Stanley Rowbotham, Dr. J. F. Taylor. Part II : Mr. R. H. Boggon, Prof. R. R. Macintosh.

Diploma in Child Health.—Dr. A. D. C. Bell, Mr. G. H. Macnab, Mr. T. Twistington Higgins.

Diploma in Physical Medicine.—Part I : Dr. Eric John Crisp, Mr. Hubert Wood. Part II : Mr. Philip Wiles, Dr. W. S. Tegner.

Diploma in Industrial Medicine.—Part I : Dr. Arthur Massey. Part II : Dr. Hubert Wyers.

Heberden Society

The annual Heberden " round " was given by Prof. F. Coste at the Hôpital Cochin, Paris, on May 20.

Faculty of Ophthalmologists

At a meeting of the council on May 19, the following were elected officers for 1950–51 : president, Mr. Frank W. Law ; vice-president, Mr. O. M. Duthie ; hon. secretary, Mr. J. H. Doggart ; hon. treasurer, Mr. A. B. Nutt. Casual vacancies on the council, caused by the alterations to the regions represented, have been filled as follows : Oxford, Mr. G. T. W. Cashell ; Northern Ireland, Mr. J. R. Wheeler ; Liverpool, Mr. McKie Reid ; South-Western, Mr. R. R. Garden ; East Anglia, Mr. G. H. Buck ; Newcastle upon Tyne, Mr. H. Vernon Ingram. Mr. Doggart was nominated to represent ophthalmology on the council of the Royal College of Surgeons for 1950–51.

It was agreed to give general support to the following resolution sent by the British Association of Otolaryngologists to the Royal Colleges and to the Otolaryngologists Group Committee of the British Medical Association :

> The council views with concern the tendency of regional boards to appoint full-time consultants to the staffs of hospitals and maintains that such appointments should remain as heretofore predominantly part-time.

A letter was received from a member objecting to a statement in a circular issued by the Welsh Board of Health regarding second eye-tests. The member felt that the power to authorise a second eye-test within twelve months should rest entirely with the ophthalmic medical practitioner and not with the ophthalmic optician. It was agreed to make representations to the Ministry that these cases should be referred to the hospital service, whether they had been examined originally by an ophthalmic medical practitioner or an ophthalmic optician.

The faculty is continuing to sponsor study visits to clinics abroad.

Ophthalmological Society of the United Kingdom

The Edward Nettleship prize for 1950 has been awarded to Prof. A. J. Ballantyne.

Renal Association

The second general meeting of this association is to be held on June 21 at 4 P.M., at the Ciba Foundation, 41, Portland Place, London, W.1.

Italian Hospital, London

On Monday, June 19, at 3 P.M., the Italian Ambassador will reopen the Italian Hospital which was closed during the war.

Liverpool Regional Hospital Board

At a meeting on June 1, the board agreed to carry out a survey in relation to preconvalescent annexes, as desired by the Ministry of Health. Similar investigations are to be made in certain other industrial areas. The board also considered a report on possible means of economising in drugs and dressings.

International Congress of Radiology

The Earl of Athlone will open the sixth International Congress of Radiology at the Central Hall, Westminster, on July 24. Nearly 50 countries will be represented at the congress, which will be continued in a number of sections until July 28. Meetings will be held in the Central Hall, at Church House, and in the Caxton Hall. A scientific exhibition, part of which will be compiled in collaboration with the Science Museum, will take place at the Central Hall during the congress week and an exhibition of apparatus, accessories, and materials for use in radiology and physiotherapy will be held in the two halls of the Royal Horticultural Society in Vincent Square.

Society of Chiropodists

This society is holding its annual convention in London on June 22, 23, and 24 at Friends House, Euston Road, N.W.1. Sir Cecil Wakeley, P.R.C.S., will open the meeting, and other medical speakers will include : Dr. I. L. MacKinnon (Rôle of the Nervous System in the Life of the Lower Limb), Dr. J. I. Aitken (Posture in relation to Feet), and Mr. J. C. R. Hindenach (Orthopædic Aspects of the Rheumatic Diseases in Relation to the Leg and Foot).

British Association of Urological Surgeons Home and Overseas

The sixth annual meeting of the association will be held at Manchester on June 30 and July 1 under the presidency of Mr. W. W. Galbraith. The programme includes short papers, films, clinical demonstrations, and operating sessions. Mr. Hugh Donovan and Mr. F. G. Hollands will open a discussion on the Results of Diathermy Treatment of Villous Papilloma of the Bladder; and Dr. Ralston Paterson and Mr. D. S. Poole Wilson will introduce a series of papers on the Treatment of Carcinoma of the Bladder.

W.H.O. Executive Board

At the opening of the board's sixth session, in Geneva on June 1, Dr. H. S. Gear (South Africa) was elected chairman, in succession to Sir Arcot Mudaliar (India). Dr. Gear, who was born in 1903, is deputy chief health officer of the Union of South Africa, and has held various public-health appointments in China, Rhodesia, and South Africa, and with the British Army.

The board decided on May 7, 1951, as the date for the opening of the fourth World Health Assembly, which is to be held in Geneva.

National Foot Health Exhibition

Opening this exhibition in London last Monday, Sir Wilson Jameson welcomed the establishment of the Foot Health Educational Bureau, which had been the means of bringing together all those interested in preventing and treating foot defects. " The medical profession, as a whole, does not yet appreciate fully the far-reaching consequences of neglect of the feet. Parents, in particular, need educating as to the importance of buying the right sort of footwear for growing children, and I feel fairly certain that there are not a few members of the boot-and-shoe industry who fall short of the standard of knowledge and practice laid down by the best elements of the industry itself."

London County Medical Society

A clinical meeting of this society will be held at Queen Mary's Hospital, Carshalton, Surrey, on Wednesday, July 12, at 2.30 P.M. Further *information* may be had *from* Mr. J. Gabe, F.R.C.S., St. Alfege's Hospital, S.E.10.

Dental Whitley Council

A Whitley Council for Dentists employed by or in contract with local authorities has been established, and the first meeting was held on June 8. A claim for improved salaries and conditions of service has been lodged by the staff side and is under consideration.

The Board of Registration of Medical Auxiliaries

Mr. L. Vernon Cargill, F.R.C.S., treasurer and a vice-president of the board since 1937, has retired. Mr. J. H. Hanby, F.CH.S., has been appointed treasurer and Dr. A. P. Gibbons and Mr. F. Melville, hon. F.S.R., vice-presidents. Dr. F. D. Howitt, has been appointed by the Society of Apothecaries to replace Mr. Cargill.

International Congress of Gerontology

The first International Congress of Gerontology will be held at Liége from July 10 to 12 under the presidency of Prof. L. Brull, dean of the faculty of medicine of the University of Liége. During the meeting it is hoped to set up an international association of gerontological societies. Further particulars may be had from Professor Brull, Hôpital de Bavière, Liége, Belgium.

R.A.F. Medical and Dental Branch

The annual dinner of the R.A.F. Medical and Dental Branch will take place on Friday, Oct. 6, at the Hyde Park Hotel, London, at 7.30 P.M. As the number of tickets (£1 8*s*.) is limited, past and present medical officers who wish to attend should apply as soon as possible to the honorary secretary, Wing-Commander G. R. Gunn, Air Ministry (MA3), Awdry House, Kingsway, W.C.2.

Lady Tata Trust

The *trustees* of this fund have made the following awards for research in blood diseases, with special reference to leukæmia, in the year beginning on Oct. 1, 1950:

Grants for research expenses and assistance: Prof. Jørgen Bichel (Aarhus, Denmark); Dr. George Discombe (London); Dr. Astrid Fagraeus and Dr. Bo Thorell (Stockholm); Dr. Niels Gunnersen Harboe (Copenhagen); Dr. Endrev Kelemen (Szeged, Hungary); Prof. Charles Oberling (Paris); Dr. Edith Paterson (Manchester); Dr. Günther Schallock (Münster).

Scholarships: Dr. Pascou Atanasiu (Rumania) for work in Paris; Dr. Henri Paul Lucien Febvre (France) for work in Paris.

Society for the Relief of Widows and Orphans of Medical Men

The annual general meeting of this society was held on June 7, with Mr. C. J. Hope Gunning, *vice-president*, in the chair. Mr. G. T. Mullally was elected a vice-president. At the end of the year the membership of the society was 244. During the year 43 widows were in receipt of grants, and the total sum distributed was £4000. The by-law setting an income-limit for widows who receive grants has been raised from £125 to £150 per annum. Further details as to membership of the society may be had from the secretary, 11, Chandos Street, London, W.1.

Association of Sea and Air Port Health Authorities

Addressing this association at its annual meeting, held at Grimsby on June 7–9, Dr. L. Thomas, senior medical officer, London Airport, stated that both London (Heath Row) Airport and Northolt Airport were designated as sanitary aerodromes as from Sept. 23, 1949. The health control was vested in the Middlesex County Council as the authority for administering the Public Health (Aircraft) Regulations, 1950. The bulk of the passenger traffic by air into England passed through these two airports; Northolt took all the internal traffic, whereas Heath Row took the world traffic; the Continental traffic was shared between the two airports. The health-control procedure was closely integrated with the examination of passengers by the immigration and customs authorities. He described the revised procedure, under the Western Union Agreement, whereby medical inspection is limited to the first port of entry within the union. At this examination the personal health declaration is stamped red or green. The red stamp indicates that further health surveillance is necessary, whereas the green stamp normally frees the passenger from further inspection or health control.

Appointments

BELL, H. E., M.B. N.U.I., D.A.: anæsthetist (registrar), Edinburgh central group of hospitals.

CASSELLS, JOHN, M.B. Glasg.: deputy superintendent, Gogarburn Institution for Mental Defectives.

GOLD, S. C., M.B. Camb., M.R.C.P.: hon. dermatologist, Hospital of St. John and St. Elizabeth, London.

GROOM, W. A., L.M.S.S.A., D.A.: senior registrar anæsthet St. Andrew's Hospital, London.

MURPHY, MONICA, M.B. Glasg., D.OBST.: obstetric and gynæcological registrar, St. Andrew's Hospital, London.

VAUGHAN, C. J. R., M.R.C.S.: M.O. Colonial Service, Somaliland.

Appointed Factory Doctors:

CARMICHAEL, LACHLAN, M.B. Glasg.: Saltcoats district.

HERFORD, M. E. M., D.S.O., M.C., M.B.E., M.B. Brist., D.P.H.: Windsor and Slough district.

LODEN, A. E., M.B.E., M.B. Lond.: Horsmonden district.

Liverpool Regional Hospital Board:

FRANCIS, W. J. L., CH.M Glasg., F.R.C.S., M.RAD. Lpool, D.M.R.T.: consulting radiotherapist, Liverpool Radium Institute.

GOLDSTEIN, DAWID, M.D. Cracow: [illegible] duties in Liverpool and clinics in ..

ROBINSON, W. A. M., M.B. Lpool, D.P.H.: [illegible] Rainhill Hospital.

SCARROW, G. D., M.B. Lpool, M.RAD., D.M.R.D.: consulting radiologist, hospitals in Wirral.

THOMAS, R. G., M.B. Lpool, D.P.H.: asst. S.M.O., regional hospital board.

Births, Marriages, and Deaths

BIRTHS

BALL.—On May 30, in London, the wife of Dr. Keith Ball—twin daughters.

BELILIOS.—On June 3, at Wimbledon, the wife of Dr. A. D. Belilios—a daughter.

CAMPBELL.—On June 3, at Clifton, Bristol, the wife of Dr. A. M. G. Campbell—a son.

CHALMERS.—On June 2, in London, the wife of Dr. J. N. Marshall Chalmers—a son.

DALE.—On May 29, at Taipeh, Taiwan, the wife of Dr. H. Donald Dale—a son.

GREGORY.—On June 1, at Guildford, the wife of Dr. Basil Gregory—a son.

HUGHES.—On June 8, in Bristol, the wife of Dr. E. Brierley Hughes—a daughter.

HUNT.—On May 31, at Blackpool, the wife of Dr. G. N. Hunt—a son.

MANT.—On May 30, in London, the wife of Dr. A. Keith Mant—a daughter.

SANDS.—On June 3, in London, the wife of Dr. Richard Xerxes Sands—a daughter.

SLOVICK.—On June 4, in London, the wife of Dr. David Slovick—a daughter.

MARRIAGES

HALL—CAPNER.—On June 5, Surgeon Vice-Admiral Sir Basil Hall to Mrs. Dorothy Capner.

LEECH-WILKINSON—COOMBS.—On June 3, at Bathwick, Arthur Leech-Wilkinson, F.R.C.S., to Janet Elizabeth Coombs.

DEATHS

EWART-JONES.—On June 4, at Folkestone, Philip William Ewart-Jones, B.SC. Wales, M.R.C.S.

GILCHRIST.—On June 4, at Shere, Surrey, John Gilchrist, M.D. Edin.

MEADEN.—On May 26, at Thetford, the Rev. Charles Anderson Meaden, M.R.C.S.

PORTER.—On June 4, at Falmouth, Frederick Joseph William Porter, D.S.O., M.R.C.S., major, R.A.M.C. retd, aged 83.

SLATER.—On June 3, in London, Alan Butler Slater, M.D. Edin., aged 75.

TATTON.—On May 29, in Edinburgh, Glyde Philip Tatton, M.B. Lond.

CORRIGENDUM: *Foresight in the U.S.A.*—Our annotation of March 25 implied that the United States, in 1940, *had far* larger "physician resources" than was in fact the case. We said: "*In 1940* a quarter of the inhabitants *of the* United States lived in regions which had 146 or more doctors per *100,000*; *a* third lived in regions with a doctor-patient ratio below 146 but above 136; and the remainder lived in *areas* with a ratio below 136 but above 118." *Closer study* of the U.S. Public Health Bulletin no. 305, which we were reviewing, shows that not quite half the population *lived* in regions with *118 doctors, or more, per* 100,000 *population.* Of these regions, numbering 37, the top 16, with a minimum doctor-patient *ratio of* 136, contained a third of the population, and the top 12, with a minimum ratio of 146, contained a quarter. *What our annotation did not make clear* was that in the remaining 89 regions, inhabited by the other half of the United States *population*, ratios were below 118 per 100,000, ranging from 56·8 upwards.

THE EXPERIMENTAL BACKGROUND AND CLINICAL USE OF ANTIBIOTICS *

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EMANUEL B. SCHOENBACH
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TODAY, the practitioner of medicine will be found wanting unless he understands clearly the experimental background for the clinical use of the many antibiotics which are, or soon will be, at his disposal. To serve efficiently his patient who is suffering from an infectious process, he must choose that antibiotic which experimental and clinical experience has shown to be best for that particular infection. His knowledge must be such that he unerringly administers the antibiotic of choice.

Five years ago this was easy: one recommended the use of penicillin if it appeared to be indicated. Four years ago the situation became more complicated owing to the introduction of streptomycin, an antibiotic which is highly effective not only against many gram-negative bacillary organisms but also against certain gram-positive ones. But even then the choice of antibiotics was not too difficult. Now the situation has changed. One has the choice of bacitracin for use in limited spheres, or of aureomycin, chloramphenicol ('Chloromycetin'), or terramycin in a wide variety of infections; and polymyxin, neomycin, and viomycin may soon emerge over the clinical horizon. Other effective antibiotics will undoubtedly be discovered, and, with each new therapeutic agent of this type, the practitioner's problem of choosing the right one for the treatment of his patient becomes more complex.

However, this multiplicity of antibiotics is all to the good, at least as far as the patient is concerned. The increasing range of efficacy of these agents against infectious processes, the ease with which they can be administered, and the certainty of their beneficial action have completely altered the medical, social, and economic aspects of infectious diseases. In most instances the practitioner can confidently assure a patient who is suffering from an infection that he will be well in a short time. This undoubtedly improves the relations between the practitioner and his patient. The latter benefits socially and economically by frequently being spared the costs of catastrophic illness, and, since certain of the antibiotics such as aureomycin are admirably suited for home use, the costs of hospital and other medical care are often avoided. Furthermore, with the development of new antibiotics and with an increase in our knowledge of possible prophylactic uses for these agents, they are becoming exceedingly valuable in preventing certain infectious processes from developing after exposure has taken place, and in minimising the seriousness of others. Thus the proper choice and use of antibiotics for the control and treatment of infections assumes a very important rôle in the practice of medicine, because they concern not only the life and well-being of the patient but even his social and economic status. This paper presents relevant data from our own laboratories and our own clinical experience.

The Experimental Background

TOXICITY

While experimental testing of the toxicity of antibiotics in mice, white rats, and dogs does not provide information about the reactions of sensitivity which these agents may produce in human beings, it does provide useful information about the direct lethal and organic toxicities of these substances. Because they are well known, the acute and chronic toxicity of penicillin and streptomycin will not be discussed here.

The acute toxicities for mice, following the subcutaneous injection of the newer compounds as measured by the lethal dose for 50%—i.e., that dose which will kill half the mice—are as follows: for polymyxin D, 250–300 mg. per kg. body-weight; for aureomycin, 3000–4000 mg. per kg.; for chloramphenicol, 1300 mg. per kg. (by the intraperitoneal route); for neomycin, 450 mg. per kg.; and for terramycin, 600–650 mg. per kg.

Young female white rats have been useful in determining whether new antibiotics may produce renal damage. It was found that, when aureomycin or terramycin was administered to white rats in doses of 50–200 mg. per kg. for a period of ten days, no renal changes took place. On the other hand, the administration to white rats of polymyxin D in doses of 10–20 mg. per kg., or of neomycin in doses of 30–60 mg. per kg., produced definite evidence of renal damage.

Further studies of the acute and subacute toxicity of antibiotics were made in dogs. From these animals additional information has been obtained concerning the renal toxicity of polymyxin D and neomycin. Polymyxin D in doses of 40 mg. per kg. for ten days produced definite injury in canine kidneys. The damage was tubular in nature. With neomycin in doses of 80 mg. per kg. for ten days, renal damage was noted in dogs, and in one instance this amount of the antibiotic appeared to

TABLE I—IN-VITRO BACTERIOSTATIC ACTIVITY OF ANTIBIOTICS AGAINST CERTAIN GRAM-POSITIVE MICRO-ORGANISMS (μG. PER ML.)

Micro-organism	No. of strains	Penicillin G	Strepto-mycin	Poly-myxin D	Aureo-mycin	Chloram-phenicol	Terra-mycin	Neomycin
Hæm. streptococcus group A	3	0·006	12·5–25	100 +	0·08–0·31	2·5–5	0·08–0·16	25–50
Hæm. streptococcus group B	2	0·006–0 031	50–100	..	0·62	2·5–5	0·16	50
Hæm. streptococcus group C	1	0·016	6·25	..	0·16	2·5	0·16	25
Hæm. streptococcus group D	4	2 5	12·5–50	100 +	0·31–1·25	0 62–10	0·16–0 31	12·5–50
Strep. viridans	3	0·625–2·5	3·12–12 5	100 +	0·31–0·62	2·5–10	0·31–0 62	0·31–25
Strep. fæcalis	2	2·5	50	100 +	0 62	10	31	25–50
Pneumococcus I	1	0·016	12·5	100 +	0·31	2·5	0·16	15·6
Diphtheroid	1	..	..	..	0·16	..	0·16	0·16
Staph. aureus	3	0·03–0·06	2–10	100 +	0·31–0·62	..	0·31	0·39–12·5
Staph. albus	2	0·016	2	..	0·31	..	0·16	0·16
Clostridium welchii	3	0·02–0·1	100–2000	1000 +	0·1	1–2	0·5	100
Cl. septicum	1	0·06	100	1000 +	0·01	1	0·05	10
Cl. sporogenes	1	0·1	100	1000 +	0·05	1	0·5	100
Cl. novyi (Cl. œdematiens A) .. .	2	0·1	100	1000 +	0·1–5	1–10	0 05	100–1000
Cl. tetani	2	0·1–10	1000	1000 +	0·1	10	0·5	100–1000
Bacillus subtilis	2	..	..	..	0·08–1·25	..	0·08–0·62	0·08–0·62

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* This paper was given in the form of a University of London lecture by Professor Long at St. Mary's Hospital on May 23.

TABLE II—IN-VITRO BACTERIOSTATIC ACTIVITY OF ANTIBIOTICS AGAINST CERTAIN GRAM-NEGATIVE MICRO-ORGANIS (µG. PER ML.)

Micro-organism	No. of strains	Penicillin G	Strepto-mycin	Poly-myxin D	Aureo-mycin	Chloram-phenicol	Terra-mycin	Neomyc
Bact. coli	1	..	6·25	0·16	5	10	1·25	3·16
Bact. aerogenes	4	..	2·5–100	0·31–0·62	2·5–5	5–10	1·25–2·5	0·78–1·5
Proteus	3	..	5	500	6·25–100	2·5–25	10–100	3·12–6·2
Ps. aeruginosa	3	..	12·5	2·5	50–100	100	6·25	7·8
Bact. pneumoniæ A	1	..	0·62	0·16	5	5	0·62	0·78
Bact. pneumoniæ B	1	..	5	0·62	5	5	1·25	0·78
Hæmophilus influenzæ B	2	..	1·25	0·065	2·5–0·625	..	2·5	5

cause deafness. Thus it can be seen that studies of the acute toxicity provide indications for the dosage of antibiotics in experimental and clinical therapy, as well as information on direct organic damage which may be done by these agents.

ANTIBACTERIAL EFFECTS IN VITRO

A general knowledge of the types of antibacterial effects, coupled with information on the degree of activity of antibiotics in vitro, is useful to the practitioner. He should know whether a given antibiotic has a primarily bactericidal or primarily bacteriostatic effect against micro-organisms. This knowledge permits him to gauge more accurately the dosage and duration of therapy. The antibacterial activity of a number of antibiotics in vitro is shown in tables I and II.

It is to be noted that penicillin G is the most effective antibacterial agent against gram-positive micro-organisms in vitro, and that aureomycin and terramycin are close seconds. Chloramphenicol and streptomycin possess some antibacterial activity against gram-positive micro-organisms, but on the whole much less than that of the three antibiotics first mentioned.

When the antibacterial activity in vitro of certain of the antibiotics against gram-negative micro-organisms is tested, polymyxin D, terramycin, and neomycin appear to be comparable in their effects (table II). Aureomycin and chloramphenicol are also similar in their antibacterial activity. There is one interesting thing—namely, that neither of these latter two antibiotics is highly bacteriostatic against *Pseudomonas aeruginosa* (*Ps. pyocyanea*, var. *erythrogenes*) and their activity against organisms of the proteus groups is quite variable.

It is fair to ask how far these in-vitro observations can be carried over to the experimental and clinical treatment of infections. The answer is more or less. While terramycin and aureomycin have about the same bacteriostatic activity in vitro, the latter is more effective against experimental pneumococcal and streptococcal infections in mice. Similarly, while polymyxin D, aureomycin, and chloramphenicol have a high degree of antibacterial activity against *Salmonella typhi* in vitro, of the thre chloramphenicol alone has proved to be of real value i the treatment of typhoid fever. In the therapy of gram negative bacillary clinical infections due to *Bacterium col* *Bact. aerogenes*, *Brucella abortus*, *Bact. pneumoniæ*, c *Bact. tularense*, aureomycin and chloramphenicol seem t be comparable. Their bacteriostatic activity agains these micro-organisms in vitro is about the same. I would appear then that while generalisations can b made from in-vitro activity (and most certainly from lack of activity), in any specific instance, the data fro such studies do not enable one to predict with certaint what the curative effects of a given antibiotic will be i all experimental or clinical infections.

TABLE III—EFFECTS OF ANTIBIOTICS IN EXPERIMENTAL HÆMOLYTIC STREPTOCOCCAL INFECTION IN MICE

*c*203 *strain.* 10,000–100,000 M.L.D. (minimum lethal doses) injected intraperitoneally. Ten to thirty mice in each group.

Drug* µg. per g. body-weight	% survival					
	Peni-cillin G	Strepto-mycin	Aureo-mycin	Chlor-amphen-icol	Neo-mycin	Terra-mycin
80	..	43	..	0	..	..
50	..	30	..	10	0	70
25	..	10	100	..	0	10
10	..	..	55	..	..	0
5	..	..	35	..	..	15
3	..	..	30	..	..	..
2	..	..	15	..	..	0
0·5	70	..	..	..	..	..
0·4	73	..	..	..	..	..
0·2	55	..	..	..	..	..
0·16	0	..	..	..	..	..
0·00	0	0	0	0	0	0

* Drug administered subcutaneously statim, 5½, and 23 hours after infection.

TABLE IV—EFFECTS OF ANTIBIOTICS IN EXPERIMENTAL TYPE PNEUMOCOCCAL INFECTIONS IN MICE

SVI strain. 10,000 M.L.D. injected intraperitoneally. Te to forty mice in each group.

Drug* µg. per g. body-weight	% survival					
	Peni-cillin G	Strepto-mycin	Aureo-mycin	Chlor-amphen-icol	Neo-mycin	Terra-mycin
60	70	40	..	..	..	..
50	..	23	..	0	0	100
25	60	0	..	0	0	10
20	..	..	100	..	..	..
15	..	..	43	..	0	0
10	30	..	40	..	0	0
5	20	..	2·5	..	..	0
2·5	20	..	0	..	..	..
0·8	0	..	..	..	..	..
0·0	0	0	0	0	0	0

* Drug administered subcutaneously statim, 5½, and 23 hours after infection.

Investigations in our laboratories over a period of years permit us to say, within certain broad limits, that, in vitro, polymyxin D is highly bactericidal, that penicillin G is moderately bactericidal, and that aureomycin, chloramphenicol, terramycin, streptomycin, and neomycin are highly bacteriostatic.

BACTERIAL RESISTANCE

The problem of bacterial resistance to the antibacterial effects of antibiotics is becoming important. Reports concerning the isolation of penicillin-resistant strains of *Staphylococcus aureus* as the ætiological agents in hospital epidemics or endemics of staphylococcal infection are increasing. Romansky (1950) reports that, in 1949, 58% of the strains of *Staph. aureus*, 21% of the strains of *Staph. albus*, 55% of the strains of non-*hæmolytic* streptococci, and 98% of the strains of *Strep. fæcalis*, which he isolated from infectious processes, showed primary resistance, of varying degree, to the antibacterial effects of penicillin. Strains of hæmolytic streptococci (group A), pneumococci, and meningococci which he tested in the same year were not resistant. Similarly, 33% of the strains of *Bact. coli*, 45% of the strains of *Bact. aerogenes*, 70% of the strains of proteus, 77% of the strains of *Ps. aeruginosa*, 33% of the strains of non-hæmolytic streptococci, and 77% of the strains of *Strep. fæcalis* which he isolated from infectious processes were primarily resistant to the antibacterial effects of streptomycin.

Studies in our own laboratories seem to demonstrate that susceptible micro-organisms seldom if ever develop "step-like" resistance to aureomycin. It is possible to produce temporarily twofold, fourfold, or eightfold increases in the resistance of certain micro-organisms to aureomycin, but first-generation increases of a thousandfold or ten-thousandfold in resistance have not been observed. Also the slight increases noted in resistance to aureomycin in vitro tend to disappear promptly in subsequent generations after the exposure to the antibiotic has ceased.

TREATMENT OF EXPERIMENTAL INFECTIONS

This phase of the investigation of an antibiotic is the one which gives valuable information about its potential activity in the treatment of infections in human beings. While a wide variety of infections may be produced in mice by infectious agents derived from human sources, certain standard infections, the natural history of which are well known, are usually employed for this purpose. In our own laboratory for more than ten years experimental infections (peritonitis) in mice produced by a strain of β-hæmolytic streptococci (C 203), a strain of type I pneumococcus (SV 1), a strain of Friedländer's bacillus (type A), and a strain of influenza bacillus (type B) have been used for determining the therapeutic effects of antibiotics. The concomitant injection of mucin to produce infections of the desired virulence is needed only with the strain of the influenza bacillus. The results of therapeutic tests with various antibiotics in experimental infections in mice are given in tables III–VI.

A study of these carefully controlled therapeutic experiments indicates that, for infections produced in mice by strains of gram-positive cocci, the most effective agents were penicillin G, aureomycin, terramycin, and chloramphenicol—in the order named. In infections produced by strains of Friedländer or influenza bacillus, polymyxin D, neomycin, streptomycin, and terramycin were almost equally effective, aureomycin and chloramphenicol being somewhat less so. It is also to be noted that aureomycin is the most effective antibiotic for the over-all treatment of all four types of infection. These results in the treatment of infections in mice have been amply confirmed by the results obtained in treating similar infections in human beings. Because of this experience, we believe that a knowledge of the results obtained with any given antibiotic in the treatment of experimental infections is essential if the antibiotic is to be properly used in clinical medicine.

TABLE V—EFFECTS OF ANTIBIOTICS IN EXPERIMENTAL FRIEDLÄNDER'S BACILLARY INFECTIONS IN MICE

Friedländer's A. 1000–10,000 M.L.D. injected intraperitoneally. Ten to twenty mice in each group.

Drug* μg. per g. body-weight	% survival					
	Streptomycin	Polymyxin D	Neomycin	Terramycin	Aureomycin	Chloramphenicol
80	100	..	..	..	90	85
70	..	..	..	..	90	100
50	100	..	..	..	70	65
35	..	..	..	..	70	80
25	100	100	..	..	20	0
20	..	..	..	80	..	..
15	100	..	..	..	..	..
8	90	100	..	..	..	..
5	..	..	100	10	..	..
2·0	40	..	90	0	..	..
0·8	30	90	..	..	..	..
0·4	..	27	0	..	..	..
0·0	0	0	0	0	0	0

* Drug administered subcutaneously statim, 5½, and 23 hours after infection.

PHARMACOLOGY OF ANTIBIOTICS

The pharmacology of penicillin and streptomycin will not be described, because practitioners are quite aware of the behaviour of these agents in the human body. Of the newer antibiotics, polymyxin D and neomycin will be omitted from discussion because of the uncertainty that they will ever become generally available to practitioners, owing to their organic toxic properties. We shall deal here with only aureomycin, chloramphenicol, and terramycin.

Aureomycin

When aureomycin is administered by mouth in a single dose of moderate size, the maximal absorption, as measured by its concentration in the blood-serum, appears to take place in from two to six hours, and detectable quantities of the antibiotic may be present in the blood-stream for at least twelve hours. The antibiotic has been noted in emulsions of the liver, kidney, spleen, and lungs of patients who died while receiving it; but nothing is known as to whether it actually diffuses into the intracellular water of the cells of these tissues. We suspect, however, that it does, and certainly it must penetrate the endothelial cells: otherwise it would be difficult to explain the action of aureomycin on rickettsia. This antibiotic does not easily pass the blood-brain barrier in human beings, but when the meninges are infected it can be detected in the cerebrospinal fluid. It passes into the bile and milk in fair concentrations. As yet we do not know whether it diffuses into the vitreous or aqueous humour. From 12 to 15% of a single dose of aureomycin can be recovered from the urine, in which it may be excreted for as long as seventy-two hours after a single dose. In the urine, concentrations of several hundred microgrammes of aureomycin are easily obtainable after moderate and repeated doses of aureomycin. It passes the placental barrier, and appreciable amounts can be detected in the cord blood of the infant when the mother is receiving aureomycin. With multiple doses of aureomycin spaced at six-hourly intervals, concentrations of 2·5 to 20 μg. of the antibiotic per 100 ml. have been noted in the blood-stream.

TABLE VI—EFFECT OF ANTIBIOTICS IN EXPERIMENTAL INFLUENZAL BACILLARY INFECTIONS IN MICE

H. influenzæ type B. 100–10,000 M.L.D. injected with mucin intraperitoneally. Ten to thirty mice in each group.

Drug* μg. per g. body-weight	% survival					
	Streptomycin	Polymyxin D	Neomycin	Terramycin	Aureomycin	Chloramphenicol
80	..	..	90	..	..	..
40	..	..	..	90	..	20
20	90	92	85	70	65	0
10	..	..	..	0	..	10
5	80	90	35	0	35	0
1	55	83	25	0	13	0
0	0	0	0	0	0	0

* Drug administered subcutaneously statim, 5½, and 23 hours after infection.

It appears that after an intravenous dose of aureomycin maximal concentrations of the antibiotic in the blood are reached within five minutes, while detectable amounts may be noted for as long as twelve hours. Also it has been observed that relatively small amounts of aureomycin, when injected by the intravenous route, will produce excellent concentrations of the antibiotic in the patient's blood. This observation is of importance to the physician when he is considering the use of aureomycin in critically ill patients.

It can be seen from this that much is unknown about the pharmacology of aureomycin, and further progress in this field awaits the determination of its chemical structure. However, it seems that it is quite well absorbed when given by mouth, is probably distributed in both the extracellular and intracellular tissues, and is excreted mainly in the urine ; also that the greater part of a dose of aureomycin, as such, is destroyed in the body. There is no evidence that renal dysfunction lessens its excretion in the urine.

Chloramphenicol

Chloramphenicol is a crystalline antibiotic which, in chemical structure, is a nitrobenzene compound. It can be produced by a synthetic method. It is relatively insoluble, and for that reason oral administration is preferred. When a single moderate dose of chloramphenicol is given by mouth, the concentration of the antibiotic in the blood reaches a peak within two hours and then declines ; at eight hours its presence is often no longer detectable.

Though extensive studies have not been made, it seems that chloramphenicol is well distributed in the body tissues. It undoubtedly is present in both the intracellular and extracellular body water : otherwise it would not be so effective in the control of rickettsial infections. It readily passes into the cerebrospinal and pleural fluids and it is found in appreciable quantities in the bile. The placenta offers no barrier to its passage and within two hours of the administration of a single dose the concentration of chloramphenicol in cord blood is approximately 75% of that in the maternal blood. It is excreted mainly in the urine, in which it appears in appreciable quantities within thirty minutes of a single dose. With multiple doses of chloramphenicol there is little difficulty in maintaining high concentrations of the antibiotic in both blood and urine. It is not yet known whether chloramphenicol passes into the vitreous or aqueous humours.

Both chemical and biological tests are available for detecting chloramphenicol and its breakdown products in body-fluids and tissues. A comparison of the two tests, on like samples of blood from patients who are receiving chloramphenicol, shows that in the first few hours after the antibiotic has been administered both tests give comparable readings. Then, however, the chemical values mount, while the biological values drop, indicating the conversion of chloramphenicol to an inactive form in the body. In the urine this difference is always very marked and the chemical test gives readings about ten times greater than those of the biological test, again indicating that most of the chloramphenicol excreted is in an inactive form. There is no evidence that renal dysfunction impairs the excretion of chloramphenicol in the urine.

TABLE VII—PRESENT-DAY USAGE OF ANTIBIOTICS IN INFECTIONS

Infection	Penicillin	Streptomycin	Aureomycin	Chloramphenicol	Terramycin
Streptococcal :					
β-hæmolytic ..	I	II	II	III	U
α-hæmolytic ..	I	II	II	..	U
Non-hæmolytic ..	I	..	II	..	U
All enterococci ..	II	..	I	..	U
Staphylococcal ..	II	..	I	..	III
Pneumococcal ..	I	III	II	..	III
Neisserian :					
N. meningitidis ..	I	..	II	III	U
N. gonorrhœæ ..	I	II	III	III	III
Diphtheritic	I + Anti-toxin	..	..	..	U
Tuberculous	..	I + P.A.S.	..	..	..
Anthrax	I	..	I	..	U
Clostridial :					
Gas-gangrene ..	I	..	U	U	U
Tetanus	I	..	..	..	..
Gram-negative bacillary :					
Bact. coli	..	II	I	I	II
Bact. pneumoniæ ..	..	II	I	I	II
Proteus	..	I	..	..	U
Bact. aerogenes ..	..	II	I	I	U
Ps. aeruginosa ..	..	II(Polymyxin is best)		..	II

I = First choice
II = Second choice
III = Third choice
.. = No value
U = Unknown

TABLE VIII—PRESENT-DAY USAGE OF ANTIBIOTICS IN INFECTIONS

Infection	Penicillin	Streptomycin	Aureomycin	Chloramphenicol	Terr- myc
Salmonella :					
S. typhi	..	..	..	I	..
Others	..	?	?	?	?
Shigella	..	..	I	I	U
Pasteurella :					
P. pestis	..	I + S.D.	U	U	U
Brucella :					
Bact. tularense ..	..	..	I	I	U
Br. melitensis ..	..	II + S.D.	I	I	U
Br. suis	..	II + S.D.	I	I	U
Br. abortus	..	II + S.D.	I	I	U
Listerella	..	..	I	U	U
Cholera	..	..	U	U	U
Hæmophilus :					
H. influenzæ meningitis	..	III + S.D.	I + S.D.	II + S.D.	U
H. pertussis	..	?	?	?	U
H. ducreyi	..	II	I	I	U

I = First choice
II = Second choice
III = Third choice
.. = No value
S.D. = Sulphadiazin
U = Unknown

Terramycin

When terramycin is administered in a single dose of 2·0 g. to fasting individuals, it can be found in the blood-serum within thirty minutes and may remain detectable for more than twenty-four hours. In this respect terramycin differs from either aureomycin or chloramphenicol. During the twenty-four hours following the injection of a single dose of terramycin, 12–25% or more may be recovered in the urine. The antibiotic passes over into the bile in goodly quantities. It traverses the placental barrier and can be found in fœtal blood. It passes into the milk. And in normal individuals it passes, in small amounts, into the spinal fluid. Data on its general distribution in the body are still lacking.

Clinical Use of Antibiotics

THE ANTIBIOTIC OF CHOICE

Having sketched the background of experimental work, we shall now attempt to summarise current thought concerning the selection and use of antibiotics. (We shall confine ourselves to the systemic use of antibiotics, because we think that their employment as topical agents is generally unnecessary and often dangerous. Sensitisation to an antibiotic can most readily be produced by its local use.)

The subject is dynamic : what is first choice today may not be recommended at all a year hence—so rapidly is work progressing. But though our recommendations, presented in tables VII–XI, are liable to revision as experience increases or new antibiotics are developed, there are nevertheless certain fundamental rules which the physician should bear in mind :

1. Adequate doses should be employed. The aim should be to bring the infection under control as quickly as possible. This is especially important in the treatment of severe or fulminating infections.

2. Do not overtreat the patient. Antibiotics are often expensive, and all of them can produce toxic reactions. Watch carefully the clinical and laboratory response of the infection to therapy, and when in your opinion the infection is controlled discontinue treatment.

3. Remember that in most instances the response should be prompt. As a rule, if definite clinical improvement is not evident within one to three days, the physician should question the value of further therapy with the particular antibiotic he is using in the particular case.*

Necessarily this last statement must be qualified by a knowledge of the natural history and pathological nature of the infection. Infectious processes of soft tissues which are of short duration generally clear up quickly; while those in bone, in thrombi, and in certain other tissues require longer exposure to the antibiotic agent. It is also important to know whether the antibiotic has a bactericidal or a bacteriostatic action against the agent causing the infection. If the action exerted is bactericidal, the therapeutic response is generally very prompt; while if it is bacteriostatic, the response may be slower and treatment must be more prolonged. *Here, too, thought must be given to the phenomena* associated with a natural recovery from the particular infectious process, especially in relation to immune responses. When certain infectious diseases are treated very early in their evolution, and therapy is discontinued as soon as a good response to treatment has been obtained, there may be a rapid relapse because immunity has not developed.

TABLE IX—PRESENT-DAY USAGE OF ANTIBIOTICS IN INFECTIONS

Infection	Penicillin	Streptomycin	Aureomycin	Chloramphenicol	Terramycin
Spirochætal:					
Treponema pallidum	I	..	II	II	II
T. pertenue	I	..	U	U	U
T. carateum	I	..	U	U	U
Bacillus recurrentis ..	I	..	U	U	U
B. vincenti	I	..	U	U	U
Leptospira icterohæmorrhagiæ	?	..	U	U	U
Donovania granulomatosis..	..	II	I	I	U
Bartonella	..	..	U	I	U
Streptobacillary ..	..	I	U	U	U
Bacteroidosis	..	II	I	U	U
Rickettsial:					
R. prowazeki	..	..	I	I	U
R. mooseri	..	..	I	I	I
R. rickettsi	..	..	I	I	U
R. conori	..	..	I	I	U
R. akari	..	..	I	I	U
R. tsutsugamushi ..	..	..	I	I	I
R. burneti	..	..	I	I	U

I = First choice U = Unknown
II = Second choice .. = No value

4. While infecting micro-organisms frequently, and often quickly, develop "step-like" resistance to streptomycin, and less frequently to penicillin, they seldom develop a similar resistance to aureomycin or chloramphenicol.

5. In severe or fulminating infections, if two or more effective antibiotics are available, use them simultaneously. The aim of all antibiotic therapy is to bring the infection under therapeutic control as speedily as possible.

6. Don't give antibiotics "on a hunch that they might do some good." Use them only when there are indications that their administration is a rational procedure. Only too often antibiotics are employed without any logic for their use. This practice increases the cost of medical care to the patient or taxpayer, increases his chance of becoming sensitised to the antibiotic, and does no-one good.

TABLE X—PRESENT-DAY USAGE OF ANTIBIOTICS IN INFECTIONS

Infection	Penicillin	Streptomycin	Aureomycin	Chloramphenicol	Terramycin
Viral:					
Psittacosis	II + S.D.	..	I	I	U
Lymphogranuloma venereum	II + S.D.	..	I	I	U
Primary atypical pneumonia	..	..	I	I	U
Herpes simplex ..	..	..	?	U	U
Herpes zoster ..	..	..	I	I	U
Chickenpox	..	..	U	U	U
Vaccinia disseminata	..	..	I	U	U
Smallpox	..	..	U	U	U
Measles	..	..	U	U	U
Mumps	..	..	..	..	U
Infectious mononucleosis	..	..	..	..	U
Epidemic hepatitis ..	..	..	U	U	U
Epidemic keratoconjunctivitis	..	..	?	U	U
Poliomyelitis.. ..	..	..	..	..	..
Influenza	..	..	..	..	..
The common cold ..	..	..	..	..	..
Parasitic:					
Acute amœbic dysentery	..	..	*I*	*U*	*U*
Fungal:					
Actinomycosis ..	I + S.D.	..	U	U	U
Trichomonas vaginalis..	..	..	I I locally	U	U

I = First choice U = Unknown S.D. = Sulphadiazine
II = Second choice .. = No value

PROPHYLACTIC USE OF ANTIBIOTICS

As the range of effectiveness of antibiotics against infections has been increased by the discovery of new agents, so too have the uses of antibiotics in the prophylaxis of infections. These uses are portrayed in table XII. Of especial interest are the following:

The administration of 300,000 units of crystalline penicillin G by mouth, or of 300,000 units of procaine penicillin G by the intramuscular route, will markedly decrease the incidence of gonorrhœa in those exposed to the chance of this infection.

The prompt administration of 600,000 units of procaine penicillin G in oil, with 2% aluminium monostearate added, will decrease the incidence of syphilis in those exposed to this infection.

In closed communities, crystalline penicillin G, given by mouth, can be used in the prevention of β-hæmolytic streptococcal or meningococcal infections.

Aureomycin given by mouth in doses of 2 g. a day for three or four days appears to be highly effective in the prophylaxis of puerperal infection.

In rheumatic subjects the intramuscular administration of procaine penicillin G before and after the extraction of teeth, the removal of tonsils, or for that matter any operative procedure around the nose or throat will

TABLE XI—SUGGESTED COMBINATIONS OF ANTIBIOTICS IN SEVERE INFECTIONS

Infection	Penicillin	Streptomycin	Aureomycin	Chloramphenicol
Severe staphylococcal ..	I	..	I	..
Subacute bacterial endocarditis:				
α-hæm. strep.	I	..	I	..
Enterococcal	I	I	I	..
Gram-negative	..	I	I	I
Staphylococcal	I	..	I	..
Acute bacterial endocarditis:				
β-hæm. strep.	I	..	I	..
Pneumococcal	I	..	I	..
Meningitis:				
Pneumococcal	I	..	I	..
Staphylococcal	I	..	I	..
Gram-negative	..	I	I	I

TABLE XII—PROPHYLAXIS OF INFECTIONS WITH ANTIBIOTICS

Infection or condition	Penicillin G	Streptomycin	Aureomycin	Chloramphenicol
Cholera	..	..	U	U
Gonorrhœa	I	U	U	U
Syphilis	I	..	..	..
Hæm. streptococcus ..	I	..	II	U
Meningococcal meningitis ..	I	..	U	U
Puerperal sepsis	II	..	I	U
Rheumatic fever	I	..	U	U
Subacute bacterial endocarditis	I	..	II	U
"Clean" surgery	I	..	I	U
Colonic surgery	..	I P.O. + S.S.	I	II
Pulmonary surgery ..	II	III	I	II
Established surgical infections	I°	II°	I°	I°
Extraction of teeth ..	I	U	II	U

I = First choice U = Unknown ° = As indicated
II = Second choice S.S. = Sulfasuxidine .. = No value
P.O. = Per os

materially aid in preventing the development of subacute bacterial endocarditis.

The same is true when, before operations on the large bowel in older patients, streptomycin is given orally, with sulfasuxidine, to decrease the flora in the large bowel. Antibiotics, alone or with certain sulphonamides, are also useful when operating on patients with perforating abdominal wounds, and in operating on the lung.

The risk of infection after certain "clean" operations—e.g., for cataract—is much decreased by prophylactic use of antibiotics. In established infections, in which surgical interference is indicated, the proper use of antibiotics will greatly facilitate the control of postoperative spread of the micro-organisms.

There can be little doubt that the intelligent use of antibiotics has been an important factor in the improvement of the results of many surgical procedures over the past few years.

DOSAGE

We shall not spend much time here on the dosage of the various preparations of the antibiotics; for this subject is generally understood. A few points, however, are worth discussing.

Penicillin

Now that procaine penicillin G has been introduced, the use of crystalline penicillin G can ordinarily be reserved for certain severe infections. When employed, it should be given in doses of 25,000 units and upwards by the intramuscular route, at intervals of three hours day and night, until the infection is controlled.

Among the procaine penicillins, the preparation of 300,000 units of procaine penicillin G which has 100,000 units of crystalline penicillin G added to it is one of the most valuable. This may be given by intramuscular injection in aqueous suspension in doses of 300,000 units or more at intervals of eight to twelve hours. It combines the features of continuous and intermittent therapy and is a good preparation to use in many severe and almost all moderate cases of infection which are susceptible to the antibacterial action of penicillin. It also produces relatively few reactions.

A less desirable preparation of procaine penicillin G is that in vegetable oil with 2% aluminium monostearate added. The usual dose, given by the intramuscular route, is 300,000–600,000 units. As the release of the penicillin in the tissues is greatly slowed, detectable (but not necessarily therapeutic) levels of penicillin are found in the blood for about three days after the administration of a single dose. This preparation can be used in the prophylaxis of certain infections, in the treatment of mild infections which are susceptible to the effects of penicillin, and especially in syphilis. As a rule, in infections other than syphilis, procaine penicillin G in oil with aluminium monostearate added may be administered by the intramuscular route at intervals of forty-eight to sixty hours.

The use of penicillin by mouth for the treatment of severe, moderately severe, or even mild systemic infections is not recommended. It is the least desirable way of administering penicillin, and an expensive one.

Streptomycin

At present, it is believed that dihydrostreptomycin offers no special advantages over streptomycin in the doses in which these compounds are now given, and there is little use for either except in tuberculosis. This statement is made because micro-organisms rapidly become resistant to the antibacterial effects of both these antibiotics, and because both may produce serious and lasting toxic reactions. In the treatment of tuberculosis both are employed in dosages much lower than formerly. Thus, in tuberculosis other than miliary and/or meningeal, the recommended dose is now 0·5 g. of either compound by intramuscular injection twelve-hourly for at least forty-two days. In miliary or meningeal tuberculosis, 0·75 g. of the antibiotics is given twelve-hourly for ninety to one hundred and twenty days. It is currently considered advisable in tuberculosis to use *p*-aminosalicylic acid (P.A.S.) in conjunction with streptomycin. In adults the daily dose of P.A.S. is 10–12 g., and it should be given in a flavoured alkaline menstruum.

TABLE XIII—DOSAGE SCHEDULES FOR AUREOMYCIN AND CHLORAMPHENICOL

Severity of illness	*Aureomycin*		*Chloramphenicol*	
	Initial dose (mg. per kg.)	Total daily maintenance dose (mg. per kg.)	Initial dose (mg. per kg.)	Total daily maintenance dose (mg. per kg.)
Moderate (oral route) ..	None	20–30	60	60
Severe (intravenous route*)	10	20–30	..	..
Severe (oral route)	10	50	60	60–120

When the oral route of administration is being used, the calculated total daily maintenance dose is divided into 4 parts and is given at *intervals of 6 hours.*

* When aureomycin is being administered by the intravenous route, do not give more than 300 mg. in any single dose. The intravenous doses should be spaced at intervals of 8 hours. A shift should be made to treatment by mouth as soon as possible.

TABLE XIV—IMPORTANT TOXIC REACTIONS IN THE COURSE OF ANTIBIOTIC THERAPY

Reaction	*Penicillin*	Streptomycin	Aureomycin	Chloramphenicol	Terramycin
Anaphylactic shock	Very rare	Very rare	0	0	0
Dermatitis	Common	Common	Rare	Rare	Occurs
Renal injury	0	0	0	0	0
Hæmatopoietic injury	0	Eosinophilia	0	Granulocytopenia	0
Central nervous system injury	Very rare	0	0	0	0
Drug fever	Common	Common	Rare	Rare	Occurs
Vertigo	0	Common	0	Very rare	0
Deafness	0	Occurs	0	0	0
Nausea	0	0	Common	Occurs	Very common
Vomiting	0	0	Occurs	Rare	Common
Loose stools	0	0	Common	Common	Common
Mouth lesions (oral administration) ..	Common	0	Occurs	Common	Common

ureomycin and Chloramphenicol

As will be noted from table XIII, dosage schedules for ureomycin and chloramphenicol are well established. Vith aureomycin, in severely ill patients treated by the ral route, the initial dose should be based on 10 mg. er kg. body-weight. For moderately ill patients the total aily maintenance dose by mouth is based on 20–30 mg. er kg., and for seriously ill patients it is based on 50 mg. er kg. In either instance the total daily maintenance ose is divided into four parts, one of which is given every ix hours. If it seems desirable, in seriously ill patients, o initiate treatment by giving aureomycin intravenously, he sodium glycinate preparation should be used. The nitial dose should be based on 10 mg. per kg. body-veight, while the total daily maintenance dose is based n 20–30 mg. per kg. The latter is divided into thirds, ne of which is given every eight hours. But not more han 300 mg. of aureomycin should be given in one dose ntravenously.

With chloramphenicol, the initial or "priming" dose s based on 60 mg. per kg. This is divided into thirds, given at hourly intervals by mouth. The total daily naintenance dose is based on 60 mg. per kg. for moderately ll patients, and 60–120 mg. per kg. for seriously ill patients, divided into four parts, one of which is given by mouth every six hours. So far, no commercially available preparation of chloramphenicol has been developed for parenteral use. Neither aureomycin nor chloramphenicol should be given by the intrathecal route.

Terramycin

Terramycin is administered by mouth. Currently (and this recommendation may well be changed as our experience increases) it is believed that moderately ill patients should receive a total daily dose based on 25 mg. per kg. body-weight. This may be divided into fourths, one of which is given every six hours. The dosage of terramycin for seriously ill patients has not been definitely established, but a reasonable basis for the total daily dose is 40–50 mg. per kg.

TOXICITY

The toxic reactions which may follow the administration of penicillin, streptomycin, or dihydrostreptomycin are well known. Reactions due to the sensitisation of patients to these three antibiotics seem to be increasing, and it should be borne in mind that dihydrostreptomycin and streptomycin can cause permanent vestibular damage and permanent deafness.

As will be noted from table XIV, the important reactions produced by aureomycin are nausea, vomiting, and loose stools (often amounting to a diarrhœa). It is believed that the nausea and vomiting are produced partly by an exogenous factor in the preparations of aureomycin at present available for administration by mouth. The looseness of the bowels results from disturbance of the bacterial-metabolism in the colon due to the suppression of bacterial growth in that organ. Localised dermatitis has been noted when aureomycin ointment is being used, and a scaly or acneiform type of dermatitis has occasionally been reported when aureomycin was being administered. Drug fever has been noted rarely.

Chloramphenicol produces nausea, vomiting, and often looseness of the bowels, but to a less degree than aureomycin. A scaly skin eruption and drug fever have been observed during treatment, and so has granulocytopenia, both granulocytic and erythrocytic series being hypoplastic.

Terramycin gives rise to nausea, vomiting, and diarrhœa in a proportion of patients. The severity of the signs and symptoms seems to depend somewhat on the size of the dose. Skin eruptions and drug fevers have been recorded. Terramycin, aureomycin, and chloramphenicol can all cause irritation of the mouth and tongue with soreness and ulceration. Renal injury or damage to nervous tissue has not yet been reported in patients receiving these three antibiotics.

Conclusion

Owing to its widespread (and often very injudicious) use, reactions to penicillin are rapidly increasing in numbers and in severity. Streptomycin and dihydrostreptomycin may produce permanent vestibular dysfunction and/or deafness; and as there are better and less toxic antibiotics for other types of infections, their use should be limited to tuberculosis. To date, aureomycin and terramycin have been relatively non-toxic, if nausea, vomiting, sore mouth, and diarrhœa are excluded from consideration. Chloramphenicol is known to cause granulocytopenia and therefore might cause agranulocytosis. It is too early to say whether the population will become as reactive to these last three antibiotics as it has to penicillin. Only time will tell. But we should remember that, up to the present, *all antibiotics have proved poisonous to some patients*, and we should use them with care and thought.

REFERENCE

Romansky, M. J. (1950) Postgraduate Conference in the George Washington Hospital, March 17, 1950.

CONTROLLED CIRCULATION WITH HYPOTENSIVE DRUGS AND POSTURE TO REDUCE BLEEDING IN SURGERY

PRELIMINARY RESULTS WITH PENTAMETHONIUM IODIDE

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THE satisfactory performance of many surgical operations depends on a moderately dry field, and in some—e.g., fenestration and certain plastic operations—bleeding of any severity may well be disastrous. In such circumstances the anæsthetist will be of great assistance to the surgeon if he can safely lower the patient's blood-pressure sufficiently to reduce bleeding to a minimum, and the patient will benefit accordingly.

Hypotension is a well-recognised feature of spinal analgesia but it need not be feared if steps are taken to prevent its ill effects by correct posture of the patient and other measures. Griffiths and Gillies (1948) have shown that considerable falls in blood-pressure may safely be produced by a spinal block high enough to paralyse the thoracic sympathetic outflow. They find that an adequate circulation can be maintained during extreme hypotension; a systolic blood-pressure of about 60 mm. Hg (Dr. J. Gillies, personal communication) will maintain a capillary circulation sufficient for cellular respiration and metabolism in all the vital organs provided the blood is well oxygenated and provided vasodilatation is ensured; whereas in cases of extreme hypotension with vasoconstriction—e.g., after severe blood-loss and the administration of vascoconstrictors—arteriolar constriction reduces the capillary circulation and hastens the onset of permanent damage. Griffiths and Gillies produce vasodilatation and hypotension by a combination of total sympathetic block, narcotics, and posture, gravitational pooling of the blood in the dilated vessels being an essential feature.

An attempt has been made to produce the same effect with pentamethonium iodide and other drugs of this group which paralyse the autonomic ganglia, so avoiding many of the dangers inherent in the spinal technique.

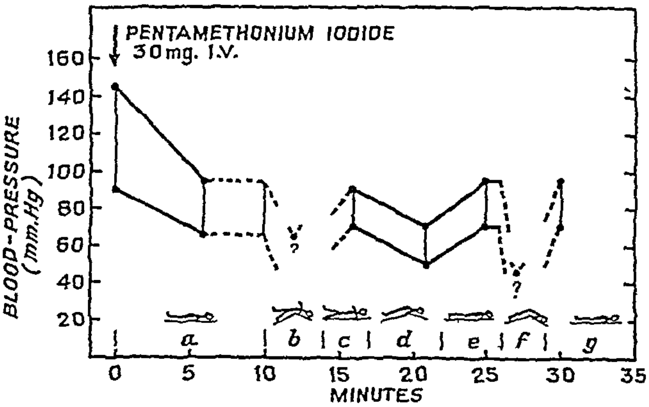


Fig. 1—Effect of posture on blood-pressure of anæsthetised healthy male, aged 40, after pentamethonium iodide, showing importance of gravitational pooling of blood in legs in production of hypotension. Blood-pressure before operation was 125/75 mm. Hg. A minor operation on the foot was completed in 30 minutes. Blood-pressure at end of operation and at start of investigation was 145/90 mm. Hg.

Postures: *a* and *g*, supine horizontal; *b*, right lateral jack-knife; *c*, right lateral horizontal; *d*, supine hyperextended; *e*, prone horizontal; *f*, prone jack-knife.

None of the available drugs completely reproduces the effects of a total sympathetic block—a fact which has been confirmed by workers in other fields, particularly by those investigating vascular disorders of the extremities (Mr. H. J. Seddon, personal communication) —and it is important to bear in mind that these drugs block both sympathetic and parasympathetic ganglia; they are not pure sympathetic paralysants.

RESULTS

First the effects of pentamethonium iodide were studied in anæsthetised subjects. A drop in blood-pressure of variable amount was usually observed, but wide variations in dose produced little difference in the resulting hypotension. In the healthy adult with a normal circulatory system it was found impossible to obtain a reduction of more than 15–30 mm. Hg in the systolic and about half that fall in the diastolic pressure. Furthermore, there was a well-marked rise of pulse-rate, probably accompanied by an increased cardiac output which maintained the blood-pressure. An investigation of tetraethylammonium chloride and hexamethonium iodide did not reveal any material difference; indeed pentamethonium iodide proved slightly more effective than the others. However, Smith et al. (1939) have shown that spinal block in the "unoperated-on subject in the horizontal position" produces no change in diastolic and very little in systolic pressure. It seems, therefore, that in the technique used by Griffiths and Gillies to produce hypotension the position of the patient and the effect of gravity must be of major importance, and it has been found that these factors are equally important when pentamethonium iodide is used.

Fig. 1 clearly demonstrates that gravitational pooling of blood in the legs is the important factor in the production of hypotension. This is supported by the work of Burt and Graham (1950), who showed that the greatest vasodilatation occurred in the legs. When vasomotor control has been abolished, placing the patient in the lateral or prone jack-knife position leads to a profound fall in blood-pressure (figs. 1 and 3). This applies to high spinal analgesia or to any drug which will effectively inhibit the vasomotor reflexes.

Since there are many operations in which neither of these positions is appropriate, a foot-down tilt of 15–20 has been used, which gives a moderate yet still valuable reduction in blood-pressure (fig. 2).

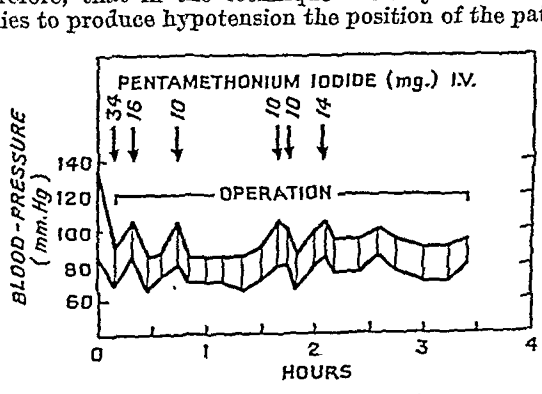


Fig. 2—Blood-pressure during spinal decompression in severe congenital kyphosis in male, aged 19, prone, with foot of operating-table tilted downwards 20°. Reduction of bleeding, owing to low blood-pressure, was of great assistance to surgeon. Blood-pressure before operation was 150/95 mm. Hg, and at end of operation, with patient supine and horizontal, 120/90 mm. Hg.

There is another group of patients whose blood-pressure falls sharply immediately after the drug is injected without the assistance of gravity. In their report on pentamethonium iodide Arnold and Rosenheim (1949 described a sharp fall of blood-pressure in hypertensive patients, and a similar and more extreme reaction is sometimes seen under anæsthesia, whether or not the patient is hypertensive. The first case encountered showed a pronounced fall after 30 mg. of pentamethonium iodide had been given intravenously.

More recently, with the necessary postural precautions, extreme hypotension has been continued satisfactorily for periods up to an hour (fig. 4). In these cases the patient's condition should be assessed during the hypotensive period on much the same lines as are indicated by Griffiths and Gillies (1948), particular attention being given to the state of the capillary circulation and to the pulse-rate, obtained if necessary from the apex-beat. In my cases it has so far always been possible to feel the pulse in either the carotid or the femoral artery, and a sensitive recording apparatus might have demonstrated a blood-pressure of about 30–60 mm. Hg. With this degree of hypotension the posture must be such that the cerebral circulation is helped by gravity; and it is always a comfort to have an injection of 'Methedrine' at hand for immediate use if desired. However, methedrine should not be given unless it is essential, and then only in a dose sufficient to restore a fraction of the blood-pressure; for a sudden rise will open vessels which otherwise would have become sealed effectively by contraction and thrombosis before being subjected again to normal pressures.

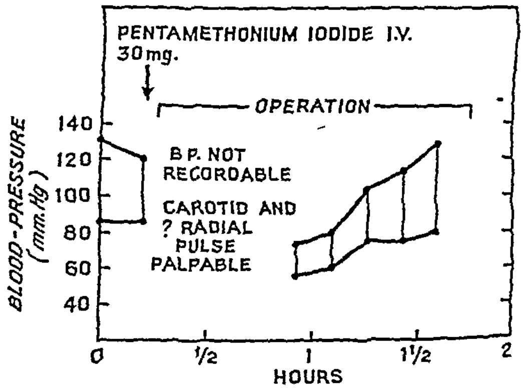
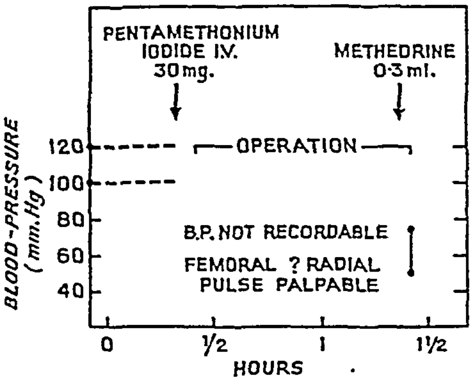


Fig. 3—Blood-pressure during lumbar sympathectomy in hypertensive arteriosclerotic male, aged 60, with patient in left lateral jack-knife position. Operation field was quite dry until blood-pressure rose towards end of operation. Blood-pressure before operation was 170/100 mm. Hg.

The total spinal technique is clearly contra-indicated in some conditions—e.g., severe spinal deformities—whereas with pentamethonium iodide it seems possible



ig. 4—Well-marked hypotension with minimal bleeding for an hour during excision of scar and insertion of tube pedicle in female, aged 21, in right lateral position for 20 minutes and then supine and 5° head down. Before operation blood-pressure was 135/85 mm. Hg. At end of operation blood-pressure was partly restored with methedrine.

o abolish vasomotor control easily and quickly in all ases, and further experience will probably lead to etter results, particularly in relation to the gravitational ffects of posture. Except in arteriosclerotic hyperensive patients, an effective reduction in blood-pressure s not usually attained without the assistance of gravity ; his probably has the effect of reducing the venous return o the heart, which in turn will diminish the cardiac utput and the blood-pressure. It is not sufficient nly to reduce the blood-pressure ; to prevent bleeding he patient must so be placed that the operation field s elevated and the blood can drain away from it.

There is an optimal dose of pentamethonium iodide which will paralyse the ganglia, and to exceed this serves no useful purpose apart perhaps from prolonging its action. I find that 30 mg. is reasonably adequate for all except the young healthy patient, but it is probably too much for arteriosclerotic hypertensives. In the latter I now start with 20 mg. and observe its effect before proceeding. Full effects appear in three minutes, while pressure changes due to gravity occur even quicker.

Pentamethonium iodide or other drugs of the series have been given in about fifty cases, but it is only in the most recent ones that the effects of posture have been fully appreciated. In twelve cases full use has been made of the effects of gravity. In those in which the blood-pressure was reduced to 80 mm. Hg there was a considerable diminution in bleeding, and in those showing more profound hypotension bleeding rapidly became insignificant.

A warning is necessary regarding cases which show only a moderate reduction to, say, 90–100 mm. Hg systolic. At this pressure bleeding will still occur, and if for any reason it is considerable and prolonged it is more dangerous than in the patient whose vasomotor system is under normal control. In such cases replacement therapy is essential.

Anæsthesia

Induction in all cases has been with thiopentone, usually followed by nitrous oxide and oxygen (2 : 1) in a closed-circuit absorber. Fractional doses of thiopentone are administered through a Gordh needle, which is also used for the pentamethonium iodide. It is always convenient to have immediate access to a vein ; but, if it should be necessary to use methedrine, the veins in the dependent parts are always well filled and present no difficulty. Of the other anæsthetic agents cyclopropane has not been used, because of its tendency to raise the blood-pressure. Trichlorethylene and ether have been used, but their influence, if any, has not yet been determined.

Under pentamethonium iodide the pupil is usually about three-quarters dilated and inactive to light, and the eyeball is fixed and central. The state of the pupil probably reflects the position of rest when both sympathetic and parasympathetic impulses have been inhibited. Recovery from this state seems to be slow, but so far there have been no postoperative complaints of interference with vision.

The immediate recovery from the anæsthetic is not delayed in any way, and the cough reflex quickly returns. The blood-pressure is usually restored to a low normal level on reversion to the horizontal position. The patients with the more extreme degrees of hypotension recover in about two hours, but their blood-pressure is often low for some hours later.

The patients' postoperative condition is particularly pleasing, and so far no ill effects whatever have been noted. Two patients said they were sleepy on the day after operation.

SUMMARY

In the past six months pentamethonium iodide, tetraethylammonium chloride, or hexamethonium iodide has been given to fifty anæsthetised patients to produce hypotension.

To lower the blood-pressure sufficiently to reduce bleeding at operation it is usually necessary to place the patient in a position that will allow the blood to gravitate into the dilated vessels. The greatest vasodilatation occurs in the legs, so their position is particularly important.

Where full use was made of the effects of gravity a valuable reduction in bleeding was obtained.

No ill effects were observed.

My thanks are due to Dr. J. Gillies and Dr. H. W. C. Griffiths for information and assistance, and to Mr. H. J. Seddon for his helpful advice and criticism. Messrs. Allen and Hanburys Ltd. supplied the pentamethonium iodide ('Antilusin').

ADDENDUM

In the ten weeks since this paper was completed more information has been obtained on the gravitational effects of posture with this drug. To obtain an effective reduction of blood-pressure it has at times been necessary to increase the foot-down tilt to 30°–40°, and to assist lesser degrees by dropping one or both legs over the side of the table with the patient supine.

Out of a total of 35 cases, excellent results have been obtained in 18, a moderate reduction in bleeding in 8, and no helpful effects in 9. Where there is no effect or but little reduction in bleeding this is because the blood-pressure has not been lowered sufficiently. This may be due to inadequate posture, for the more extreme positions are often incompatible with the surgery. There may also be constitutional differences between patients.

Bleeding is considerably reduced in all fields of surgery when the systolic pressure is between 60 and 70 mm. Hg, but in some regions it is possible to keep the systolic pressure at 70–80 or even over 80 mm. Hg and still obtain the required effect.

The problem as I see it still is to reduce the blood-pressure to 60 mm. Hg in all cases requiring it, for so often with pentamethonium iodide the reduction falls short of this by a small margin.

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THE NERVOUS MANIFESTATIONS OF PERIARTERITIS NODOSA

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Periarteritis nodosa is a necrotising panarteritis, principally affecting blood-vessels of small or medium size. General symptoms (from the inflammatory reaction) and focal symptoms (from the disseminated arterial lesions) give it protean manifestations. The disease is not rare (Miller 1949) but its diagnosis can be difficult and it often goes unrecognised.

Although the primary lesions are scattered throughout the body, one particular part of the body is often more affected than the rest. In the three cases described here the brunt of the disease fell on the nervous system. Involvement of the intracerebral vessels is relatively uncommon, the reported frequency varying from 8% (Gruber 1926) to 20% (Foster and Malamud 1941).

CASE 1

This case illustrates the occurrence of spontaneous subarachnoid hæmorrhage and a vascular lesion affecting the right middle cerebral artery.

A man, aged 35, was admitted on Feb. 3, 1946, with a history of having had tonsillitis ten months earlier, accompanied by pains in the right knee and both ankle-joints. On the evening preceding his admission to hospital he had had severe occipital headache, and within four hours had become unconscious.

On admission he was comatose, with stertorous breathing and severe neck rigidity. Kernig's sign was positive. Both plantar responses were extensor. His blood-pressure was 160/100 mm. Hg and his urine contained albumin. Lumbar puncture produced a heavily bloodstained cerebrospinal fluid (C.S.F.). Spontaneous subarachnoid hæmorrhage due to rupture of a congenital aneurysm was diagnosed.

Progress.—The patient gradually recovered, but unexplained pyrexia persisted. There was a leucocytosis of 17,500 cells per c.mm. On the twenty-seventh day after his admission he had a sudden onset of left hemiplegia. His C.S.F. was under pressure and the protein was increased to 100 mg. per 100 ml.

At this stage the possibility of secondary cerebral deposits from an undiscovered primary neoplasm was considered. Despite careful search, no primary growth was discovered, though the impression of malignant disease was strengthened by the rapid deterioration in the patient's condition. He died on the thirty-seventh day after admission.

Necropsy made the diagnosis obvious. There was a leaking aneurysm on the left posterior cerebral artery, thrombosis of the right middle cerebral artery, and multiple hæmorrhagic nodules in both kidneys, liver, and spleen. Microscopically typical lesions of periarteritis nodosa were found in the heart, liver, spleen, brain, and kidneys.

The diagnosis was not suspected in life, though in retrospect there were several obvious pointers. The experimental studies of Rich (1942) and Rich and Gregory (1943) demonstrated that in rabbits a necrotising periarteritis could be produced by injecting foreign serum. The occurrence of periarteritis in close time relationship with various infections has often been noted; in particular, streptococcal infections have often preceded the onset of the disease (Manges and Baehr 1921, Dietrich 1933, Vining 1938). This patient had a history of rheumatism, probably an allergic reaction to streptococcal infection. Other facts which pointed to periarteritis were the persistent pyrexia, high leucocytosis, hypertension, and albuminuria.

CASE 2

This case, in which periarteritis was diagnosed during life, presented as a polyneuritis affecting chiefly the extensor muscles of both wrists.

A man, aged 54, was admitted on May 1, 1949. Two previously he had complained of pain in both calves weakness of both legs. His legs had been so weak that he had fallen to the ground, but he had not lost consciousness.

On examination he was thin and youthful-looking, with circular pupils that were equal and reacted normally. All his cranial nerves seemed to have normal function. All movements of his right arm were weaker than those of his left. The tendon reflexes in the arms were equal on both sides. Apart from tenderness of the calf muscles, there were no changes in the legs. Loss of pain sensation was noted on the right forearm and hand.

Progress.—Within five days of the patient's admission the extensors of his right wrist and the plantar flexors of his left foot became very weak. On June 2, 1949, severe epigastric pain came on; but, apart from muscle guarding in the epigastrium, no localising signs were present. Marked weakness of the extensors of the left wrist was noted, together with patchy impairment of sensation. Throughout the whole course of the illness a high pyrexia persisted. His white-cell count was 30,000 per c.mm. (polymorphs 90%). Blood-cultures were sterile. The blood Wassermann reaction was strongly positive but the C.S.F. Wassermann negative. The C.S.F. was normal in cytology and chemistry. The blood-pressure was 170/100 mm. Hg. He died seventeen weeks after admission.

Necropsy confirmed the clinical diagnosis of periarteritis nodosa. Typical lesions were found in the small intestine, pancreas, kidneys, and liver. Microscopy showed changes characteristic of periarteritis nodosa.

The symmetrical polyneuritis in the arms, pyrexia, leucocytosis, albuminuria, hypertension, and visceral pain pointed clearly to periarteritis nodosa. The positive serological reaction for syphilis is a noteworthy feature of this case; Chvostek and Weichselbaum (1877), Gruber (1926), and Volland (1936) have reported instances of periarteritis following syphilitic infection.

Kernohan and Woltman (1938) noted polyneuritis in association with periarteritis nodosa in 20% of cases. A higher incidence was recorded by Jones (1940), who found evidence of peripheral neuritis in 9 out of 14 cases. Careful neurological examination will probably show that polyneuritis is much more common than is suggested by Kernohan and Woltman. The pathological basis of the polyneuritis in periarteritis nodosa was demonstrated by Wohlwill (1923) to be an endarteritis of the vasa nervorum. It has been suggested by Baló (1926) and Kulkow (1941) that the polyneuritis of periarteritis nodosa is toxic, but Nelson (cited by Miller 1949) has demonstrated endarteritis of the vasa nervorum in many of these cases.

Miller (1949) proposes to classify the peripheral neuritis of periarteritis into three main forms: (1) a mononeuritis multiplex with asymmetrical neuritis of nerve-trunks; (2) a symmetrical polyneuritis, usually maximal in the lower limbs, together with a neuritis of individual nerve-trunks; and (3) symmetrical polyneuritis alone. The detailed systematisation of the symptoms of this necessarily pleomorphic disease is undesirable. Rather is it necessary to call attention to the bizarre distribution of the neuritis and to emphasise the consideration of periarteritis nodosa in the differential diagnosis of infective polyneuritis.

CASE 3

The last case in this series presented features which pointed to acute infective polyneuritis involving both the peripheral and the cranial nerves.

A woman, aged 21, attended the outpatient department in December, 1947. Six weeks earlier she had had a sore throat and stiff neck. This illness had responded well to sulphadiazine. On Dec. 18, 1947, she had had diplopia, and three days later difficulty in walking and paræsthesiæ in both hands.

On examination she had slight ptosis of the right eyelid, palsy of the right external rectus, immobility of the palate, patchy anæsthesia to light touch on the palms and anterior surfaces of the fingers of both hands, and absent vibration sense as far as the elbows of both arms.

Progress.—On Dec. 23, 1947, she had a complete right external ophthalmoplegia and absent vibration sense in the egs. Her C.S.F. was under increased pressure (300 mm. of water), the protein content was raised to 80 mg. per 100 ml., and there were 35 polymorphs per c.mm. Pyrexia persisted throughout the illness. The urine contained a moderate amount of albumin and a few red cells and granular casts. A blood-count showed red cells 3,500,000 per c.mm., Hb 65%, and white cells 15,500 per c.mm. (polymorphs 85%).

On the eighteenth day of illness the spleen became palpable and tender. Three days later there was a frank hæmaturia, and four days later blurring of vision in the left eye. Multiple elevations or detachments of the retina were noted, together with choroidal exudates.

From then onwards the patient went progressively downhill, and died on the thirtieth day after admission.

Necropsy revealed typical changes of periarteritis in the brain, meninges, kidneys, spleen, liver, and retina.

This case again illustrates the development of periarteritis nodosa in the wake of a streptococcal infection. The very widespread nature of the lesions of this disease are also well illustrated. The occurrence of changes in the retinal vessels in periarteritis nodosa was first noticed by Müller (1899), and many workers have noticed arteriosclerotic retinal changes. Sampson (1945) has described the typical retinal lesions of periarteritis nodosa as multiple retinal detachment, choroidal exudates, and, ultimately, typical arteriosclerotic changes in the vessels. Conjunctivitis and chemosis have also been described by Peron and Desvignes (1947).

DISCUSSION

Though nervous involvement is not one of the common manifestations of periarteritis nodosa these three cases, in which the main incidence was on the nervous system, show that the possibility of periarteritis nodosa should be kept in mind when bizarre clinical patterns of polyneuritis are encountered. Other signs can usually be found to establish the diagnosis. Pyrexia always occurs at some time in the course of the disease, and leucocytosis, albuminuria, hypertension, and splenomegaly are often found. Difficulty in diagnosis usually arises because the possibility of periarteritis nodosa is not considered.

SUMMARY

Three cases of periarteritis nodosa are described in which the chief presenting clinical signs were due to involvement of the nervous system.

The importance of considering this diagnosis in obscure cases of polyneuritis is emphasised, and the more important nervous manifestations of the syndrome are briefly reviewed.

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A.C.T.H. IN RHEUMATOID ARTHRITIS
COMPARED WITH INTRAMUSCULAR ADRENALINE AND WITH DEOXYCORTONE AND ASCORBIC ACID

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L. G. C. PUGH M.A., B.M. Oxfd
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THE dramatic effects of the adrenocortical steroid hormone 'Cortisone' and of anterior pituitary adrenocorticotrophic hormone (A.C.T.H.) in alleviating the symptoms of rheumatoid arthritis (Hench et al. 1949) have been amply confirmed (Markson 1949, Elkinton et al. 1949). Attempts have been made to produce similar results by stimulation of the adrenal cortex with adrenaline (Thorn et al. 1949), and Godlowski (1949) has claimed benefit in some cases of rheumatoid arthritis treated with this drug. The claim of Lewin and Wassén (1949) that the simultaneous injection of deoxycortone acetate and ascorbic acid in rheumatoid arthritis produces a striking and even more rapid improvement than that of cortisone or A.C.T.H., has aroused considerable interest, and is strongly supported by Le Vay and Loxton (1949, 1950) and others. Some workers, however, have failed to demonstrate any objective or subjective change following the administration of these compounds (Kellgren 1949, Spies et al. 1949, Kersley et al. 1950, Currie and Will 1950, Bywaters et al. 1950).

In the following case of rheumatoid arthritis treated with A.C.T.H. the effects observed have been compared with those obtained in the same patient with adrenaline, and with deoxycortone acetate and ascorbic acid.

CASE-HISTORY

The patient, a printer aged 42, was admitted to hospital in September, 1949, suffering from rheumatoid arthritis of four years' duration. His previous health had been good, and there was nothing relevant in the family history. The illness began insidiously at the end of 1946 during a period of stress in connection with the reconstruction of his business, which had declined during his absence on military service. The first symptoms were migratory muscle pains and lassitude. In March, 1947, he was admitted to hospital with pain, swelling, and stiffness of the proximal finger-joints. His erythrocyte-sedimentation rate (E.S.R.) was 72 mm. in one hour (Westergren). Although the symptoms subsided with rest in bed, they recurred soon after discharge; and from May, 1947, the illness ran a progressive course with little remission. By June, 1947, his hands, feet, elbows, shoulders, knees, hips, cervical spine, and temporomandibular joints were involved; he was unable to walk, shave himself, brush his hair, or handle a knife. Biopsy of a subcutaneous nodule from the right ankle confirmed the diagnosis of rheumatoid arthritis. From August, 1948, to April, 1949, he received a course of weekly injections of gold (total 1·0 g. of 'Myocrisin') with little benefit. At the time of his present admission to hospital he had been bedridden for eighteen months. He was admitted under Dr. E. G. L. Bywaters on Sept. 19.

Findings on admission.—A coöperative, intelligent man, slightly overweight. The skin, throat, and nails were normal. He was edentulous. No abnormality was found in his lungs, abdomen, heart, or central nervous system. Blood-pressure 134/90 mm. Hg. Urine normal.

Joints.—Movements of the *cervical spine, temporomandibular joints, hips, and shoulders* were severely restricted by pain. There was a moderate degree of periarticular swelling of both *elbows* and 10° limitation of full extension. Both *wrists* were swollen, and movement at these joints was restricted to 10° palmar flexion on the right side and 20° on the left. The metacarpophalangeal and proximal interphalangeal joints of both *hands* were swollen and tender and his grips were weak. There were bilateral effusions into both *knee-joints*, the synovial membranes of which were palpably thickened. Movements of the *ankles* were restricted and both joints were swollen and painful.

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with great difficulty, and was unable to get out of bed or walk, even with assistance.

In spite of the striking clinical improvement, objective measurements of joint function by the methods used showed relatively small changes (fig. 1). There was little increase in the range of joint movements, but within their range the movements became free and painless. The E.S.R. fell during A.C.T.H. therapy from 120 to 22 mm. On the 5th day after treatment it had risen once more to 70 mm. (fig. 2).

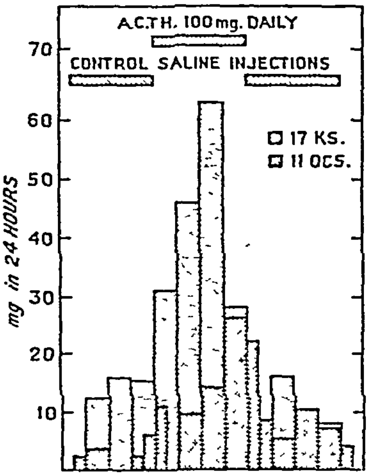

Fig. 3—Effects of A.C.T.H. on urinary excretion of 17-ketosteroids (stippled columns) and 11-oxysteroids (hatched columns).

After discontinuation of A.C.T.H. the patient gradually relapsed. He complained of pain in the neck and left hip 5 hours after the final injection, but did not require to take analgesic tablets until 8 days later. By the end of a month, his clinical condition as regards joint pains and stiffness was comparable with his state before the administration of A.C.T.H.

Hæmatological effects (fig. 2).—Circulating eosinophils had disappeared from the blood 4 hours after the first A.C.T.H. injection and none were found in daily counts during the whole period of treatment. They reappeared within a few hours of discontinuing A.C.T.H. A marked rise in total white blood-cells to 21,000 per c.mm. during the period of therapy was due to an increase in polymorphonuclear leucocytes, the lymphocytes remaining at a fairly constant level. There was no significant change in red-cell counts, hæmoglobin levels, or hæmatocrit readings, or in the serum thymol-turbidity or colloidal-gold flocculation tests.

Blood-pressure.—Average readings of systolic blood-pressure rose from 134–144 mm. Hg during the control periods to 145–152 mm. during therapy. Diastolic readings were unaffected.

Metabolic effects.—The nitrogen balance was negative during A.C.T.H. therapy. Serum uric-acid values fell from an average level of 5·8 mg. per 100 ml. during the first control period to an average level of 2·6 mg. from the 3rd to the 9th day of treatment. Minor changes only were noted in the serum electrolytes, with the exception of potassium, which fell from 20 mg. per 100 ml. before treatment to 15 mg. on the 8th day of treatment. The electrocardiogram showed a fall in voltage of the T waves consistent with a low serum-potassium. The fasting blood-sugar levels did not change significantly on A.C.T.H. and there was no significant alteration in basal metabolic rate.

Excretion of steroid hormones (fig. 3).—There was an increase in the urinary excretion of 17-ketosteroids and 11-oxysteroids during A.C.T.H. administration and a rapid return to control levels at the end of treatment.

Adrenaline

By the time the adrenaline trial began, the patient had relapsed completely and his clinical state was comparable to that before A.C.T.H. All the affected joints were painful and restricted and many were swollen. Morning stiffness was severe. The patient was completely bedridden, and unable to handle a knife and fork, get out of bed, or wash himself. He required 8 analgesic tablets daily.

Administration of adrenaline in oil, 2·0 mg. daily for 14 days, produced no subjective clinical improvement, and objective measurements of joint function, as described for the A.C.T.H. trial, showed no significant deviation from the control periods. His daily requirement of analgesic tablets remained unaltered. The E.S.R., which varied from 72–77 mm. during the first control period, showed a tendency to fall when adrenaline was given, and 7 days afterwards had fallen to 50 mm.

Hæmatological effects (fig. 4).—There was little change in the total white-cell count, and lymphocytes remained fairly constant. The eosinophils fell to 50% of the resting level during the first 24 hours on adrenaline, but after 48 hours had risen again to the resting level, and thereafter rose steadily, reaching a maximum 4 days after adrenaline was stopped. Red-cell counts, hæmoglobin levels, hæmatocrit readings, and serum flocculation tests showed no appreciable change.

Blood-pressure.—There was a moderate rise in systolic blood-pressure, and a lesser rise in diastolic pressure, during the first two days on adrenaline.

Metabolic effects.—The fasting blood-sugar level rose immediately after adrenaline was started and remained elevated during the period of its administration, thereafter falling to normal. The maximum reading (167 mg.) was on the first day of therapy. Glycosuria did not develop.

There was no significant alteration in the body electrolytes.

Steroid hormones.—The excretion of 17-ketosteroids remained within normal limits during the whole of the adrenaline trial, and there was no increase during the test period. The urinary oxysteroids rose towards the end of adrenaline administration to a maximum of 10 mg. per day, the range of excretion during the control periods being 2–6 mg. in 24 hours.

Deoxycortone and Ascorbic Acid

Deoxycortone acetate 5 mg., and ascorbic acid 1 g., were given by intramuscular injection thrice daily for

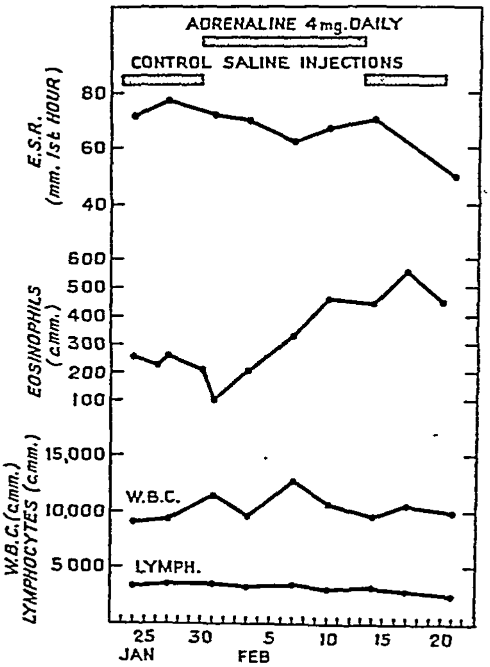

Fig. 4—Hæmatological effects of adrenaline.

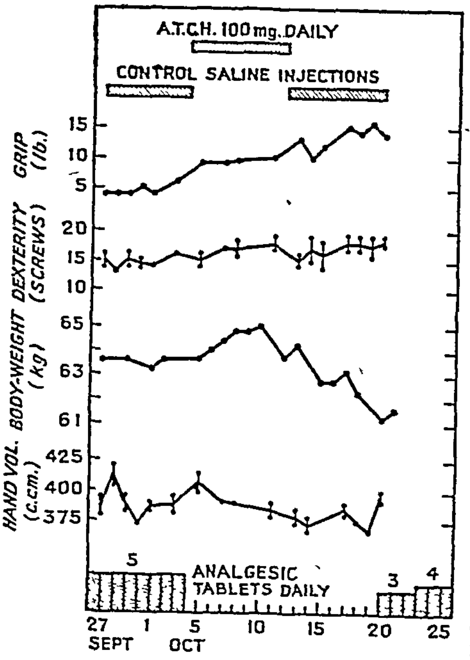

Fig. 1—Clinical effects of A.C.T.H. In spite of complete relief of pain, objective measurement of hand volume, dexterity, and grip show no significant changes. Note the gain in weight attributable to water retention.

Laboratory investigations.—The E.S.R. was 77 mm. in the first hour. The hæmoglobin was 12·7 g. per 100 ml. and red-cell count 4·0 million per c.mm. The white-cell count was 9500 per c.mm. (polymorphs 67%, eosinophils 1%, lymphocytes 30%, monocytes 2%). The serum uric acid and cholesterol and the plasma proteins were within normal limits.

Radiographs of the affected joints were characteristic of established rheumatoid arthritis. The bones were generally decalcified, there were subchondral erosions in the finger-joints, and the joint spaces were reduced.

METHODS OF STUDY

The patient was kept under clinical observation for one week before the investigations started. During the A.C.T.H. and adrenaline trials he was maintained on a constant food and water intake.

The A.C.T.H. trial began on Sept. 27 and lasted 25 days. For 9 days 100 mg. of A.C.T.H. was given daily by the intramuscular injection of 25 mg.* at 7 A.M., 12, and 5, and 10 P.M. The first and last 8 days served as control periods during which intramuscular injections of sterile saline solution were given. In this and the subsequent treatments, the nature of the injections was unknown to the patient or nursing staff.

The trial of adrenaline began on Jan. 23, 1950, and lasted 28 days. During the first and fourth weeks control injections of saline were given 6-hourly. During the middle 14-day period 0·5 mg. of adrenaline in oil was given 6-hourly.

During the first control week of this trial a preliminary injection of 0·3 mg. adrenaline was given to ascertain the eosinophil response. The result was a fall of the circulating eosinophils to 52% of the resting level at the 4th hour, indicating that the adrenal cortex was capable of responding to adrenaline stimulation.

Deoxycortone and ascorbic acid were given for 4 days from Feb. 25 to 28 inclusive, with control periods of 4 days on saline injections before and afterwards. The drugs were given by simultaneous intramuscular injections of 5 mg. of deoxycortone acetate and 1 g. of ascorbic acid thrice daily. During this trial, clinical assessments and hæmatological investigations were carried out daily, but no metabolic investigations were done.

Clinical assessment.—A cinematograph record was made before and during A.C.T.H. therapy. Day-to-day progress was assessed by the following methods, the measurements being made at the same time each day. Passive movement of all affected joints was measured with a goniometer, strength of grip with a spring dynamometer, and manual dexterity by means of a screw-plate test. This test consists in screwing nuts on to rows of bolts projecting vertically from a base plate. The test score is the number of nuts screwed on in 2 minut The score for a normal individual is 27–30.

Changes in hand volume were followed by the method water displacement, the hand being immersed up to indelible mark drawn round the wrist. Measurements we made daily in duplicate.

An attempt was made to assess the symptomatic rel obtained with A.C.T.H. and other forms of therapy, by charti the number of analgesic tablets (tab. codein. co. *B.* required daily. A supply of these tablets was kept at t bedside.

Technical Methods

Eosinophil-counts were performed by the method Randolph (1944). Estimations of urinary 11-oxysteroids we carried out by Dr. C. L. Cope (method to be publishe Estimations of urinary 17-ketosteroids were carried out Dr. W. Klyne by a modification of the method of Call et al. (1938).

RESULTS

A.C.T.H.

Clinical effects.—During the first control period of t A.C.T.H. trial minor symptomatic fluctuations were not by the patient, but there was no sustained subjecti or objective improvement apart from a slight decrease tenderness and increase in mobility of the fingers. The was no corresponding increase in manual dexterity *significant alteration in the hand volume.* The E.S. remained high and eosinophils ranged from 120 to 24 per c.mm. of blood.

Within 5 hours of the first injection of A.C.T.H. th patient volunteered the information that his joints wer painless for the first time for over a year, relief beginnin 2 hours after the injection. His comment was: "tha last injection had a kick in it. I feel revitalised." Fo the next 16 days he required no analgesic tablets an slept without sedatives. His mental outlook becam cheerful an optimistic. Al movements be came quicke and mor forceful, an he was abl to wash, and brush his hai for the first time for 14 months. The hands and wrists were no longer tende on pressure and passive movements were painless. By the 4th day of A.C.T.H. therapy he was able to turn back the bedclothes, get out of bed, and walk a few steps without assistance. This was perhaps the most striking functional improvement, for previously he could turn back the bedclothes only

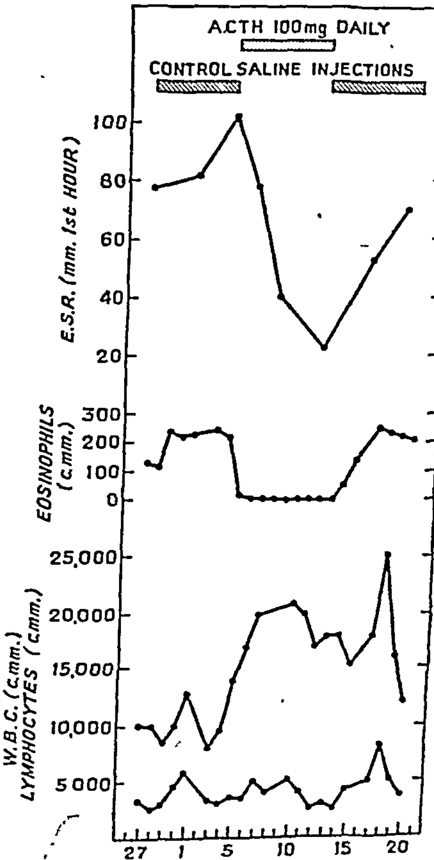

Fig. 2—Hæmatological effects of A.C.T.H.

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* We are indebted to Messrs. Organon Laboratories for the A.C.T.H. used in this trial.

5. No clinical or other effects followed the administion of deoxycortone and ascorbic acid.

Ve are indebted to Dr. E. G. L. Bywaters for permission to lish this case, to Dr. W. Klyne for the urinary ketosteroid mations, to Dr. C. L. Cope for the estimations of reducing oids, and to Prof. E. J. King and his department for the aining biochemical estimations.

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STEROID THERAPY IN RHEUMATOID ARTHRITIS

A FURTHER REPORT

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N April we reported a screening of certain steroids—inyl œstradiol, methyl testosterone, testosterone pionate, progesterone, and 'Pregnyl'—for their lue in rheumatoid arthritis, both alone and in combinan with ascorbic acid and at the same time comparing e effects with those of deoxycortone acetate and ascorbic id. Although there were a few fairly definite improveents throughout the series, we considered that their erapeutic value was not proved (Kersley et al. 1950).

Nevertheless, we felt that there were certain additional ints which required further investigation—namely, hether some other substance would take the place of corbic acid in an oxidase-reductase system and so oduce a more favourable result, and whether the use a steroid together with several injections of such a mpound (which is in any case very rapidly excreted) uld be beneficial and in that case whether a larger se of deoxycortone acetate would be advantageous.

As in our last series no change had been observed the eosinophil counts, urinary uric-acid/creatinine tios, and other laboratory tests, in this series clinical sessments only were made. This included observations changes in pain, stiffness, swelling, range of movement, d deep hyperalgesia, in addition to functional ability.

As a substitute for ascorbic acid, we decided to try oflavine, which is widespread in the body tissues and ich in combination with phosphoric acid is an portant co-enzyme with many dehydrogenases. Eleven ses were divided into three groups and each treated r three weeks with 2 injections per week of (A) prosterone and riboflavine, (B) progesterone and ascorbic id, and (C) saline as a control. Progesterone was used, a dose of 100 mg., because in our previous work this eroid had given as good a result as any of those tried. iboflavine 30 mg. was given intramuscularly or ascorbic id 1 g. was injected intravenously. In series A rogesterone and riboflavine) one patient was markedly tter, two slightly better, and one unaffected. In ries B (progesterone and ascorbic acid) one was markedly improved, one slightly improved, and two unaffected. In series C (saline) one was slightly improved at the end of the three weeks. It was considered that there was no significant clinical difference between the results of treatment with progesterone and riboflavine and with progesterone and ascorbic acid.

Another five patients were each given two injections of progesterone and riboflavine, followed a week later by deoxycortone acetate and riboflavine, and in a third week by saline as a control. All these injections were given on two successive days. Again there was no significant difference between the results of each series.

Six patients were given (*a*) saline, (*b*) the usual dosage of deoxycortone acetate 5 mg. and ascorbic acid 1 g., (*c*) deoxycortone acetate 5 mg. and three injections of ascorbic acid 1 g. at four-hourly intervals, and (*d*) deoxycortone acetate 25 mg. and three injections of ascorbic acid as above. No significant change was observed in the results of any of these series.

In four other cases we made an experiment which was exactly similar except that deoxycortone, and riboflavine were used instead of deoxycortone and ascorbic acid. Similar negative results were obtained.

SUMMARY AND CONCLUSIONS

1. Administration of progesterone with riboflavine 30 mg. did not produce a more favourable clinical result than the use of progesterone with ascorbic acid 1 g. It is doubtful whether their superiority over the use of saline is significant.
2. The clinical effect of progesterone and riboflavine was similar to that of deoxycortone acetate and riboflavine.
3. Three injections of ascorbic acid or riboflavine 4-hourly after the injection of deoxycortone acetate had no significant advantage over the single injection.
4. The use of deoxycortone acetate 25 mg., together with three injections of ascorbic acid or riboflavine, again appeared to have no enhancing therapeutic value.

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KERNICTERUS AND PREMATURITY

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ACCORDING to the many accounts of kernicterus or nuclear jaundice, this condition is usually associated with hæmolytic disease of the newborn. In the early report by Schmörl (1904), who first gave the name kernicterus to nuclear jaundice, the cases were typical of icterus gravis neonatorum, and Wiener and Brody (1946) state that kernicterus is found only in infants of mothers with agglutinating antibodies in their blood. No description can be found of the association of kernicterus with jaundice due to biliary obstruction without hæmolytic disease of the newborn, but various workers have suggested that neonatal sepsis together with hæmolytic disease may play some part in the development of kernicterus (de Bruyne and van Creveld 1948). Claireaux (1950) has lately declared that kernicterus is always associated with icterus gravis, arising from hæmolytic disease of the newborn; and Blackwood (1949) agrees with this view.

Claireaux suggests that the cells of the nuclear masses, and particularly the cornu ammonis, basal ganglia, inferior olives, and dentate nuclei, are severely affected by

4 days. No subjective or objective change was noted resulting from the administration of these drugs as compared with the control periods. Pains, swelling, and stiffness of joints were unaltered, and there was no decrease in the daily requirements of analgesic tablets.

The E.S.R. rose from 46 mm. before treatment to 90 mm. during the test period. Blood eosinophils fluctuated during the trial but there was no decrease as compared with the control periods. Other hæmatological findings remained unaltered (fig. 5).

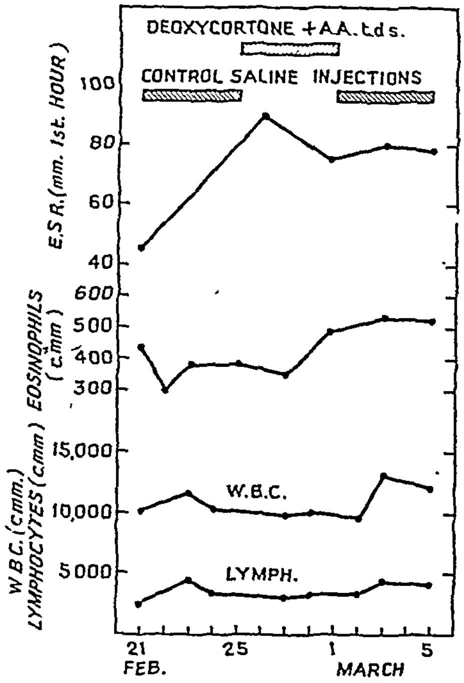


Fig. 5—Hæmatological effects of deoxycortone and ascorbic acid.

DISCUSSION

The remission induced by A.C.T.H. in this case was comparable to those originally obtained by Hench and his colleagues (1949) with cortisone and A.C.T.H. and to the results since obtained with A.C.T.H. by other workers (Markson 1949, Elkinton et al. 1949, Ragan et al. 1949, Thorn et al. 1949). A pronounced reduction in joint pains, tenderness, and stiffness, together with an increase in the speed, strength, and agility of movement, commenced within a few hours of the administration of A.C.T.H. and was sustained as long as the drug was given. Relapse followed withdrawal of the drug and was complete in about one month.

Evidence of stimulation of the adrenal cortex by A.C.T.H. was provided by a sustained fall in eosinophils, and increased excretion of 17-ketosteroids and 11-oxysteroids. No unpleasant side-effects occurred. The sense of physical and mental well-being which follows the abolition of the "toxic" feelings of rheumatoid arthritis by A.C.T.H. and cortisone was a prominent feature in this case.

In assessing the clinical remission induced by A.C.T.H., difficulty was encountered in selecting suitable measurements to demonstrate functional improvement. The tests used failed to express the over-all improvement in performance, as shown by the patient's ability to carry out tasks previously impossible for him; and, taken alone, they are misleading as a record of progress. The cinematograph film was the best record of this improvement, which might also have been assessed by noting the improvement in day-to-day measurements of the time taken to perform familiar and accustomed movements, such as tying a tie or writing a test sentence. It seems likely that improvement in performance of individual joints may be due to a reduction in pain, stiffness, and muscle spasm, leading to increased ability and willingness to use the joints, without necessarily any increase in their range or power.

Apart from the administration of cortisone and A.C.T.H., the level of cortical steroids in the body can be increased by the administration of adrenaline. This has been demonstrated in normal, but not in hypophysectomised, animals (Vogt 1944, Long 1947), indicating that the drug acts via the anterior pituitary and not by direct stimulation of the adrenal cortex. The most useful index of increased adrenocortical activity is a fall in the level of circulating eosinophils, caused by the 11, 17-oxysteroids (Compounds E and F). It has long been known that adrenaline can cause a temporary eosinopenia in man. Thorn et al. (1949), investigating the effects of adrenaline in cases of rheumatoid arthritis, confirmed this, and demonstrated an associated rise in the urinary excretion of 17-ketosteroids. These workers claimed a slight but definite clinical improvement in cases of rheumatoid arthritis treated with 1·2 to 2·0 mg. adrenaline daily, given intramuscularly for 2–4 weeks. Beneficial results in rheumatoid arthritis have also been claimed by Godlowski (1949) with adrenaline given intramuscularly or by intravenous infusion.

In the present study no subjective or objective clinical improvement resulted from the administration of 2·0 mg. adrenaline daily for 14 days, though there was a slight fall in the E.S.R. The eosinophils, which showed a 50% fall at the start of treatment, returned to the resting level within 48 hours and thereafter remained high. Urinary excretion of 17-ketosteroids was unchanged. The corticoids in the urine, which were low during the first period, showed a rise during treatment and then fell again when the drug was stopped. This increase occurred during the second week on adrenaline, when the eosinophil-count had risen to a high level. There were no demonstrable effects on serum or urinary electrolytes, and no other metabolic changes were seen. The usual clinical effects of adrenaline administration—apprehension, tremor, and palpitation—occurred after each injection. The data suggest that the adrenal cortex is stimulated less by adrenaline than by A.C.T.H.

The striking improvement claimed by Lewin and Wassén (1949) and Le Vay and Loxton (1949, 1950) from the use of deoxycortone and ascorbic acid in rheumatoid arthritis has been disputed by numerous authors (cited fully by Bywaters et al. 1950). In the present case, as in others we have studied, no demonstrable clinical or hæmatological effects followed the administration of deoxycortone and ascorbic acid for 4 consecutive days in the amounts recommended. The failure to elicit an eosinophil response with deoxycortone and ascorbic acid is in accord with the findings of others (Blackburn and Burke 1950).

In conclusion, it is of interest to record the patient's opinion of the therapeutic value of the three forms of treatment. On adrenaline and combined deoxycortone and ascorbic acid, though he showed initial enthusiasm, especially in the pre-treatment control periods, his final comment was: "They are not a patch on A.C.T.H."

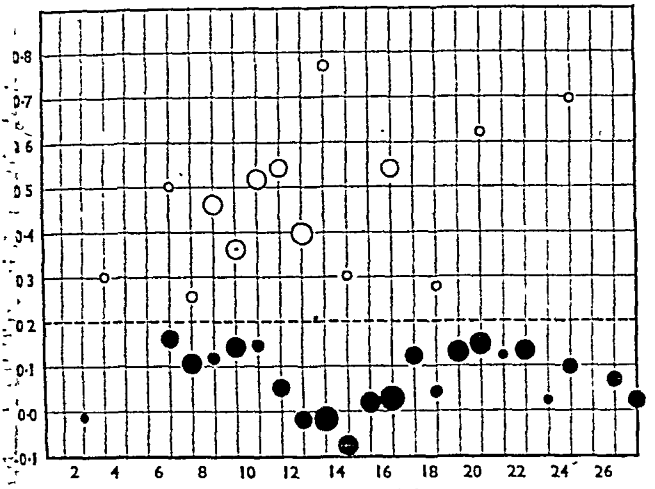
SUMMARY

1. The clinical and metabolic effects of A.C.T.H. have been studied in a case of severe rheumatoid arthritis treated with 100 mg. of the drug daily for 9 days.

2. No clinical improvement or significant changes were observed when the same patient was subsequently treated with adrenaline parenterally for 14 days, or during the 4 days when he also received deoxycortone and ascorbic acid by simultaneous injection thrice daily.

3. Adrenocortical stimulation by A.C.T.H. was shown by a sustained fall in circulating eosinophils and a rise in the urinary excretion of 17-ketosteroids and 11-oxysteroids.

4. Stimulation of the adrenal cortex by adrenaline was less marked than stimulation by A.C.T.H.



Average consistence of cervical secretions at different stages of menstrual cycle or of pregnancy in 86 non-pregnant women (black circles) and 35 pregnant women (open circles). Areas of circles are proportional to the number of cases included in the average, the smallest circle representing one case.

being sufficient. In its present form, however, the instrument is still in the experimental stage and not yet by any means perfect.

The records obtained are plots of the variations of pressure with length of column of material in the capillary tube. For a newtonian fluid these are straight lines, and although cervical secretions are very far from being true fluids they give plots which are virtually also straight lines. On the other hand, the direction of these lines clearly reveals the extent of the anomalous flow. In the present preliminary work two parameters are taken from the records: (1) the slope, and (2) the pressure of extrusion when the capillary tube is half full. The pressure is a measure of the over-all consistence. This is not readily correlated with the physiological state and has therefore been little used in the present work. The slope is certainly more useful. For most secretions, pressures fall as the tube empties, as would be expected, but at some stages of the sexual cycle secretions are found which actually require an increasing pressure as the fluid column shortens. In other words, their consistence increases considerably with shearing. Thus the slopes may be positive or negative. So that these values can be handled more conveniently they are all given the same sign by a suitable rotation of axes.

A programme of research has been carried out on human cervical secretions in which it was the intention to plot the slope against the date in the menstrual cycle for women in normal physical condition. The ideal way would have been to examine a few women daily throughout their cycles, as two of us (F. A. G. and G. W. S. B.) are doing in a similar programme on bovine secretions. It was not practicable to collect human samples so frequently, so instead samples were taken from a large number of women on one or two occasions. We were then confronted with the difficulty of the different lengths of their menstrual cycles. The length of cycle chosen for plotting was 27 days, this being the modal value.[5] The duration of the first part—from menstruation to ovulation—varies widely, whereas the second—from ovulation to the next menstruation—is relatively constant at 14–15 days.[6 7] Hence the dates for all patients examined within 14 days of the approaching menstruation were plotted as so many days before that event, whereas for those examined more than 14 days before menstruation the dates were plotted as a proportion of the interval before the 14th day. Thus we fitted each individual cycle length to the normal (a method similar to Palmer's [8]).

It was realised that this treatment could be criticised from the statistical point of view; but, considering that the preovulatory and postovulatory stages in the menstrual cycle consist of two entirely different processes, we thought this the best way of dealing with our problem.

Secretions were taken from 300 women attending the gynæcological and antenatal departments of a large hospital. Of these, 86 non-pregnant and 35 pregnant women were selected as being in normal physical condition. To confirm the occurrence of ovulation, endometrial biopsies were done, and in some cases basal temperature charts were also kept to ascertain the probable date of ovulation. Each patient was asked to state the date of the start of her previous menstruation, and later to notify the onset of the next period. We thus knew the date and length of the cycle in which the secretion was taken.

The average value of the slopes for all patients at the same adjusted date in the cycle was plotted against that date. There appeared to be one maximum at about the 8th day, another at about the 20th, and a minimum at the 14th. To justify postulating the existence of these maxima and minima, an analysis of variance was carried out on averages taken over every three days, and it was established that the differences between those averages were significant well beyond Fisher's $P = 0{\cdot}001$ level.

Two important points which do not appear in the figure must be noted. First, though the averages show non-pregnant and pregnant women clearly separated, there is an overlapping in the case of 3 women. These pregnancies were diagnosed by the clinician, but they have not yet reached the time of parturition. Some pregnant women who have given secretions of lower slopes than those expected have later been known to abort. Secondly, among the non-pregnant women, there is a very large scatter. Some of this spread is due to the physically heterogeneous nature of the samples, the very wide range of consistence encountered, and the errors introduced by the instrument and the operator.

So complicated is the physical state of these secretions that very little is known of their rheology. Our approach as yet has been largely empirical. The results are regarded as preliminary and encouraging for further work with an improved instrument which is already under construction.

It is known that the changes in the physical properties of these secretions are governed by the hormones acting on the cervical glands. Hence the measurements of these properties may well be correlated with hormone levels and perhaps serve as some estimate of them. Such a quick and convenient method of assay would be invaluable. We are therefore planning a series of experiments to test this hypothesis.

A more detailed account of our work is now in preparation.

One of us (F. A. G.) is indebted to the Agricultural Research Council for a grant enabling him to carry out this work.

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anoxia (resulting from severe anæmia), which increases the cell permeability to bilirubin and gives rise to the typical yellow or orange staining; but the damage may not be severe enough to cause cell death, and in fact, Claireaux found that in infants dying within the first few days after birth, antemortem cell death was not present histologically. The only recent report on kernicterus without serological evidence of hæmolytic disease is that by Parsons (1947), who mentions two such cases.

RESULTS

In our experience, hæmolytic disease of the newborn is not the only, or the commonest, cause of kernicterus. Since 1948, post-mortem examinations have been made on altogether 239 infants dying in Southmead Hospital during the neonatal period. Of this total, 144 were premature.

In this series there were 14 proved cases of hæmolytic disease of the newborn, of which 10 showed kernicterus. There were 24 premature babies (i.e., infants weighing 5 lb. 8 oz. or less at birth) and one infant weighing 6 lb. 5 oz., in whom no evidence of hæmolytic disease could be found but all of whom showed typical kernicterus.

In these 25 cases the appearance of the brain macroscopically was indistinguishable from that in kernicterus due to hæmolytic disease. The intensity of the staining varied from pale lemon-yellow to deep orange. The distribution was variable, as it is in kernicterus associated with hæmolytic disease. In every case the cornu ammonis and the subthalamic nucleus showed staining, and in many cases there was also staining of the nuclei in the thalamus, midbrain, and medulla; often the floor of the 4th ventricle was stained. In no case was there biliary obstruction, nor was there any clinical or histological evidence of sepsis.

In 10 cases no other abnormality was found post-mortem. Of the remainder, 1 had a tentorial tear with slight hæmorrhage; 1 had hæmorrhagic disease of the newborn with melæna, which had ceased several days before death; and the others showed patchy areas of atelectasis in the lungs, with small intrapulmonary hæmorrhages in a few cases, and pulmonary œdema in 1 case only. In none of these cases was there histological evidence of lung infection.

In none of the 25 infants who died with kernicterus did the serological findings accord with a diagnosis of hæmolytic disease. The direct anti-human-globulin (Coombs) test, performed on the blood of the majority of the infants, was always negative. In 13 of the cases the mother's serum was examined for immune Rh and other irregular antibodies; and in none were such antibodies demonstrated.

The frequency of this post-mortem finding of kernicterus in premature babies led to an analysis of the clinical records of these cases, and a striking clinical similarity was found. Cases were found in all the weight ranges into which premature babies are usually classified, the smallest infant weighing 2 lb. 8 oz. Clinically, in every case the infant showed well-marked physiological jaundice; but usually they seemed to be making fair progress until 24–48 hours before death, which took place between the 5th and 9th day of life.

The most usual early signs were disinclination to feed, a tendency to vomit, and periods of cyanosis during which the respiration became shallow and irregular with apnœic periods. In many cases there was increased muscle tone with some neck and general rigidity, and occasionally twitching or actual convulsions were noted; in a few cases there was excessive flaccidity. Thermolability was greatly increased, and death was preceded by repeated cyanotic attacks and hyperpyrexia. Laryngeal swabs and post-mortem bacteriological examination confirmed the histological finding that no respiratory infection was present.

DISCUSSION

Prematurity associated with physiological jaundice and other characteristic signs, arising between the 5th and 9th day of life and resulting in death with kernicterus, seems to be a definite entity which has not been described before.

Bearing in mind the unusually great susceptibility of the tissues of the premature infant to hypoxia, the atelectasis found in some cases suggests that oxygen deficiency may be the primary factor predisposing to brain-cell damage and thus to increased permeability of certain groups of cells to bile pigment.

A further factor to be considered is the damaging influence of hypoxia on capillary permeability in the newborn (Clifford 1941); the blood-brain barrier might well be altered towards a greater concentration of bile products in the immediate vicinity of the nerve-cells in the most susceptible areas of the brain.

If, as is thought, physiological jaundice is partly due to immaturity of the liver, the premature infant is particularly liable to have a high plasma-bilirubin content. This may be an important associated factor, as Küster and Krings (1950) have suggested. These factors, which may be present in prematurity and in hæmolytic disease, suggest that in both conditions the kernicterus may have the same origin. Investigations are proceeding.

SUMMARY

In 239 consecutive post-mortem examinations following neonatal death, there were 25 cases of jaundiced premature infants in which kernicterus was found without post-mortem or serological evidence of hæmolytic disease, sepsis, or biliary obstruction.

These 25 cases seem to form a definite clinical group in which death occurred between the 5th and 9th day of life with jaundice and other characteristic physical signs.

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Preliminary Communication

RHEOLOGY OF HUMAN CERVICAL SECRETIONS

EFFECTS OF MENSTRUAL CYCLE AND PREGNANCY

It has been recognised previously[1 2 3] that the physical properties of the uterine cervical mucus undergo characteristic changes throughout the sexual cycle. We have recently made further researches on the flow properties of such secretions taken from the human and bovine cervical canals with the aim of correlating these properties with the physiological states.

The instrument used is a modification of the Scott Blair[4] emptying and filling capillary-tube viscometer, which measured the varying-flow-rate as the fluid was extruded by a constant pressure. The present apparatus (originally devised for the investigation of bovine cervical secretions) makes a continuous record of the varying pressure required to extrude the material partially at a constant rate. This is a great improvement over the earlier technique in that complications due to accelerations are largely avoided. The design enables extremely small quantities to be investigated, 0 006 ml. of secretion

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THE LANCET

LONDON: SATURDAY, JUNE 24, 1950

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These figures drive home a lesson that has long been known but has still to be acted on. This is simply that, with due allowance for failures for one reason or another, the number admitted to advanced training should not greatly exceed the number that can be absorbed into specialist posts in our own hospitals, in the Services, or overseas. (Openings in the Services and overseas may have been largely neglected in the last year or two, but the Scottish report argues that they do not materially alter the picture.) What the aggregate should be can only be decided nationally; and, since we now have a National Health Service, the delay in publishing the facts for England and Wales, and in forming a policy thereon, is not easily explained; for the need has been apparent for a long time.[2] Many graduates are prepared to pursue a small chance of a consultant post rather than enter general practice in its present state; and many have frankly faced the risk involved. But, in the words of the report, "it is neither fair to the individual, nor good business, to train over a period of years, and at public expense, excessive numbers of aspirants who in the event cannot find places in their chosen field." Of course, limitation of numbers need not necessarily be extended to junior registrars. Here greater latitude is reasonable; for a period in this grade enables a graduate to tell whether he likes a particular specialty (and whether it likes him), and the experience that he gains will usually be valuable in other fields, including general practice. But the position of those who have carried their specialist training further is very different. Long preoccupation with one corner of the whole field may actually make a man less competent—as well as less willing—to enter general practice than when he finished his house-appointments.

In view of these facts the Scottish report suggests first that the registrar's training should take more account of the requirements of future practitioners, and secondly that those who have been "shed" during their training should be enabled to attach themselves to hospital departments, after entering general practice. Here it touches the heart of the matter. If, as must happen, the number of registrar and senior registrar appointments is to be reduced, the loss to the hospital service will have to be made good. More consultants might be appointed; but consultant establishments have only lately been fixed, and any substantial increase at this juncture of the nation's (and the service's) affairs is likely to be resisted. At a lower level there might be an increase in the number of junior registrars, usually serving as such for only a year. (In Scotland, the number of junior registrars is actually 2 below that set as desirable.) But people of greater maturity will also be needed, and by far the most hopeful solution would be to secure part-time help from practitioners with suitable experience. To anyone considering the advantage of the service as a whole, rather than hospital work alone, it must be clear that the inconveniences of such a plan are heavily outweighed by its potential benefit to general practice. For many registrars, it seems, the road to advancement in hospital practice must shortly be closed by the termination of their present appointments; and many must be profoundly disappointed. But the tragedy lies not so much in our inability to offer them consultant appointments as in our failure, so far, to provide conditions of general practice which will enable first-rate men and women, with a high level of training, to enter it with interest and confidence. A big step towards providing such conditions would be to create or restore numerous hospital appointments to be held by general practitioners. Nothing, on the other hand, could be more disastrous to general practice than that these men and women should reluctantly take up the work of family doctors with the certainty of complete separation from the hospital work which was their first choice and for which they have laboriously trained.

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He is very properly concerned for the social and economic status of the epileptic, as well as with the diagnosis and scientific study and treatment of epilepsy: but the whole tenor of the book is that of the missionary and the educationist: Bridge is clearly much more interested in the epileptic than in epilepsy. It is difficult to follow the scientific theme in this setting, but there is a good index and bibliography to help the discriminating.

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Salicylate in Rheumatic Fever

In the seventy-five years since Buss[1] and Maclagan[2] introduced salicylate it has been established beyond question that the drug dramatically reduces the pain and pyrexia of acute rheumatic fever. But there is still no agreement on the far more important question: Does salicylate in any way protect the patient against the crippling valve lesions that follow rheumatic carditis? Coburn,[3] who gave massive, almost toxic, doses and relied largely on the erythrocyte-sedimentation rate (E.S.R.) as a test of cure, concluded that if salicylate is given early enough, long enough, and in large enough amounts it can cure carditis. He has received some support from Reid,[4] but other observers[5, 6] have been unable to confirm his findings. In this respect there is as yet no published evidence that 'Cortisone' is any more effective than aspirin. The several clinical reports[7] that have appeared are all careful not to claim that cortisone or adrenocorticotropic hormone has a greater effect on rheumatic carditis than can be explained as a result of the reduced load on the heart with the decrease in fever. Nevertheless, by deduction from the known non-specific action of cortisone in suppressing the formation and maturation of all forms of granulation tissue, there is good reason to hope that the pathological changes of rheumatic carditis can be aborted by the early administration of this drug. But both cortisone and salicylate await a statistical study with long-term evaluation, comparing the course of the treated with the untreated disease. This would be difficult to arrange, since it would mean depriving some patients with pain and fever of the undoubted immediate benefits of salicylate. Yet there is no other way of obtaining a satisfactory answer to our question; for the natural history of rheumatic fever is so variable that any apparent cure may be but a natural remission, whereas a real cure might be masked by exposure to a fresh group-A streptococcal infection with subsequent recurrence of the disease.

As Buss noted, the effect of salicylate on pain and fever is manifest in diseases other than rheumatic fever; but it is so striking in this disease that it has long been suspected that the drug has a specific effect on the rheumatic process as well. In addition, salicylate in high dosage depresses the E.S.R. in rheumatic fever,[3, 4, 8] though again a similar but slighter effect has been demonstrated in other diseases.[5, 9] In their recent study of the distribution of the body-fluids in rheumatic fever, Reid and his colleagues[10] claim that salicylate induces a pronounced shift in body-fluids, so that with the relief of pain and swelling of the affected tissues there is a reduction in intracellular fluid and an increase in plasma volume. This effect may be so great that in moderate salicylate intoxication signs of tissue dehydration may develop at a time when the plasma volume is raised to 150% of the figures found on recovery. Indeed this increase in plasma volume may itself be so heavy a load on an already damaged heart that pulmonary œdema supervenes.

Some light is thrown on the mechanism of this fluid shift by the work of Swyer,[11] who showed that salicylate seems to reduce the permeability of damaged capillaries and therefore decrease the loss of fluid from them. Smith and Humphrey[12] suggest that this action in reducing capillary permeability may explain their findings that salicylate protects experimental animals against the tissue necrosis that follows the reversed Arthus and Schwartzman reactions. These reactions depend on the hypersensitivity of connective tissue to which an antigen has been affixed by local injection. Again, some observers[13] contend that salicylate protects against the arterial and myocardial lesions that occur in serum myocarditis, though this opinion is not unanimous.[14] It is not certain that there is a hypersensitivity of the connective tissue in rheumatic fever, but many think it highly probable. If these views are correct, salicylate seems to act on that final common pathway of these connective-tissue reactions which involves increased capillary permeability. It may be because of the same effect on capillary permeability that salicylate inhibits the increase in the spreading action of hyaluronidase which occurs in rheumatic fever; for the increase may merely depend on a greater flow of tissue fluids as a result of increased capillary permeability.

Thus evidence is accumulating to show that the action of salicylate in rheumatic fever depends on local tissue reactions, and it is highly important that such effects should be investigated in other disease processes in man as well as experimentally in animals.

Hospital Life

No-one can live and work for long in a large hospital without becoming aware that he is in the midst of various hierarchies, held together by a common purpose, yet divided by the exclusive lore of each. A report[15] on employment relations in a group of hospitals in Lancashire brings out some of the tensions engendered by the system. It is noteworthy that, according to this study, the smaller the hospital the higher the morale; for in the smaller units life is likely to be less highly formalised. The report draws attention to much else that we should bear in mind: the demand for joint consultation (now, happily, to be satisfied[16]); the need for a clear and encouraging policy governing promotion, and for better catering and a more satisfying social life; and the wish of nurses that shift work shall be substituted for the broken periods of duty which now bar them from true leisure. That 50% of student nurses were found to leave in their first year, suggests that selection is less rigorous than it might be.

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2. Maclagan, J. T. *Lancet*, 1876, i, 342.
3. Coburn, A. F. *Bull. Johns Hopk. Hosp.* 1943, 73, 435.
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5. Harris, T. N. *Amer. J. med. Sci.* 1947, 213, 482.
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8. Manchester, R. C. *Arch. intern. Med.* 1946, 78, 170.
9. Rapoport, S., Guest, G. M. *Proc. Soc. exp. Biol., N.Y.* 1946, 61, 43.
10. Reid, J., Watson, R. D., Sproull, D. H. *Quart. J. Med.* 1950, 19, 1.
11. Swyer, G. I. M. *Biochem. J.* 1948, 42, 28.
12. Smith, W., Humphrey, J. H. *Brit. J. exp. Path.* 1949, 30, 560.
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14. Forman, C., Seifter, J., Ehrich, W. E. *J. Allergy*, 1949, 20, 273.
15. Employment Relations in a Group of Hospitals: a report of a survey by the department of social science of the University of Liverpool. Joan Woodward, M.A. Published by the Institute of Hospital Administrators, Tavistock House North, Tavistock Square, London, W.C.1. Pp. 115. 5*s*.
16. See *Lancet*, June 10, p. 1079.

Unfortunately, these reports have often covered only short periods of observation; and opinions have differed on what constitutes a remission. Nevertheless, the reports give the impression that clinical and hæmatological remissions—admittedly temporary—were too common to be purely spontaneous.

In order to gain a more balanced view, SACKS and his associates [2] carefully observed 14 patients with acute leukæmia over a period of twelve months. The diagnosis was based on examination of the peripheral blood *and* the bone-marrow. Complete temporary remission was recorded only if both blood and bone-marrow returned to normal; at the same time there would be remission of any anæmia, a return of the platelet-count to normal, decrease in the size of enlarged spleen or lymph-glands, and cessation of hæmorrhages. With only some of these improvements, and particularly when the peripheral blood appeared normal but abnormal cells were still numerous in the bone-marrow, "partial temporary remission" was recorded. "Clinical remission," in which the patient felt better but neither blood nor bone-marrow returned to normal, was rightly disregarded. Of their 14 patients, 6 were children up to 8 years of age, 2 were adolescents, and 6 were adults between 26 and 63 years of age. Of the whole group, 7 were diagnosed as having lymphatic leukæmia, while the myeloid form was found in 4 and the monocytic in 3. The patients were treated with aminopterin intramuscularly, 0·5–2 mg. daily; and instead, some received a few doses of 'Amethopterin' for a short time, but this antagonist did not seem to have any advantages. Of the 14 patients, only 2 had complete temporary remissions; partial remissions took place in 3, who all died later; and in 9 there was no response. The 2 cases which remitted were in an adult, aged 39, and a child, aged 14 months; in each case the remission lasted about 3 months, after which the patients relapsed and died, further aminopterin having no effect. Another, and larger, group has been studied by STICKNEY and his colleagues,[3] who treated 21 children and 33 adults with aminopterin; some amethopterin was used, but this was soon given up because it seemed less active and more toxic than aminopterin. They gave 1 mg. of aminopterin, orally or intramuscularly, each day until toxic effects appeared or remission was induced. By SACKS's criteria, among the 21 children, there were 5 complete temporary remissions, lasting 1–3 months; and among the 37 adults, 3, lasting 3–4 months. With 1 exception, all these cases relapsed and would not respond to further treatment; the single exception was a 5-year-old child who had 3 remissions and relapses and was still alive 14 months after the initial treatment. The report notes that, though abnormal cells in the bone-marrow were greatly reduced, they were never completely absent; and the effectiveness of the folic-acid antagonist is shown by the appearance of typical megaloblasts in some cases.

The results obtained by these two groups of workers are typical, and discouraging. It is clear from the case-records that to obtain a remission with aminopterin the drug was pushed up to and beyond the limit of tolerance. Toxic effects, such as ulcerative stomatitis, diarrhœa, alopecia, and an exaggerated hæmorrhagic diathesis, were quite frequent. All the patients had to be given supporting blood-transfusions and antibiotics to prevent or treat secondary infections. The margin between the dose that may induce a remission and the dose that will cause marrow aplasia is very narrow. No criterion for predicting which cases are likely to remit has emerged, though lymphoid types seem to be most responsive, and monocytic types least. Another serious disadvantage is that few cases will respond to even a second course of aminopterin. (Cells of transmitted mouse leukæmia that were initially sensitive to amethopterin became resistant quite quickly.[4]) There are many possible folic-acid antagonists besides aminopterin and amethopterin; the difficulty is to select those that combine minimum toxicity with maximum efficacy. Unfortunately, "screening" by testing on experimental mouse leukæmia has not proved satisfactory, because of the species difference—in mice amethopterin was found to be the best antagonist for this purpose.

Despite all these difficulties, work with folic-acid antagonists is likely to continue; and further studies may tell us how the remissions are produced. Much credit must go to those manufacturers who have used their resources for this relatively unrewarding field. Meanwhile, it is not surprising to learn that adrenocorticotropic hormone (A.C.T.H.), which is known to cause a reduction in lymphoid tissue, has been tried in acute leukæmia. A preliminary report by DAMESHEK and others [5] deals with 8 patients, 2 with subacute myeloid, and 6 with acute or subacute lymphoid, leukæmia. The myeloid cases were unaffected. The 1 case of lymphatic leukæmia in an adult was probably too far advanced to respond; but the 5 children had remissions, and in 4 of them the bone-marrow became normal or almost normal; the remissions were accompanied by a rise in reticulocytes and platelets, suggesting that the A.C.T.H. actually stimulated the remaining normal marrow. Experience with this substance in other conditions suggested that if treatment with it were stopped a relapse would follow; in 1 patient treatment was stopped and a relapse did in fact ensue. It must be noted that all of DAMESHEK's cases which remitted were of the "leucopenic" type, and it is not clear whether the same results will be seen in the classical types. DONOHUE and others [6] have reported the case of a boy, aged 7, who had an eosinophilic type of myeloid leukæmia with many myeloblasts in the bone-marrow. The response to A.C.T.H. was good, as judged by the disappearance of eosinophils from the blood and reduction of myeloblasts in the bone-marrow from 88 to 8·5%. Side-effects appeared early, however, and were troublesome so treatment was discontinued after a month. During the next 13 weeks the blood condition slowly relapsed, and it was reported to be responding less well to a second course.

At present, then, two lines of research are being explored. These offer at least some dim hope that acute leukæmia may eventually be controlled.

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4. Burchenal, J. H., Robinson, E., Johnston, S. F., Kushida, M. N. *Science*, 1950, 111, 116.
5. Dameshek, W., Saunders, R. H., Zannos, L. *Bull. New Engl. Center*, 1950, 12, 11.
6. Donohue, W. L., Snelling, C. E., Jackson, S. H., Keith, J. D., Chute, A. L., Laski, B., Silverthorne, N. *J. Amer. med. Ass.* 1950, 143, 154.

secretary, an animal secretary, and a treasurer of doubtful status—a pleasantry which was accepted without rancour by Dr. G. I. M. Swyer, Mr. Arthur Walton, PH.D., and Dr. W. J. Tindall, the officers in question.

The conference presented the usual record of careful work. Dr. R. G. Harrison and Dr. A. G. Oettlé, in studying pathological changes in the rat testis following ischæmia, have found that temporary ischæmia, induced by clipping the vas and its attendant vessels, is followed by temporary sterility. Dr. Parkes discussed the storage of mammalian spermatozoa at low temperatures, the essential process for success being immediate and complete freezing to a temperature of −79°C. Dr. Margaret Hadley Jackson asked the significance of clusters of round cells which she had found in the endometrium of a few "stubbornly infertile women." This patchy infiltration is found at almost any level in the endometrium and is not confined to any particular phase in the menstrual cycle. She distinguished it from the dense infiltration found before and after menstruation starts, from postabortal, postpartum, or gonococcal endometritis, and from the infiltration seen with carcinoma and in senile endometritis, and also—though less certainly—from tuberculosis of the endometrium. Mr. L. M. Snaith, F.R.C.O.G., had found that this appearance was often associated with pelvic inflammation—sometimes an old healed lesion—elsewhere than in the uterus. Miss Josephine Barnes, F.R.C.S., recalled that pathologists are apt to vary in the proportion of cases of tuberculous endometritis which they report. In regular menstruators the endometrium is shed monthly. One month a biopsy may be positive for tuberculosis, and the next it may be negative, in spite of the presence of active disease.

Dr. Claude Béclère, who showed a film illustrating the use of hysterosalpingography in the diagnosis and treatment of sterility, believes it is important to limit the amount of radiopaque material injected, to control the procedure by screening during the injection, and to distinguish between the spilling from a patent tube and the slow filling of a hydrosalpinx. Patency of tubes can be confirmed for certain by taking a control film one or two days after the injection, but Dr. Bernard Sandler attempts to complete the investigation at one session by introducing into the rectum a plastic instrument roughly 8 in. long and $^1/_2$ in. in diameter, with a radiopaque marker in the tip; the fallopian tube can be massaged against this firm object (the position of which can be checked by looking at the marker), and a patent tube will then spill its contents. Dr. Béclère expressed his interest in this method, but again stressed the importance of excluding hydrosalpinx.

EMIGRATION OF BACTERIA FROM THE GUT

PERITONEAL irrigation with slightly hypertonic fluid is often used for patients with acute renal failure or uræmia, but the treatment has its dangers.[1] Despite the most careful technique a *Bact. coli* peritonitis may supervene, and we need to know why. It has been shown that if sterile but irritant fluids, such as a solution of gum tragacanth or 5% monoethanolamine oleate, are injected intraperitoneally in dogs, coliform organisms can eventually be recovered from the peritoneal cavity. In uræmic dogs long-continued dialysation of the peritoneum leads to peritonitis caused by coliform organisms or other intestinal bacteria, and yet blood-cultures taken from these dogs are sterile; so it seems probable that bacteria have migrated through the wall of the gut into the peritoneal cavity.

The hypothesis of transmural migration, which has an obvious clinical bearing, has now been tested by Schweinburg and his colleagues[2] in dogs by introducing bacteria tagged with radioactive iodine into the gastro-intestinal tract after treating the peritoneum with a chemical irritant. The iodination of washed bacteria with I^{131} apparently did not affect their viability, but it is not known whether the reaction occurs on the surface or in the interior of the bacterial cell. The breaking down of tagged organisms will produce soluble radioactive protein, but if the organisms themselves remain in the gut little radioactive material should reach the peritoneal exudate. In a control group of dogs Schweinburg and his co-workers first gave radioactive iodine by stomach-tube and found that very little of this reached the peritoneal cavity, whereas when labelled coliforms were injected intravenously ten times as much radioactive material appeared there. The difference reflects the rapid elimination of ionic iodine in the urine and the slow disintegration and elimination of bacterial substances. In another group of dogs to which tagged bacteria were given by stomach-tube before the peritoneal fluid became contaminated the amount of radioactivity subsequently found in the exudate was small; but if coliforms were already present in the exudate when the labelled organisms were given, whether these were dead or alive, something like 1000 times as much radioactive material appeared in the exudate, the amount that could be recovered from the peritoneal fluid being 0·5–4% of the total radioactive bacterial substance introduced.

These findings support the contention that coliforms migrate into the peritoneal cavity when the intestinal coat is irritated by chemical substances. Since dead as well as living bacteria make the journey, their migration must be a passive transfer in the flow of fluid across the serosa. In patients with uræmia treated by dialysis it seems likely that the same mechanism is responsible for the occurrence of peritonitis; if so it should be possible to prevent this complication by giving streptomycin by mouth or one of the other drugs which "sterilise" the intestinal contents.

DANISH TREATMENT OF PSYCHOPATHS

THOSE who have not had the chance of visiting Denmark's psychopathic prison had the prison brought to them on June 6 when Dr. Georg Stürup showed his documentary film at the Institut Français. The showing was sponsored by the Institute for the Scientific Treatment of Delinquency and the Howard League for Penal Reform, the chair being taken by Lord Justice Denning, deputising for the Attorney-General. The film is a product of the Government Film Committee, the Danish equivalent of our C.O.I. Films Division; it is beautifully photographed by Annelise Reenberg; and largely written and acted by the psychopathic detainees themselves. The hero is the psychopathic criminal Jensen, who finally leaves the old court-house of Denmark a wiser, a better, and a free man. Happily he is not a sexual offender, so there is no call for him to submit to castration, though the method which is employed in the Herstedvester Institution is graphically illustrated. By some strange psychopathological trick, the recovering castrati are shown tending a button-mushroom farm—the button-mushrooms being almost identical with the glass pseudo-testicles so recently inserted, and photographically painfully reminiscent of the real thing so recently departed.

These psychopaths are fascinating folk. Their characteristics emerge admirably in the film—the over-determined gait, the over-manly chewing of the pipe and furrowing of the forehead, the egocentricity, the petty lies and silly sulks, the lack of facial mobility. The film shows dramatically the contrast between the pleasant environment of Herstedvester (recalling a modern English borstal), and the slow realisation by the detainee that he is in for good, unless he can come to terms with society. Dr. Stürup emphasises that the

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1. Frank, H. A., Seligman, A. M., Fine, J. *Ann. Surg.* 1948, 128, 561.
2. Schweinburg, F. B., Seligman, A. M., Fine, J. *New Engl. J. Med.* 1950, 242, 747.

Annotations

BREAST-MILK

DURING the late war a very large number of analyses of breast-milk were made at the National Institute for Research in Dairying, for the purpose mainly of assessing the nutritional state of the mothers. Kon and Mawson, and their many collaborators in this study, first sought a means of telling how far the constituents of the milk were a measure of the mother's nutrition. They investigated the normal range of variation and the effect of supplements and deprivations: and they charted the variations in the course of lactation. The results, which have now been published,[1] indicate where our national feeding habits may lead a mother into taking less of a vitamin than she is giving to her baby.

The analyses were mostly of vitamins. Vitamin D is present in breast-milk only in almost undetectable quantities, even where the mother's intake is ample; and breast-fed as well as bottle-fed babies should receive supplements. Vitamin C, as was known, is present in higher concentration in milk than in plasma. A detailed study of food intake and milk secretion of one mother showed that the milk vitamin-C content responds only slowly to increased intake of this vitamin, and similarly the milk content is only slowly depressed by deprivation. For five weeks during which the mother took only 10 mg. daily, the amount in the milk fell continuously, but in these weeks she secreted about 0·5 g. more of the vitamin than she received. (Incidentally, the point where a consignment of oranges arrived in this country shows clearly in the survey.) The B vitamins differ from each other in their behaviour. Supplements of riboflavine have a quick and brief effect on the concentration in the milk, which may be altered by each meal. The thiamine concentration, on the other hand, varies very little with food supplements and remains fairly constant throughout lactation and when the mother ate more thiamine the effect was more evident in the concentration of the free than of the combined form. The strange thing about this vitamin is that the concentration of it is lower in the milk of young and of old mothers; and it is also low where the mother has little milk—a feature which recalls the suggestion by Knott et al.[2] that nervous factors may influence the concentration.

The fat content of milk varies with the technique of taking the sample; and so Kon and Mawson have related the concentration of vitamin A to the fat content, and not to the volume, of milk. Definite trends emerge: there is a continuous fall in concentration during the first twenty weeks of lactation and a consistent increase with increasing maternal age, independent of parity—a phenomenon which remains unexplained. The taking of one large dose of the vitamin is reflected in the concentration in the milk for a day or more. The carotenoids—the substances responsible for the yellow colour of colostrum and milk—apparently dwell in the capsule of the fat globules. Unlike vitamin A, their concentration in the milk remains unaltered throughout lactation, though varying from day to day. β-carotene is present in such small quantities that its contribution to the baby's vitamin-A supply is negligible.

The practical implications are that a mother should take her vitamin-A tablets during lactation, that with the B vitamins her needs are well met by the national loaf and by the extra rations she gets, and that she should certainly eat fresh fruit and not despise green vegetables.

TOTAL SYMPATHECTOMY

THE original purpose of operations for hypertension was to reduce the blood-pressure to normal, and since the fall of blood-pressure is more or less proportional to the extent of the sympathectomy the operations became more and more extensive. In 1941 Grimson[1] reported 3 cases in which he had performed "total" bilateral sympathectomy, removing the sympathetic chains from the stellate ganglion to L3 on both sides. But after studying 30 cases Ray and Console[2] conclude that, except in exceptional circumstances, the greater lowering of blood-pressure attained does not offset the higher morbidity-rates and mortality-rates which accompany the total when compared with the standard thoracolumbar sympathectomies. Smithwick[3] supports this view, and records that 4 out of 16 of his patients were quite unable to stand after total sympathectomy. It is becoming clear, in Britain at least, as recent letters in these columns have emphasised, that the primary aim of treatment in *advanced* cases of hypertension is to relieve symptoms, especially headache, and that reduction of blood-pressure is a secondary consideration. For this purpose quite limited sympathectomies are effective. In early cases it is arguable that adequate denervation of the kidneys is all that is required, and this can be achieved by thoracolumbar sympathectomy.

Is there then any place for "total" sympathectomy? Ray and Console believe that the indications are: (1) hypertension associated with angina of effort; (2) postural hypotension with severe tachycardia after less extensive operations; and (3) severe vasospastic conditions in the hands, accompanying hypertension or appearing after a thoracolumbar sympathectomy. In the first group the prognosis is poor, and many would hold that no operation is justified. Lowering of the blood-pressure may itself precipitate or aggravate angina pectoris. Before deciding on total bilateral sympathectomy, removal of the stellate and upper four thoracic ganglia on the left side alone should be considered. This operation, by dividing the afferent pain fibres from the heart, may give satisfactory relief of symptoms. As regards the second group of cases, the effects of postural hypotension usually pass with time and can largely be controlled with a corset and elastic stockings. If troublesome tachycardia on standing persists, the same limited high thoracic sympathectomy on the left may be done with the object of dividing the cardiac motor nerves. Lastly, Raynaud's phenomenon in the hands after thoracolumbar sympathectomy is rarely severe enough to call for further surgery—Shucksmith[4] makes the interesting observation that if the third thoracic ganglia are removed (presumably in a supradiaphragmatic operation) it does not occur. If the vascular spasm was present *before* thoracolumbar sympathectomy it may become very severe afterwards and demand more extensive procedures. But even then total sympathectomy seems rather drastic.

A NEW SOCIETY

BIOLOGISTS, veterinarians, physiologists, and doctors have all contributed to the study of fertility; and for some years now representatives of these disciplines have held an annual conference to exchange views and lighten each other's way. The seventh of these conferences was held on June 16 and 17 in the Zoological Society's house in London, and the mating of so many fertile minds was then blessed with the birth of a new scientific body—the Society for the Study of Fertility. Mr. A. S. Parkes, D.SC., F.R.S., the first president, remarked, at the annual dinner, that the society had provided itself with a human

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[1] *Spec. Rep. Ser. Med. Res. Coun., Lond.* no. 269. Human Milk: Wartime Studies of Certain Vitamins and Other Constituents. By S. K. Kon and E. H. Mawson. H.M. Stationery Office. Pp. 186. 4*s*.

[2] Knott, E. M., Kleiger, S. C., Torres-Bracamonte, F. *J. Nutrit.* 1943, 25, 49.

[1] Grimson, K. S. *Ann. Surg.* 1941, 114, 753.

[2] Ray, B. S., Console, A. D. *Ibid*, 1949, 130, 652.

[3] Smithwick, R. H. *Ibid*, p. 671.

[4] Shucksmith, H. S. *Lancet*, April, 22, p. 787.

Special Articles

THE ROYAL COLLEGE OF SURGEONS THROUGH 150 YEARS

NEXT week the Royal College of Surgeons of England is celebrating the 150th anniversary of the charter which constituted it a Royal College.

A Guild of Barbers is mentioned in the records of the City of London in 1308 and a Fellowship of Surgeons in 1369. In 1493 the latter entered into an alliance or "composition" with the Barbers Company, the two being formally united by Act of Parliament in 1540. The partnership was dissolved by an Act of Parliament in 1745, which constituted the "Master, Governors and Commonalty of the Art and Science of Surgeons of London."

The present unanimity of applause for the celebration of the 1800 charter is in marked contrast to its birth-throes and early infancy. The Surgeons obtained the charter of 1800 because they had failed to secure a private Bill in Parliament. Certain technical irregularities about the acquisition of premises in Lincoln's Inn Fields and the sale of the dilapidated Surgeons' Hall near the Old Bailey had led to a Bill being presented in 1797 to convert the company into a Royal College. But when the Bill came up for its third reading in the House of Lords, it was rejected after a violent speech by Lord Thurlow, who may have been influenced by the fact that he had a house near the new hall. The inhabitants of Lincoln's Inn Fields did not like the idea of dissections being carried on in what was a residential neighbourhood. Thurlow has been described as not only vulgar, arrogant, and profane, but also immoral. Perhaps, however, he had some justification for his fears about the presence of the college in Lincoln's Inn Fields, for in 1803 his old house was acquired to accommodate the Hunterian Museum.

Eventually it was decided not to proceed with a private Bill but to obtain a Royal Charter. The petition for this was presented in March, 1798, and the charter passed the Great Seal on March 22, 1800.[1] This constituted the Royal College of Surgeons of London. A further charter in 1822 changed the titles of master and governor to president and vice-president, and converted the court of assistants into a council.

But more controversy was to come, and its spokesman was Thomas Wakley.[2] THE LANCET, under his editorship, attacked the regulation of the council regarding medical students, which, Wakley said, created a monopoly to the benefit of council members. It also attacked the undemocratic nature of the self-electing council. Twelve hundred persons attended a protest meeting organised by Wakley at the Freemasons' Tavern in February, 1826. Strong language was used and on one occasion Wakley was thrown out of the college in a free fight. Eventually, however, Wakley and the general pressure of public opinion secured a further charter in 1843, which set up a new class of membership—the Fellows—from and by whom the council was to be elected, and broadened the court of examiners. It also changed the name to the Royal College of Surgeons of England. Even in 1889, however, there was a test case about the right of members to hold meetings at the college.

During the 19th century distinguished leaders of the profession served as presidents of the college, which increased in stature and influence. In 1886 the practice of electing a different president each year was discontinued. Sir William Scovell Savory, elected in 1885, was re-elected each year until he retired in 1888. At the turn of the century Sir William MacCormac filled the office from 1896 until the end of the centenary year, 1900. Lord Moynihan, who was first elected president in 1925, breathed new life into the college, restarting the research work: he was president for six years. His term of office was exceeded by that of Lord Webb-Johnson (1941-48), who, entering office in the war years, saw the post-war controversy on the health service, in which the presidents of the Royal Colleges played an important part at a critical stage. He was responsible for the great development of the college's postgraduate work during his term. Sir Cecil Wakeley, elected president last year, presides over a college comprised of some 3300 fellows and 25,000 members in all parts of the world.

THE COLLEGE AND EDUCATION

The Royal College of Surgeons has always been concerned with education. In the last century its attention was devoted to undergraduate medical schools, but with the growth of the medical faculties of universities and the establishment of the General Medical Council, the emphasis, as with other medical corporations, has shifted to the postgraduate student. The increasing popularity of the higher examinations is shown by the fact that the numbers in 1938–39 taking primary fellowship were 439 and the final examination 469; in 1949, 814 sat the examination for the former and 790 for the latter. The number of passes in 1938-39 was

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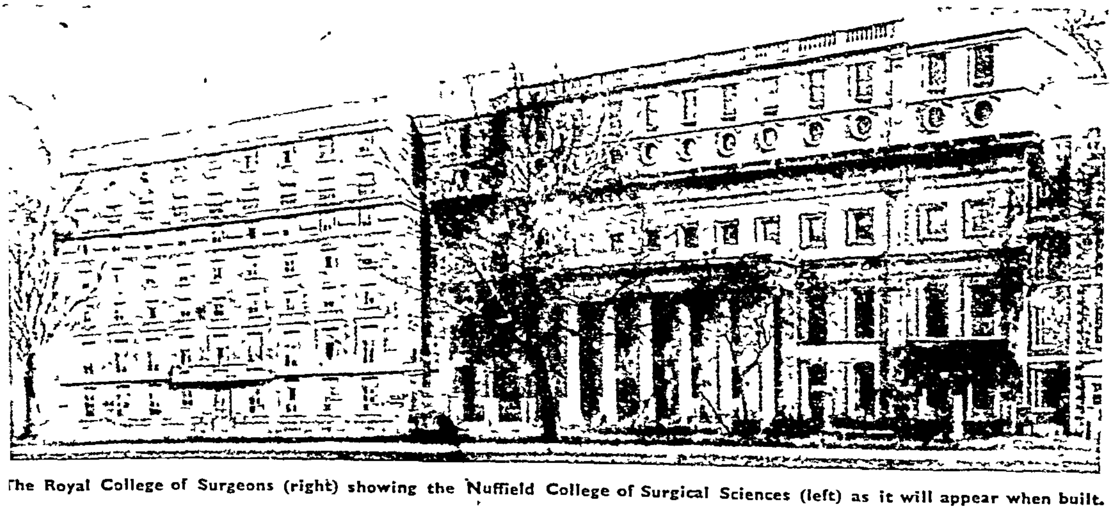
[1] Wall, C. The History of the Surgeons' Company, 1745–1800. London, 1937.

[2] Sprigge, S. S. Life and Times of Thomas Wakley. London, 1897.



The Royal College of Surgeons (right) showing the Nuffield College of Surgical Sciences (left) as it will appear when built.

secret of his success-rate—nearly 50% in his first 300 cases—is above all the indeterminate sentence. Without this fierce stimulus, the psychopath will make no effort to grow up and face the world as it is.

The details of the work and the theoretical basis of treatment at Herstedvester have been described in our columns by Taylor.[1] Dr. Stürup had some additional information to add. The cost of Herstedvester is about £1 per day per detainee—a high figure, but not the highest among world criminal institutions (the average for the ordinary Danish prisons is 10s. a day). Sterilisation is occasionally performed in Herstedvester in non-sexual psychopaths, usually because they have requested it to relieve the anxiety that they may have children like themselves. It is never done without full discussion first with the detainee's wife. For sexual offenders, castration is usual. A number of the castrati have subsequently married, and some are able still to perform the sexual act on occasion. The wives are often divorced women who have had, in Dr. Stürup's words, "more than enough of sex with their previous husbands." Such marriages are remarkably successful.

The lesson of Herstedvester is not that we should follow the Danish example with the sexual offender. It is rather that the psychopathic criminal is the toughest nut in both the penal and psychiatric calendars. The only hope lies in a combination of rigorous occupation, psychiatric understanding, and absolute toughness. For these people, prisons without bars are useless. Unless the detainee can be brought to see that his only hope of release is that he shall change himself, nothing can be done. It was good to see a number of the senior officials of our Prison Commission in Dr. Stürup's audience.

INFERTILITY IN CATTLE

THE fertility of our dairy herds is said to be decreasing. Reliable statistics are difficult to obtain, but the falling off seems to be particularly severe among pedigree cattle—the very ones in which a rapid increase in number is most desirable. Various explanations—genetic, endocrine, nutritional, and so on—have been suggested, but none is likely to be convincing until carefully planned experiments have been made. One suggestion is a dietary deficiency. The necessity for generous feeding of breeding stock is part of the stock-breeder's traditional knowledge, and it would be absurd to suggest that our pedigree cattle are underfed. Over a long period, however, it seems probable that a specific dietary deficiency might cause a deterioration in their fertility without other symptoms.

In the past, the difficulty encountered in getting cows into calf during the winter months used to cease with the advent of spring grass. But on the modern farm spring grass is not the old grass mixture of the fields and water-meadows but a ley growing on land that is mostly fertilised from sacks instead of the dung-cart. Through the work of Stapledon the food value of modern grass crops has undoubtedly been much improved, but there is no denying that the best dairy herds, whose reproductive-rate is apparently falling most sharply, are those that are increasingly fed by the new methods. May the crops so produced be lacking in some reproductive factor?

The disastrous experience of sheep-farmers in Western Australia, and the finely coordinated investigations that it inspired, revealed another and perhaps more likely mechanism by which infertility might result from modern methods of pasture improvement. It will be recalled[2] that the fertility of the flocks in that part of Australia declined so severely that many owners gave up sheep-farming. In spite of repeated mating with rams of proved fertility a large proportion of the ewes remained sterile. Where conception did occur, the fœtus sometimes died in utero. The infertile ewes were found to have a cystic hyperplasia of the endometrium, and uterine prolapse was common in non-breeding ewes. The most informative finding was that some virgin females and castrated males had well-developed teats and udders, such as can be produced by treatment with œstrogens. The sheep were clearly ingesting some œstrogenic substance from the pastures, and this was finally traced to the subterranean clover which had been introduced a few years previously to improve the pastures and had flourished exceedingly. Workers at the Courtauld Institute of Biochemistry and the National Institute for Research in Dairying have established that some English herbage also contains potent œstrogens. Is it possible that these are affecting the fertility of our pedigree cattle?

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[1] Taylor, S. *Lancet*, 1949, i, 32.

[2] Leading article, *Ibid*, March 25, 1950, p. 550.

ENTERTAINMENT UNDER LOCAL ANÆSTHESIA

LOCAL anæsthesia has never been really popular in this country, either among surgeons or their patients. There are times, however, when the patient must be kept awake; and then it may be a nice problem how to occupy his attention during the hours that the surgeon is operating. The usual practice has been to administer so much opiate or barbiturate or both that there is little attention left to occupy. This is not an entirely satisfactory solution, because many intelligent patients would prefer to be more aware of their surroundings. Entertaining and interesting conversation is another solution, and surgeons have even employed special assistants solely for this purpose. Thus Pitkin[1] speaks of his "auburn-haired vamp who has the faculty of making a woman forget that she is in the operating-room and causes her to imagine she is attending a musical or a bridge party. In some unknown way she causes the children to desert their own mothers for her, and she makes the men feel that the operation could go on forever if she would only remain with them."

Music as an aid to local anæsthesia was suggested many years ago. In latter years more than one hospital in Britain has had its theatres "piped" with radio, but the patients often preferred not to have the earphones on—like people in the "blitz" who, when radio or gramophone was being played to relieve the strain, would say, "Please turn the thing off. I can't hear what is going on." In the U.S.A. the use of music in the operating-theatre is being re-investigated.[2] In a Chicago hospital adults who are to be operated on under regional anæsthesia are asked the night before, "Will you have classical, semi-classical, or popular music tomorrow?" and children are offered a choice of "Cinderella," "Peter and the Wolf," or "Pinocchio." It is suggested that the right music lightens tension in the patient and also in the surgeons, who can talk more freely without the inhibiting influence of an attentive patient. As for relieving tension, it is said that Leonardo da Vinci, when painting La Gioconda, ensured that she retained her amused expression by having music played during the sittings.[3]

The truth probably is that during an operation under local anæsthesia each patient needs a divertissement suited to his particular temperament.

PROF. E. C. DODDS, F.R.S., will deliver the Bertram Louis Abrahams lecture at the Royal College of Physicians of London, on Thursday, July 13, at 5 P.M. He is to speak on the Bearing of Protein Structure on Clinical Problems.

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[1] Pitkin, G. P., quoted in L. H. Maxson's Spinal Anesthesia. Philadelphia and London, 1938.

[2] *New York Times*, June 4, 1950.

[3] Encyclopædia Britannica. 11th ed.; vol. XVI, p. 451.

THE CELEBRATIONS

The celebrations next week will take the form of a banquet when addresses of congratulation will be presented to the college, and on June 28 and 29 there will be special exhibitions on view. In the museum, the departments of anatomy and pathology will be staging exhibitions which will include examples of Hunter's originals and specimens made to replace those destroyed. There will be photomicrographs prepared for teaching purposes, and a series of radiographs of bone prepared by the type of X-ray tubes used in crystallography, which magnify without loss of definition and are stereoscopic. There will also be shown relics of the late war. These will be colour photographs including ones on the treatment of wounds and burns and the pathology of gas-gangrene. The museum has also acquired a number of specimens which will form a permanent record of the horrors of Belsen, including adult hearts about a quarter the normal size and weight. In the library will be an exhibition illustrating the research carried out at the college during the last 150 years.

REGISTRAR APPOINTMENTS

A SCOTTISH SURVEY

A review of the number of registrars in hospital appointments has now been completed by the Department of Health for Scotland. Read in conjunction with the earlier account of the number of consultants,[1] *it* leads to the conclusion that—in the words of the review—"the problem of reconciling the needs of the hospitals for medical staff with those of training for, and promotion to, specialist posts, both over the whole field and within the several specialities, has yet to be tackled. Its solution may well require a substantial change in present views and practices."

NUMBERS AND AGES

The survey, based on figures furnished by regional boards in the first three months of this year, shows that throughout the country there are 548 registrars of all grades. "The figures for each grade should be considered against the time normally spent in it: one year for junior registrars, two for registrars; and three or more for senior registrars—assume $3^1/_2$ years." At present junior registrars number 88; registrars 269, spread over two years, so that, with even distribution, there will be about 135 due to pass out of this grade each year; and senior registrars 191, of whom, presuming the spread to be over $3^1/_2$ years, 60 per annum will complete their course of specialist training. (The assumption here is that there is no "shedding" of senior registrars during their normal tenure.)

As regards ages, the year of birth of senior registrars ranges from 1900 to 1925; the year with the largest number is 1916 (corresponding to a present age of 34), with sharp declines in previous and later years. Of the 180 senior registrars whose ages are known, 139 are 32 or more years old; 7 are over 40, and the oldest is 50. The age-distribution of registrars and junior registrars generally follows that of the senior registrars at intervals corresponding to the time spent in the first two grades. Thus the years of birth of registrars are distributed round 1920 as a peak year (present age 30), with extremes at 1902 and 1924; and of junior registrars round 1922 as a peak year (present age 28), with much narrower extremes at 1916 and 1925. "All this represents a distinctly older population than the Spens report assumed in the training grades."

VACANCIES FOR CONSULTANTS

At the end of 1949, 646 consultants and 274 senior hospital medical officers were in hospital posts; and during the year 92 vacancies were advertised for these two grades together.

> "These advertised appointments represent in some cases replacements of specialists passing out of the Service and in others new appointments due to expansion of the Service, but they also include some vacancies arising from the movement of a specialist from one post to another. While they represent, therefore, rather more than the opportunities of promotion in Scotland for senior registrar, they do give a general measure of the prospects. In the first completed year of the Service, it is hardly to be expected that the appointment and promotion situation will set the pattern for subsequent years; it is too early to forecast the kinds of specialists who will be required for the hospital service in the next ten or twenty years. However, there may already be enough information to suggest that demand and supply are not yet equated."

The largest number of registrars of all grades is in general medicine (111), and general surgery (103), with 35 and 33 senior registrars respectively. The number in training in each specialty bears no close relation to the vacancies in Scotland.

> "In general surgery, with 103 registrars, including 33 senior registrars, there were only two specialist appointments advertised in Scotland during 1949. In orthopædic surgery only one post was advertised—the specialty has 27 registrars, including 11 senior registrars. By contrast there were 10 appointments in radio-diagnosis, which has only 16 registrars, including 7 senior registrars: and 10 appointments in psychiatry which counts only 34 registrars, 16 senior. In tuberculosis and chest diseases there were 11 appointments advertised—there are in this field 31 registrars, including 12 senior registrars."

CONTINUOUS SELECTION

The earlier memorandum suggested that the process of continuous selection of registrars for higher grades involved a "promotion pyramid," with the larger numbers in the junior grades progressively reduced to a comparatively small number regarded as fit to pass to consultant posts.

> "It is clear that this does not obtain today. Numbers of hospital medical staff assimilated to the Service after the appointed day were ex-Service men who had had considerable training, perhaps incomplete, and for whom the senior registrar grade was considered appropriate. In like case were some junior specialist staff holding quasi-substantive appointments before the inception of the Service, who were graded senior registrars. The result is that this grade now seems inflated in comparison to the other registrar grades, and as long as promotion from these grades is to be contingent on vacancies for consultants there may be very serious congestion.

The previous memorandum suggested a desirable distribution between the years of training, based on a yield of 30 trained specialists each year (which seemed a reasonable estimate of the number that might be absorbed in Scotland). The "desirable" and actual distribution is as follows:

Grade	*Numbers*			
	Desirable		*Actual*	
Junior registrars		90		88
Registrars:				
1st year	60		130*	
2nd year	40		139*	
		100		269
Senior registrars:				
1st year	30		50*	
2nd year	30		50*	
3rd year	30		50*	
4th year	30		41*	
		120		191
		310		548

* The distribution between years is only approximate.

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[1] See *Lancet*, 1949, ii, 1193.

151 and 117, and in 1949, 229 and 219. At present consultations are taking place between the English and Scottish corporations with a view to establishing a common standard for their fellowships (but not a common fellowship).

Some postgraduate demonstrations were carried on at Lincoln's Inn Fields before the war, but systematic teaching started since the war. Today the characteristic of the college is the number of young men and women of all colours and nationalities—and styles of dress—working in the museum and library, and attending the postgraduate courses. Last year something unique in conjunction with a medical corporation was inaugurated—the Nuffield College of Surgical Sciences. The provision of a residential postgraduate college has been made possible through the munificence of Viscount Nuffield, and when the special building, adjacent to the Royal College of Surgeons, has been built it will accommodate 100 men postgraduates; at present 20 are accommodated in a converted building, also next door to the college.

A hundred years ago Sir Richard Owen, when conservator of the Surgeons' Museum, delivered lectures on dentistry. In 1859 the college instituted the L.D.S., its first special diploma, and in 1947 it created an innovation by forming a Faculty of Dental Surgery and a Fellowship in Dental Surgery; in 1948 a similar Faculty of Anæsthetics was established. The college also grants, jointly with the Royal College of Physicians, eleven specialist postgraduate diplomas.

SCIENTIFIC WORK AND THE MUSEUM

Much scientific work is carried on under the auspices of the college. There are departments of anatomy and pathology at the college; the department of experimental research has the Bernhard Baron Research Laboratories and the Buckston Browne Farm; and the ophthalmological research unit was established in conjunction with the Royal Eye Hospital.

In 1799 the Surgeons Company wisely accepted the contents of John Hunter's museum which had been purchased by the Government and turned down by other scientific bodies. This formed the nucleus of the college museum which was built up into one of the largest medical collections. Among the distinguished conservators of the museum, two particularly stand out—Sir Richard Owen, in the 19th century, and Sir Arthur Keith in the 20th. In the days when presidents came and went each year, much depended on the permanent officials, and Owen was conservator for 30 years. He was especially interested in comparative anatomy, and tried to persuade the college to take over the Natural History collections of the British Museum. Quite properly the council considered this rather outside their scope, and so Owen, having persuaded the British Museum authorities to set up a special Natural History Museum, left the college and spent a further period as curator at South Kensington. Prof. G. Grey Turner has described the 26 years (1908–34) that Sir Arthur Keith was conservator as the heyday of the old museum.[3]

The destruction by bombing on the night of May 10, 1941, has proved to have been even more extensive than was thought. Only 3489 specimens survived out of a total of 11,225; and of 2671 Hunterian specimens, 1567 were saved.[4] But already much progress has been made in restoration of the collections, especially with a view to the requirements of postgraduate students.

THE LIBRARY

The library of the Royal College of Surgeons is 150 years old this year, for it was in July, 1800, that the first grant—of a sum not exceeding £50—was made for library purposes. Although in the early years considerable donations were made, the progress of the library for a quarter of a century was very slow. One of the LANCET letters, written by James Wardrop under the pseudonym "Brutus," said: "Some years ago Sir William Blizard [President, 1822] promised that the library should soon be opened. We are still outside the door, however, and a part of the bust of Sir William, like the molten calf of the Israelities, may go down our throats (by adulteration of bread or in the drinking of soda water) before we shall see a book, especially the Hunterian MSS." Two years later the first librarian was appointed.

The first of the great librarians of the college was Robert Willis, a physician; he prepared the first classified catalogue. In the 'nineties J. B. Bailey reorganised the library, and he was the first person to recognise the importance of periodicals; today the library is particularly rich in transactions and journals. Like the rest of the college, the library has changed with the times. With the expansion of the other great medical libraries in London—notably those of the Royal Society of Medicine and the British Medical Association—and also the libraries in the medical schools, which has taken place in the present century, it was realised that the purpose of the Surgeons' library needed to be redefined; and under the present librarian, Mr. W. R. Le Fanu, it has been developed as a library of surgery and the basic sciences; it also, of course, has a rich historical collection. Like the museum, the library has been affected by the growth of postgraduate teaching at the college, and it caters particularly for the postgraduate student.

SOCIAL ACTIVITIES

On the social side the college holds monthly subscription dinners. The Royal College of Surgeons Club, whose object is "to promote social activities for members of the medical profession within the college," has a luncheon-room in the basement. Within the precincts of the college there is maintained a joint secretariat for a number of surgical and medical societies, which are thereby afforded close association with the college.

THE BUILDINGS, OLD AND NEW

The first building of the Royal College of Surgeons was constructed at the beginning of the last century to the designs of George Dance, R.A. It soon proved inadequate, and was demolished and replaced in 1835 by a new building, which forms the greater portion of the present structure. This was designed by Sir Charles Barry, R.A., the architect of the Houses of Parliament, but he did not, fortunately, attempt a Gothic style which would have been most inappropriate, and he retained Dance's portico idea. Numerous additions and extensions have been made to Barry's building—in 1847, for instance, the Duke's Theatre in Portugal Street, where the *Beggar's Opera* had been staged, was pulled down for an extension of the museum.[5]

Today plans are ready for another great rebuilding. On an adjacent site now partly occupied by corrugated iron sheds which are used as an osteological store will arise the Nuffield College of Surgical Sciences. The ruins of the museum will be built upon. This will provide residential quarters for male postgraduate students, a modern lecture-theatre, and new museum and laboratory accommodation. In the existing building there will be an extension of the entrance hall and the reading accommodation in the library, at present often overstrained as a result of the number of students, will be enlarged. The whole will form an impressive "palace of surgery" worthy of the capital city.

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[3] Grey Turner, G. The Hunterian Museum Yesterday and Tomorrow. London, 1946.

[4] Royal College of Surgeons of England: Scientific Report, 1948–49.

[5] Webb-Johnson, Lord. *Annals of the Royal College of Surgeons*, 1950, 50, 343.

This used to be my left thigh, but the place gradually rked up because it was a nuisance to have to take trousers down every time, and I now have an insensie bump just below my waist on my left side, which can get at by undoing about three buttons. (Just w insensitive the bump is can be gauged from the t that a needle lasts me normally about 18 months, ien the soft metal lining of the top wears out.) By ese methods, time and trouble devoted to care and intenance are reduced to a minimum, and diabetes s become barely a disability to me.

I had to give up schoolmastering, of course, when, r years ago, I was found to have bilateral pulmonary berculosis, the left lung being severely infected and e right slightly, and my sputum being positive. I nt home, but did not, after a preliminary skirmish, t myself under the appropriate medical authority, for rious reasons. I was not at all anxious to go to a natorium, which I was told to do, since I was certain at they would hold other views than mine about abetes. The treatment proposed was rest, which I as having at home under what were to me more pleasant rcumstances; and as my home was a small farm, ere was plenty of good food. I was not led to put uch trust in the probable results of sanatorium treatent in any case, and came to the conclusion that should not have been a very satisfactory patient. s it happened, within three months I was farming, and farmed for four years, and would still be doing so d it not been that for family reasons I was forced to ll the farm in September, 1949.

I have since been told that I ought not to have survived is wilful course. I did not see a doctor during these ur years, so I have no precise evidence of my condition, xcept that I certainly lost no weight and certainly ad no wish for another way of life. Of course I could ot work as hard as a healthy agricultural labourer, ut I surprised myself by what I could do. I tried o avoid the heavier work, but it wasn't always possible n a small farm, so I did my share of muck-carting, otato-lifting, and the more laborious jobs. I became uite good at tractor work, which is far harder work han it looks, and there was much light work connected with fruit trees and so on which was ideal for me. I ran short of breath pretty quickly, but then I would stop and get it back. I found no complication of diabetes through having tuberculosis, my established system continuing to run with its customary smoothness.

I don't want to encourage others to follow my lead about farming without proper thought; though I believe it offers a good life for any tuberculous person who can get about without running a temperature. But it can't be done without a great deal of careful reparation, and the most exact attention to detail in aving labour, time, and breath. Labour, machinery, method, type of farm, and the farm buildings must all e considered. Before embarking on such a venture ne should appreciate that there are many problems to urmount and more are bound to arise from each ndividual experience. But with ingenuity, intelligent lanning, and determination, a way can often be iscovered round, through, or over the most formidable bstacles.

For the next three months after leaving the farm, I moved about the country staying with friends, doing very little but considerably perturbed over my financial position (since the sale of the farm had been at the worst possible time for me, and such agreements as I had in writing unfortunately ensured that I bore any financial loss), and exceedingly unhappy over the curious manner in which it seemed to me my nearest and hitherto dearest had behaved. Moreover, for the first time I faced the social problems of tuberculosis, which had not arisen on the farm, where I hardly saw anyone unless in the open air. I did not in any case realise how serious the risk of infection was. I had at one time been given a booklet from which I learnt to cough into a handkerchief, not to spit, and to keep a window open in any room I happened to be in, and I was under the impression that if I did these things, I endangered none. By the end of the three months, I reached what I hope is my lowest ebb. I had worried about a stone-and-a-half of weight away; I had become fully aware of my social position, and couldn't begin to see where I was going to fit in ever again; I got a bad cold and lost my voice. Finally I had a handsome attack of flu while staying in a drab but expensive hotel. I had no wish to prolong my visit, so I did not retire to bed, but shamefacedly acquired a thermometer which made, at times, very interesting reading.

By this time I realised that I wasn't very well, and was even more worried about what I would find to do in the future, so I went to see a doctor who has been a friend of mine for a long time. I was duly X-rayed, and it was decided that I should find somewhere to live and do as little as possible for three months, and then be X-rayed again. I had no intention of going to a sanatorium, and this plan was just what I wanted to do, and I was prepared to invest the rest of my slender capital in it. It was an interesting three months. I found a one-roomed flat where I do my own cooking and housework, neither of which amount to much, though I am by nature fairly clean and I realise that food is important. I led an entirely selfish and timeless existence. I ate when I felt like it, rested when I felt like it and for as long as I wanted. There was no-one for me to worry about, and no-one to worry about me; that was easy.

Ever since I've had tuberculosis, though, I have found the mental part of it far and away the most important. I have never worried about my health, but worry over other things certainly affects my tuberculosis, and at this time there seemed to be plenty of other things. There was also plenty of time to give to them. Every man will deal with these things in his own way, but it seems to me vital to understand that they must be dealt with, or else they will have a bad physical effect. I began to improve rapidly once I was able to stop worrying and feeling depressed; but I had to make a sustained effort to achieve this. A recent examination has shown that I am making excellent progress and there is good reason to believe that I shall once more become a more or less useful member of society—an unbelievably entrancing prospect.

My course has been dictated by circumstances and my own temperament. I do not particularly recommend it, but it has its points, and my farming venture might well have turned out more successfully. It does show, too, that a man can do a great deal for himself in his own home; and I wonder how many people on the waiting-lists of sanatoria could, with a little guidance, be cured or put well on the way to recovery before their turn comes.

". . . In many of our small towns the inhabitants, with the enthusiastic support of their doctors, have built and equipped small hospitals with mutual benefit to all concerned. Now, in at least one region, some of these hospitals have been closed to the general practitioners who have staffed them for years. The consequence of this ridiculous step is particularly obvious in relation to midwifery. Now, a woman who for several good reasons, including the distance of her home from her doctor, wishes to have her baby in hospital but would like to be looked after by her own doctor cannot do so. One can scarcely imagine anything more calculated to depress the standard of general practice and discourage recruitment to its ranks than the deliberate exclusion of the practitioner from the hospital. It *is* a policy which should be completely reversed.—Dr. E. R. C. WALKER, *Edinb. med. J.* 1949, 56, 493.

As the survey observes, the prospects cannot be assessed from totals: numbers must be evaluated in relation to each of the specialties.

> “*If* and when the specialist replacement rate falls to something like 30 a year in Scotland, the figure previously indicated, *if* graduates in successive years are to have an equal chance of becoming specialists, and *if* the assumptions underlying the Spens Report are considered to hold valid, clearly a very considerable readjustment must be made. Either fewer individuals will have to be selected for entry to the registrar grades, or the passage through these grades will have to become progressively more difficult, otherwise the numbers completing training will be far beyond the ability of the Service to absorb them.”

Young doctors, says the report, will not indefinitely proceed up a blind alley. Sooner or later the evidence of disillusionment and disappointment among registrars and the poor prospect will dissuade many aspirants and reduce the numbers of those seeking registrar appointments; and it seems better that this readjustment should be made deliberately rather than be left to happen. “It is neither fair to the individual, nor good business, to train over a period of years, and at public expense, excessive numbers of aspirants who in the event cannot find places in their chosen field.”

Progressive selection of registrars for higher posts implies competition at the transition from junior registrar to registrar, and from registrar to senior registrar. Senior registrars who are unsuccessful in competition for specialist posts may now, in theory, have their appointments terminated as they run out. There is understandable reluctance to take such a course, which means the loss to the hospital service of a highly trained man, and perhaps the destruction of his hopes of a career in special work.

> “But if senior registrars are allowed to hold their posts beyond a set tenure, until they can obtain specialist posts, or the posts they desire, the number of vacancies in their grade, available for competition to other registrar grades, is by so much reduced. Progressive selection is unduly hampered, to the detriment of other aspirant specialists and eventually to that of the hospital service.”

EFFECTS OF REDUCING NUMBERS

If the numbers of registrars are to be reduced by restricting entry or by eliminating more at certain bars during the training courses, the result will be twofold: (1) as regards hospital staffing, the loss of men in training who are rendering valuable help in the regular work of the hospital will have to be offset by additional appointments of some other kind; and (2) those registrars who have been “shed” during their training will have to turn to other fields—often that of general practice. “It seems to follow from the second result that there would be good reason for adjusting the registrar curriculum so that it takes more account of the future requirements of the very considerable numbers—perhaps the majority—who will become general practitioners. Further, if the training in special subjects which has been given to such men is not to be wholly lost and unproductive, their attachment to hospital departments after they are in general practice would be of considerable mutual benefit, and might go far to promote the reintegration of general and hospital practice.”

The unrequited demand for specialists overseas and in the Services offers opportunities which “may have become temporarily overshadowed by the sweeping changes which have followed the inception of the National Health Service in the home country.” Nevertheless, this factor alone, the report concludes, cannot radically alter the position at home.

Disabilities

51. DIABETES AND TUBERCULOSIS

I GOT diabetes twenty years ago when I was a boy at a preparatory school. It was a great anxiety to my parents, and a severe blow to me as it was discovered three days before Christmas. I was sent to a nursing-home, put on to insulin and a rigid diet, and remember being exceedingly hungry. When I returned home, my mother looked after me, gave my injections, and tested my urine. A weighing-machine was installed in the dining-room, and I entered entirely into the spirit of the thing, keeping most rigidly to the rules. It took time to get used to a new sort of life, a very regular day being the most important thing, as otherwise the balance of insulin and diet became upset. Apart from the various limitations to what I could do, which at that age were irksome, the only thing I really minded, and which I continued to mind until I found how to disguise it, was being different from other boys, particularly not going to a public school, which did not seem practicable at that time. However I led a very pleasant life.

About two years later, my mother became much interested in Christian Science, and she interested me in it too. Eventually, under the influence of a doubtless well-meaning practitioner, my mother was persuaded to stop giving me insulin, and entrust the matter to God. Not surprisingly, God rejected the responsibility and reduced this proselyte to a skeleton. I went back to insulin, and had soon recovered.

Not so long after this episode, I began to look after myself, giving my own injections. I had long regarded the testing of my urine as unnecessary. According to the sugar content, so the colour of the solution alters from blue to green to muddy green to rust, and I had been able to forecast the colour for a long time with almost unfailing accuracy. I tested my urine once, broke the tube, and have never tested since. I made some mistakes later (though never serious ones), but that was because I was young and not prepared to pay proper attention to what I was feeling like. Now I have the thing to a fine art, and I think any reasonably intelligent person who wishes to save himself the trouble of testing could, by carefully noting his “feelings” and then comparing them with a urine test—and doing this possibly for a month or two—soon be able to do the same. I suppose the chief feeling is thirst, and this can be graded with practice to extreme nicety. I find it hard to list others; I have a certain sort of tired feeling and a dry feeling of the skin. I think anyone would soon find out his own feelings for himself. I imagine no-one has much trouble about knowing when he's had too much insulin. I save myself a great deal of trouble by this method; but I should add I have found doctors almost universally unsympathetic to the theory.

Having broken the ice, I gradually simplified the whole business. I gave up the weighing-machine and any pretence at diet. One of the reasons for doing this was that I became a schoolmaster at the age of eighteen, and being nervous enough in any case, the thought of about eighty pairs of eyes on a specially prepared dish—even if such had been forthcoming—and the uninhibited questioning of the young, filled me with a fearful terror. And, in fact, I liked treacle pudding.

My system has become one of the utmost simplicity. I use ordinary insulin, 80 units per c.cm., and give myself two main injections a day—one before breakfast, the other before supper—usually of 40 and 30 units, though foreknowledge of the menu may affect this. In the course of the day if I feel at any time that I want more insulin I have it. I carry insulin and syringe and glucose with me always, and inject in the same place every time.

In England Now

A Running Commentary by Peripatetic Correspondents

Now washing-day is bright and brisk
And Monday passes in a 'WISK':
Matron or virgin needs no urgin'
To chuck her woollies into 'STERGENE';
For whiter whites, the blithesome bride
Leaves everything to time and 'TIDE.'
Her nylons, if she's any left,
She deftly rinses out in 'DREFT,'
And fluttering outside her pre-fab
Are brighter coloureds washed in 'FAB.'
But Graves' the ailment that afflicts her.
As each advertisement depicts her,
With wide-eyed stare, with animation
Unnatural flushed, in conversation
With other too-ecstatic wives
Having the wash-day of their lives—
She'll soon have exophthalmic goitre.
Pray, Mr. Bevan, do not loiter:
To Monday's menace call a halt
By iodising table-salt!

Or, 'LUX' *ex-tenebris*, let's hope
That Maurice Webb de-rations soap.

* * *

This week the children retrieved my *Lancet* the moment t fell through the letterbox; last week they left it ying on the floor in the hall, where it was found by Dougal McPoodle, our puppy. (His mother was an Aberdeen; his father is known to have been "brown n colour and able to get under the garden gate," hitherto believed to be dog-proof.) Dougal evidently liked the ook of the *Lancet* and took it to a quiet corner to chew over the latest researches. Later my wife found the kitchen and scullery littered with small pieces of white paper, and in a corner lay the moist and macerated remains of Vol. CCLVIII, No. 6611. There was much laceration of the middle pages, some being torn out by the roots, so to speak, while others bore evidence of vigorous toothwork (canines, I presume), great semilunar segments having disappeared from the top corners. The cover pages and advertisements came through the ordeal fairly well, apart from some fancy fretwork here and there. Reading this number called for a combination of skilful guesswork and patient selection of the pieces of paper gathered from the kitchen floor. On the whole I managed fairly well, but give me a *Times* crossword any day for choice. Fortunately, our shaggy pup is a selective reader like myself. When I sought him out to administer reproof he did not seem the least ashamed. He lay on his back, pawed the air, and said in the way that shaggy dogs do: "When does the *B.M.J.* arrive?"

* * *

Fearful of getting a long neurological case at the forthcoming Membership examination, I trailed along to a neurological hospital for suitable instruction. Having arrived late, I hurried through the portals without finding out the subject for the afternoon's demonstration. I tried to creep in at the back unobserved but was publicly shamed by being given a seat in the second row, where I felt bound to be more than usually attentive. With glasses on my nose and notebook and pencil on my lap I prepared to gather some neurological pearls, but after a few moments, in which phrases like "dissociated personality" and "*la belle indifference*" kept cropping up, I realised that I was in for an hour's psychiatry. There was no escape—I clearly could not walk out after accepting the courteous invitation to sit in front—so I comforted myself with the thought that the examiners do occasionally ask psychiatry and settled down to listen.

The lecture, I now gathered, was on hysteria, but the two patients who were to illustrate the subject had apparently defaulted and a rapid glance outside likely doors failed to reveal them. As a consolation prize we were given their histories with all the gory and intimate details. Their characters were relentlessly dissected and their remarkable behaviour explained. It was while the first case was being dealt with that I noticed two middle-aged women sitting in front of me. One had an incredible hat perched precariously on the side of her head and kept twiddling her fingers. I said to myself, "She'll never pass the Membership." However, she seemed to be listening with great avidity to the lecturer's words of wisdom. "The second case," he was saying, "is one of hysterical coughing. . . ." At this the woman with the hat turned to her equally queer-looking neighbour and said, "That's me, Elsie." I was too dumbfounded to do anything but listen to the tale of marital unhappiness which had led to this hysterical symptom. The lecturer concluded by again apologising for the non-arrival of the patients, but this time the two women in front announced triumphantly and simultaneously, "We're 'ere: 'ave been all the time." With tremendous aplomb (only a psychiatrist could have done it) the lecturer mildly rebuked them, led them forth, sat them down facing the class, of which they had so recently been members, and demonstrated their various features. When this was over the patient with the hat was given a date for a future appointment with the distinguished psychiatrist, and as she reached the door she paused for an instant, smiled at us all, and said, "Thanks for the lecture. Ever so interestin' it was."

I feel sure that her husband's slumbers will no longer be disturbed by her hacking cough. Perhaps it is sound therapeutics to pop the patients into the audience occasionally. I must ask my psychiatric friends.

* * *

Our Public Health Department occupies a convenient but somewhat unhygienic position, in the centre of the town over the public lavatories. This juxtaposition, while helpful in directing strangers, is not to be commended. It has, for example, caused the administration and staffing of the lavatories to be a responsibility of the Health Department, and when the department lately advertised for a male lavatory attendant the following letter was received.

Dear Sir,—Can I apply for your post as lavatory attendant. I am a limbless ex-serviceman, from the first war, use a artificial leg, and also hard of hearing, but can manage all right. I would like a job to help me, as the pension alone will not keep me, do any kind of cleaning, clean, honest, and sex free, that is, do not bother about women. Age 50, lost my leg when 20 years old, single, non-smoker, and don't drink, only tea which is far better than beer, and trustworthy, on the King's Roll of Honour.

Thanking you kindly for a reply, I am, Sir . . .

The job, however, finally went to one of our quiescent tuberculous patients, whose name (appropriately enough it is Dan) I allowed to go forward somewhat reluctantly, having in mind the underground work. But my fears proved groundless, for Dan took to the job like a duck to water, and is successfully passing through his "Arrested" years with no inconvenience. The ammoniaco-carbolic odour in which he "works" seems to stimulate his resistance—a point perhaps worth taking up for further investigation?

* * *

A month or two ago I listened enthralled to Fred Hoyle's description of the universe on the Third Programme. So graphic, detailed, and confident was his account of the evolution and fate of suns and stars that one felt sure he had been present at the Creation and must hold a ticket for the End of All Things. Then today I found that my six-year-old son had written his name and address in one of my books in the cosmic style children sometimes affect, as follows:

SIMON,
35 ANEMONE CRESCENT,
LONDON,
THE WORLD,
WHOLE THING,
NUTHING,
Oh i dont know

A timid person myself, pleased not to know too much about these things, I prefer Simon's cosmology.

* * *

DEAR SIR (June 10),—LOCOS TENENTES please! I don't know who you hare but whoever you hare you're very higgorant.

Medicine and the Law

Surgical Operation as Technical Assault

If a plaintiff sues a surgeon in respect of an entirely successful operation for which no fee was charged and which the surgeon did not in fact conduct, it comes as something of a surprise to learn that the surgeon has committed a "technical trespass" and must pay damages, even though the sum is nominal.

Mr. Emanuel Michael, an antique dealer at Folkestone, sued Mr. H. W. L. Molesworth, the Folkestone surgeon. He said that the surgeon was recommended to him by his own doctor as thoroughly competent and experienced. He consulted the surgeon in December, 1947, in respect of an operation for hernia; the operation was successfully performed in the following March by the house-surgeon at the local hospital, but he complained that Mr. Molesworth himself had undertaken to operate on him for a fee of 25 guineas. His claim for damage was apparently brought in order to vindicate a patient's right to choose his own surgeon; "an apprentice practised his skill on me without my consent, when I had engaged a craftsman."

The defendant surgeon, Mr. Molesworth, denied the alleged agreement: the plaintiff, he said, had signed a document whereby he agreed to accept the ministrations of the hospital staff (including the house-surgeon): the operation was part of the services given by the hospital; the house-surgeon was a very able young man. Mr. Molesworth stated in evidence that he had never charged a fee to a patient in a public ward; Mr. Michael had asked him what was his minimum fee and he had replied that in a private ward it would be 25 guineas; there were no private wards in the local hospital at Folkestone; the nearest would be at Canterbury or Ashford.

Lord Justice Singleton, sitting as a trial judge, held that there was no breach of contract. Mr. Molesworth had said that he undertook no personal obligation in the case. The Lord Justice said he regarded Mr. Molesworth as a man of honour and a witness of truth; he probably did not realise in March that Mr. Michael expected him to operate personally. His lordship did not think Mr. Molesworth led Mr. Michael to believe that he himself would operate. The plaintiff's claim was unusual; he had had the benefit of an entirely successful operation at the hospital by a competent surgeon for no charge; he was thus 25 guineas better off than he might have been.

That might have been supposed to be the end of the litigation. The learned Lord Justice, however, held that, as the house-surgeon had operated without the patient's leave or licence, there had been a trespass—"a highly technical trespass." An unauthorised person had done an act which another person had been authorised to do, and the act had been done in a thoroughly competent manner; Mr. Michael had been treated with consideration everywhere; Mr. Molesworth had behaved properly, in accordance with his duties and his high professional standing; nevertheless there was a technical trespass for which the court awarded the nominal sum of 20s.

The result is puzzling. One would expect the claim for the trespass to have been brought against the house-surgeon, not against Mr. Molesworth; one would expect the document which Mr. Michael signed to have barred his claim. Lord Justice Singleton did indeed observe that the action ought not to have been brought. The plaintiff, he said, might well have recognised that the time of those like Mr. Molesworth, engaged in such work for the good of the people generally, could be better spent than in resisting claims of this nature: "I regret that the action was brought and persisted in."

The plaintiff's claim on the issue of breach of contract was dismissed with costs: his award of 20s. was with costs; a counter-claim for 3 guineas by Mr. Molesworth (as his fee for the December consultation) was allowed with such costs as were appropriate. Mr. Michael's claim to choose his own surgeon had not, in the court's opinion, been challenged. The trespass, since the Lord Justice had accepted Mr. Molesworth's account of the facts, remains something of a puzzle; but the case will serve to remind us all that any operation is an assault unless all proper consents have been obtained.

Public Health

Poliomyelitis in England and Wales

In the twenty-third week of the year, ended June 10, there were 79 (37) notifications of poliomyelitis—61 (27) paralytic and 18 (10) non-paralytic cases. Figures for the previous week are shown in parentheses, and it will be seen that these numbered slightly less than half of the total for the twenty-third week. In the twenty-first week notifications numbered 50—34 paralytic and 16 non-paralytic cases. Geographically, there is a clear preponderance of cases in the Midlands, with 22 notifications in Warwickshire and 9 in Staffordshire.

This rise in notifications has come earlier than usual, and 79 is probably the highest figure ever recorded in a twenty-third week. It is, however, not possible to be certain about this since the change in categories of notification introduced this year makes exact comparison impossible. It is too early to tell whether this early rise presages an incidence of the order experienced in 1947 and 1949, or whether the experience of 1948 is more likely to be repeated. In 1948 there was no clear-cut epidemic, but the curve of summer and autumn prevalence was protracted and flattened. In that year the incidence rose to 31 cases in the twenty-fifth week, remained about 30–45 cases until the thirty-third week, then rose to 78, and remained at about that level until the forty-fourth week after which it slowly declined.

Travelling Exhibitions on Cleanliness

The film *Another Case of Poisoning*[1] will be shown in conjunction with three travelling exhibitions on Health and Cleanliness which the Central Office of Information is preparing for the Ministry of Health. The exhibitions may tour for two years. They are designed for showing to workers in the food and catering industries, in canteens, and to organisations such as women's institutes. Display sets of twelve pictures, 15 in. by 12 in., have also been prepared, and may be shown by firms and other bodies which apply.

Census in 1951

A draft Order in Council which has been laid before Parliament outlines arrangements for the next census in Great Britain. This is to be held on April 8, 1951; and censuses are expected to be held on the same day in Northern Ireland, the Channel Islands, and the Isle of Man.

The inquiries proposed for 1951 are somewhat more extensive than those in 1931, when the last census was held. Information is to be obtained on the distribution of the people by area, sex, age, and marital condition; the size and composition of households; where people were born, where they live, and where they work; what their nationality is; their occupations and industries; whether they are still at school, college, &c., or, if they have finished whole-time education, at what age they finished; whether the dwelling is structurally separate, how many rooms it has, and whether the household has or shares a piped water-supply, a kitchen sink, a cooking-stove, a water-closet, and a fixed bath. Married women under 50 are to be asked the date of their marriage and the number of children.

The complete analysis of the returns will be spread over many years, but a preliminary return by numbers, sex, and areas will be published within a few weeks of census day.

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[1] See *Lancet*, Jan. 14, p. 96.

ıe digits amputated for various disorders, was not able ı demonstrate the Sucquet-Hoyer canals before the ȝe of 4½ months. He found that they are less frequently found in the arteriosclerotic; and that they ·e opened up in certain inflammatory states.

The reason for the lowering of the blood-flow after ıe sixth day after operation is not quite so easy to ꞔplain, but the active dilatation of the muscular and astic tissue of the glomus is not likely to persist :definitely. Furthermore the glomus is under the ıntrol of tissue metabolites,[8] alteration of which would ːcessarily affect the patency of these canals. Such ı alteration includes stagnant hypoxia of capillaries stal to the anastomosis and "hyper oxia" of the veins. 'ith regard to the case described by Mr. Lynn and r. Martin—a multiple ligation of varicose veins in a g whose veins were not competent, accompanied by mbar sympathectomy—I suggest that such a combined ɔeration is automatically followed by the persistent rcing of arterial blood into the veins, which, being :cluded, can never empty. It is doubtful whether ıis procedure has much to support it—except possibly some chosen cases of thromboangiitis obliterans.

London, N.7. I. H. MILNER.

WHOLE-WHEAT BREAD

Sir,—Any ordinary consumer may obtain wheat grain, ' flour, direct from the grower, thus ensuring unadulter- ed whole-wheat. The ideal is to grind at home, fresh r each baking (this contributes much to the wonderful ıvour). For those who cannot manage this, freshly 'ound flour can be obtained; and bread made from it now available, too. It is more expensive from home- ound flour, because there is no subsidy, although on ıtional bread, containing adulterants, the subsidy is 6*d*. ɛr 3½-lb. loaf.

Whole Food Society, Goosegreen Farm,
Bridgwater, Somerset.

DEREK RANDAL
Vice-president.

ENERAL ANÆSTHESIA FOR BRONCHOGRAPHY IN CHILDREN

Sir,—In your issue of June 10, Dr. Way and Mr. ames describe their method of anæsthetising children ɔr bronchography. Whilst ready to admit that their ɛchnique may give satisfactory conditions in their own ʞpert hands, I feel that the authors should be upbraided ɔr not stressing in any detail the inherent dangers of ıe operation as a whole, and for recommending an ıæsthetic agent which is notoriously unsuitable for ıch cases, without a note of why its contra-indications ·e ignored.

The corner-stone of any anæsthetic, especially for a agnostic or therapeutic procedure, must be "safety." gainst this, thiopentone as the sole agent for straight- ɪrward intubation, even in adults, may readily be ɔmplicated by cough and laryngeal and bronchial ɔasm. In the presence of excessive bronchial secretions, hen the narrow bronchial tree in children may so easily ɜ completely obstructed, this technique is foolhardy. he dosages of thiopentone mentioned may be danger- ısly large in themselves as depressants for small children ith respiratory pathology. Again, premedication is not iscussed, though it must obviously, I hope, not be a ɑrbiturate.

In my opinion, the administration of anæsthesia for ronchography should be undertaken only by experienced ıæsthetists, and I would warn any unsuspecting col- :agues that in such cases a dose of thiopentone in inexpert ands will sooner or later result in disaster to the patient.

St. Thomas's Hospital,
London, S.E.1.

R. B. WRIGHT
Anæsthetist.

DAIRY-GOAT'S MILK

Sir,—Increasing numbers of medical men are prescribing goat's milk for patients. Almost all the milk from my dairy-herd, whose annual yield is roughly 4000 gallons, goes to invalids. When the characteristics of goat's milk are studied, one wonders why the milk of the cow is ever used for human consumption.

The goat is almost immune from tuberculosis; the very rare cases recorded in goats have nearly all been traceable to the fact that they had been reared on cow's milk or had been in contact with tuberculous cattle. Nowadays goatkeepers do not use cow's milk for rearing kids; and fortunately, it appears that goats that do contract tuberculosis invariably die of the disease, thus preventing their use for breeding purposes. Of 77,000 goats slaughtered in the U.S.A. in one year, not one was condemned as tuberculous.[1] Over one-third of our dairy cows are tuberculous, and these diseased animals are still being used for breeding.

Ease of assimilation is probably the greatest point in favour of goat's milk for invalids. The fat globules are only about one-eighth the size of those of cow's milk, and the curd of the milk is softer and more open in texture. The cause appears to be the greater amount of salts of sodium and potassium, especially citrates, in the milk of the goat as compared with the milk of the cow.[2]

The following are averages for the composition of cow's and goat's milk, based on analysis of some thousands of samples:

	Milk, constituents (%)	
	Cow's	*Goat's*
Fat	3·67	4·50
Lactose	4·78	4·08
Casein	2·63	2·47
Albumin and globulin	0·60	0·43
Non-protein nitrogen compounds	0·19	0·44
Lime	0·18	0·19
Phosphoric acid	0·23	0·27
Total mineral constituents	0·73	0·79

There is no reason to suppose that the vitamin content of goat's milk is inferior to that of cow's milk.

There is a common belief that goat's milk is "strong" in flavour, or "smelly." This is untrue. Goats, like cows, if badly fed and tended, will produce tainted milk. A well-tended herd of either cows or goats will produce milk completely free from objectionable flavours and smells.

Two years running at the Essex County Agriculture Show, a test was carried out in which hundreds of people unknowingly participated. Members of the public were invited to sample the milk from each of two pails and to record their preference. One pail contained goat's, and the other cow's, milk. On balance, there was little difference in the popularity of the two; but some who had pronounced in favour of goat's milk stated that they would not have drunk it had they known it was goat's milk.

Ample supplies of good, clean, dairy-goat's milk are available throughout the country. More than 4000 goatkeepers are registered with the British Goat Society and the affiliated county societies; and probably double this number are not registered. The bulk of the milk is being used, not medically, but for the manufacture of ice-cream, cheese, and so on. Perhaps doctors are not taking full advantage of these supplies because they are unaware that goat's milk is obtainable, or because they are under a misconception as to its purity and value. I will gladly supply to doctors or hospitals the address of the secretary of the nearest county society, who will be able to give the names of reliable goatkeepers in the area.

Blue Boar Farm, Frankton Lane,
Stretton-on-Dunsmore, near Rugby.

GILBERT HARRIS.

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[8] S. Grant, R. T. *Heart*, 1930, 15, 281.

1. Graham, H. Yearbook of the British Goat Society. Diss, Norfolk, 1925; p. 134.
2. Knowles, F., Urquhart, J. C. *Ibid*, 1929, p. 61. Asdell, S. A. *Ibid*, 1936, p. 80.

Letters to the Editor

DANGERS OF THE MUCUS CATHETER

SIR,—I should like to draw attention to some dangers associated with the mucus catheter so frequently used on the newborn infant.

The mucus catheter, if correctly used, should be a safe instrument for removing mucus and other secretions from the upper air passages of the asphyxiated baby. The catheter lies ready sterilised in a covered dish during delivery so as to be available for immediate use if necessary. It is sterile on the first occasion it is inserted into the baby's mouth, but is by no means so on subsequent insertions.

Many a time I have seen a catheter allowed to trail over unsterile bedsheets, blankets, and towels so that after the initial sterile insertion a large number of organisms are introduced by the instrument into the baby's upper respiratory passages and pharynx. Moreover, the catheter is frequently passed much too far down and in some cases would appear to reach into the œsophagus—surely not only a useless but also a dangerous procedure. This direct implantation of organisms may result in virulent pneumonia or gastro-enteritis; recently I have seen some seriously ill babies with these infections in whom the source of infection was in all probability the mucus catheter.

I feel that teachers of medical students and midwives should point out these risks and should impress upon them:

1. Not to use the mucus catheter as a routine measure (a procedure I have noted in many hospitals and nursing-homes). It should be used only if the mucus cannot be removed by posture or the baby's own efforts.
2. Not to pass the catheter further than the pharynx. (It might be worth while putting a mark on the catheter 2 in. from the tip so that it cannot be passed too far).
3. To wipe the end of the catheter, after each insertion, on some sterile material.
4. To avoid contamination of the catheter with unsterile objects, and to lay it on a sterile towel during use.

London, N.W.2. M. E. LANDAU.

THE SIGNIFICANCE OF EOSINOPHIL-COUNTS

SIR,—Your leading article of June 3 has done a great service in drawing attention to the use and difficulties of eosinophil-counts. There are some points of importance, however, which I feel ought not to be passed without comment.

In the first place, Fin Rud's[1] extensive work is rightly quoted, but his results are accepted quite uncritically. Like Thorn and Forsham in Boston and Prunty in this country, he uses a modification of Dunger's technique for the direct counting of eosinophils. However, as pointed out by Randolph,[2] the solution used lyses not only the red cells but also the white. As anyone who has used this technique will realise, one must not shake the pipette containing the blood and dilution fluid for more than about 30 seconds before transferring the contents to the counting chamber. If very much longer than this is taken for mixing, no eosinophils can be found, and it is doubtful whether adequate mixing can be obtained in this short time. Certainly in my hands this method of counting not infrequently has yielded results which were obviously erroneous. A further point of criticism is that Rud counts only the cells in one Fuchs-Rosenthal chamber, whereas it is quite possible to fill eight such chambers from one white-cell pipette, thereby increasing one's accuracy nearly threefold.

Dr. Janet MacArthur, Dr. Donald Harting, and myself, working at the Massachusetts General Hospital, have modified the technique described by Randolph,[2] propylene glycol to render the red blood-c invisible. The details of this method will be p elsewhere, but the advantages are that no lysis of cells occurs, that the total white-cell count can be in the same chamber as the eosinophil-count, and that the mixture of blood and dilution fluid can remain for a considerable time in the white blood-cell pipette without detriment.

Using this technique, and counting the cells in eight chambers, a spontaneous fall in the eosinophils of a normal person of the degree quoted by you *may* occur betwe 10 A.M. and 2 P.M., even if that person is kept under bas conditions, but I should be very surprised if it did very commonly. In any event, using this counting technique, the four-hour adrenocorticotropic-hormone (A.C.T.H.) test described by Forsham and his colleagues[3] has been found to give quite reliable results in clinical practice, there being even some relationship between the eosinophil fall and the clinical response of an arthritic patient to A.C.T.H.

Finally, may I use this opportunity to deprecate the use of such expressions as "40 to 228 per c.mm. should be regarded as the normal range for males . . ." Until there is a generally agreed convention as to what constitutes a "normal range," such of that precision of meaning with scientific terminology.

Department of Medicine,
University of Bristol.
G. A. SMART.

CIRCULATORY CHANGES AFTER SYMPATHECTOMY

SIR,—I was greatly interested in last week's articles by Mr. Lynn and Professor Barcroft, and by Mr. Lynn and Mr. Martin. I suggest that in all the cases described the effects are due chiefly to the direct transference of arterial blood to the veins as the result of the opening up of the arteriovenous communications which occurs after sympathectomy. Modern textbooks of physiology have paid insufficient attention to the work of Claude Bernard[4] on the effects of cervical sympathectomy. This great French physiologist wrote:

> ". . . quand on a préablement coupé le grand sympathique dans la région moyenne du cou . . . la circulation s'accélère considérablement, la température augmente, le sang veineux devient rouge, la pression augmente. Si l'on vient à galvaniser le bout périphérique ou supérieur du sympathique, la circulation diminue d'intensité, les vaisseaux se resserent, et la température baisse en même temps que le sang devient très noir. C'est particulièrement sur les chevaux où tous ces faits se présentent avec une grande évidence."

It is probable that corresponding effects are produced in the vessels (and blood) of the limbs when their sympathetic nerves are similarly affected.

Sucquet[5] quoted Claude Bernard in his own classical monographs on arteriovenous communications—subsequently known as Sucquet-Hoyer canals[6]—and offered reasonable data to indicate that these become opened up in conditions of cachexia and after a rapid and prolonged phlebotomy. Sucquet found that after injecting fluid into the arteries of the limbs of the cadaver, the fluid reached the corresponding veins at rates which would not allow for its passage through capillaries. In the case of the lower limb, "il revient plus vite et plus abondamment par la veine crurale que par la saphène"—suggesting even greater numbers of these communications in deep than in superficial vessels. Popoff,[7] who examined

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[1] Rud, F. The Eosinophil-Count in Health and Mental Disease. Oslo, 1947.

[2] Randolph, T. G. *J. Allergy*, 1944, 15, 89.

[3] Forsham, P. G., Thorn, G. W., Prunty, F. G. T., Hills, A. G. *J. clin. Endocrinol.* 1948, 8, 15.

[4] Bernard, M. C. Liquides de L'Organisme. Paris, 1859; vol 2, p. 436.

[5] Sucquet, J. P. D'une circulation dans les membres et dans la tête chez l'homme. Paris, 1860; *Ibid*, 1862.

[6] Hoyer, H. *Arch. Mikr. Anat.* 1877, 3, 603.

[7] Popoff, N. W. *Arch. Path.* 1934, 18, 293.

Africans in Kenya are nearly always infested with hookworms and/or other helminths, and we have put forward the view that worms may interfere with the synthesis, absorption, or utilisation of hæmopoietic principles, and give rise to this aberrant picture (cf. *Dibothriocephalus latus* anæmias). The factor of diet probably enters the picture. Years ago Gilkes and Orr found significant differences between the hæmoglobin level of the vegetarian Kikuyus and the blood- and milk-taking Masai. We think the fact that many of the cases respond to marmite is not without significance.

Whatever the cause of these megaloblastic anæmias among Africans, it seems clear that peripheral bleeding due to worms is not likely to produce the marrow picture that we are finding here, although as stated above worms may be playing their part. In the frank hypochromic microcytic anæmias that exist here worms may play an important part.

Regarding gastric function, a great number of our cases show hypochlorhydria after histamine, but we have so far not found a histamine-fast achlorhydria. Our feeling is that this question is an important one.

The low gastric acidity in so many of our cases may contribute to the low hæmaglobins that we are finding with colour indices of 0·4 and M.C.H. as low as 9·0–11·0 micromicrogrammes. The very low-protein diet of some of the tribes with which we are dealing may also be an important factor in the deficient synthesis of hæmoglobin. There may however be another factor, which we are investigating, that may have a bearing on these profound iron-deficient anæmias. This is the possible iron loss in the sweat of races whose sweat glands have the formation found in the Negroid races of torrid Africa. Mitchell and Hamilton[3] have shown that the iron loss in the sweat may increase from 13% to 40% of the iron intake under hot humid conditions (cf. Stewart et al.[4]). How far the iron-deficient anæmias in the hot humid areas of the East Coast of Africa and on the shores of Lake Victoria are due to hookworms, poor diet, achlorhydria, and loss of iron in the sweat is now being examined. It is significant that the hot humid areas of Africa are generally centres of high hookworm and malaria incidence.

As you state in your leading article, the time may have come to revise our conception of the megaloblastic anæmias, and we suggest that with the production of such substances as folic acid and B_{12}, with others no doubt to follow, the time has already arrived when we can look upon the megaloblastic macrocytic anæmias as having a different ætiology from the megaloblastic normocytic anæmias, and fit into the picture the presence or absence of the giant stab-cells.

HENRY FOY
ATHENA KONDI
A. HARGREAVES.

Nairobi, Kenya.

WEAR AND TEAR

SIR,—I have not the ability to dispute the argument of Lord Moran's stimulating paper last week, but I feel it not unfair to remind him that *Henry V* was probably written about 1598—i.e., three and a half centuries ago instead of five as stated—and that in spite of the theory that Shakespeare himself saw military service, it is doubtful whether he had as good opportunity personally to observe the morale of the men of Agincourt (1415) nearly 200 years before as had Lord Moran to observe that of the men of the Royal Fusiliers.

I would suggest that yokels even in the Middle Ages need not be presumed to have vacant minds without better evidence than this.

Amble, by Morpeth,
Northumberland.

R. P. ROBERTSON.

ANOMALIES OF SALARY

SIR,—In your leading article of May 20 you commented on the poor rates of remuneration of Civil Service medical officers. In fact their salaries contrast sharply with the Spens recommendations, the starting-point being in most cases lower than that offered to senior registrars. Moreover, as you note, the majority of Civil Service doctors are excluded from the recommendations of the Chorley report because their salaries are not over £1500.

We are told that our conditions cannot be improved because of the wage-freeze. Nevertheless salaries have been substantially improved for many of our colleagues in the National Health Service and in the medical schools. Most of us on appointment were required to have special knowledge and experience, and many of us are engaged solely in responsible clinical work. The low salary-scale has led many doctors to leave the service, whilst others are deeply dissatisfied and are seeking alternative employment.

The B.M.A. has refused to accept advertisements for the service, but we note that you have decided to publish them. This, to us, amounts to condoning the salary-scale and denies us your practical support in our attempt to obtain conditions comparable with those of other medical men. We have for a long time been employing the methods of negotiation used by educated men. These methods have got us nowhere, and we remain the poorest-paid group of experienced doctors in the country.

Whilst we appreciate your clear statement of your attitude and your sympathy for us, we feel that in this matter, as in others, an ounce of help is worth a ton of pity.

SIX CIVIL SERVICE MEDICAL OFFICERS.

*** Our help so far has taken the form of explanation and comment, which are the normal functions of a journal. On Jan. 14 and May 20 we drew attention to the damage now being done to the Government medical services, and the anomalies of remuneration in them; and we pressed for an unprejudiced inquiry, which we believe would have better results than a few episodic concessions by the Treasury. We differ from our correspondents only on method. At the present time especially, we are uneasy about any ready resort to measures other than "the methods of negotiation used by educated men."—ED. L.

USE OF POLYESTER RESINS IN MEDICINE

SIR,—Dr. Scales (June 10) says that if I was "concerned with scientific advancement," surely my methods of bone-casting should be published. In the article in *British Plastics* (December, 1949) which he mentions, full data are given as to the materials used—which information is sufficient for the informed readers of that specialised technical journal to "reconstruct" the process. In an article in the *British Medical Journal* (Feb. 25, 1950) the method of moulding (viz., in polyvinyl chloride copolymer), and the materials used for casts, are given. This article further states that other moulding and casting methods are being developed. Is one, at an experimental stage, to give incomplete details, including trade names of compounds used (as done by Dr. Scales)? Surely the usual principle is that the really interested reader writes to the author for further information, which, of course, is always fully given. (Incidentally I *did not* myself write either of these articles.)

May I add a few words on the question of who carried out the pioneer work in plastic bone-casting? Though many workers may have occupied themselves with the same problem, I do not know of others having taken this fascinating idea to its logical conclusion—namely, to the making of the fully *articulated skeleton*. I shall be most interested to learn of any achievement in this field, if for no other reason than to enable a fraternal

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3. Mitchell, H. H., Hamilton, T. S. *J. biol. Chem.* 1949, 178, 345.
4. *Proc. Soc. exp. Biol., N.Y.* 1950, 73, 473.

THE MEGALOBLASTIC ANÆMIAS

SIR,—We have read with great interest the papers by Israëls and Sharp and Tuck and Whittaker and your leading article in *The Lancet* of April 22, and should like to make the following observations.

In previous communications[1] we have described megaloblastic anæmias that are not macrocytic, and macrocytic anæmias that are not megaloblastic. These findings raise the question of the origin of macrocytosis and the fate of the megaloblast (cf. Fruhling and Spehler[2]). From our investigations it appears that the following combinations may exist in the megaloblastic and/or macrocytic anæmias.

(*a*) An anæmia with, say, red-cell counts between 0·5 and 1·0 million per c.mm. in males or pregnant or non-pregnant females; with typical Ehrlich's megaloblasts and giant stab-cells in the sternal marrow (Riesen stab-kern of Schulten; giant metamyelocytes); with high M.C.V., M.C.H., M.C.H.C., and C.I.; Price-Jones curves well to the right of normal; with a high percentage of macrocytosis, raised M.C.D., M.C.A.T., and abnormal volume-thickness ratios. There may be a raised indirect van den Bergh, and a positive Schumm's test. The cephalin-cholesterol, thymol turbity, bromo-sulphthalein clearance, plasma proteins and ratios, and colloidal gold may be normal or abnormal. Such anæmias respond to crude or refined liver, to folic acid, and more slowly to 'Marmite' in large doses or a high-protein diet. These anæmias are similar to those that have been described in Macedonia and elsewhere.

(*b*) Anæmias with counts between 1·0 and 1·5 million, with Ehrlich's megaloblasts and giant stab-cells in the sternal marrow but with *normal* M.C.V., M.C.H., and M.C.H.C., with Price-Jones curves within normal limits, no macrocytosis, normal M.C.D., M.C.A.T., and volume-thickness ratios. Liver function may be normal or abnormal. These cases respond as do those in group (*a*). So far they have been described only here and in Bechuanaland.

(*c*) Anæmias with counts between 1·0 and 2·0 million, with no Ehrlich's megaloblasts in the marrow but with giant stab-cells. The M.C.V., M.C.H., M.C.H.C., and diameter distribution may be raised or normal. These cases also respond as do the two previous types.

(*d*) Anæmias with neither megaloblasts nor giant stab-cells in the marrow, but with raised M.C.V., M.C.H., M.C.H.C., and C.I.; Price-Jones curve to the right of the normal span; macrocytosis and raised M.C.D. and M.C.A.T. There is generally liver involvement, and the response to treatment is rarely satisfactory, no doubt because of the underlying condition.

The existence of these anæmias, some of which have megaloblasts and/or giant stab-cells in the sternal marrow, with or without macrocytosis, has led us to postulate three factors as responsible for the conditions:

(1) A red-cell maturation factor, the absence of which leads to abnormal maturation of the red-cell line in the marrow and the production of Ehrlich's megaloblasts.

(2) A white-cell maturation factor, the absence of which is responsible for the production of giant stab-cells.

(3) A diameter-controlling factor. We are aware that there are numerous factors concerned with the regulation of cell size. We are of the opinion that this aspect of the question requires considerably more attention than it has so far received, especially in view of the emphasis that hæmatologists often placed on the phenomenon of macrocytosis.

The factors postulated above are by no means always jointly absent, as is shown by the different types of anæmia that occur.

In pernicious anæmia, folic acid produces a response in the hæmatological condition but leaves the nervous symptoms untouched; liver deals with both symptom complexes. It is now reported that in idiopathic steatorrhœa large doses of 'Anahæmin' leave the megaloblasts untouched. This is indeed quite extraordinary when one considers the rapidity with which these cells disappear in pernicious anæmia and the nutritional macrocytic anæmias. Are the megalob of idiopathic steatorrhœa in some way physiologically different from other megaloblasts? If so, this is an observation of considerable interest and significance. Is it possible that there may also be similar differences in the response of the giant stab-cells in different forms of anæmia, or in the responses to different pure substances such as folic acid and vitamin B_{12}?

The giant stab-cells that occur in many of the dyshæmopoietic anæmias have not, we think, received the attention due to them by the British and American workers; Continental workers are familiar with these cells and do not neglect to comment on their significance. In our opinion these giant stab-cells are just as pathognomonic as are the megaloblasts of Ehrlich, and indicate an upset in marrow maturation of the white-cell series, as the megaloblasts indicate a defect in red-cell maturation. It is still not realised by many writers that the megaloblast is a pathological cell, and is not to be confused with early and late erythroblasts. We recently read an article in which the author naively stated that megaloblasts were not as numerous in his normal controls as they were in his patients!

As was pointed out some years ago, sternal biopsy as an aid to hæmatological diagnosis has become a very popular procedure, but unfortunately proper methods of staining, and discriminating diagnosis are neither so common nor so popular, and we sometimes question whether the observers are really aware of what they see or are looking for, and whether the results they obtain justify the use of this not unpainful technique.

Perhaps we have been fortunate in the countries in which we have done our work, in that we can keep our patients under observation in hospital for five or ten days before we commence any specific therapy. This may not always be possible, but we would like to point out the great importance of this procedure. We believe it involves no extra risk to the patients, who have generally been in their anæmic state for weeks or months, often going about their daily affairs; to keep them under observation in bed for a few days is unlikely seriously to affect them. The discordant reports regarding the effect of vitamin B_{12} in the nutritional macrocytic anæmias makes us wonder whether perhaps more discriminating procedures would have yielded less contentious results.

Perhaps we have also been fortunate in not being obliged to resort to what may be called the "neo-polypharmacy." If such treatments as blood-transfusions, liver, folic acid, marmite, B_{12}, &c., are all given to the patient within a few days, the results are of questionable value. Our own procedure is to give one form of treatment only, and to continue this until it has become clear that no response is to be expected, to wait for a few days watching the reticulocytes, red-cell count, and Hb, and then to commence with the new form of therapy.

Whatever the relation that may exist between the M.C.V., M.C.D., M.C.A.T., Price-Jones curve, and the reticulocyte level, there can be no question that the M.C.V. should be taken at a low reticulocyte level. More often than not the M.C.V. is given without any reference to the level of reticulocytes. The correlation between these five variables may turn out to be not always positive.

It is not sufficient, in our opinion, to base a diagnosis of a macrocytic blood picture on slide examination, M.C.V. or high C.I. Price-Jones curves should be prepared if an accurate picture is desired. Unfortunately diffraction methods for estimating cell diameters cannot be substituted for the time-consuming and laborious Price-Jones curve.

The megaloblastic macrocytic and megaloblastic normocytic anæmias that we are dealing with among the

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[1] *Lancet*, 1943, ii, 505; *Trans. R. Soc. trop. Med. Hyg.* 1950, 43, 635.

[2] *Sang.* 1949, 20, 164.

Muscular Dystrophy

. R. H. TURTON asked the Lord President of the Council research was being conducted into the origin of and cure uscular dystrophy.—Mr. HERBERT MORRISON replied: rch on the muscular dystrophies forms an important of the work of the Medical Research Council's neuro- al research unit at the National Hospital, Queen Square, lon.

Voeller Treatment of Parkinson's Disease

. JOHN ARBUTHNOT asked the Minister of Health whether as yet in a position to make a statement on Dr. Voeller's ment for Parkinson's disease.—Mr. BEVAN replied: group of patients who went to this clinic under observa- have now been re-examined a year after their treatment . I am advised that the methods used by Dr. Voeller ine an intensive rehabilitation course with drug treat- and diet. These methods do not constitute a cure, lo they introduce any new principles, but in the small le of cases investigated they modified with varying of success the steady deterioration which is the al progress of the disease, and encouraged patients ntinue their own efforts to improve.

Anthrax

answer to a question, Mr. TOM WILLIAMS stated that in and there were 108 outbreaks of anthrax in 1947, 95 in , and 204 in 1949, and there have been 149 so far this year. ough outbreaks have occurred in the majority of counties have been most numerous this year in Lancashire and Vest Riding of Yorkshire. It is probable that the increased ence of anthrax is due largely to the increased imports rtilisers and animal feeding-stuffs from abroad.

Education of Deaf Children

eplying to a question, Mr. GEORGE TOMLINSON said that anuary, 1949, there were, on average, 10 8 pupils in class for the deaf or partially deaf. The increase in school accommodation during the past two years had led places to be found for an additional 200 deaf children, unfortunately, owing largely to the increasing apprecia- that deaf education should begin at a very early age, was still a waiting-list of some 450 children for deaf ols. Everything possible was being done to expedite osals for further deaf school accommodation in the next or two. The accepted policy of separating the education ne partially deaf from that of the deaf was being carried as far as the existing accommodation permitted. A small ease was being made in the provision for deaf children ring from a second defect, and he looked forward to further osals as soon as the shortage of ordinary deaf school es had been substantially reduced. Deafness was cted in the schools at the periodical medical inspections, pecial medical inspections to which individual children been referred by their teachers or by the school nurse, by group audiometer tests. Facilities for the treatment iseases which might cause deafness were available through school health service and the National Health Service.

Institutional Care of Mental Defectives

r. D. J. LLEWELLYN asked the Minister of Health why late Lily Irene Palmer, a mental defective, had been arge for three years prior to being murdered; how many tal defectives were known to be at large; and how many nese had been awaiting admission to institutions for one or longer.—Mr. BEVAN replied: This girl had been mmended for institutional care when a suitable vacancy d be found. She was a borderline case for which admission n institution was not regarded as urgently necessary, and had not been certified under the Mental Deficiency Acts. ording to returns by local health authorities, the number nental defectives awaiting admission on Jan. 1 last was . The returns do not indicate how many had been ing for one year or longer.

Osteopathic Treatment

r. PETER FREEMAN asked the Minister of Health how far opathic treatment was available for all those who wanted nd particularly in hospitals.—Mr. BEVAN replied: Osteo- y, as such, is not provided in the National Health ice.

Obituary

WILLIAM FREEMAN SNOW

M.A., M.D. STANFORD

A VERY wide circle of friends in the U.S.A., in Britain, and in most other countries will be grieved to learn that on June 12 Dr. W. F. Snow, chairman of directors of the American Social Hygiene Association and president of the Union Internationale contre le Péril Vénérien, dropped dead in a street at Bangor, Maine.

William Freeman Snow was born in 1874. After graduating as B.A. in chemistry at Stanford University and becoming later M.A. in physiology, he qualified M.D. in 1900. Subsequently he studied at Johns Hopkins and other institutions in the U.S.A. and elsewhere. He very quickly joined the teaching staff of Stanford University, and from 1902 to 1919 was professor of preventive medicine there; from 1908 to 1914 he was State health officer, California. In these offices he quickly became known as a man of energy, tact, and wisdom, and in 1913 he was persuaded to undertake the direction of the newly formed American Social Hygiene Association.

This now-powerful organisation owes its origin to such men as President-Emeritus Charles W. Eliot, of Harvard, and Dr. Prince Morrow, of New York, who were then leaders of organisations trying to promote sex hygiene, as also to President David Starr Jordan, of Stanford University, who then headed a movement against commercialised prostitution. These and others, seeing the need for a voluntary agency with the broadest possible approach to the problems of social hygiene, merged several existing societies together to form the A.S.H.A.

In 1917 Snow became principal adviser on the prevention of venereal diseases to the American Army, on its entry into the war of 1914–18; and concerning this phase of his work, Prof. C. E. A. Winslow, of Yale, said in a public address about fifteen years ago: "In this whole first phase of practical diseases control in the United States, William F. Snow was the stage manager, even though he rarely occupied the limelight in his own person." Dr. Maurice A. Bigelow, in a short biographical sketch accompanying invitations to a commemorative dinner to Dr. Snow in 1937, said: "The amount of labor he performed was colossal. He seemed to be driven by some high compression engine denied to other men. In fact his nickname was 'Driven Snow.'"

From 1924 to 1928 he was chairman of the League of Nations Committee to Study the Traffic in Women and Children, and from 1947 until his death he was president of the International Union against Venereal Diseases. Besides these offices he held many others, as professor or lecturer in preventive medicine in different universities, as chairman of various bodies interested in public health, and as adviser to the U.S. Public Health Department. Throughout, his work was actuated by the principles of preventing infection through education, medical care, wholesome occupation of leisure, and repression of commercialised prostitution.

The affection and esteem of his associates were expressed magnificently at a dinner in New York on Oct. 1, 1937, when over 400 guests met to present him with a bronze portrait plaque, "on the occasion of his fortieth year of distinguished service to education, public health and social hygiene." Many speakers, including the late Sir Arthur Newsholme, testified to Dr. Snow's courage, energy, single-minded honesty of purpose in the service of mankind, and modesty. There were 27 cables and 116 letters from people unable to attend the dinner. The speeches and other communications were published in the souvenir number of the *Journal of Social Hygiene* (December, 1937), and to the writer of the present tribute it was comforting to find "how did you do it?" to be asked between those concerned.

Those interested in the history of anatomy (and workers in this field ought to be) know that the first skeletal model—the model of the skull—was reported to have been used in the teaching of anatomy by Henri de Mondeville, surgeon-anatomist of Montpellier, in the 14th century. As Mondeville was a pupil of the Italian Lanfranchi, it is conceivable that he was not the first. Jumping a few centuries (which is a pity, because it is quite conceivable that the genius of Leonardo da Vinci, to whom anatomy owes so much, produced artificial bones) we come to the Italians Fontana and Mascagni in the 1780s, producing wonderful plastic replicas of all sorts of anatomical specimens, many of which can still be viewed (without admission fee being charged) at the Dorotheum in Vienna and in the Department of Anatomy in Budapest.

The 19th century was not sterile in this field, either. As early as 1828 a "complete anatomy in papier mâché" was announced, containing over 1000 parts, many of them presumably bones. Later in the 19th century the now famous modelling houses of Gerrards of London, Deyrolle of Paris, and Sommer of Sonningen in Thuringia (to name but the few leaders in the field) produced some bones in artificial material, soi-disant plastic.

Let us, therefore, be humble in fighting about 19th-century priorities. Some may have produced bones in modern plastic materials before me; I do not know. I presented the first plastic bone, made by a member of my research team (*a lance-corporal in the Royal Army Dental Corps*) *at the Middlesex Hospital Medical School during 1943, to* Professor Kirk at the department of anatomy.

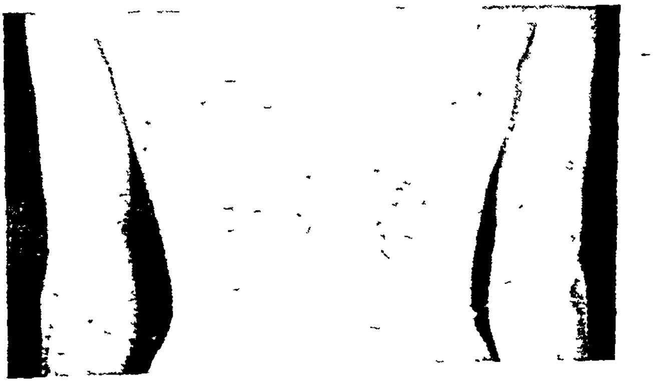
Let me end by making a plea not to confuse technical advances with the advancement of science. The making of artificial bones in one material rather than another is an adaptation of technique; the real scientific advance in this field has been made by the plastic chemists, who have given us materials of incredible versatility.

Sutton, Surrey. GEORGE BLAINE.

STRIÆ CUTIS DISTENSÆ

SIR,—Recently it has been said that 'Cortisone' can produce striæ of the skin[1]; and that the effect varies with the intensity of treatment and its cessation.[2] These observations "would indicate that in any patient in which coloured lineæ distensæ appeared, or were present, it can be concluded with a reasonable measure of confidence that the adrenal glands are secreting an excess of cortisone, and that their hyperfunction is therefore playing an important part in the pathology of the condition observed."[3]

I once regarded purple striæ distensæ as of major importance for the differential diagnosis of Cushing's syndrome[4]; but I was persuaded that this view cannot be upheld, and Cushing, in the course of correspondence, confirmed this view.



The accompanying illustration is from a (I also possess a lantern-slide in colour) of a young who first came under my care in April, 1941, was 20.

He was a tall, slim, well-built youth, with lobar A few weeks later he developed extensive purple distensæ on his back. In 1945 I encountered him by chance. He had remained in excellent health, complete investigation showed no signs of any condition. The purple striæ had only slightly faded. him under observation until 1947, without any the condition.

Albright and his associates[5] have suggested a general theory of the pathogenesis of Cushing's with the exception of the hyperpiesia. They pos protein wastage in the course of gluconeogenesis. other effects, this is said to cause a thinning of skin with the appearance of striæ and redness. has remained, however, a hypothesis, "and further presuppositions for its support."[6]

London, S.W.3. V. C.

DRUGS IN PARKINSONISM

SIR,—In your leading article of June 17, imme after your comment on the value of adminis mephenesin by mouth, you state:

> "More serious disadvantages of mephenesin are overdose may cause respiratory paralysis for which seems to be no effective antidote."

The extensive literature of work on m ('Myanesin') does not support the implication respiratory paralysis is in fact likely to occur on administration to patients, and certainly not when given by mouth. Indeed in the same issue of LANCET Dr. Armstrong Davison states on p. 1131 "despite large dosage of mephenesin continued several days, it has no obvious adverse effect" and p. 1132 that "the action of mephenesin is such antidote is required."

The British Drug Houses Ltd.,
Graham Street, London, N.1.

FRANK HARTLEY
Scientific Services Direct

Parliament

QUESTION TIME

Distribution of Merit Awards

Mr. CHARLES TAYLOR asked the Minister of Health wh he expected to receive the report of the committee n sitting to deal with merit awards for medical consultants Mr. ANEURIN BEVAN replied: I expect to receive a rep within the next three months.

Mr. TAYLOR: Is it not intolerable that this class of c sultant should be left in such a state of uncertainty for long?—Mr. BEVAN: This is entirely a professional matt It has not been determined by me at all. It would have be even more intolerable if by hasty action the wrong peop had been selected.

S.H.M.O. and Consultant Status

Dr. REGINALD BENNETT asked the Minister to what exte medical officers graded senior hospital medical officer we thereby rendered ineligible for promotion to consulta status.—Mr. BEVAN replied: Not at all. Dr BENNET Would the Minister not agree that the interpolation of th grade between the grade of senior registrar and that consultant looks extraordinarily like a device for obtaini the service of specialists at cut rates? No further reply w given.

B.C.G. Vaccine

Mr. P. F. REMNANT asked the Minister whether he h considered the merits of B.C.G. vaccine as a tuberculo immuniser; and whether he would make it available to t public.—Mr. BEVAN replied: A trial use of the vaccine being made for selected cases, but I am advised that it wou not yet be suitable for indiscriminate use.

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1. McNee, J. W. *Brit. med. J.* Jan. 14, p. 113.
2. Sprague, R. G. Cited by Simpson, S. L. *Postgrad. med. J.* 1950, 26, 201.
3. Simpson, S. L. *Ibid.*
4. Medvei, V. C., Wermer, P. *Med. Klin.* 1934, 30, 992.
5. Albright, F., Parson, W., Bloomberg, E. *J. clin. Endocrin* 1941, 1, 375.
6. Kenyon, A. T. Endocrinology of Neoplastic Diseases. N York, 1947; p. 271.

Notes and News

TRAINING OF LABORATORY TECHNICIANS

EGULATIONS and syllabuses of an intermediate certificate mination for laboratory technicians have been recently pted by the City and Guilds of London Institute. The me, prepared by the institute's advisory committee on ratory technicians' work, which is composed of repre- atives of twenty-five interested bodies, is designed to t the needs of laboratory technicians in schools, technical eges, universities, industrial organisations, and research ciations. It was drawn up on the suggestion of the Com- tee on the Education and Training of Laboratory Tech- ans, which, in 1946, was appointed by the Association of ntific Workers, the Association of University Teachers, the British Association of Chemists.

he scheme aims at providing an all-round training, as l as training special to the particular type of laboratory hich the student is attached, while special consideration iven to the technician who may wish to change in the rse of his training from one type of laboratory to another. course is part-time and occupies a period of three years, uiring attendance for approximately 180 hours per annum. the end of the three years the candidate will be eligible sit for the examinations, which will be held annually in at Britain and Ireland at any place at which the local cation authority or the governing body of any university niversity college accepts responsibility for their conduct, ell as at approved centres in the Commonwealth countries the Crown Colonies. In addition, local college examinations be held at the end of the first and second years. There be special facilities for those external students whose ndance at a scheduled course of instruction has not been sible. The scheme comprises a general syllabus for all didates, including one on general laboratory techniques, kshop practice, and photography and projection, and a ial syllabus for each of the following specialties : physics ; mistry ; biology ; physiology and pharmacology ; anatomy ; nal house ; mechanical engineering ; electrical engineering ; metallurgy.

ACHIEVEMENTS AT CROYDON

roydon Hospital Management Committee is evidently one those which have set themselves to win the sympathy and port of local people ; for it holds an annual public meeting, its report on the past year is well designed to catch the and the imagination. Thus under " additional services " find succinctly listed some of the improvements lately de. These include extended arrangements for occupational rapy and for showing films, the opening of a shop for ients at one of the hospitals, and the inauguration in the e hospital of an internal bank. But no attempt is made to the pill. Mr. D. A. Lawrence, the chairman, writes : ly committee deeply deplore . . . that they were not wed to continue the prenursing training scheme organised conjunction with Croydon Education Committee. The ult of this embargo has meant the loss of a considerable nber of potential nurses for the Croydon group."

iversity of Cambridge

n June 8 the honorary degree of D.SC. was conferred on W. S. Middleton, F.R.C.P., president of the American lege of Physicians and dean of the medical school of the iversity of Wisconsin.

n June 10 the degree of M.D. was conferred on A. G. E. rse and Ashton Miller.

iversity of London

he title of professor of pharmacology has been conferred Dr. J. M. Robson in respect of the post held by him at y's Hospital.

Dr. E [illegible] in pharmacology Gu [illegible] of the University Leec [illegible] use-appointments the Leeds General Infirmary and at the Leeds Hospital for omen before he became an assistant in the department of surgical earch and later in the department of physiology at Leeds. In 0 he was appointed assistant at the Institute of Animal Genetics Edinburgh, and when in 1932 he was awarded a Beit fellowship, continued to work there and later at the department of pharma- ogy of the University of Edinburgh, where in 1936 he was ointed lecturer. He is the author of *Recent Advances in Sex Reproductive Physiology*.

Mr. George Brownlee, D.SC., has been appointed to the [illegible] King's College from Oct. 1

University of Sheffield

Dr. E. J. Clegg, Dr. J. A. Howarth, and Dr. F. R. Johnson have been appointed demonstrators in anatomy. Dr. H. F. West has been appointed part-time clinical teacher within the department of medicine, and Mr. J. G. Napier part-time tutor in obstetrics and gynæcology.

University of Edinburgh

Dr. David Whitteridge has been appointed to the chair of physiology in succession to the late Prof. W. H. Newton.

Dr. Whitteridge, who is 38, received his medical education at the University of Oxford and King's College Hospital, London. He graduated B.M. in 1937, and the following year he was appointed a demonstrator in physiology at Oxford, and he is now a fellow and lecturer of Magdalen College. His work as a Beit fellow and as a Schorstein fellow has dealt mainly with the physiology of the nervous system. In 1946 he took his D.M. He is senior secretary of the Physiological Society. He was also one of the Oxford team which carried out experiments for the Ministry of Home Security on the physiological effects of blast.

The Wellcome medal and prize (£25) in the history of medicine for 1950 has been awarded to Dr. H. P. Tait for his essay on the Early History of Pædiatrics. The subject chosen for 1951 is Hippocrates in the Light of Modern Medicine. Further particulars may be had from the dean of the faculty of medicine.

University of the West Indies

Dr. E. K. Cruickshank, lecturer in medicine at the University of Aberdeen, has been appointed to the chair of medicine at the new university at Kingston, Jamaica.

Dr. Cruickshank, who is the son of Prof. John Cruickshank was educated at Aberdeen Grammar School and the University of Aberdeen, where he graduated M.B. with honours in 1937. He spent a year as a research fellow in surgery at Harvard University before he was appointed to the department of medicine at Aberdeen as assistant. In 1940 he joined the R.A.M.C. and he was for three years a prisoner-of-war in Japanese hands. For his work before and during captivity he was twice mentioned in despatches. In 1946 he read a paper on his experiences to the Nutrition Society and he described in our columns painful feet syndrome. He took his M.D. with honours in 1948 and his M.R.C.P. the same year.

Beit Fellowships for Medical Research

The following awards have been made :

FOURTH YEAR FELLOWSHIP

G. WEBER, PH.D. To study the dissociation of insulin : at the school of biochemistry, University of Cambridge.

JUNIOR FELLOWSHIPS

J. CROSSLAND, M.A. Oxfd. To study the nature and functions of humoral factors in nervous transmission in the brain : at the neuropsychiatric research centre, Whitchurch Hospital, Cardiff.

JOAN E. KEILIN, M.B. Camb. To study the link between the hæm and protein in hæmoglobin : at the school of biochemistry, University of Cambridge.

R. J. SALTON, Bac. Agric. Sc. Sydney. To study the chemical and immunological nature of the outer envelopes of bacterial cells : at the department of colloid science, University of Cambridge.

Faculty of Homœopathy

At a meeting of the faculty to be held at the Royal London Homœopathic Hospital, Great Ormond Street, W.C.1, on Thursday, June 29, at 5 P.M., Dr. G. Pampligione (Bologna) will give an address on the Clinical Uses of Electro-encephalography.

Conference on Preventive Medicine

The South Wales branch of the Socialist Medical Association is holding a conference on preventive medicine at the Y.M.C.A. Hostel, Rhoose, near Barry, on Sunday, July 2. The speakers will include Dr. J. B. Atkins, Dr. T. Francis Jarman, Dr. A. S. Jarman, and Dr. S. Leff. Tickets may be had from Mr. L. R. Fletcher, National Council of Labour Colleges, 321, Cowbridge Road, Cardiff.

Salaries for Senior Nursing Staff

The Nurses and Midwives Whitley Council have announced that revised salary scales have been agreed for senior nursing staff in general and fever hospitals and sanatoria. The new scales are part of the general review of nurses' salaries which has been proceeding for some time and they have retrospective effect from Feb. 1, 1949. Details will be published as soon as possible. The new scales cover all senior staff in these hospitals except tutorial grades, which are now being considered by the council. The scales for senior staff in mental and maternity hospitals are also under consideration.

Association of Clinical Pathologists

The summer meeting of the association will be held on July 20, 21, and 22 in the medical school of the University that all expressed in effect the spirit of his own contribution to the symposium:

> "It was high time that Dr. Snow was dragged into the limelight, so that he may feel the esteem in which those best qualified to judge his work hold him, and a wider public may learn something of what society owes him for the great part he has played in the campaign against venereal diseases and the traffic in women and children. Just before I first met Dr. Snow, at the birth of the League of Red Cross Societies in Cannes in 1919, I heard one of the American leaders speak of him as a man who, in the long run, achieved his objective, whatever the obstacles, without fuss and often without anyone being conscious of the solvent process that had been at work on the opposition. I think events have shown that judgment to have been pretty correct. Snow and I, with such distinguished men as Roux and Ducrey, were members of the V.D. committee of that Red Cross conference at Cannes, and it ended in the two of us *drafting the resolutions.* At least Snow did the work, and I, knowing that he would get his own way about them eventually, meekly agreed. It must be very gratifying to him and to you all, his associates in the fight you have waged so long against V.D. in America, to see its importance being recognised at long last by the general public."

In the years since then nothing has occurred to alter those sentiments. It may be added that Dr. Edward L. Keyes, in presenting the plaque, said: "I have been asked, my dear Dr. Snow, to present this plaque to the most modest and the most diplomatic man I know."

Dr. Snow is survived by his widow and two sons.

L. W. H.

After the presentation to Dr. Snow in 1937, the American Social Hygiene Association set up the William Freeman Snow Award, to be made from time to time "for distinguished service to humanity" in the field of social hygiene. The recipients have included Mrs. Neville-Rolfe, Colonel L. W. Harrison, F.R.C.P.E., and Sir Sidney Harris.

EDWARD BURTON GUNSON

M.D. EDIN., F.R.C.P.

Dr. E. B. Gunson, who was for many years in consulting practice in Auckland, died in Melbourne on June 4; at the age of 67. He was born in Auckland of English parents and he came to Britain for his medical education. After he graduated at Edinburgh in 1910 he held house-appointments at the Children's Hospital, Shadwell, and the West End Hospital for Nervous Diseases. When war broke out in 1914 he was research assistant in the heart department of the London Hospital, and he spent the next four years serving with the R.A.M.C. in the Middle East.

In 1919 he returned to Auckland, where he was for a time physician to the Auckland Hospital. He practised as a consultant in general medicine, but he was especially interested in cardiology. A past-president of the Auckland division of the British Medical Association, he also served from 1929 to 1938 as a member of the Auckland hospital board. A forceful public speaker, he held office on many public bodies, including the Society of Arts, the Open-Air Schools League, and the Crusade for Social Justice. Latterly he had served under the Commonwealth government in the Northern Territory.

Dr. Gunson is survived by his wife and daughter. His brother, Sir James Gunson, was a former mayor of Auckland.

ARTHUR DE WINTON SNOWDEN

C.B.E., M.A., M.D. CAMB.

Dr. A. de Winton Snowden, who died on May 20 in Bournemouth, at the age of 77, was the son of Prebendary J. H. Snowden, vicar of St. Paul's, Hammersmith. He was educated at St. Paul's School and Christ's College, Cambridge, where he was captain of his college boat-club. He rowed in the trial eights, but he just missed rowing in the Oxford and Cambridge boat-race.

Soon after qualifying from St. George's Hospital in 1897 he developed symptoms of tuberculosis, and in 1898 he went out to South Africa, as resident medical officer at Grahamstown Hospital, Cape Colony. For his services during the South African war he was awarded the Queen's Medal with four bars. After his return to England, symptoms of his disease recurred, and he went to Nordrach upon Mendip, first as a and afterwards as medical officer. In 1907 he staff at Mundesley, where he worked in close cc with the late Vere Pearson. In the 1914–18 war served as major *in charge of the* medical section of Red Cross Hospital *at Netley*, and for his services was appointed C.B.E. After the war he purchased, developed, the *Linford Sanatorium* at Ringwood the New Forest, where he carried on a most useful successful *practice.* On *his retirement* he settled Bournemouth. A friend adds: "Snowden will be remembered by *a large* number of appreciative grateful patients, and sadly missed by a im number of old friends. These regrets will be shared any young children *of his acquaintance.* With them was always at his best."

He married Miss E. C. *Drummond*, who died in the daughter of Captain Cecil Drummond, of Enderby Leicester. His only son, born in 1912, survives him.

KENNETH McALPINE

M.B. GLASG.

Dr. Kenneth McAlpine, senior school medical for Leicester, died in hospital on June 11. He grad at Glasgow in 1917, and served for a time with R.A.M.C. After demobilisation he held appointm the school medical services at Birmingham and on-Trent before he joined the staff of the L education authority in 1924 as assistant school officer. In 1946 he became senior school medical and he had to handle the many fluctuating of the post-war years.

A. J. S. writes: "Dr. McAlpine was an able efficient administrator dealing with the health well-being of the city's child population. To thousands of people in the city, as well as to his friends, he was much more than that. His nice sense punctilio in administrative affairs could never mask kindly, generous *nature* of the man himself. His fessional experience among children must have unique; his personal dealings with each one of young and old, was of a texture not found in books stemmed from his deep love of children and his own charm. By those of us who worked with him and his supervision—clerical staffs, nurses, professional leagues—Dr. McAlpine will be remembered with and lasting affection. To all who sought his advice any time, he was an immediate guide, counsellor friend. But beyond those, there must be thousands Leicester who, meeting him as children and now gr up, would wish to pay generous tribute to a fine doct and a most lovable personality."

Births, Marriages, and Deaths

BIRTHS

CRAWFORD.—On June 13, in Liverpool, the wife of Dr. F. J. *Crawford—a son.*

GOLBERG.—On June 16, in London, the wife of Dr. Boris Golbe —*a* son.

HARKNESS.—On June 13, in London, the wife of Dr. R. D. —*a daughter.*

LESTER.—On June 16, at Solihull, Birmingham, the wife of M Stephen Lester, F.R.C.S.E.—a son.

MCLAREN.—On June 16, in Udayagiri, India, the wife of Dr. D. McLaren—a son.

ORMROD.—On June 12, at Boney Hay, Walsall, the wife of Peter Ormrod—a son.

PINKERTON.—On June 9, at Worcester, the wife of Dr. J. R. Pinkerton—a son.

PITT.—On June 13, at Watford, the wife of Dr. Peter Pitt daughter.

RAMSAY.—On June 3, in London, the wife of Mr. Gordon Ram F.R.C.S.—a daughter.

THOMPSON.—On June 13, in London, the wife of Mr. Vernon Thompson, F.R.C.S.—a daughter.

WARREN.—On June 9, at Arundel, the wife of Dr. J. N. Wa —a son.

WINTER.—On May 31, in Bristol, the wife of Dr. George Win —a son.

WOLFSON.—On May 26, in Birmingham, the wife of Dr. L. Wolfson—a daughter.

WOOTTON.—On June 3, in London, the wife of Dr. I. D. P. Wootto —*a son.*

DEATHS

MCKENDRICK.—On June 5, John Wellesley McKendrick, M.B. Glas aged 35.

PHILLIPS.—On June 9, at Pinner, Albert Edward Phillips, M Dubl., surgeon commander, R.N. *retd.*

West London Medico-Chirurgical Society

The annual general meeting of the society will be held on Friday, June 30, at 6 P.M., at the West London Hospital, Hammersmith, London, W.6

Royal Society

On Thursday, June 29, at 4.30 P.M., at Burlington House, Piccadilly, London, W.1, Prof. J. Z. Young, F.R.S., will deliver the Ferrier lecture on Growth and Plasticity in the Nervous System.

British Spas and Health Resorts

On Thursday, June 29, at 4.30 P.M., a meeting of medical and non-medical men and women is to be held at 11, Chandos Street, London, W.1, to consider setting up an association for the study and development of British Spas and health resorts. Dr. A. P. Cawadias is the acting hon. secretary, and he may be addressed at 6A, Bourdon Street, W.1.

Memorial to Professor McMurray

A fund is being raised to commemorate "the services of the late Prof. T. P. McMurray who by his skill as a surgeon and as a teacher enhanced a great tradition." It is proposed to offer the fund to the University of Liverpool for the establishment of a prize for clinical work in orthopædic surgery, to be associated with his name. Contributions may be sent to Mr. Bryan McFarland, Department of Orthopædic Surgery, the University, Liverpool.

Kathleen Schlesinger Fellowship

The Medical Research Council invite applications for this fellowship from research-workers who wish to investigate the mechanisms underlying degenerative processes affecting the brain. The fellowship will ordinarily be tenable whole-time at the National Hospital for Diseases of the Nervous System, Queen Square, London, for one year in the first instance, renewable annually up to a maximum of three years in all. The stipend will be from £700 to £1000 per annum. Applications should reach the secretary of the Council, 38, Old Queen Street, S.W.1, not later than July 15.

Free Hospital Library Service to End

The *Times* (June 14) reports that the Order of St. John and the British Red Cross have decided to discontinue the free library service which they have offered to all hospitals since the end of the first world war. After consultation with the Ministry of Health it has been decided to ask hospital management committees, from June 30, for a contribution of about 1*d.* for each occupied bed. The decision does not apply to Forces' hospitals, at home or overseas, or to the Ministry of Pensions hospitals. Disabled ex-Service men and women in their own homes will also continue to receive free library facilities.

Convalescent Home for London Hospital Patients

The Marie Celeste Samaritan Society of the London Hospital has bought a large house at Woodford for the accommodation of patients from the London Hospital. The society, which does not come under the jurisdiction of the National Health Service, has redecorated and equipped the house. This home can now take 17 patients who no longer require hospital treatment but are not yet fit to go home or who may have no suitable home. The hospital allows any patient to return to the wards who is found to need further treatment. The house has been open only a few weeks but it has already proved its worth by setting free beds at the hospital. The North-East Metropolitan Regional Hospital Board has agreed to make a grant towards the cost of patients who are entitled to treatment under the National Health Service. The cost for patients who are not entitled to free treatment by the National Health Service will be borne by the Samaritan Society. The home has been named the Hora Home in memory of Mr. James Hora, the husband of Marie Celeste, who was a benefactor of the society.

International Congress of Ophthalmology

In connexion with this congress which is to take place in London from July 17 to 22, an exhibition of industrial and social ophthalmology is to be held at the London School of Hygiene, Keppel Street, W.C.1. The exhibition, which deals with the prevention of accidents and the promotion of visual health and safety, will be open on Friday, July 21 (9.30 A.M. to 6 P.M.), and Saturday, July 22 (9.30 A.M. to 1 P.M.).

Ministry of Health Appointment

Mr. F. L. Edwards has been appointed to the p under-secretary for finance and accountant-general i Ministry of Health, in succession to Mr. H. H. George, retiring on July 5.

Claims to Sickness Benefit

In England and Wales new claims to sickness benefit the National Assistance Act during the weeks ended 9, 16, 23, and 30 were as follows: 115,200, 111,500, 1 101,600, and 79,400 during May the weekly a was 100,500. The weekly averages in months from 1949, to April of this year were: 97,700, 83,500, 88,800, 100,900, 119,100, 136,200, 96,700, 154,900, 17 181,000, and 116,000.

The next television programme in the series *Matters of Life and Death* is one on Peptic Ulcers on M June 26, from 8.45 P.M. to 9.30 P.M.

Appointments

COHEN, E. LIPMAN, M.B. Camb.: consultant dermatolo Margaret's Hospital, Epping.
HEADON, M. F., M.B. N.U.I., B.SC.: appointed factory Tilbury district.
KEATES, G. H. W., M.B. Lond., D.A.: consultant ana County Hospital, Huntingdon.
MARSHALL, J. K., D.M. Oxfd, D.P.M.: consultant psych St. Audry's Mental Hospital, Woodbridge.
PARK, T. M., M.B. Glasg.: appointed factory doctor, Ca district.
REYNARD, A. L., M.R.C.S., D.A.: senior registrar in ana Norfolk and Norwich Hospital.

Colonial Medical Service:

GILCHRIST, K. J., M.B. Lond., F.R.C.S.: surgeon sp Nigeria.
HOWELL, A. T., M.B. Camb., D.T.M.: director of medical Tanganyika.
NEVILL, LESLEY, M.D. Edin., D.T.M.: M.O., Kenya.
NICHOLAS, G. J., M.R.C.S.: government M.O., British Gu
VAUGHAN, C. J. R., M.R.C.S.: M.O., Somaliland Protecto
YOUNG, W. B., B.M. Oxfd, D.T.M., D.M.R.E.: specialist rad *Singapore.*

Diary of the Week

JUNE 25 TO JULY 1

Monday, 26th

INSTITUTE OF NEUROLOGY, National Hospital, Queen Square,
5 P.M. Prof. H. J. Seddon: Pott's Paraplegia.
MEDICAL RESEARCH COUNCIL
5.15 P.M. (London School of Hygiene, Keppel Street, W
Prof. A. C. Burton, PH.D. (University of Western Ont
Transfer of Heat and of Vapour through Clothi

Tuesday, 27th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.
5 P.M. Dr. Arthur W. Allen: Current Trends in the Su
Management of Lesions of the Colon. (Hunterian le
UNIVERSITY OF LONDON
5.30 P.M. (London School of Hygiene.) Prof. C. J. W
(University of Minnesota): Some Recent Studi
Porphyrin Metabolism and Porphyria.
INSTITUTE OF OPHTHALMOLOGY, Judd Street, W.C.1
5.30 P.M. Mr. H. C. Weston: Standards of Lighting and V
Hygiene.
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. R. M. B. MacKenna: Matters Relating to Oc
tional Dermatoses.
PADDINGTON MEDICAL SOCIETY
8.45 P.M. (St. Mary's Hospital, W.2.) Dr. L. Zeitlin: S
Problems of General Practice.

Wednesday, 28th

INSTITUTE OF DERMATOLOGY
5 P.M. Dr. J. O. Oliver: Biochemistry.
MEDICAL RESEARCH COUNCIL
5.15 P.M. Professor Burton: Science of Field Testing.

Thursday, 29th

INSTITUTE OF DERMATOLOGY
5 P.M. Dr. A. D. Porter: Vitamin-A Deficiency and the
INSTITUTE OF NEUROLOGY
5 P.M. Dr. Ludo van Bogaert (Antwerp): Neurosur
Aspects of Vascular Diseases.
INSTITUTE OF OPHTHALMOLOGY
5.30 P.M. Prof. David Slome: Referred Pain.
ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, S.W.1
4.30 P.M. Dr. Partridge: Psychiatry demonstration.

Friday, 30th

UNIVERSITY OF EDINBURGH
2.30 P.M. (University New Buildings, Teviot Place.) Dr. Ar
W. Allen: Venous Thrombosis and Pulmonary Embol
(Macarthur
MAIDA VALE HOSPIT W.9
P.M. Dr. Helen rological demonstrat